TECHNICAL REPORT

Sea ice reports for the Antarctic shipping season 2014 - 2015

Prepared by Dr Jan L Lieser, Dr Robert A Massom, Dr Petra Heil
Antarctic Climate & Ecosystems Cooperative Research Centre 2015

ACE CRC
ANTARCTIC CLIMATE & ECOSYSTEMS CRC

Sea ice reports for the Antarctic shipping season 2014–2015

Prepared by: Dr Jan L Lieser (Jan.Lieser@acecrc.org.au), Dr Robert A Massom (Rob.Massom@acecrc.org.au) & Dr Petra Heil (Petra.Heil@acecrc.org.au)
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The ACE CRC is established and supported under the Australian Government's Business Cooperative Research Centres Program.

The ACE CRC is a collaboration between the Australian Antarctic Division, CSIRO, University of Tasmania, Australian Government Department of the Environment, Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (Germany), National Institute of Water and Atmospheric Research Ltd (NZ), Australian Bureau of Meteorology, and a consortium of other participants.

This research was also supported under Australian Research Council's Special Research Initiative for Antarctic Gateway Partnership (Project ID SR140300001).

Executive summary:

The sea ice reports compiled in this document are weekly reports on sea-ice conditions for East Antarctica, including sub-weekly updates. They were prepared to support ship operations in East Antarctica during the 2014/2015 shipping season. These reports were primarily used to guide the Australian Antarctic program, but were partly provided to other Antarctic operators. In particular, we assisted Chinese National Antarctic Research Expeditions (RSV *Xue Long*), the Royal New Zealand Navy, the New Zealand National Institute of Water and Atmospheric Research (RV *Tangaroa* Voyage 2), the Australian Marine National Facility (RV *Investigator*) and the US Antarctic Program (RVIB *Nathaniel B. Palmer* Voyage 15-03). During the season, these reports informed eight voyages, all of which returned within schedule or early due to navigational choices made by the ships' captains based on sea-ice reports.

Throughout the season, the focus of individual reports shifts with the main purpose of specific voyages of the Australian Antarctic research and supply vessel *Aurora Australis*. The Antarctic voyages of RSV *Aurora Australis* of the 2014/2015 season were:

No.	Leave port	Main Purpose	Return
V1	19/10/2014	Davis resupply, refuel, summer personnel deployment and changeover	23/11/2014
V2	05/12/2014	Casey Station resupply and refuel; Totten Glacier & Mertz Glacier Marine Science	25/01/2015
V3	28/01/2015	Mawson resupply, refuel, and changeover; Marine Science; Davis essential cargo and summer personnel retrieval	03/04/2015
V4	06/04/2015	Macquarie Island resupply and personnel changeover	21/04/2015

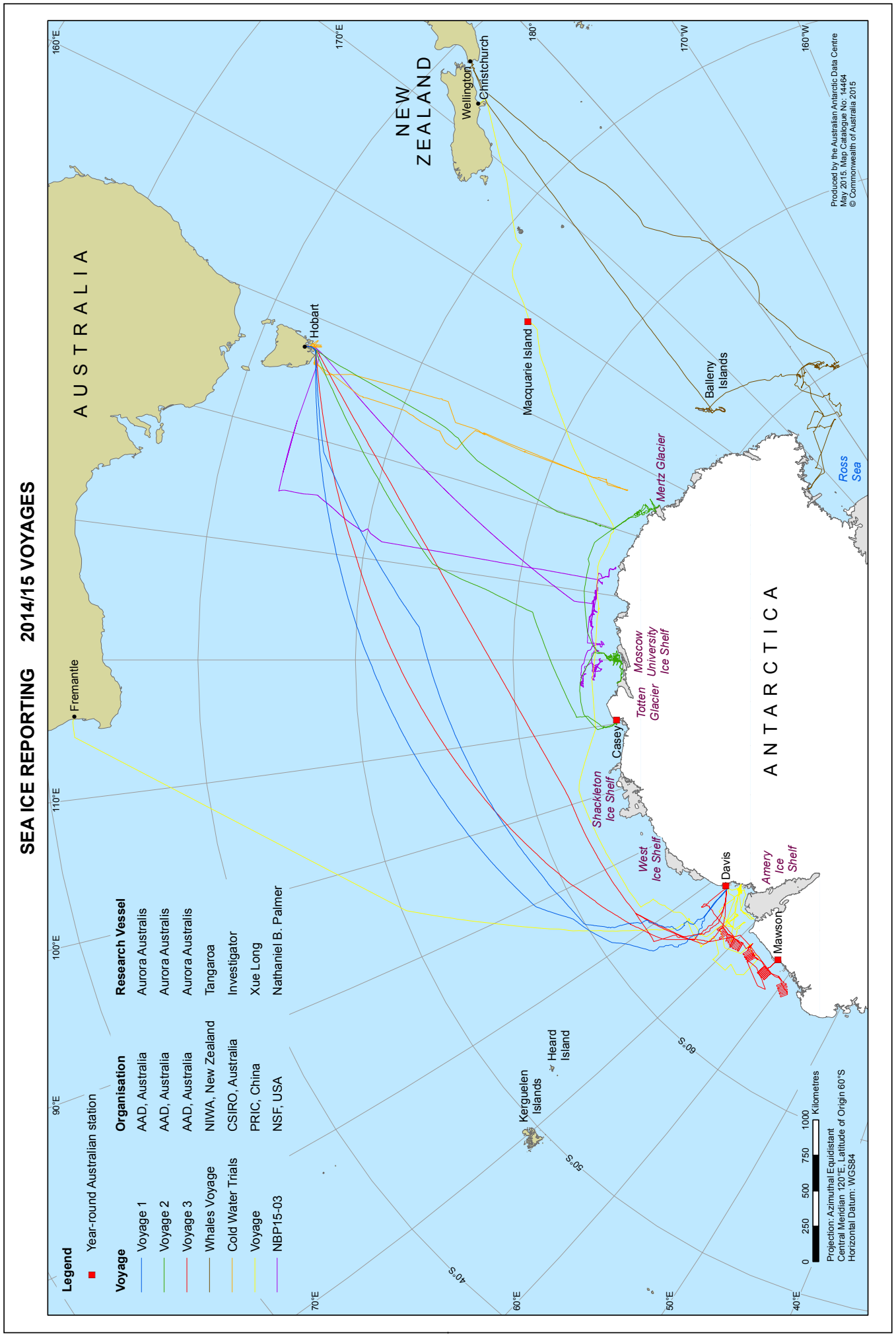
The 2014 winter season was following from record-breaking winters of 2012 and 2013. In 2014, the circum-Antarctic daily maximum sea-ice extent of 20.41×10^6 km^2 exceeded the record of 2013 (19.58×10^6 km^2), which itself exceeded the 2012 record of 19.48×10^6 km^2. In 2014, a new record sea-ice area of 16.21×10^6 km^2 was also recorded. While these overall, large-scale sea-ice figures are masking contrasting regional differences, in 2014 the slight increasing trend in Antarctic sea ice continued (since reliable satellite observations became available in1979).

About this report

This compilation report is the fourth volume of sea ice reports prepared by the Sea Ice Group of the Antarctic Climate & Ecosystems Cooperative Research Centre and Australian Antarctic Division. The first weekly report of this volume is the 15th report for the year 2014; that is the first report after the 2013/2014 shipping season ceased.
Previous reports are available from the Manager Communications, Antarctic Climate & Ecosystems Cooperative Research Centre (see inside cover for details).

About the authors

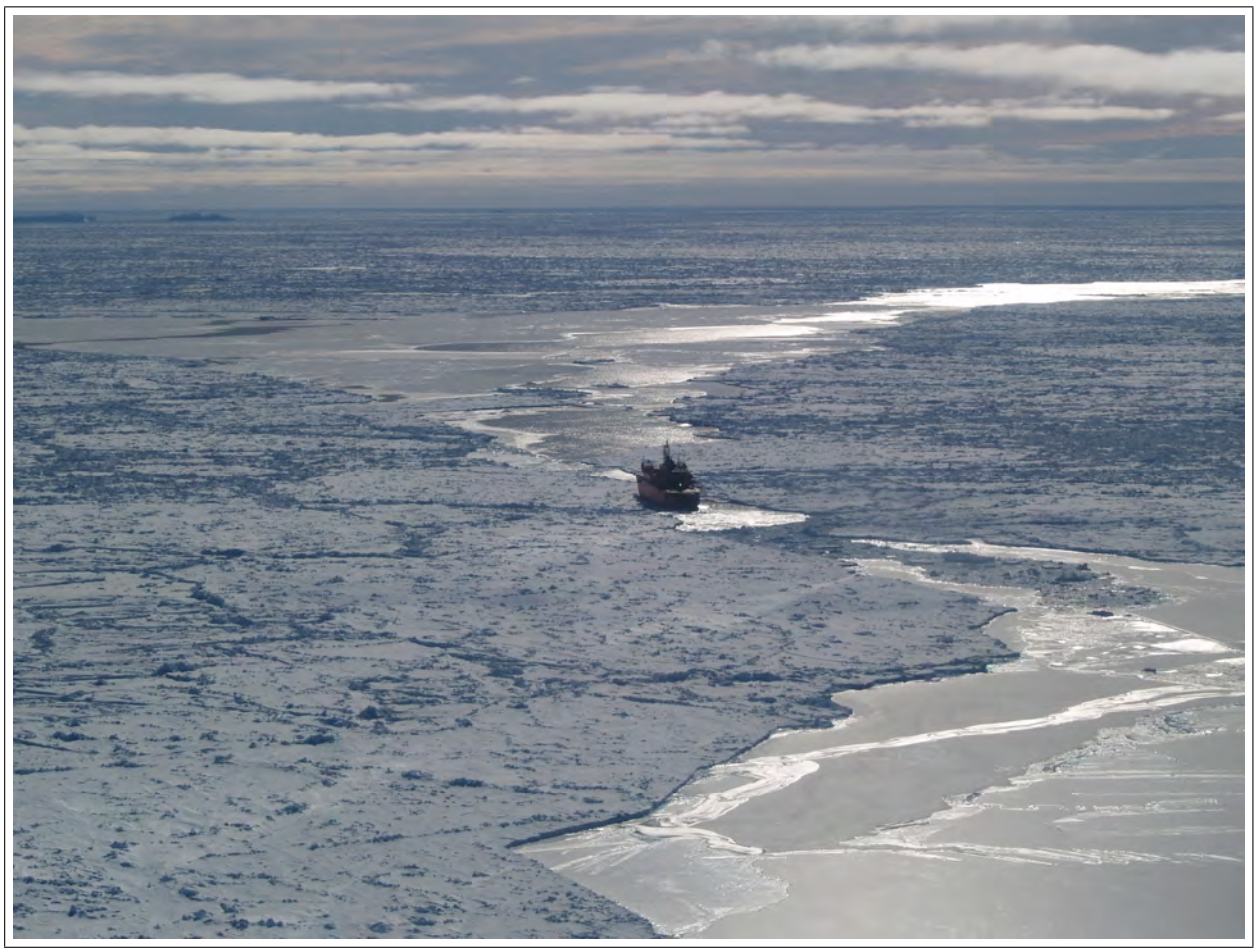
The Sea Ice Group of the Antarctic Climate & Ecosystems Cooperative Research Centre and Australian Antarctic Division consists of research scientists from a broad spectrum of disciplines, including remote sensing, meteorology, oceanography and ecology. Short biographies of the authors of this report can be found on the inside back cover.


SEA ICE REPORTING 2014/15 VOYAGES
Legend
Year-round Australian station
Voyage
Organisation
Research Vessel
Voyage 1
AAD, Australia
Aurora Australis
Voyage 2
AAD, Australia
Aurora Australis
Voyage 3
AAD, Australia
Aurora Australis
Whales Voyage
NIWA, New Zealand
Tangaroa
Cold Water Trials
CSIRO, Australia
Investigator
Voyage
PRIC, China
Xue Long
NBP15-03
NSF, USA
Nathaniel B. Palmer
AUSTRALIA
NEW ZEALAND
ANTARCTICA
Fremantle
Hobart
Wellington
Christchurch
Macquarie Island
Balleny Islands
Casey
Davis
Mawson
Kerguelen Islands
Heard Island
Shackleton Ice Shelf
West Ice Shelf
Totten Glacier
Moscow University Ice Shelf
Amery Ice Shelf
Mertz Glacier
Ross Sea
Produced by the Australian Antarctic Data Centre
May 2015. Map Catalogue No: 14464
© Commonwealth of Australia 2015
Projection: Azimuthal Equidistant
Central Meridian 120°E, Latitude of Origin 60°S
Horizontal Datum: WGS84
0 250 500 750 1000 Kilometres

Contents

Frequently used acronyms

AAD	Australian Antarctic Division
ABOS	Australian Bluewater Observing System
ACE CRC	Antarctic Climate & Ecosystems Cooperative Research Centre (AUS)
AMSR-2 [1]	Advanced Microwave Scanning Radiometer 2
AVHRR	Advanced Very High Resolution Radiometer
BoM	Bureau of Meteorology (AUS)
ESA	European Space Agency
GMRT	Global Multi-Resolution Topography
IBCSO	International Bathymetric Chart of the Southern Ocean
IR	Infrared spectrum
JAXA	Japan Aerospace Exploration Agency
MODIS [2]	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration (USA)
NSIDC	National Snow and Ice Data Center (USA)
OLI	Operational Land Imager (scientific payload on Landsat-8 satellite)
SAR	Synthetic Aperture RADAR
TIR	Thermal Infrared spectrum
TSX	TerraSAR-X satellite, operated by German Aerospace Center (DLR)
USGS	United States Geological Survey (USA)
VNAA	Call sign: Research & Supply Vessel *Aurora Australis*
WBP3210	Call sign: Research/Survey Vessel Icebreaker *Nathaniel B Palmer*



[1] The AMSR-2 instrument is onboard the GCOM-W1 satellite, which is operated by JAXA.
[2] The MODIS instrument is operational on two satellites: AQUA and TERRA, both operated by NASA.

Sea Ice Report #15/2014

by the AAD/ACE CRC Sea Ice Group

22/05/2014

Figure 1 provides a circum-Antarctic view of sea ice concentration for 20 May 2014, plus the median sea ice extent for May based on a 30-year record (1981-2010) as a red line. On a hemispheric scale, the overall sea ice extent is above the median, but as the figure clearly shows there are stark contrasting regional differences.

For East Antarctica between 45° E and 160° E, the sea ice edge of the daily snapshot from 20 May is generally close to the long-term median for the month of May.

With best regards,

Jan.

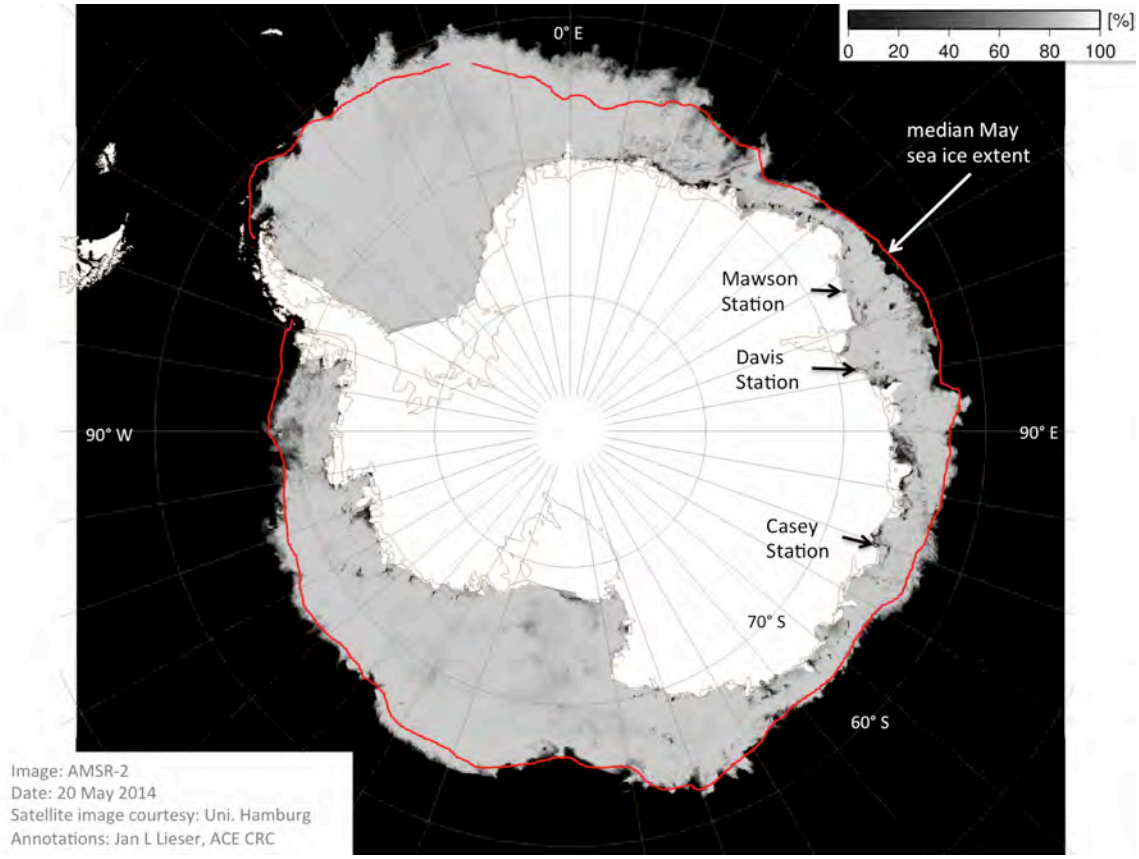


Figure 1: AMSR-2 image, acquired 20/05/2014 and provided by Universität Hamburg. Median May sea-ice extent provided by NSIDC.

Sea Ice Report #16/2014

by the AAD/ACE CRC Sea Ice Group

20/06/2014

Figure 1 provides a circum-Antarctic view of sea-ice concentration for 18 June 2014, plus the median sea-ice extent for June based on a 30-year record (1981-2010) as a red line. On a hemispheric scale, the overall sea-ice extent is above the median by about 1.1 million square kilometres (or 12%), but the figure clearly shows contrasting regional differences.

For East Antarctica between 45° E and 95° E, the sea-ice edge of the daily snapshot from 18 June is mostly south of the median, while between 95° E and 140° E the sea-ice edge is mostly north of the median. In this eastern East Antarctic sector, the northward extension is most pronounced north of the Moscow University Ice Shelf, where the sea-ice edge is about 120 nautical miles north of the median (with the exception of an about 10 nautical miles wide distinct indentation at about 122° E).

With best regards,

Jan.

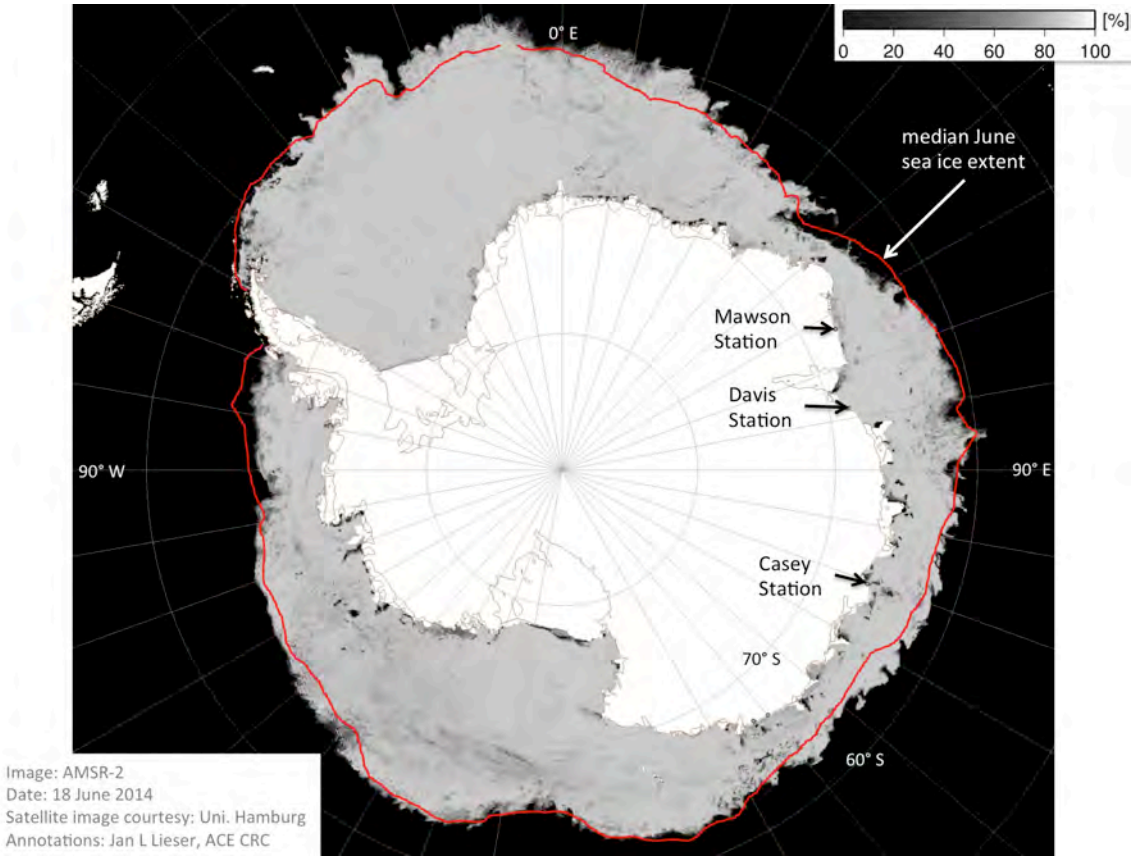


Figure 1: AMSR-2 image, acquired 18/06/2014 and provided by Universität Hamburg. Median June sea-ice extent provided by NSIDC.

Sea Ice Report #16a/2014

by the AAD/ACE CRC Sea Ice Group

09/07/2014

This report provides a brief update on fast ice and icebergs off the Mawson Coast.

- **Mawson Station**
  Figures 1 and 2 show images taken by the Advanced Very High Resolution Radiometer's (AVHRR) infra-red channels (IR). The infra-red channels provide information on sea ice during darkness when no cloud cover is present. Darker grey represents warmer temperatures and lighter grey represents cooler temperatures. Between 55° E and Cape Darnley in the east, the fast ice edge is indicated by the red line.

  The fast ice edge has not changed significantly since our last report, #14c/2014, from 08/04/14.

  We note that the big tabular iceberg B15T, which was in early April located between 56° 30' E and 58° E, just north of 66° S, has moved westward and away from the area. Three smaller, large tabular bergs, namely B09F, B16 and C28B are transiting relatively fast through the region from east to west. During the past four weeks, these three bergs have travelled about five degrees in longitude roughly in the same triangular formation as they can be seen in Figure 1. As of 08/07/14, iceberg C28B can be seen to the west of the so-called north-west polynya, off Mawson Station. The other two bergs of the formation are obscured by a large cloud band.

With best regards,

Jan.

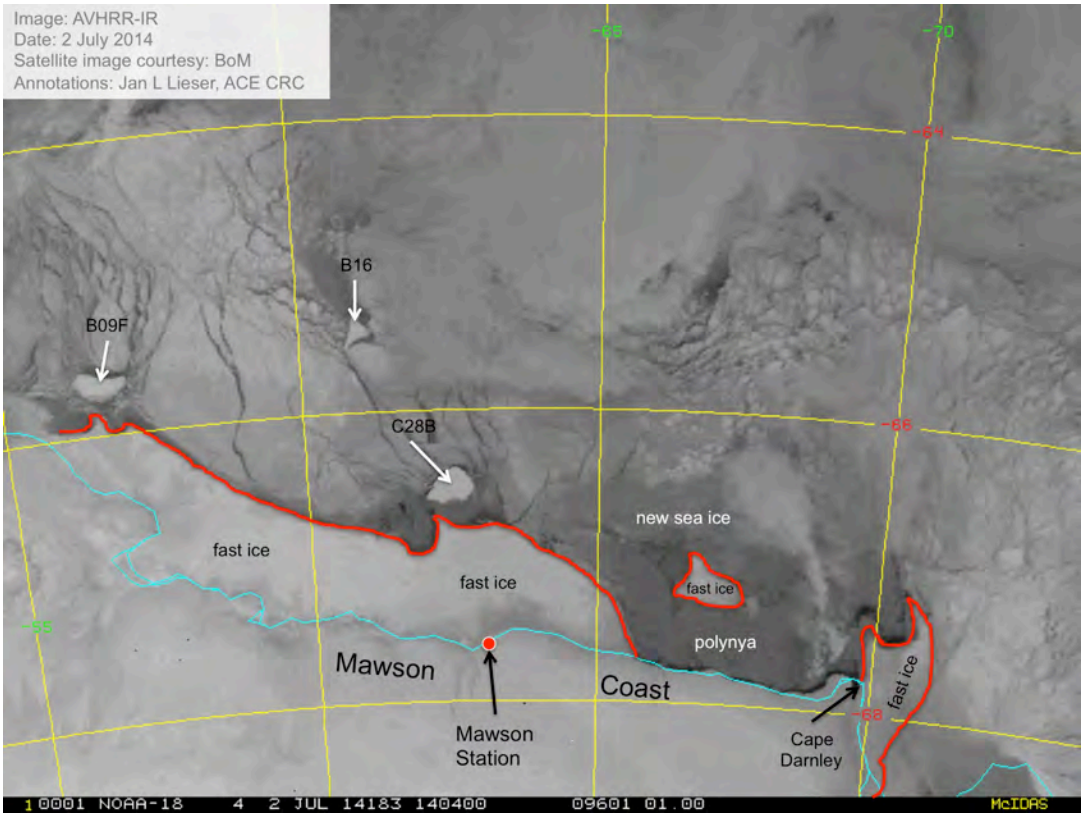


Figure 1: AVHRR-IR image, acquired 02/07/2014 and provided by Bureau of Meteorology.

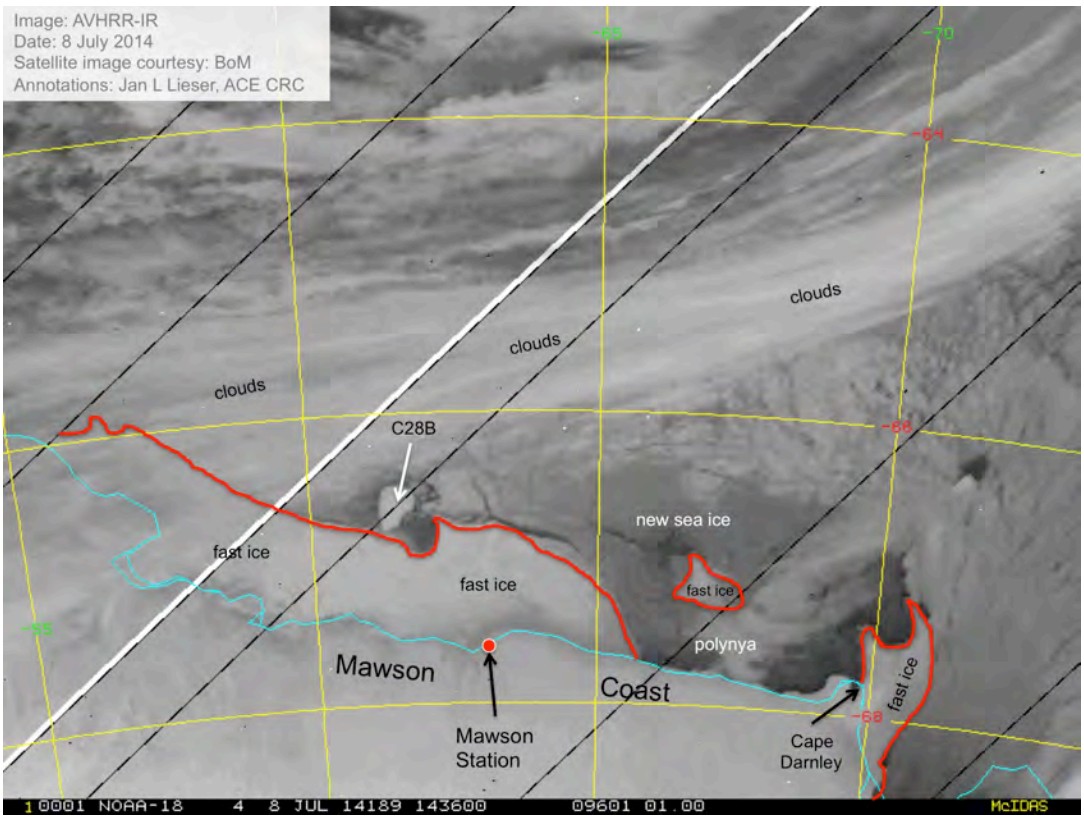


Figure 2: AVHRR-IR image, acquired 08/07/2014 and provided by Bureau of Meteorology.

Sea Ice Report #17/2014

by the AAD/ACE CRC Sea Ice Group

17/07/2014

For the past two-and-a-half months, the overall sea-ice extent in the Antarctic was tracking well above the 30-year average (and outside its standard deviation), breaking records since satellite observations began on a daily basis. This trend has slowed during the past week, with the current extent tracking just below the record maximum extent of 2010.

There are still starkly contrasting regional differences around Antarctica, but for the East Antarctic the sea-ice extent is currently at or slightly below the long-term median extent, while a series of low pressure systems are affecting the sea-ice edge, and therefore the extent. Cloud patterns associated with these lows are obscuring the view on the sea ice in the visible and infra-red spectrum, but some selected images below allow for a general assessment of certain areas.

- **Mawson Station**
  Figure 1 shows the Mawson Coast and the sea ice region north of it almost entirely cloud covered. But we identify iceberg C28B crossing 60° E westward. It appears to be tumbling along the fast ice edge possibly touching it every now and then, which provides some angular momentum.

- **Sabrina Coast**
  The Sabrina Coast, between the Totten Glacier and the Moscow University Ice Shelf, is shown in Figure 2. The polynya west of the Dalton Iceberg Tongue appears to be active and the six moorings in the region are experiencing constantly changing sea ice cover.

- **Commonwealth Bay**
  The scene of Commonwealth Bay and the Mertz Glacier region shown in Figure 3 is obscured by clouds only in the northwest corner. Iceberg B09B is identified and the polynya to the north of it appears active, as do the polynyas northwest of Dumont d'Urville Station and off the Mertz Glacier. The location of the Australian Bluewater Observing System (ABOS) mooring is indicated by the red dot. This location is currently under fast ice, about 3.5 nautical miles south of the fast ice edge.

With best regards,

Jan.

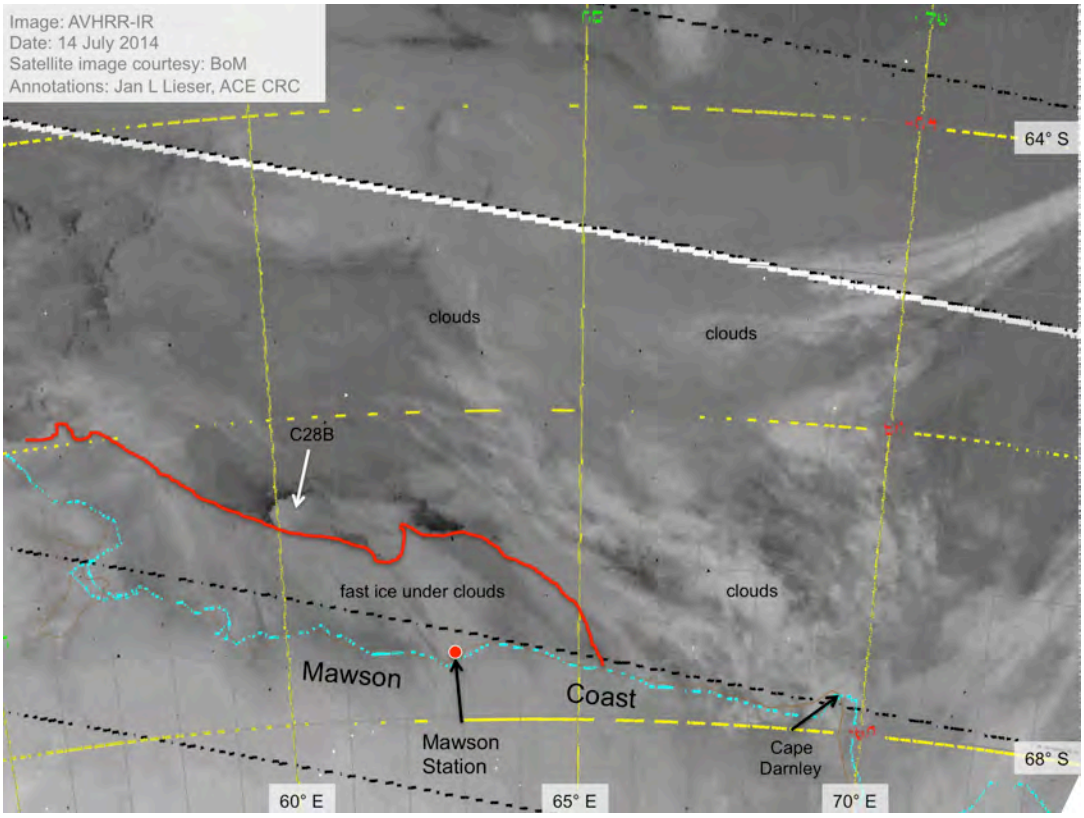


Figure 1: AVHRR image, acquired 14/07/2014 and provided by Bureau of Meteorology.

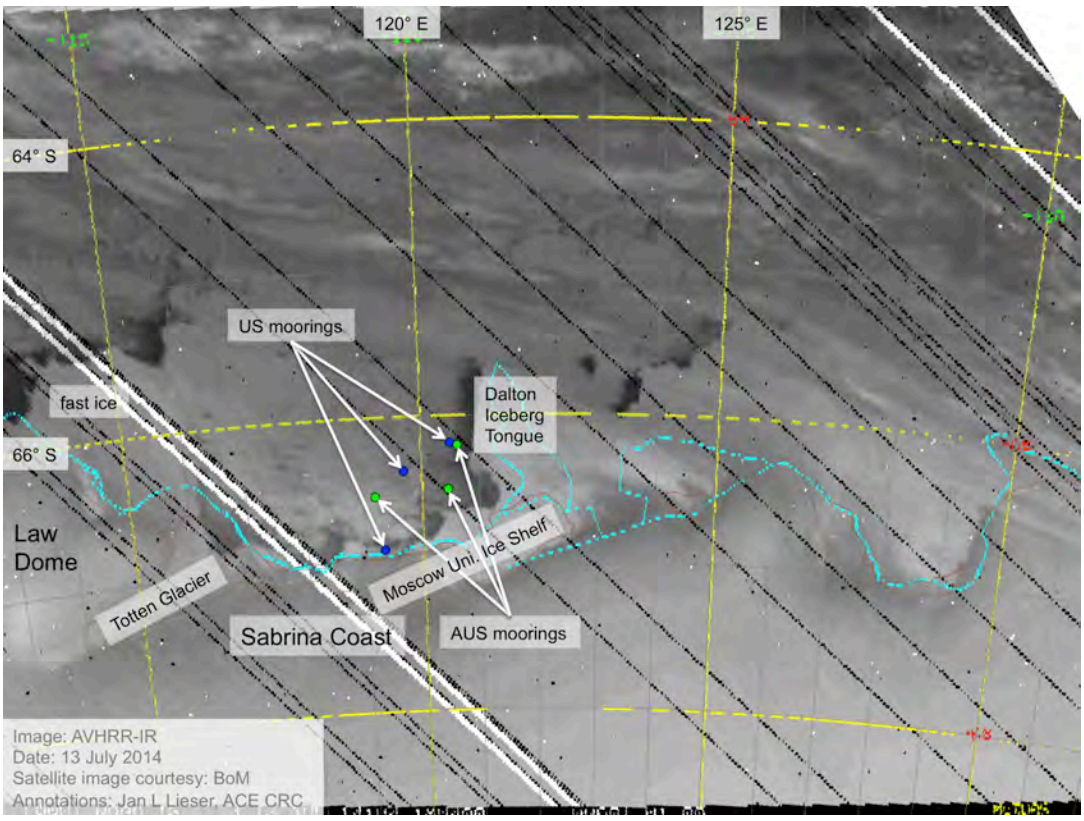


Figure 2: AVHRR image, acquired 13/07/2014 and provided by Bureau of Meteorology.

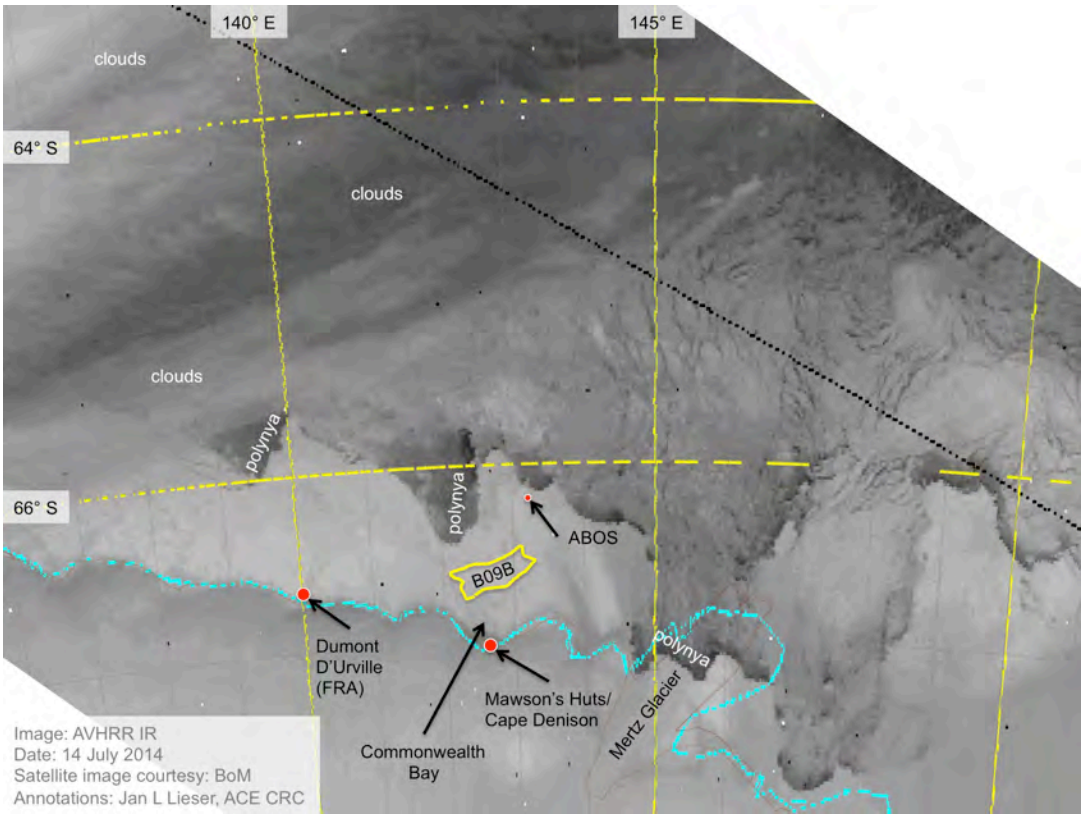


Figure 3: AVHRR image, acquired 14/07/2014 and provided by Bureau of Meteorology.

Sea Ice Report #18/2014

by the AAD/ACE CRC Sea Ice Group

14/08/2014

The circum-Antarctic sea-ice extent has resumed its trend clearly above the long-term mean, reaching new daily maxima almost every day. As of 12/08/14, the daily overall sea-ice extent is higher than the long-term average annual maximum value, typically expected in late September.

In East Antarctica during July, we also observe higher than average sea-ice concentration values west of about 70° E and east of about 90° E, with the region between 70° E and 90° E experiencing sea-ice concentration slightly lower than average. However, the sea-ice edge, and therefore the extent, is generally further north than previously seen in remote sensing data, and thus contributing to the overall exceptional sea-ice extent.

The sun has returned to illuminate the East Antarctic coast again, which allows for visual imagery to be recorded.

- **Commonwealth Bay**
  The sea ice between 135° E and 150° E (Figure 1) shows typical winter patterns. Fast ice is hugging the coast with some polynya activity off the Mertz Glacier, north of iceberg B09B in front of Commonwealth Bay and west of 135° E. The ABOS mooring location is indicated by a little red dot in the figure, currently about 3 nautical miles south of the fast ice edge. The large iceberg immediately west of the mooring (not marked; see Sea Ice Report #13a/2014 for reference) is completely surrounded by fast ice, as is iceberg B09B.

  North of the fast ice, a band of consolidated pack ice spans about 45 nautical miles in north-south direction, followed by close pack ice with typical strips and patches marking the marginal ice zone.

With best regards,

Jan.

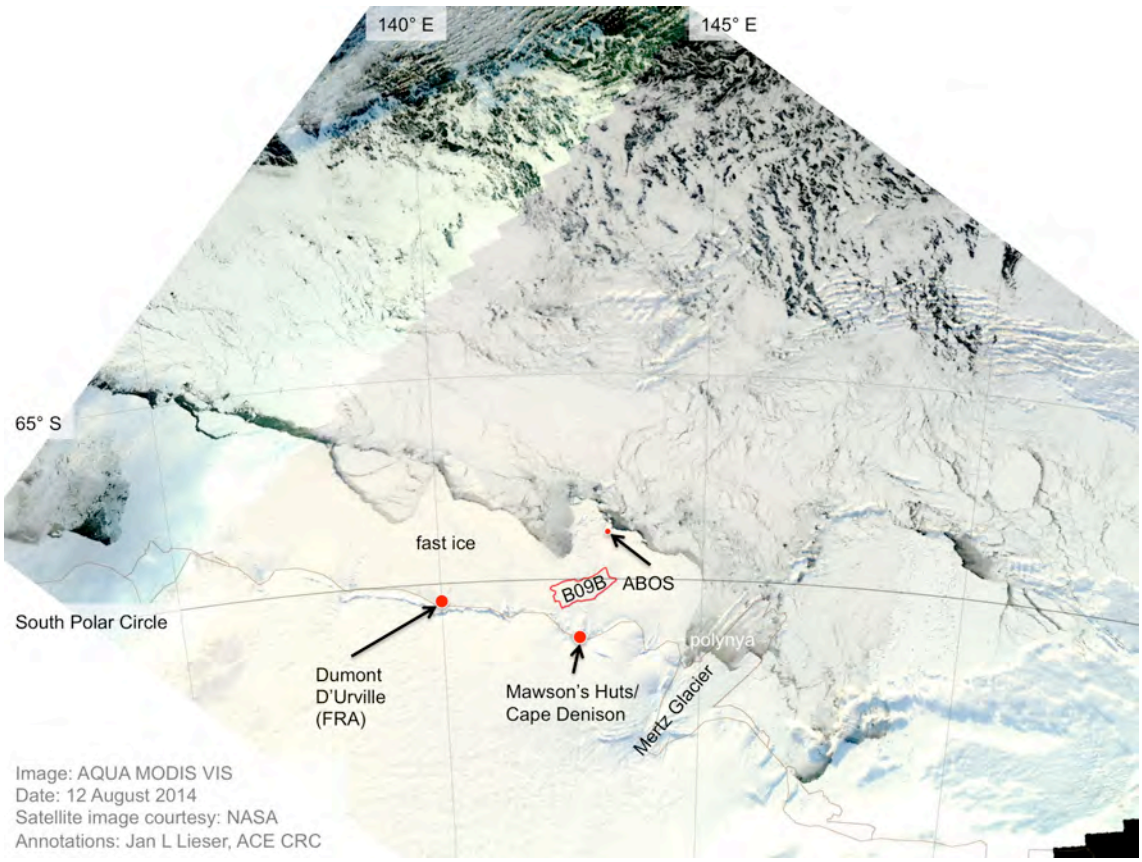


Figure 1: MODIS image, acquired 12/08/2014 and provided by NASA.

Sea Ice Report #19/2014

by the AAD/ACE CRC Sea Ice Group

19/09/2014

On 17/09, the overall circum-Antarctic sea-ice extent has exceeded 20 million square kilometres. This is the first time since routine satellite observations started in 1979. As well, the overall sea-ice area, that is the actual area covered by sea ice within the present extent (taking sea-ice concentration into account), has reached a new recorded maximum above 16 million square kilometres.

Underlying this overall assessment are regionally contrasting sectors, where lower than usual sea-ice area and extent are outweighed by areas with higher than usual area/extent.

During August, the pattern of anomalous sea-ice concentration described in Sea Ice Report #18/2014 has manifested further. In East Antarctica, we are observing sea-ice concentration slightly below the annual average only between 75° E and 90° E. The rest of the Australian Antarctic Territory and Adélie Land experienced largely above average sea-ice concentration. Only to the west of Adélie Land the pattern is more locally mixed.

- **Davis Station**
  Figure 1 provides a cloud free view of Prydz Bay and Davis Station, on 16/09. This is a typical winter sea ice image, with a large variety of sea-ice types present. The figure shows the near coastal part of the slightly below average sea-ice concentration sector mentioned above.

- **Commonwealth Bay**
  North of Dumont d'Urville Station and the Commonwealth Bay, a fast ice band along the coast stretches between 40 nautical miles and 70 nautical miles in north-south direction, with the shortest distance between Dumont d'Urville Station and the nearest polynya northwest of the station just over 40 nautical miles.

With best regards,

Jan.

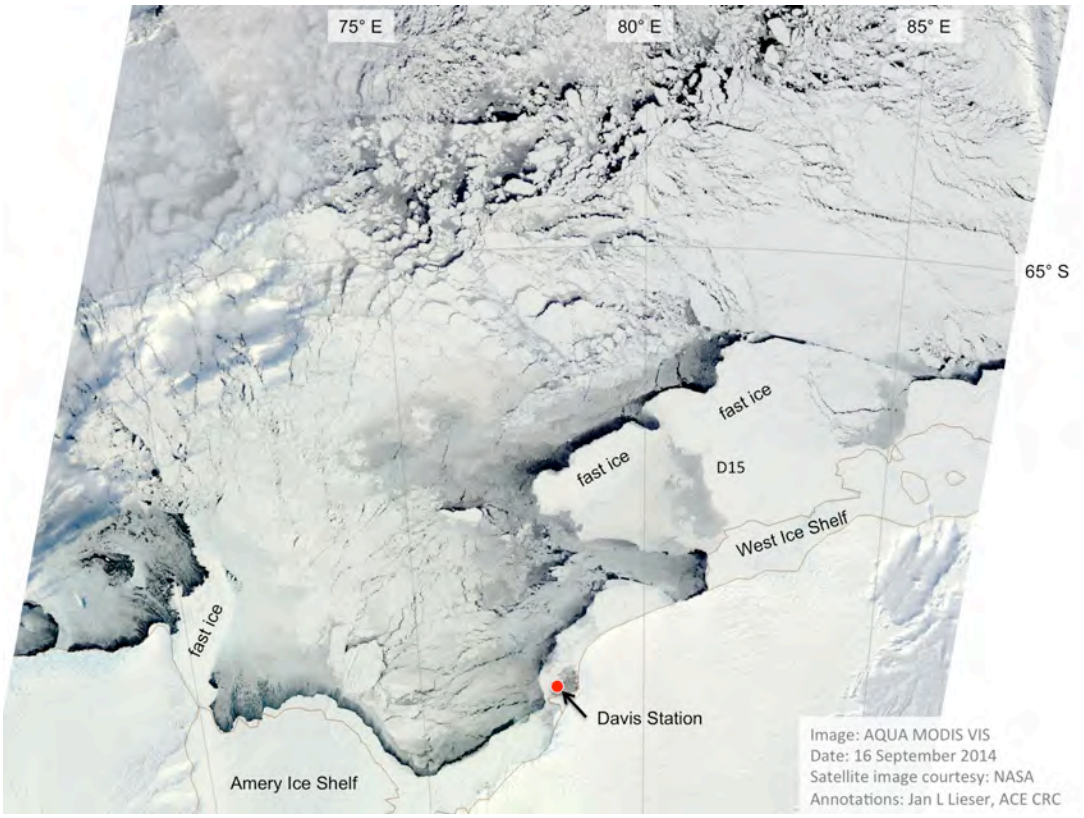


Figure 1: MODIS image, acquired 16/09/2014 and provided by NASA.

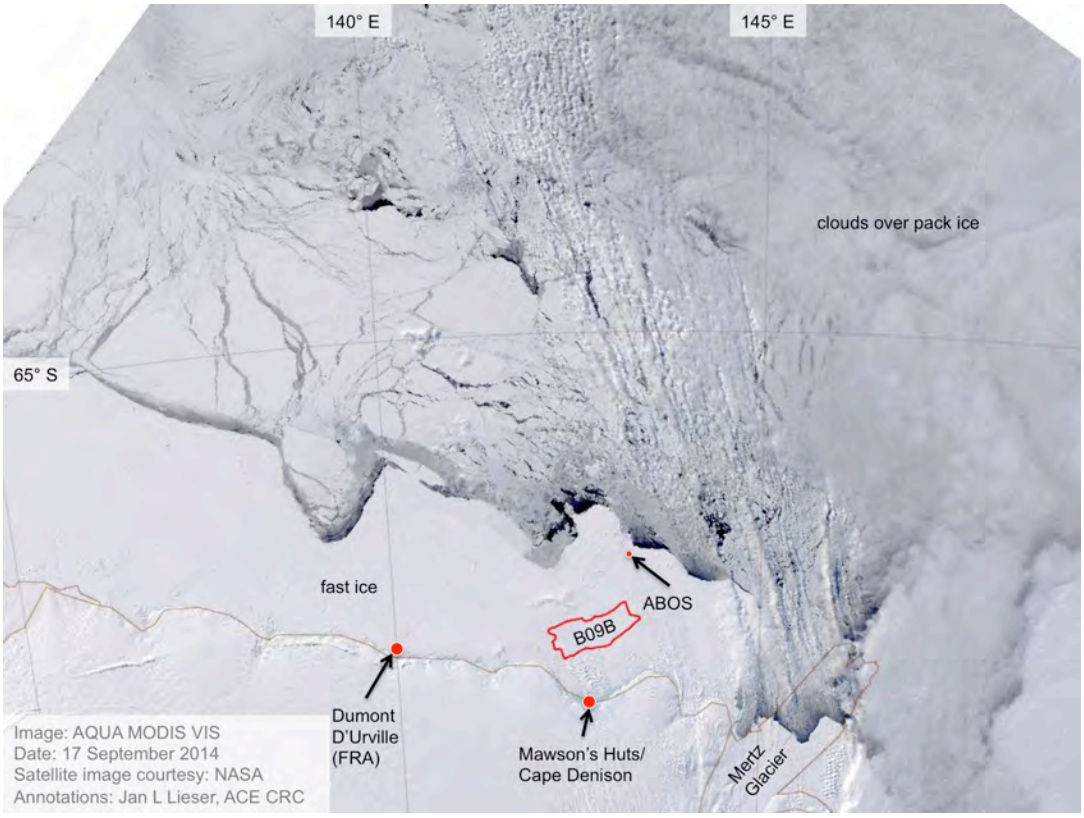


Figure 2: MODIS image, acquired 17/09/2014 and provided by NASA.

Sea Ice Report #20/2014

by the AAD/ACE CRC Sea Ice Group

02/10/2014

On 20/09/2014, the Antarctic sea-ice extent peaked at 20.14 million square kilometres, and is generally on the decline since. As mentioned previously, this record extent masks regional differences of extent above and below the 30-year average and median (Figure 1).

A recent series of low pressure systems and associated cloud patterns prevented high resolution visible and infrared data acquisition in East Antarctica. Additionally, the MODIS near real time image distribution appears to have been stalled since 25/09. NASA informs about network maintenance and apologises for any inconvenience, which might be unrelated, but appears to be coincident.

The new, high resolution data stream expected from European Space Agency's Sentinel-1A satellite (a weather independent RADAR system) has entered ramp-up phase, but no data acquisition is scheduled for the regions of the Australian Antarctic stations, before the end of November. However, the Dumont d'Urville/Mertz Glacier region will be covered every 12 days initially.

With best regards,

Jan.

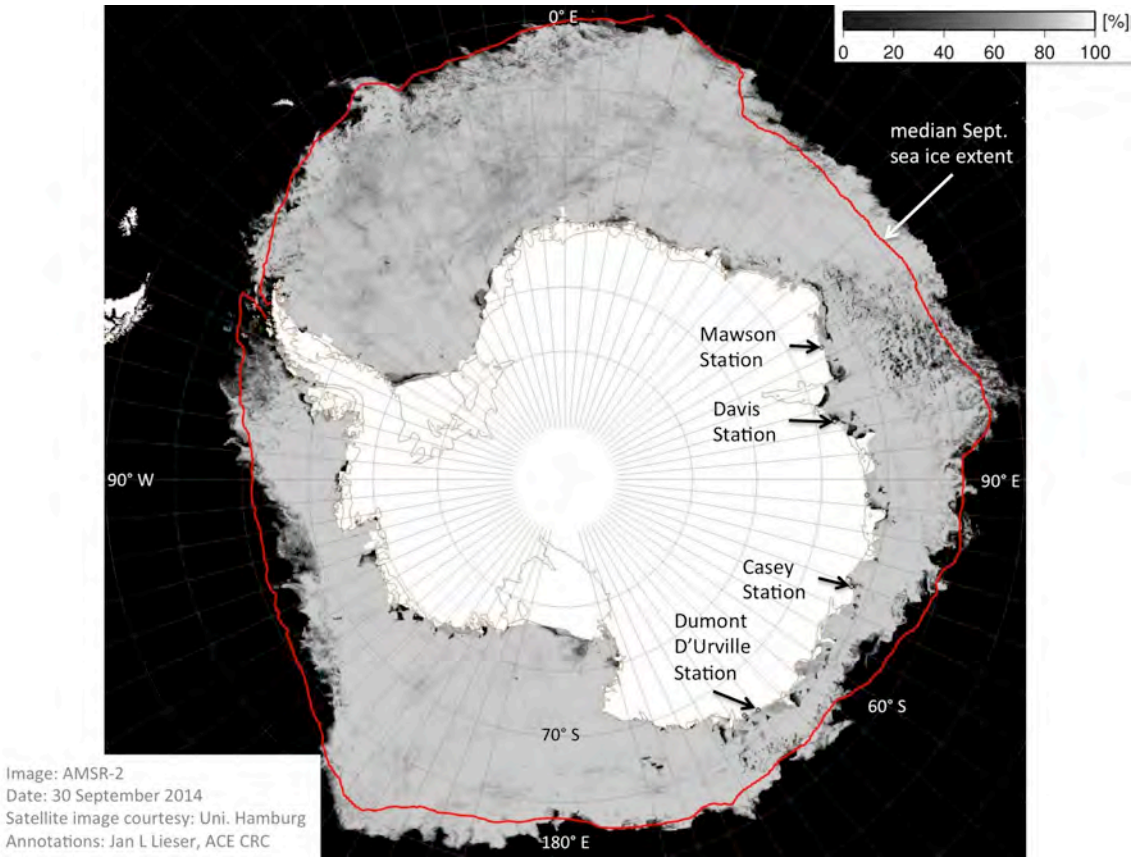


Figure 1: AMSR-2 image, acquired 30/09/2014 and provided by Universität Hamburg.

Sea Ice Report #21/2014

by the AAD/ACE CRC Sea Ice Group

16/10/2014

After the record breaking circum-Antarctic sea-ice extent and area in September, the sea-ice cover is in general decline now. Last month in East Antarctica, we observed regions of contrasting sea-ice concentration anomalies. West of about 80° E in the outer sea-ice zone, a large positive anomaly (that is higher sea-ice concentration than previously observed) developed, while between 80° E and about 130° E a slightly negative concentration anomaly was observed at the northern edge of the sea-ice zone with higher than usual sea-ice concentration in the inner pack ice of that region. East of 130° E and throughout the Ross Sea, sea-ice concentration was again anomalously high. All this is within the maximum sea-ice extent that was reported earlier. This means that this season there is generally more sea ice in the East Antarctic than previously seen in remote sensing data.

The following investigates sea-ice conditions off Davis Station in more detail.

- **Davis Station**
  North of Davis Station, sea ice has advanced the furthest north in the Australian Antarctic Territory, reaching almost 55° S at about 80° E. This is however an area of low concentration and the northernmost tip of this sea-ice area is currently drifting east and dispersing. In a sector between approximately 65° E and 85° E, large areas of low sea-ice concentration (below 50%) can be seen as far south as about 65° S (Figure 1). South of 65° S, the sea-ice cover appears compact with vast regions of 100% concentration and is generally moving westward with the coastal current. As in previous seasons, a bottleneck in the sea-ice drift appears to be immediately north of iceberg D15 off the West Ice Shelf. West of this iceberg, a large region of fast ice has developed, which is currently surrounded by larger polynyas. These open water regions can be seen in Figure 2 as dark patches in the sea-ice zone, even though the whole scene is obscured by a thin cloud layer. This figure is also showing the polynya off the fast ice off Davis Station.

With best regards,

Jan.

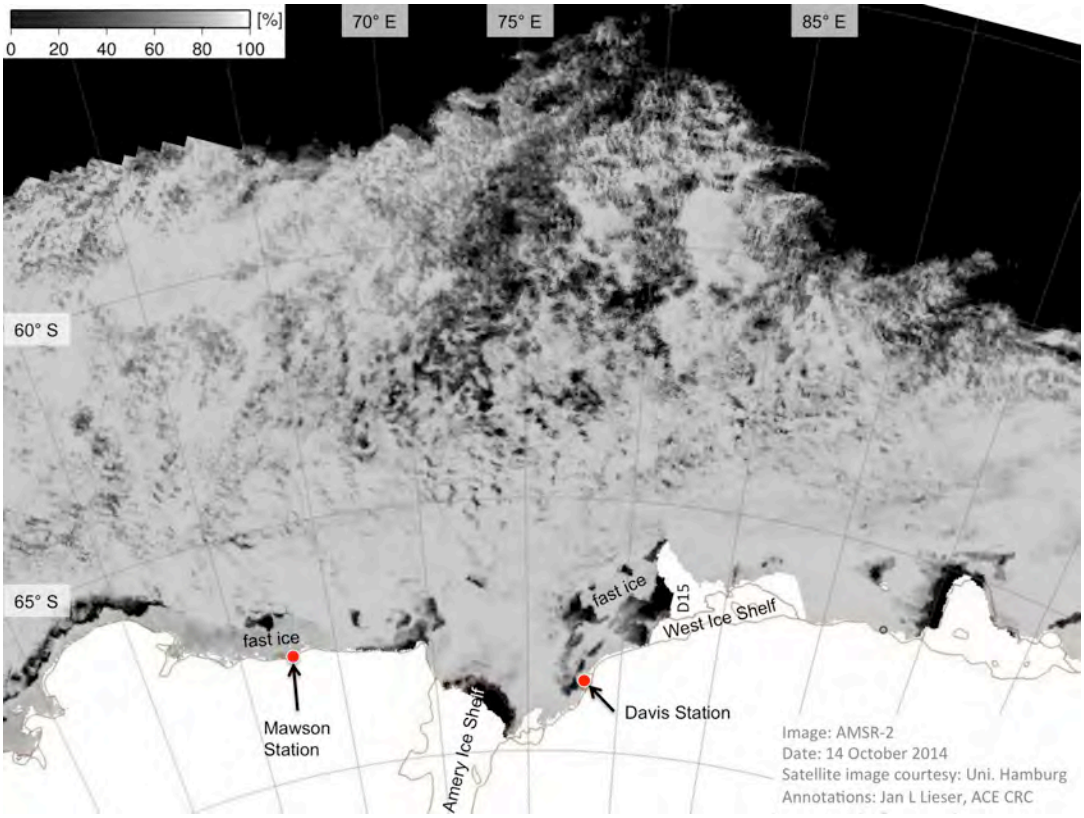


Figure 1: AMSR-2 image, acquired 14/10/2014 and provided by Universität Hamburg.

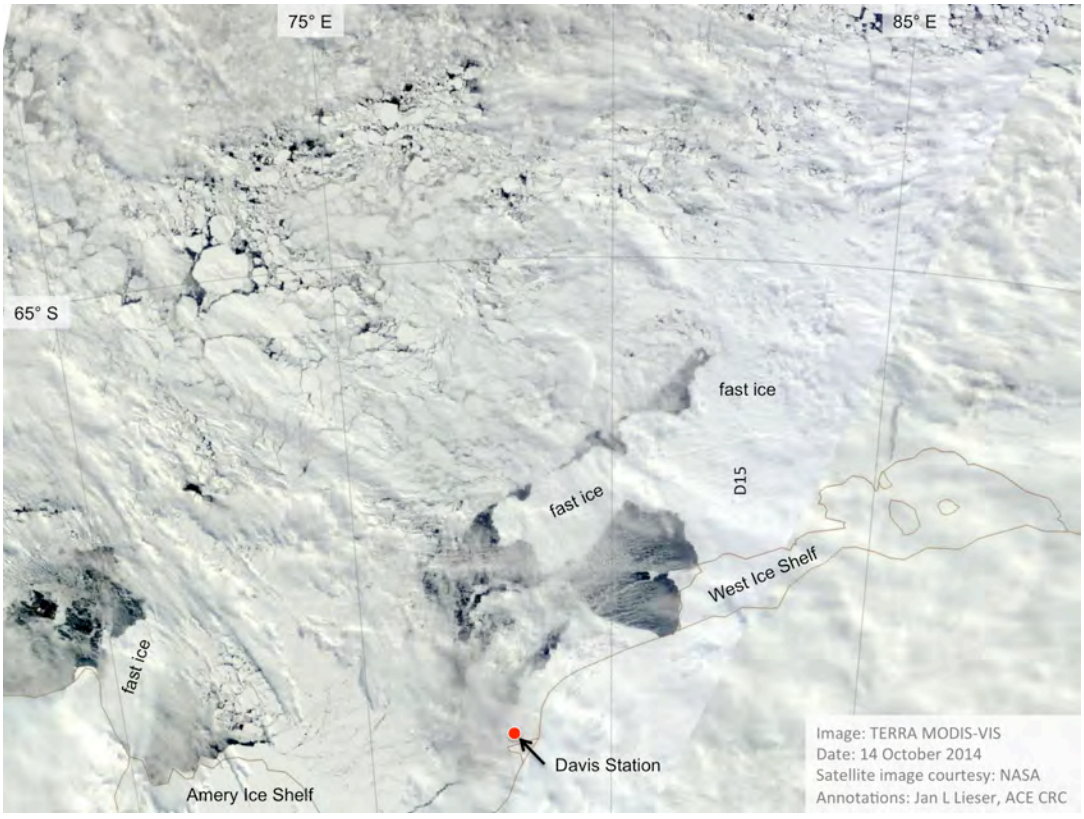


Figure 2: MODIS image, acquired 14/10/2014 and provided by NASA.

Sea Ice Report #21a/2014

by the AAD/ACE CRC Sea Ice Group

17/10/2014

The following is a brief update on sea-ice conditions off Dumont d'Urville Station.

- **Commonwealth Bay**
  Figure 1 shows a sea-ice concentration product (6 km resolution) derived from AMSR-2 data. North of Dumont d'Urville Station, the sea-ice edge meanders along 62° S. The fast ice edge (yellow line) was derived from the MODIS image shown in Figure 2. The position of the large tabular iceberg B09B is indicated by the red line, still immediately north of Commonwealth Bay/Mawson's Huts (nota bene: the confused signature in the sea-ice concentration product around the iceberg). The location of the Australian Bluewater Observing System (ABOS) mooring is shown by the blue dot. It is currently about three nautical miles south of the fast ice edge.

  The MODIS scene (Figure 2) is partly obscured by clouds in the northwest corner. Corresponding with the AMSR-2 data, lower sea-ice concentration can be seen as far south as 65° S east of 145° E, and as far south as about 64° 30' S to the west of 145° E.

With best regards,

Jan.

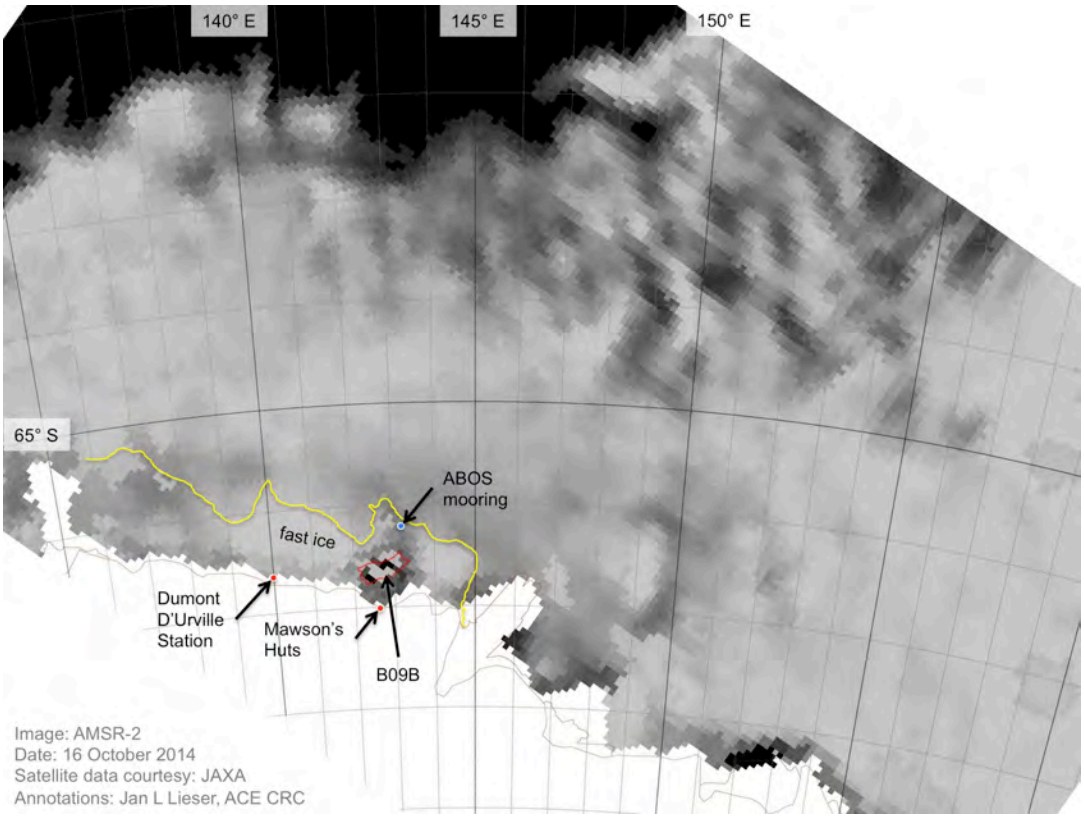


Figure 1: AMSR-2 image, acquired 16/10/2014 and provided by Drift & Noise Polar Services.

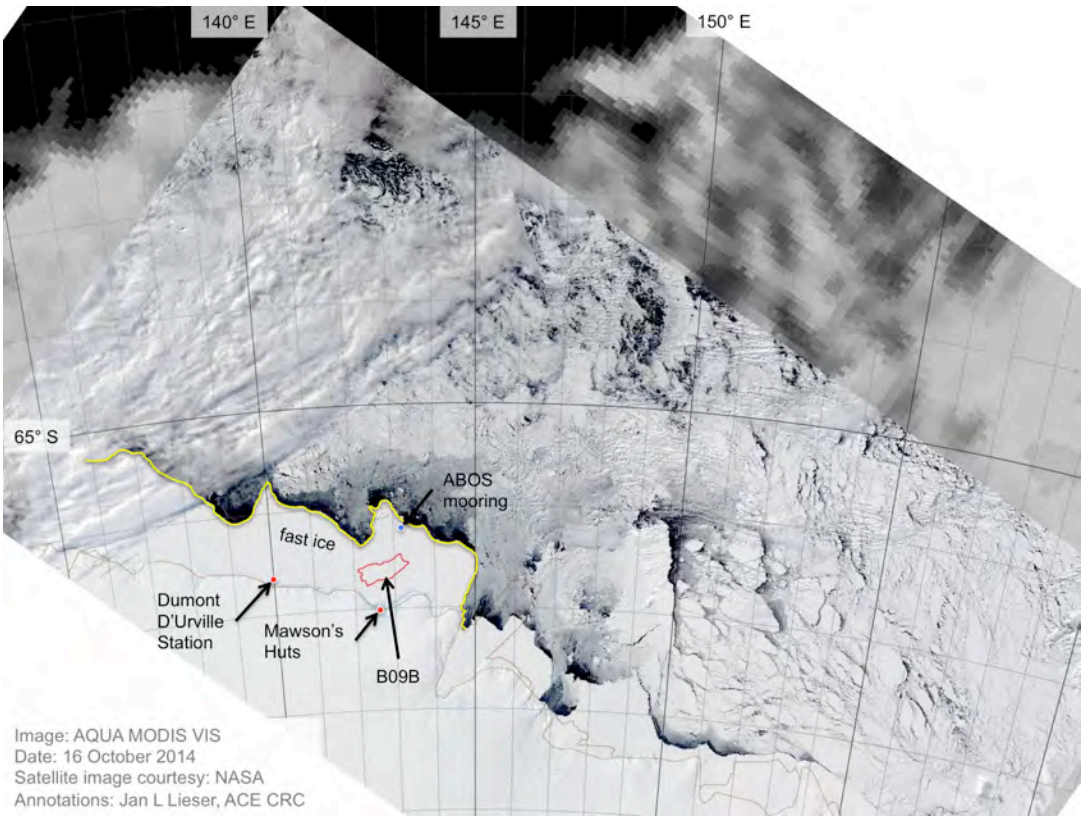


Figure 2: MODIS image, acquired 16/10/2014 and provided by NASA, with AMSR-2 image of Figure 1 as background.

Sea Ice Report #22/2014

by the AAD/ACE CRC Sea Ice Group

23/10/2014

Sea-ice extents still as far north as 56° 30' S in East Antarctica, at about 80° 30' E. Those are isolated patches of pack ice large enough to be picked up visually and by the sea-ice concentration algorithms, but they appear to be disintegrating and melting in the area.

The following examines sea-ice conditions off Mawson, Davis and Dumont d'Urville stations.

- **Mawson Station**
  The fast ice off Mawson Station remains largely unchanged. The polynya to the northwest of the station is well maintained, as is the Cape Darnley polynya. North of the polynya and the fast ice is a band of high concentration sea ice drifting west and the transition to the more easterly drift regime of the northern pack ice is roughly between 64° S and 65° S.

- **Davis Station**
  In Prydz Bay north of 65° S, sea-ice concentration is low to moderate and many individual floes can be identified in the MODIS image (Figure 1). This outer part of the pack ice is generally moving to the east and dispersing. The cloud patterns exhibit a number of eddy structures (the most prominent indicated by the blue dots). These small scale pressure systems act currently to loosen the pack ice further. South of 65° S, a band of high sea-ice concentration is still prevalent, originating north of the West Ice Shelf and iceberg D15 and turning southwest into the Prydz Bay at about 80° E and 65° S. The polynya off Davis Station and the fast ice distribution north of the station remains unchanged, including the tongue of fast ice extending west from iceberg D15.

- **Dumont d'Urville Station**
  The sea-ice edge north of Dumont d'Urville Station reaches 62° S and beyond in a few locations (Figure 2). The edge is well defined, and a band of high concentration sea ice marks the outer region of the pack ice. This band (and its northernmost peak) is drifting predominantly to the east. Between 63° 30' S and the fast ice is a band of slightly lower sea-ice concentration. The coastal fast ice and the pack ice are separated by a well maintained polynya.

With best regards,

Jan.

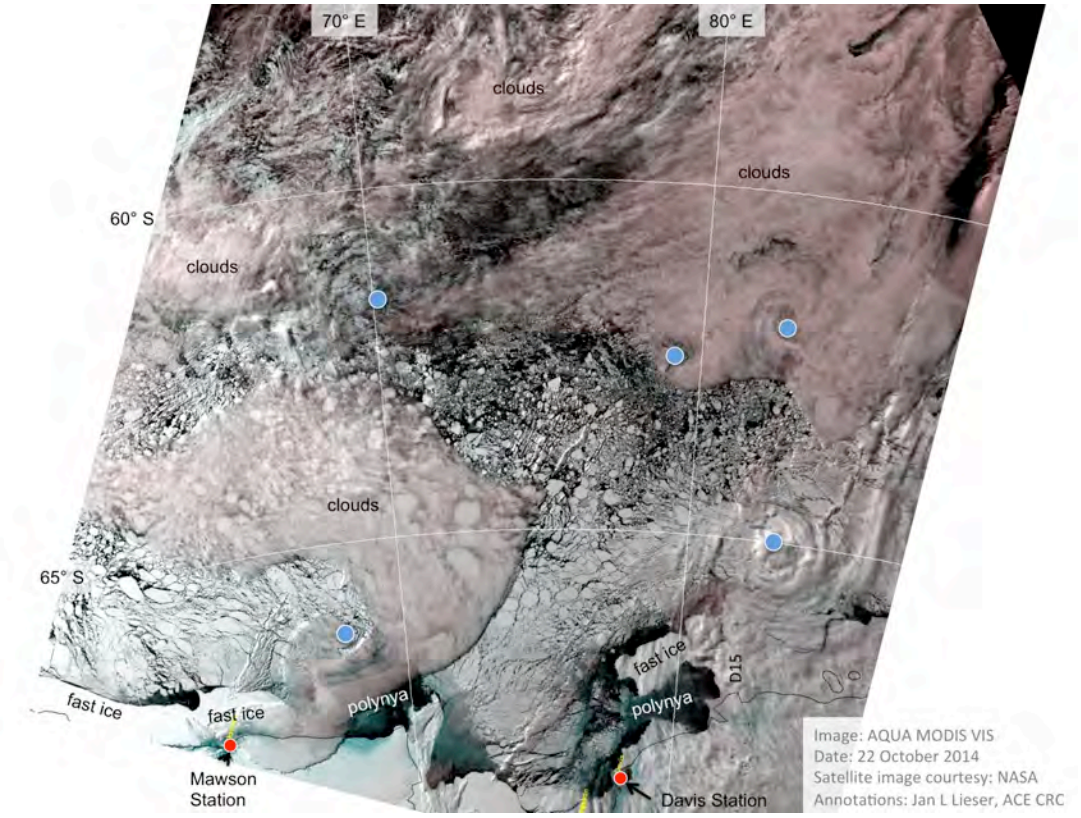


Figure 1: MODIS image, acquired 22/10/2014 and provided by NASA.

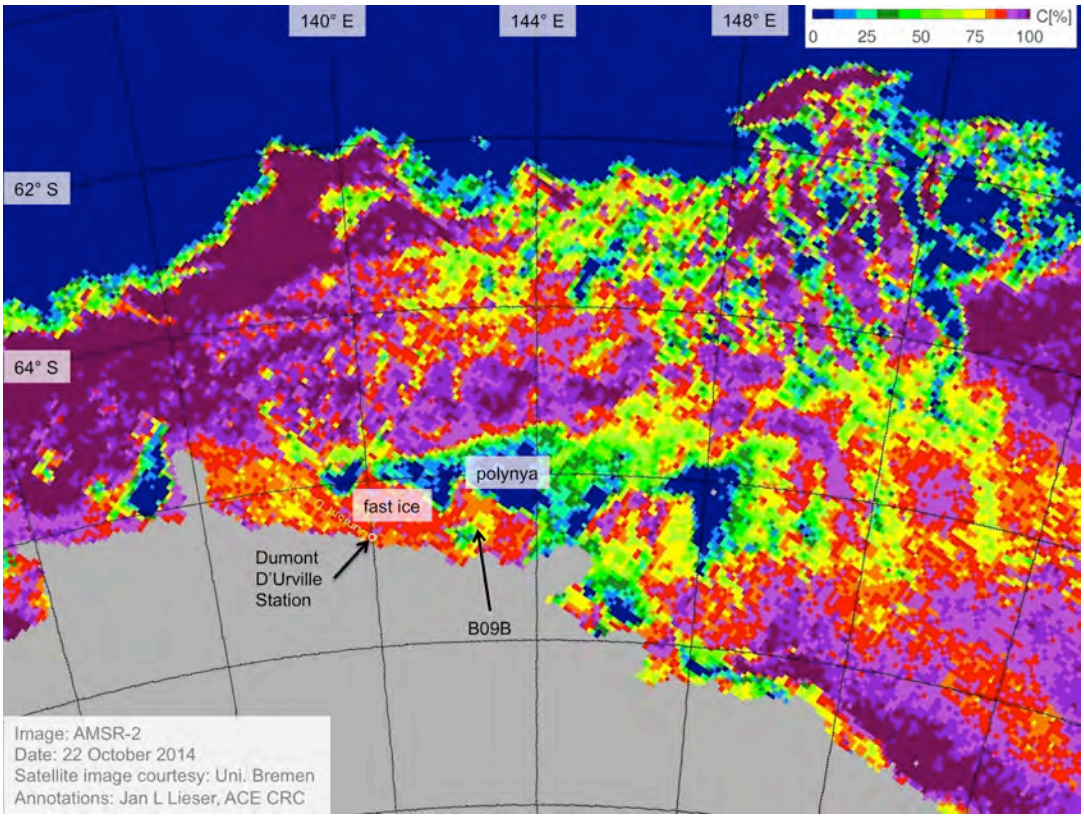


Figure 2: AMSR-2 image, acquired 22/10/2014 and provided by Universität Bremen.

Sea Ice Report #23/2014

by the AAD/ACE CRC Sea Ice Group

30/10/2014

The following examines sea-ice conditions between 70° E and 150° E.

- **Davis Station**
  In Prydz Bay north of 65° S, sea-ice concentration is low to moderate, see Figure 1. The location and track of RSV *Aurora Australis* (up until about 30/10/2014 00:00 UT) is given by the orange line in the figure. The low sea-ice concentration persisted during the entire week. The region was under the influence of a series of low pressure systems and while the sea ice is generally drifting northward, there is over night a slight southward shift in the eastern part of Prydz Bay detectable, while the western part of Prydz Bay still experiences northerly drift. East of 85° E, the marginal ice zone is characterised by many strips and patches of sea ice, generally drifting east and northeast with reducing concentration.
  North of Davis Station and south of 65° S, many individual floes can be identified in the MODIS image (Figure 2). This is a high sea-ice concentration region, and only minor cracks and leads can be seen, mostly in northwest-southeast orientation east of 76° E, and southwest-northeast orientation west of 74° E, with a region of no prominent lead orientation in between.
  The fast ice off Davis Station reaches currently about six nautical miles out to the west.

- **Sabrina Coast**
  A cloud-free view of the fast ice north of Sabrina Coast is provided in Figure 3. East of Law Dome to about 120° E, the region is covered by fast ice, which shows a defined eastern edge where sea ice formed in the polynya west of the Dalton Ice Tongue accumulates. The approximate locations of three Australian (green dots) and three US (yellow dots) moorings are marked in the polynya region.

- **Dumont d'Urville Station**
  Figure 4 shows a sea-ice concentration map of the region off Dumont d'Urville Station and the Mertz-Glacier. A band of moderate to high sea-ice concentration moves generally westward. The polynyas off the fast ice of the station, north of iceberg B09B and the Mertz Polynya appear well maintained. The fast ice edge northwest of the station is about 40 nautical miles away from the station (at about 139° 20' E), while the pyramidal peak in the fast ice edge at 140° E is almost 60 nautical miles offshore. The ABOS mooring is two nautical miles south of the fast ice edge (blue dot in Figure 4).

With best regards,

Jan.

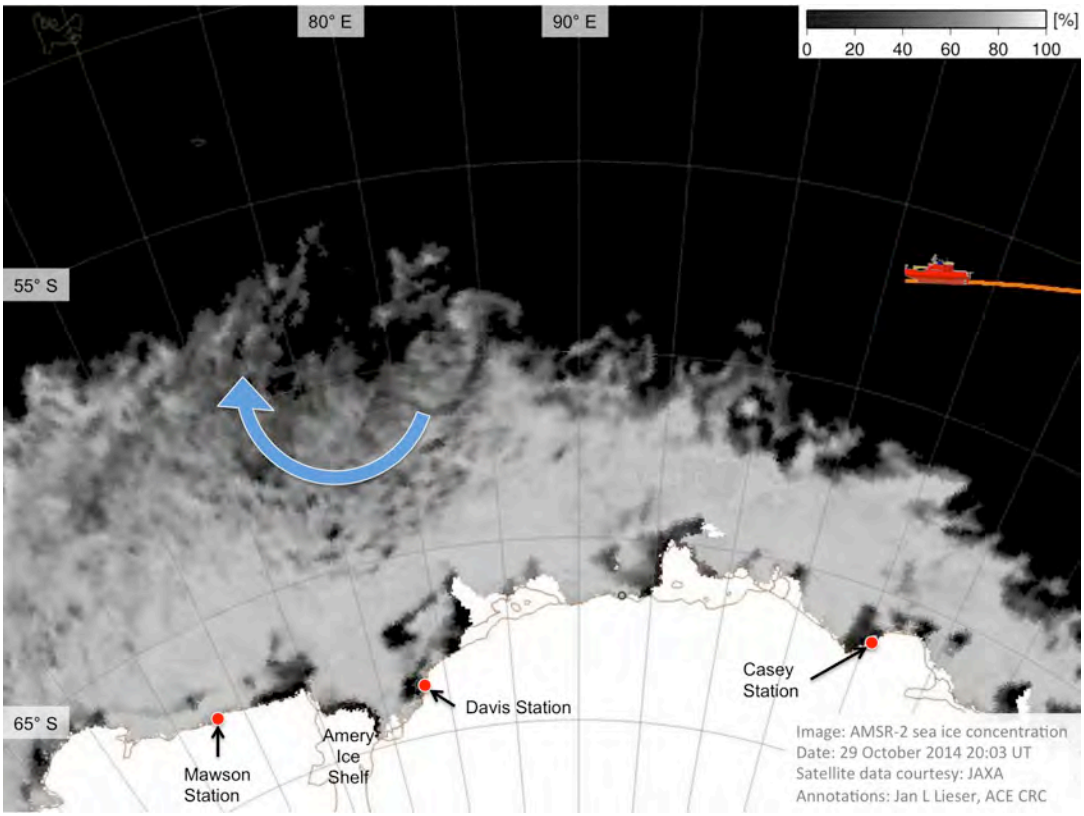


Figure 1: AMSR-2 image, acquired 29/10/2014 and provided by Drift & Noise Polar Services.

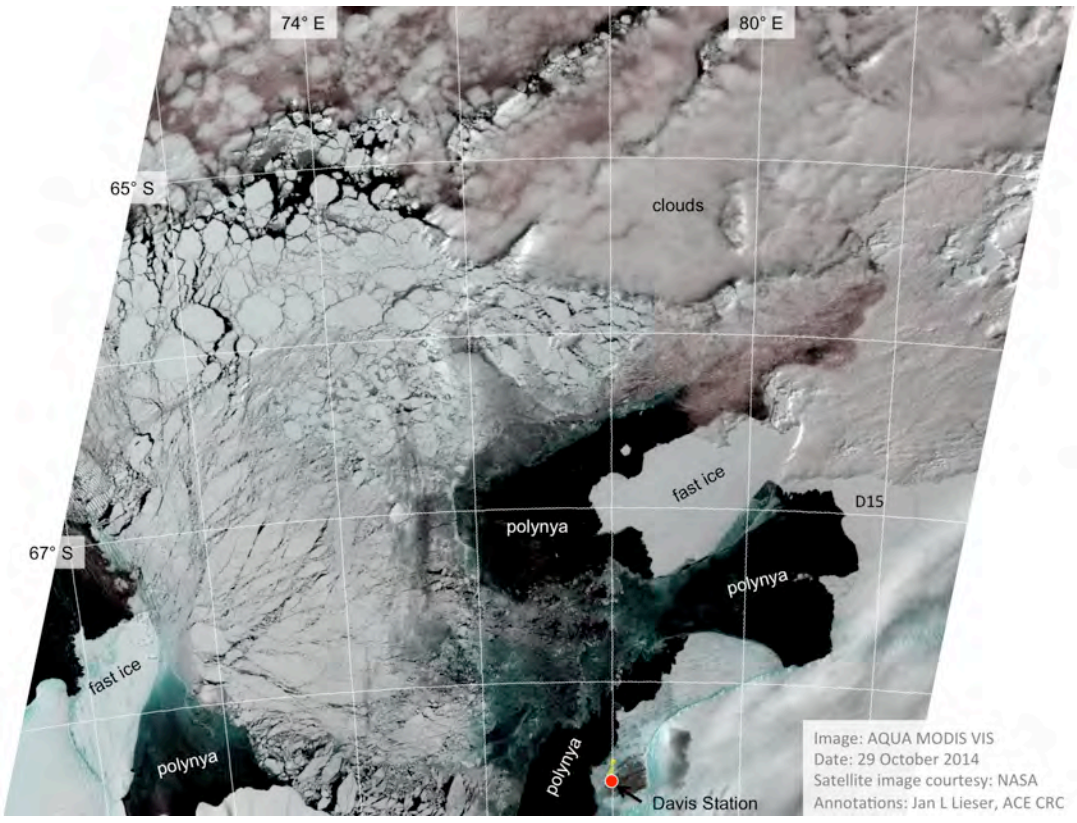


Figure 2: MODIS image, acquired 29/10/2014 and provided by NASA.

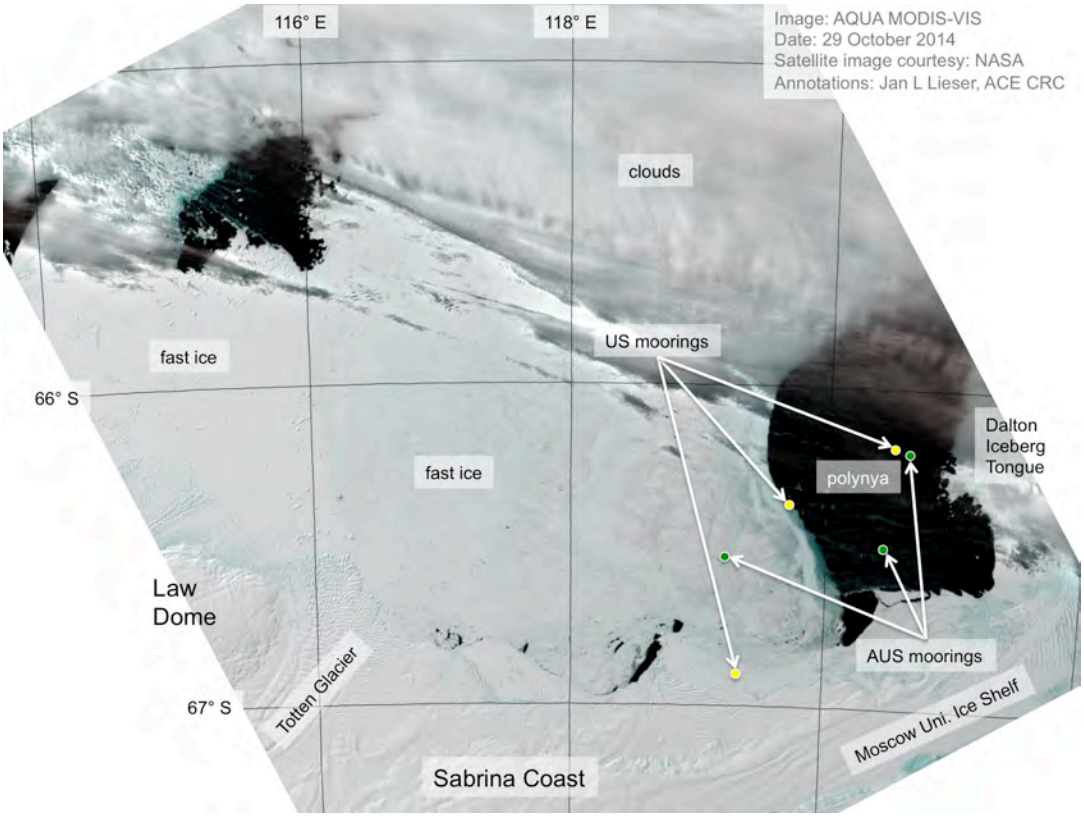


Figure 3: MODIS image, acquired 29/10/2014 and provided by NASA.

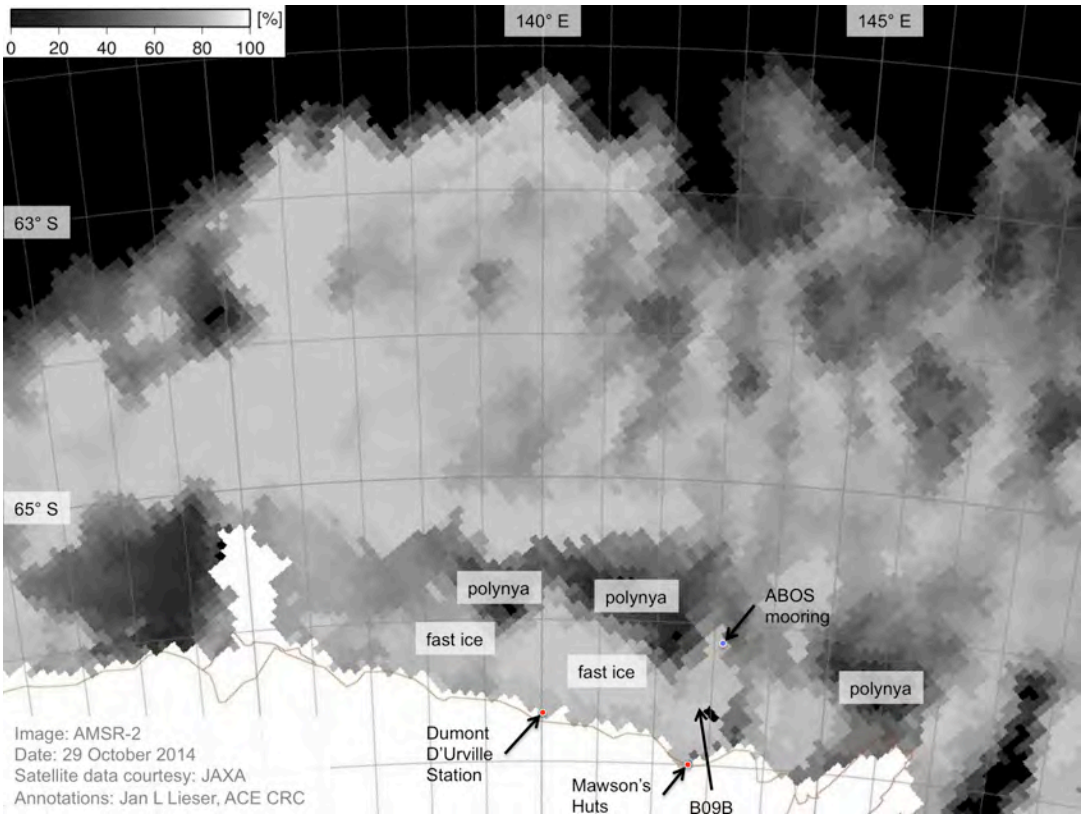


Figure 4: AMSR-2 image, acquired 29/10/2014 and provided by Drift & Noise Polar Services.

Sea Ice Report #24/2014

by the AAD/ACE CRC Sea Ice Group

06/11/2014

This report examines sea-ice conditions off Mawson and Davis stations and the Totten Glacier region.

- **Mawson Station**
  Figure 1 provides a high-resolution overview of sea-ice conditions off Mawson Station. The scene is partly obscured by thin clouds. North of 65° S, a large number of vast sea-ice floes can be seen in the eastern part of the image, drifting in loose pack. West of about 70° E, the sea-ice concentration is getting higher, and reaching further north.

  South of 65° S, a band of very high concentration sea ice persists, drifting generally westward. Close to the coast, the Cape Darnely polynya appears well maintained, with one very large iceberg drifting freely and rotating. Its long axis aligns along 68° E on 05/11/14.

  The pack ice west of 66° E appears detached from the fast ice, and the distance from Mawson Station to the so-called north-west polynya is currently about 43 nautical miles.

- **Davis Station**
  Figure 2 is an eastward continuation of Figure 1. The red line denotes the recent cruise track of RSV *Aurora Australis* in the region. Between 65° S and 66° S, a band of high sea-ice concentration can be seen, which feeds the band of high sea-ice concentration at the same latitude that was described in the previous section. In the westward drift of this band, sea ice of the western Prydz Bay (the region between 71° E and 77° E, south of 66° S) gets amalgamated into this stream.

  Fast ice has broken off from the West Ice Shelf east of iceberg D15, on 04/11/14. North of this now ex-fast ice, a region of very high concentration sea ice stretches up to about 64° 30' S (partly obscured by clouds in Figure 2).

  The white track in Figure 3 shows the recent approach of RSV *Aurora Australis* through the fast ice towards Davis Station. Red dots are hourly markers. The vessel reached its parking position at 08:10 UT on 06/11/14.

- **Sabrina Coast**
  Figure 4 gives a cloud-free view of ex-fast ice north of Sabrina Coast, which has broken off on 31/10/14. The cracks leading north and east from the face of the Totten Glacier can be seen clearly in the image. The polynya west of the Dalton Iceberg Tongue appears well maintained. The approximate locations of three Australian (green dots) and three US (yellow dots) moorings are marked in Figure 4. On

01/11/14, fast ice has also broken away from the eastern side of the Dalton Iceberg Tongue.

With best regards,

Jan.

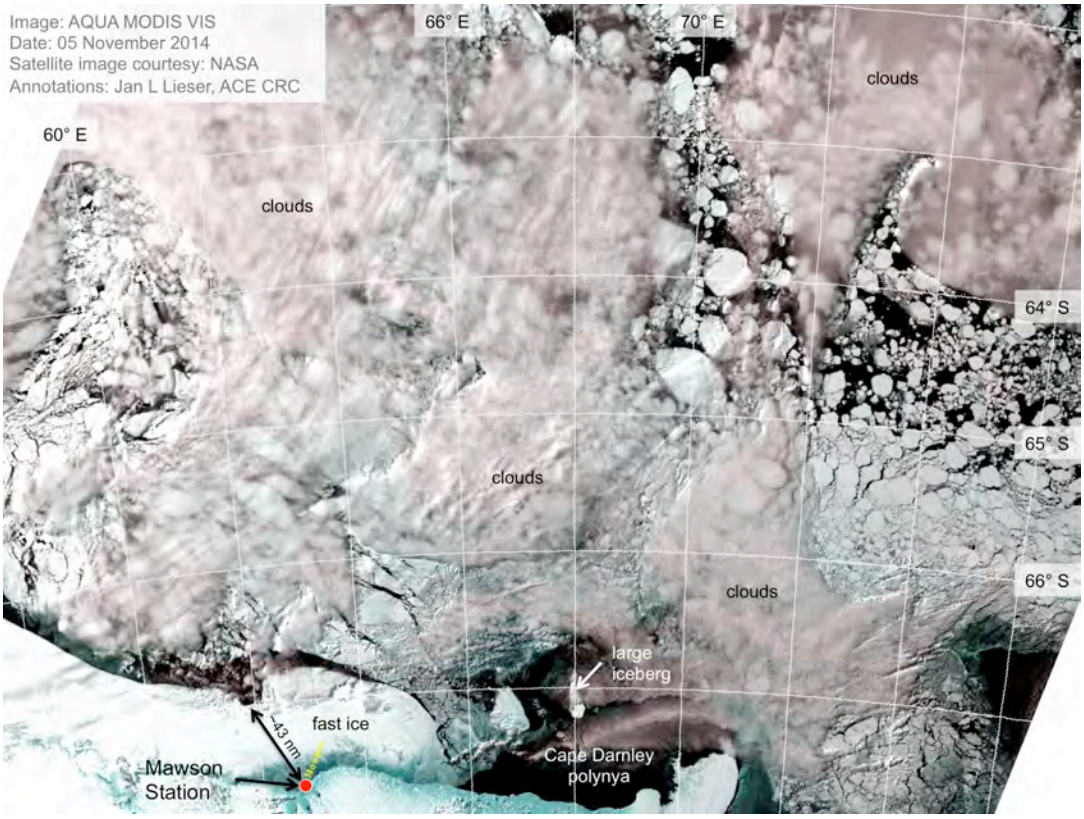


Figure 1: MODIS image, acquired 05/11/2014 and provided by NASA.

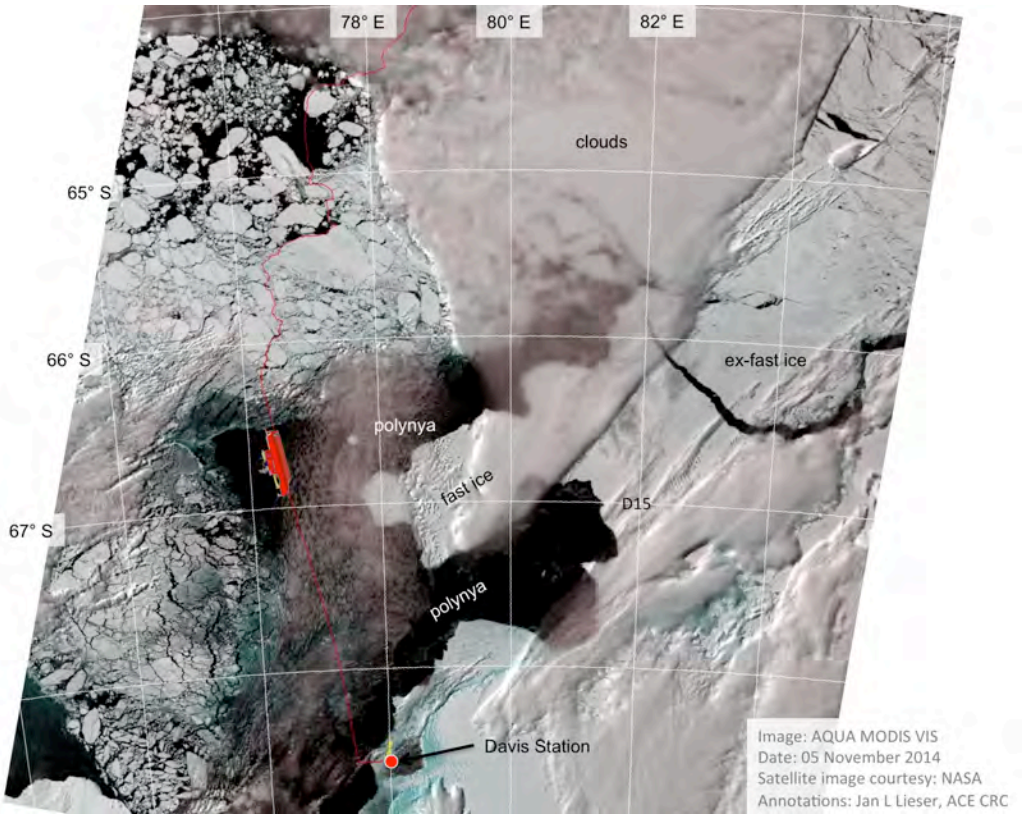


Figure 2: MODIS image, acquired 05/11/2014 and provided by NASA.

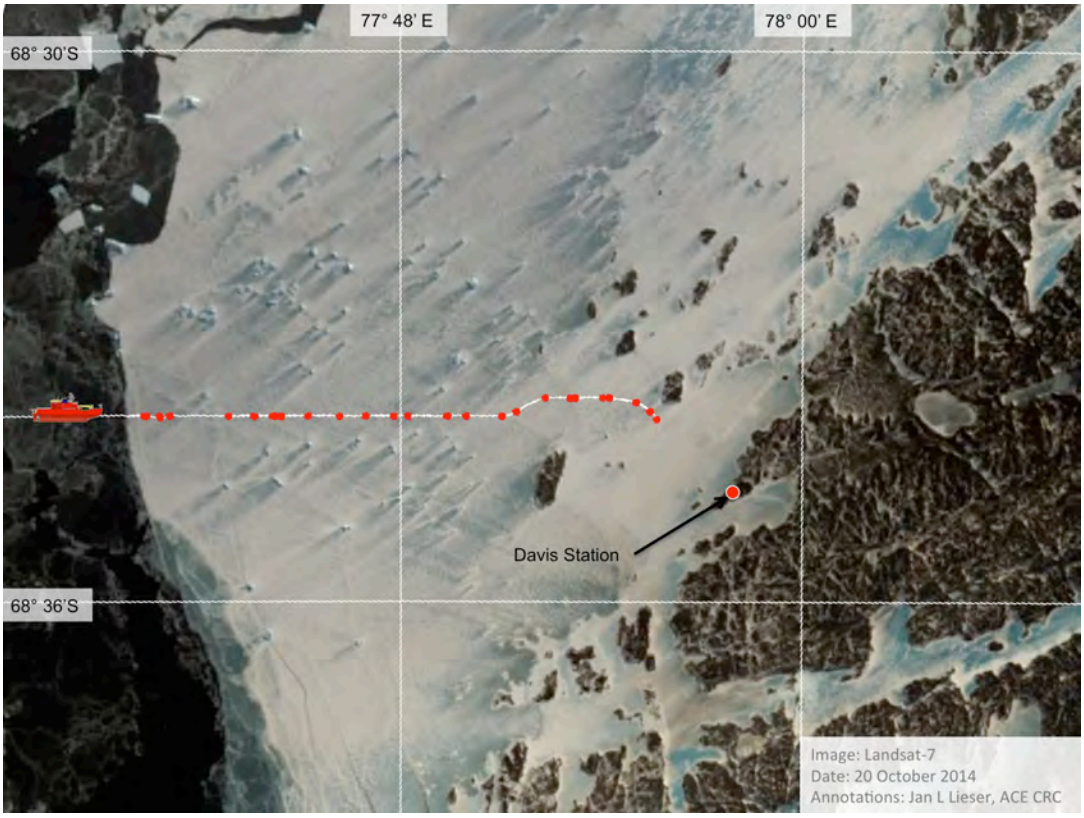


Figure 3: Landsat-7 image, acquired 20/10/2014.

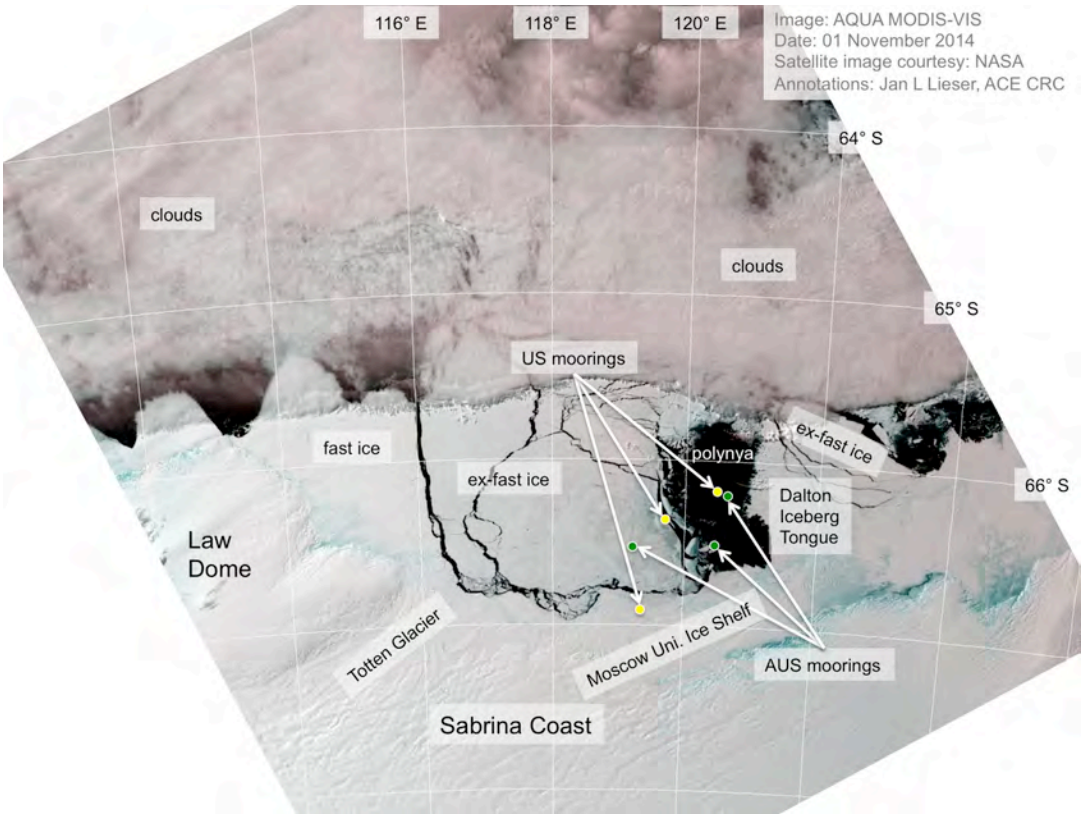


Figure 4: MODIS image, acquired 01/11/2014 and provided by NASA.

Sea Ice Report #25/2014

by the AAD/ACE CRC Sea Ice Group

13/11/2014

This report examines sea-ice conditions off all Australian Antarctic stations and the regions of Marine Science interest for the upcoming Voyage-2 of RSV *Aurora Australis*.

- **Mawson Station**
  The fast ice off Mawson Station is still solidly in place, but some locations along the coastline appear to show signs of darkening in the MODIS image (Figure 1), for example at 67° 33' S and 62° 18' E, at 67° 30' S and 63° 03' E, at 67° 29' S and 63° 19' E and at isolated locations further along the continental margin to the east. This darkening could indicate surface melting (thinning), hints of which can also be seen in the microwave data (Figure 2), even though this is an unvalidated data product and coastal effects could result in misclassification of sea-ice concentration.

  The pack ice north of the fast ice off Mawson Station still reaches as far north as 56° 30' S, between 65° E and 70° E. However, most of this ice pack is of low to medium concentration down to about 64° S, where a band of high sea-ice concentration (as mentioned in report #24/2014) still remains.

- **Davis Station**
  RSV *Aurora Australis* is currently on her way out from Davis Station through the highest concentration band of sea ice north of the station. Once north of 65° S, sea-ice conditions are expected to ease. The southernmost part of the sea-ice edge is just north of 63° S, between 78° E and 79° E (see Figure 2).

- **Casey Station**
  Figure 3 shows an almost completely cloud free scene of the sea ice north of Vincennes Bay and Law Dome. The polynya off Casey Station appears well maintained, with some fast ice still remaining north of the station, attached to the northwestern coastline of Law Dome. The pack ice is reaching far north, in isolated location even north of 62° S, but only with low to moderate concentration (Figure 4). Some vast sea-ice floes to the north and northwest of Vincennes Bay show clear signs of imminent disintegration. One example is given by the green outline in Figure 3: while this floe still appears as one large entity in the MODIS image, the smaller floes of which it consists are already starting to re-appear, which is typical during the break-up process.

- **Sabrina Coast**
  Further east from Casey Station, along the Sabrina Coast, clouds obscure the view on the sea ice in the visible and infra-red spectrum

recently. Figure 4 shows the sea-ice concentration in the region between Law Dome and the Dalton Iceberg Tongue, and to the north of it. The approximate locations of three Australian (green dots) and three US (yellow dots) moorings are marked in the figure. The ex-fast ice remains still in the bay northeast of the Totten Glacier. The westernmost Australian mooring is certainly under a high concentration sea-ice cover, while the southernmost US mooring is so close to the coast, that it is under the land mask used to compute sea-ice concentration. However, it might be possible that this near-shore fast ice could break up as well as the large piece that has broken away in late October. The middle US mooring (119° 42' E, 66° 22' S) is located in the marginal zone between the polynya to the east of it and the pack ice in the west. The remaining three moorings are located in the open water of the polynya to the west of the Dalton Iceberg Tongue.

- **Commonwealth Bay**
  The fast-ice distribution between Dumont d'Urville Station and the Mertz Glacier has not changed significantly during the past week. The location of the Australian Bluewater Observing System mooring north of Commonwealth Bay is covered by fast ice, about two to three nautical miles south of the fast-ice edge. Iceberg B09B remains fully surrounded by fast ice.

With best regards,

Jan.

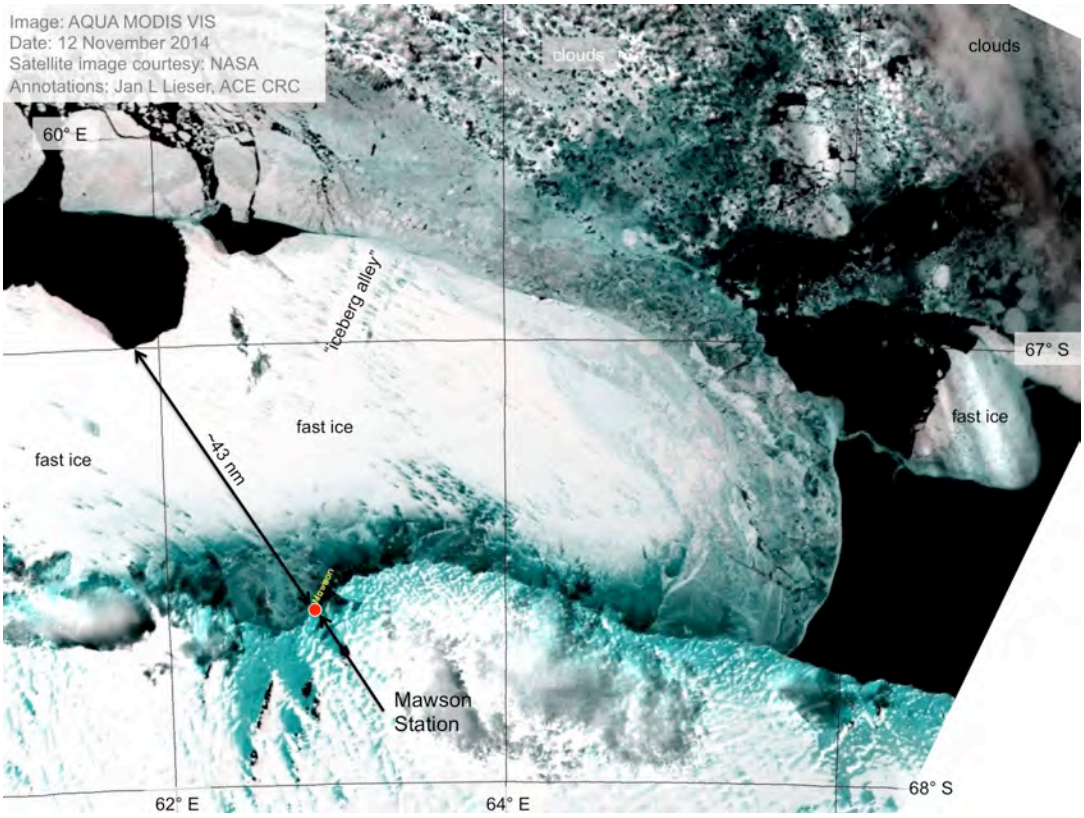


Figure 1: MODIS image, acquired 12/11/2014 and provided by NASA.

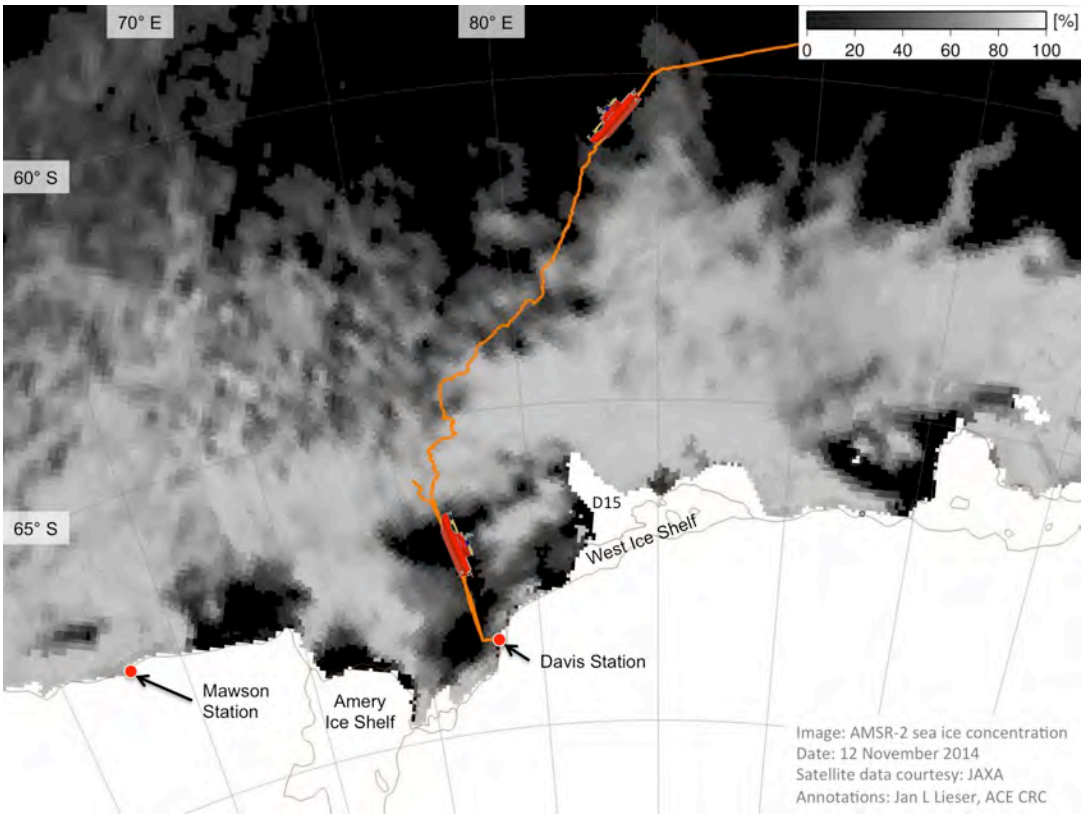


Figure 2: AMSR-2 image, acquired 12/11/2014 and provided by Drift & Noise Polar Services.

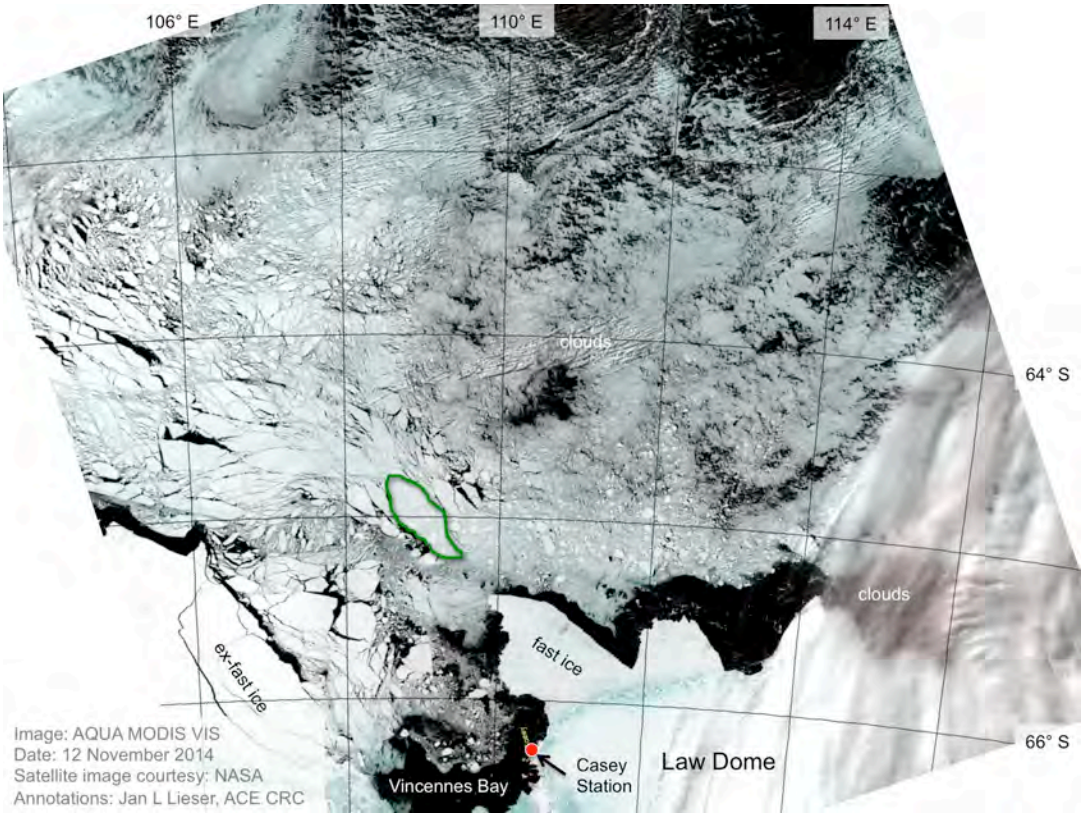


Figure 3: MODIS image, acquired 12/11/2014 and provided by NASA.

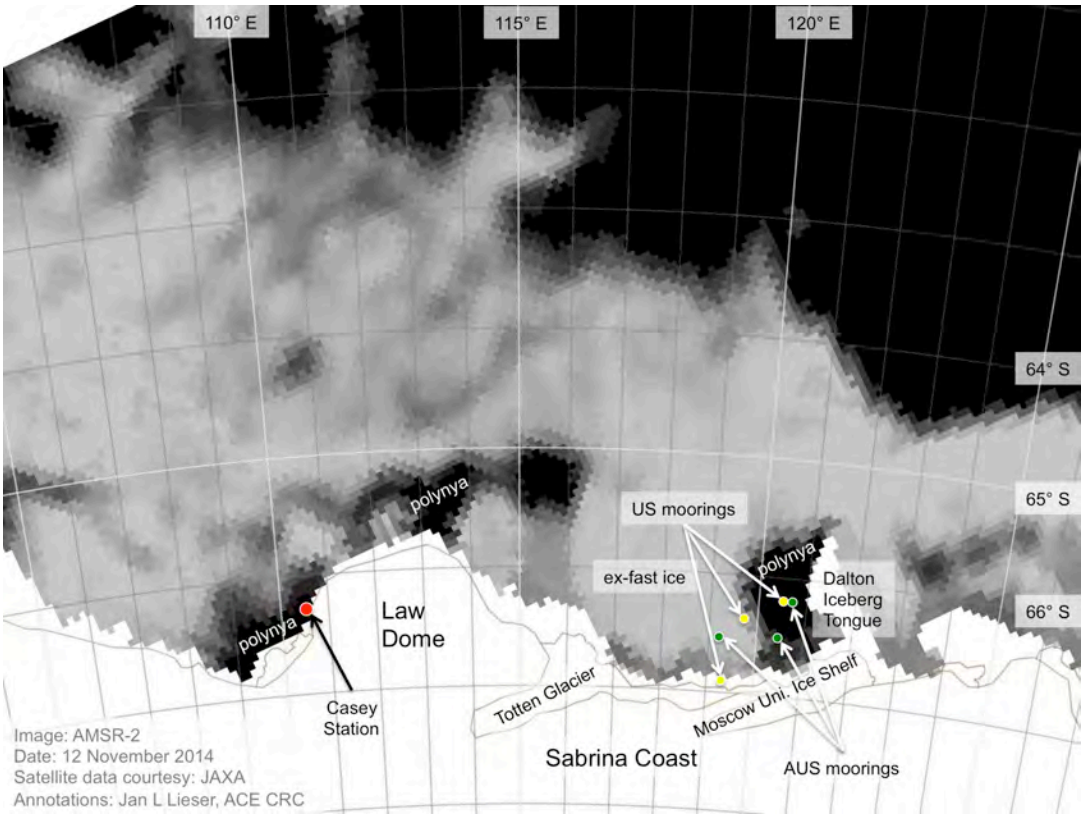


Figure 4: AMSR-2 image, acquired 12/11/2014 and provided by Drift & Noise Polar Services.

Sea Ice Report #25a/2014

by the AAD/ACE CRC Sea Ice Group

13/11/2014

This report provides an update on the progress of RSV *Aurora Australis* and the fast ice conditions off Sabrina Coast.

- **Davis Station**
  RSV *Aurora Australis* has crossed 65° S northwards and sea-ice conditions have eased. The cruise track can be seen as a thin red line with hourly dots in Figure 1.

- **Sabrina Coast**
  The latest imagery from MODIS instrument confirms the further break-out of fast ice off Sabrina Coast, which was suggested in the previous Report #25/2014. Figure 2 shows the approximate locations of three Australian (green dots) and three US (yellow dots) moorings marked in a cloud-free scene of the Dalton Iceberg polynya. The southernmost mooring location (yellow dot of US-M3 mooring) is in the gap between a remaining bit of fast ice locked to the coast and a larger floe of ex-fast ice drifting towards the northwest.

With best regards,

Jan.

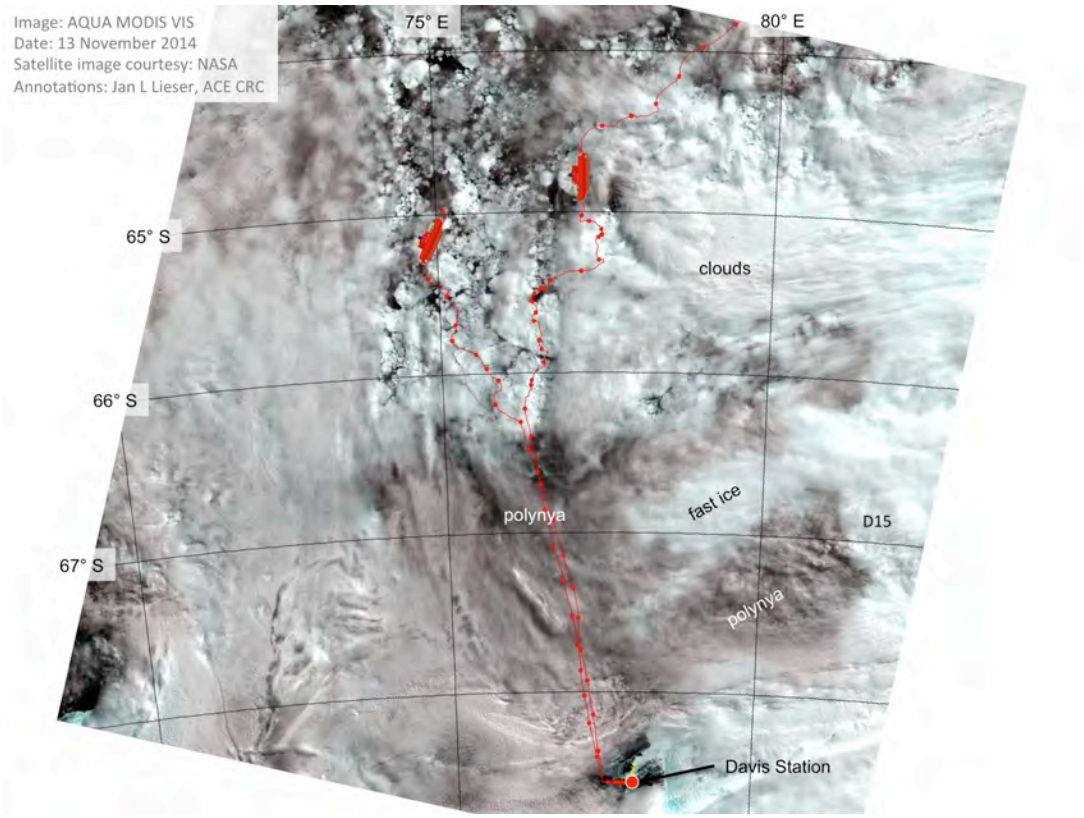


Figure 1: MODIS image, acquired 13/11/2014 and provided by NASA.

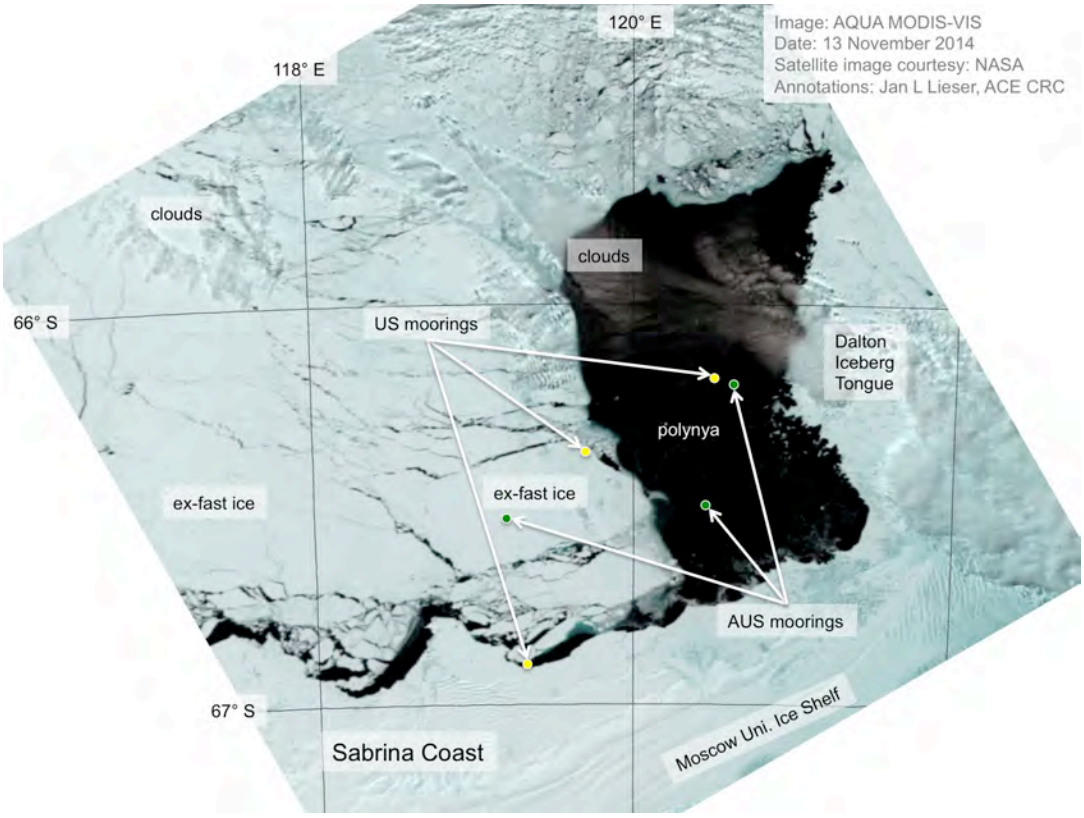


Figure 2: MODIS image, acquired 13/11/2014 and provided by NASA.

Sea Ice Report #25b/2014

by the AAD/ACE CRC Sea Ice Group

18/11/2014

This report provides an assessment of sea-ice conditions of eastern Prydz Bay and off the Larsemann Hills.

- **Zhongshan and Progress stations**
  Figure 1 shows a visual image of the eastern Prydz Bay region only partly obscured by clouds. The fast ice off the Larsemann Hills, the location of Zhongshan and Progress stations, extents about 16 nautical miles in northwesterly direction. West of 76° E, a mixture of remaining sea ice and breaking off fast ice can be seen all along the face of the Amery Ice Shelf. The polynya appears well maintained by offshore winds and the recent low pressure system passing north of the sea-ice zone.

  Figure 2 provides a larger overview of sea-ice concentration in the region, derived from passive microwave data. The white arrow in the sea-ice zone between 65° S and 66° S indicates the general drift direction of a band of very high (up to 100%) sea-ice concentration. Recently, RSV *Aurora Australis* negotiated the region successfully transiting this band roughly between 75° E and 77° E. North of 65° S and between 73° E and 75° E, medium high to high sea-ice concentration of predominantly first year sea ice exceeding one metre in level ice thickness plus up to 40 cm of snow cover on top exists. South of 66° 30' S and east of 75° E, sea ice in the polynya is generally thin and of low concentration.

With best regards,

Jan.

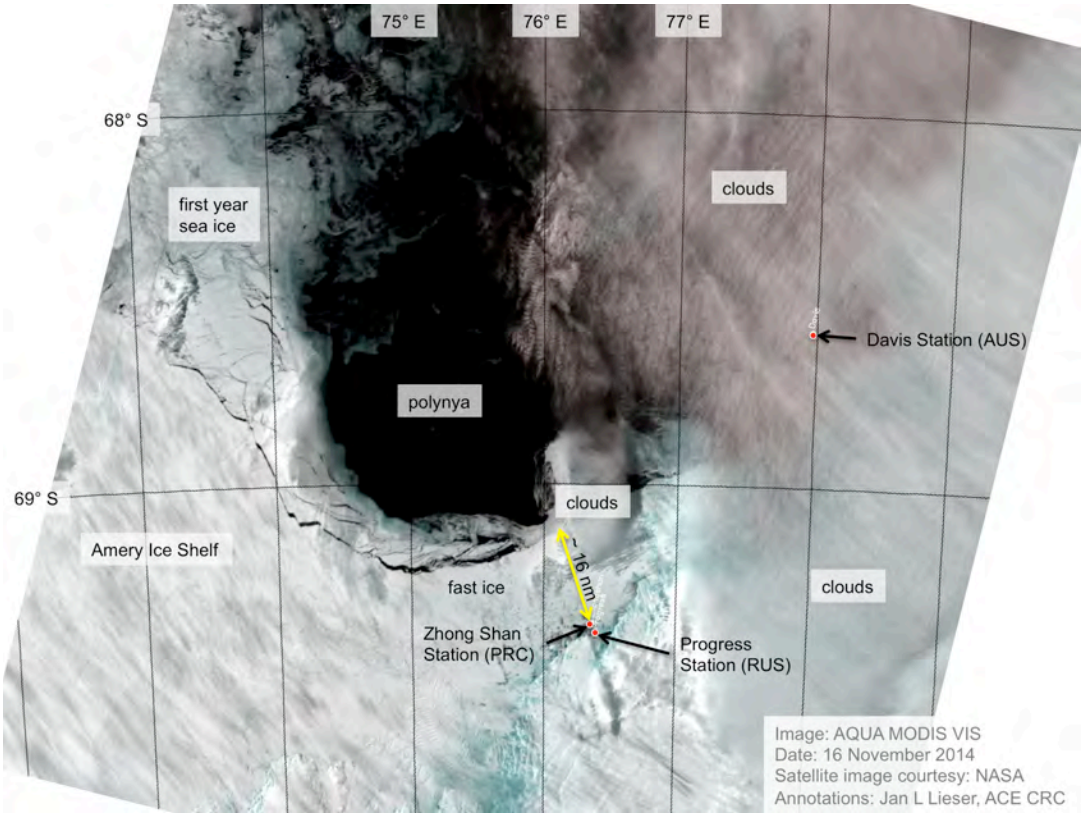


Figure 1: MODIS image, acquired 16/11/2014 and provided by NASA.

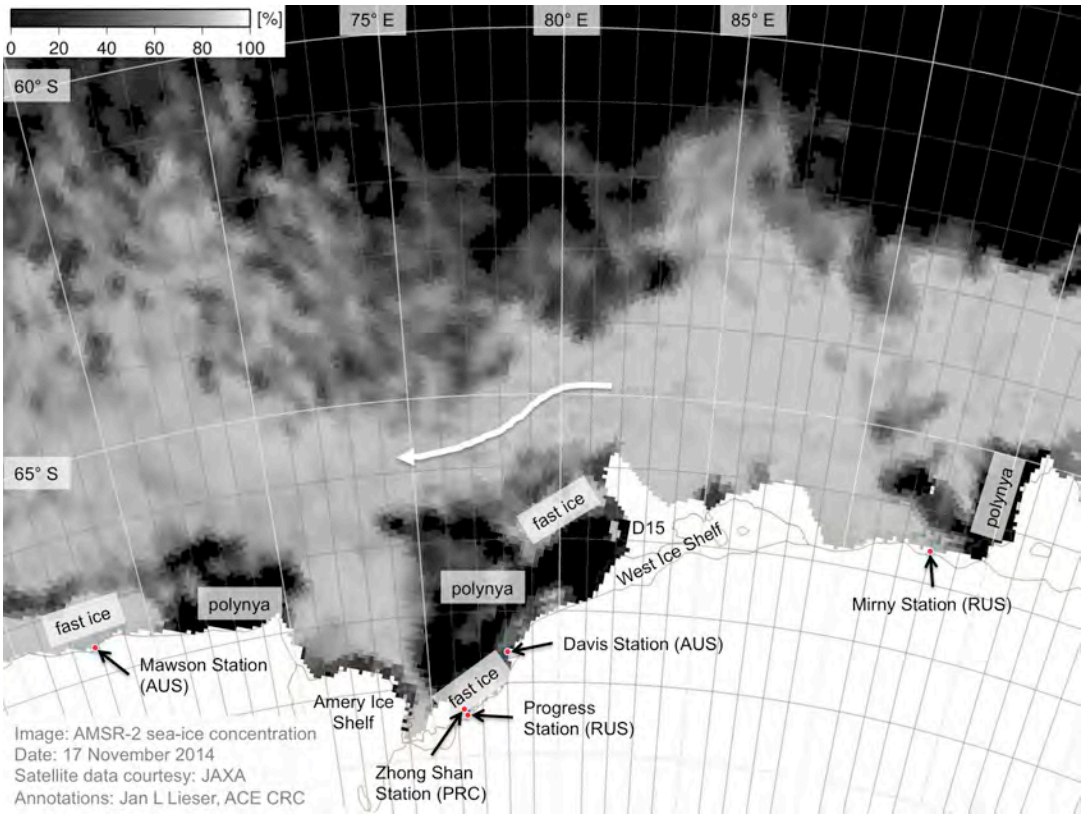


Figure 2: AMSR-2 image, acquired 17/11/2014 and provided by Drift & Noise Polar Services.

Sea Ice Report #25c/2014

by the AAD/ACE CRC Sea Ice Group

19/11/2014

This report provides an appreciation of the first Sentinel-1a image received for RSV *Aurora Australis*.

- **Davis Station**
  Figure 1 shows a high resolution Synthetic Aperture Radar (SAR) image of the Vestfold Hills. It is the first available image of an Australian base from the Sentinel satellite series. The imagery is provided courtesy of European Space Agency (ESA).

  The Sentinel-1a SAR is a replacement of the Advanced SAR (ASAR) on-board the ENVISAT satellite. On 08 April 2012, communication with the ENVISAT satellite was suddenly lost after ten successful years in orbit.

  The path of RSV *Aurora Australis* through the fast ice towards Davis Station can clearly be seen as a whitish (rough surface) line. The bright spot at the end of the line is the good ship (VNAA).

With best regards,

Jan.

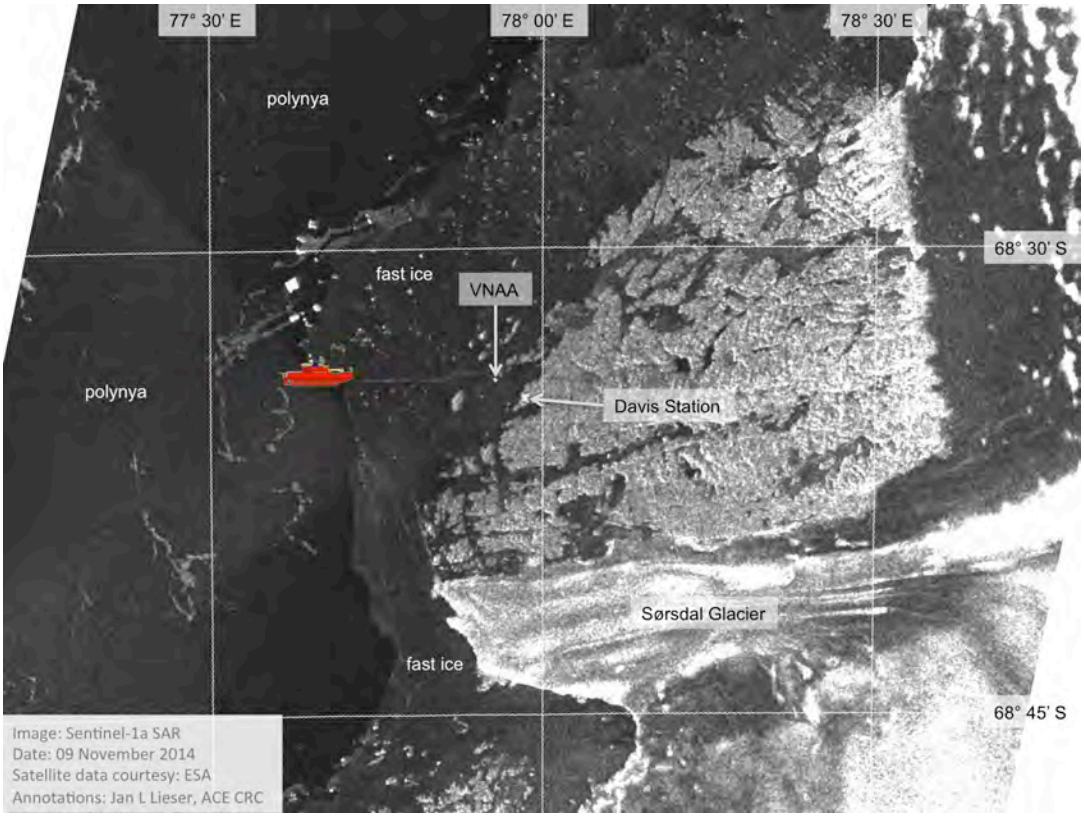


Figure 1: SAR image, acquired 09/11/2014 and provided by ESA.

Sea Ice Report #26/2014

by the AAD/ACE CRC Sea Ice Group

20/11/2014

This report examines sea-ice conditions off all Australian Antarctic stations and the regions of marine science interest for the upcoming Voyage-2 of RSV *Aurora Australis*.

- **Mawson Station**
  Figure 1 shows the Antarctic coast between Mawson Station and Cape Darnley and the sea ice to the north of it. During the past week, a sheet of accumulated pack ice against the fast ice off Mawson Station, about 15 nautical miles wide, has broken away from the eastern end of the fast ice, west of 66° E. About one degree further east from there, a large iceberg (annotated in Figure 1) has collided with a large patch of fast ice, currently to the southeast of the berg, and mobilised about 50% of the patch, which is now drifting with the westward current. Also, some ice has started to break away from the fast ice to the east of Cape Darnley.

  Between 65° S and about 67° S, pack ice of various floe sizes and high to very high concentration is drifting predominantly westward in a compact band. Lesser concentration sea ice is found north of 65° S and currently reaching beyond (north of) 60° S.

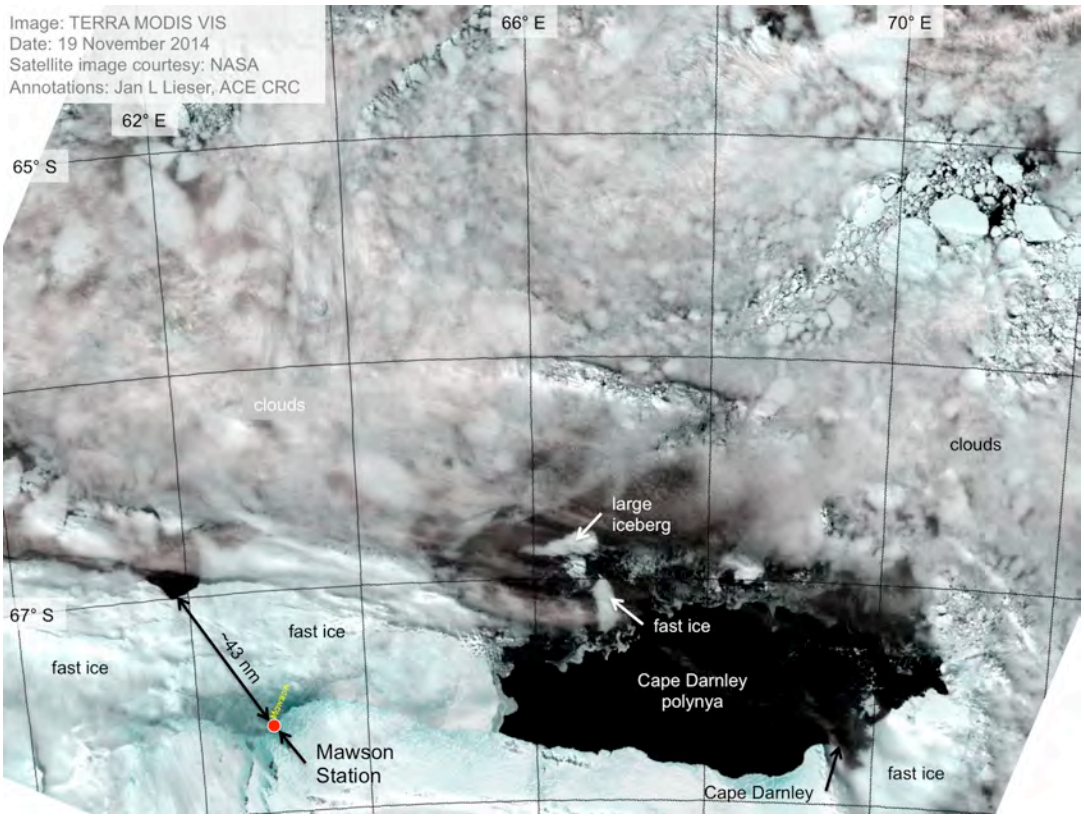


Figure 1: MODIS image, acquired 19/11/2014 and provided by NASA.

- **Davis Station**
  The fast ice off Davis Station and to the north of it has started to break off, since RSV *Aurora Australis* has left. The face of Sørsdal Glacier is already free of fast ice, as well as the outer islands of the Rauer Group.

- **Casey Station**
  Off Casey Station, the eastern part of Vincennes Bay is currently free of sea ice, up to the northern end of the fast ice attached to the northwestern coast of Law Dome. Between about 64° S and the northern top of the aforementioned fast ice is a band of very high concentration sea ice with various floe sizes. Between 107° E and 112° E, the northern pack ice edge is approximately at 62° 30' S, with some strips and patches of sea ice even further north of that.

- **Sabrina Coast**
  Figure 2 shows the region north of Sabrina Coast, between Law Dome and the Dalton Iceberg Tongue, almost entirely obscured by clouds. However, open water can be detected as darker patches through the cloud cover. The polynya west of the Dalton Iceberg Tongue remains active, and the ex-fast ice off the eastern flank of Law Dome remains mobile, even though it does not escape the embayment, yet. The pack ice north of this embayment reaches as far north as 63° 30' S, which is about one degree latitude further south than the pack ice edge described in the previous section.

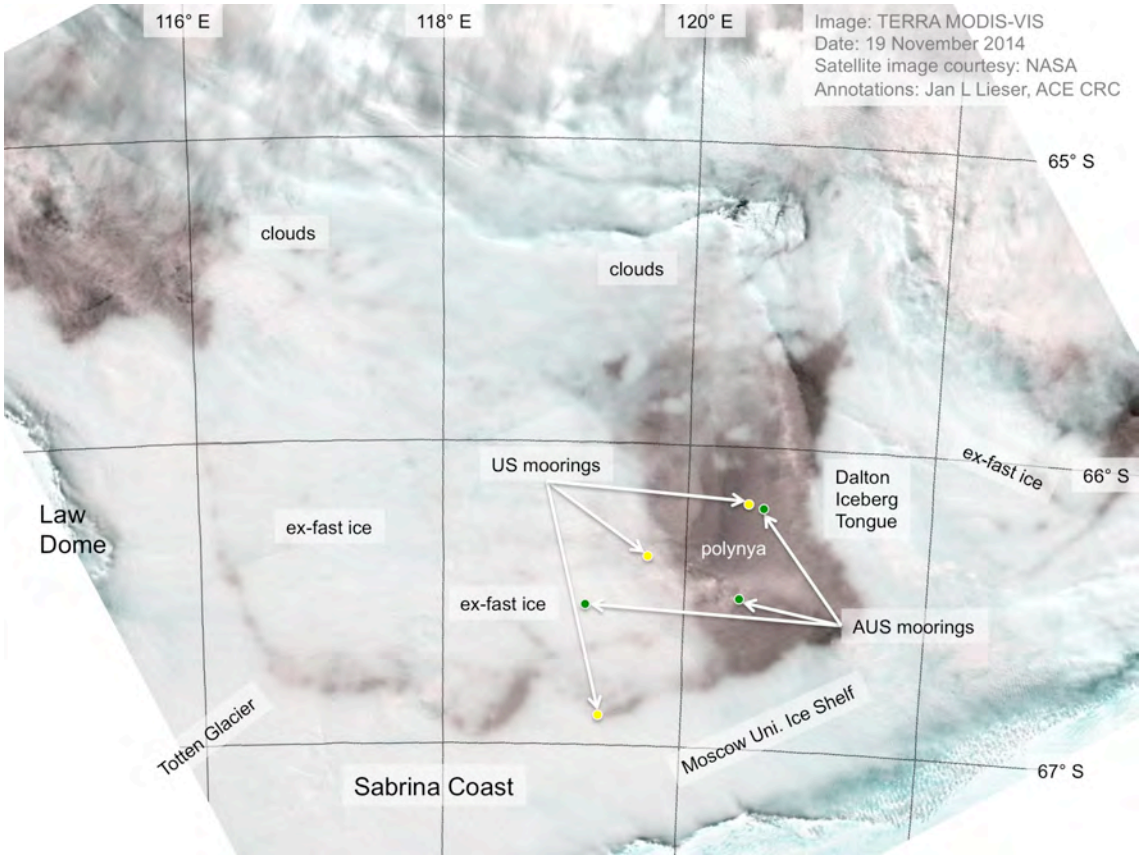


Figure 2: MODIS image, acquired 19/11/2014 and provided by NASA.

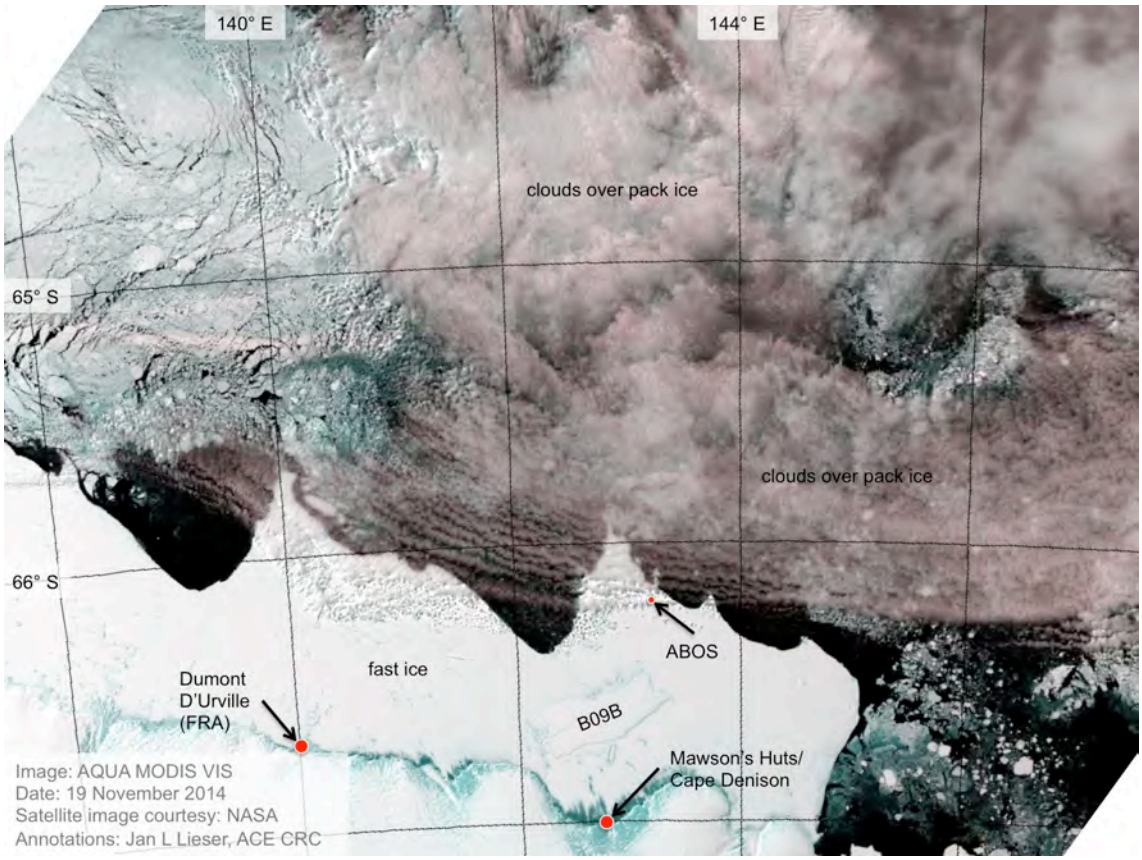


Figure 3: MODIS image, acquired 19/11/2014 and provided by NASA.

- **Commonwealth Bay**
  Figure 3 gives a cloud-free view of the fast ice between Dumont d'Urville Station and the Mertz Glacier polynya. The location of the ABOS mooring is still covered by fast ice. The pack ice to the north of the fast ice is partly obscured by clouds. It shows patchy sea-ice concentration in the area with a band of very high concentration between 64° S and 65° 30' S, west of approximately 143° E. The remaining regions of the figure show medium high to high sea-ice concentration.

With best regards,

Jan.

Sea Ice Report #26a/2014

by the AAD/ACE CRC Sea Ice Group

20/11/2014

This report provides an assessment of sea-ice conditions of eastern Prydz Bay and off the Larsemann Hills.

- **Zhongshan Station**
  Figure 1 shows a very high resolution (30 metres) visible image of the fast ice off the Larsemann Hills and the locations of Zhongshan Station and its neighbouring Progress and Bharati stations. The fast ice extends about 16 nautical miles in a northwesterly direction, plus about two nautical miles of recently accumulated pack ice that is temporarily fastened as well. West of 76° E, a few fault lines between icebergs are marked in the figure.

  A larger overview of sea-ice concentration in the region is provided in Figure 2. The white arrow in the sea-ice zone between 64° 30' S and 65° 30' S indicates the general drift direction of a band of very high (up to 100%) sea-ice concentration. Overall, the sea-ice zone is contracting towards the south, as the sea-ice edge is retreating with the advancing summer conditions. The general sea-ice drift pattern within Prydz Bay north of the Amery Ice Shelf is northwestward, expanding the polynya off the Vestfold Hills and Larsemann Hills.

With best regards,

Jan.

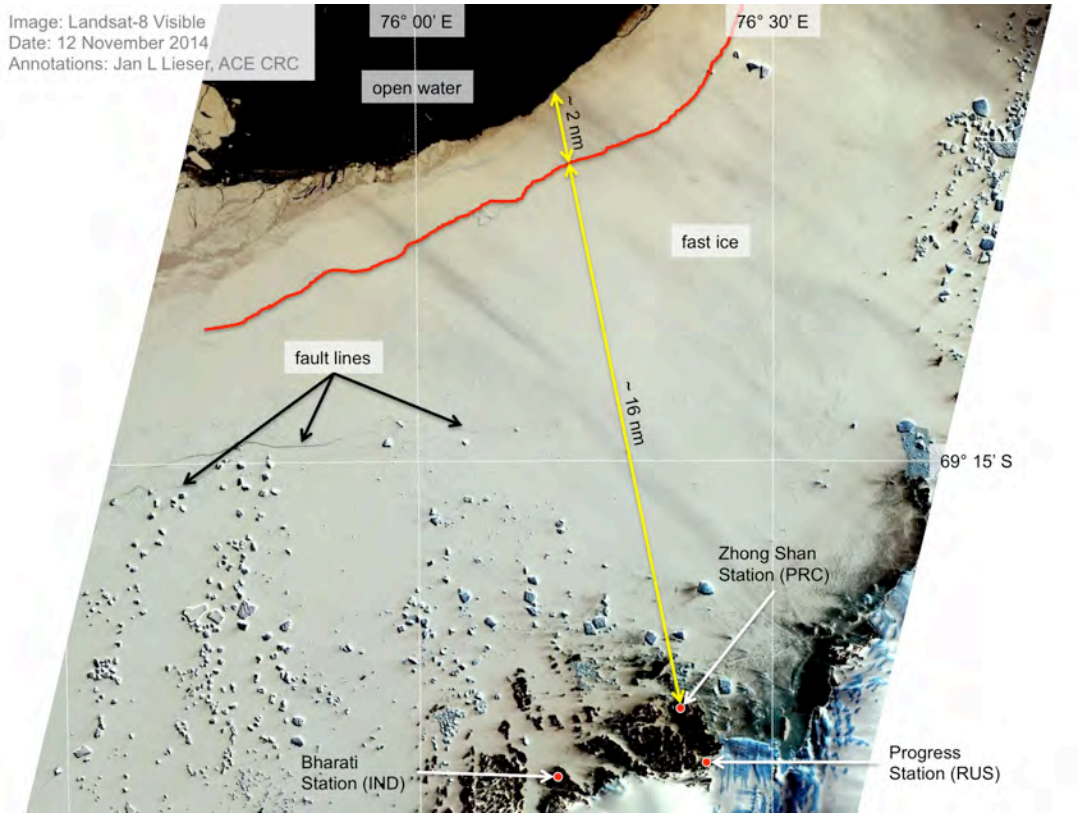


Figure 1: Landsat-8 image, acquired 12/11/2014.

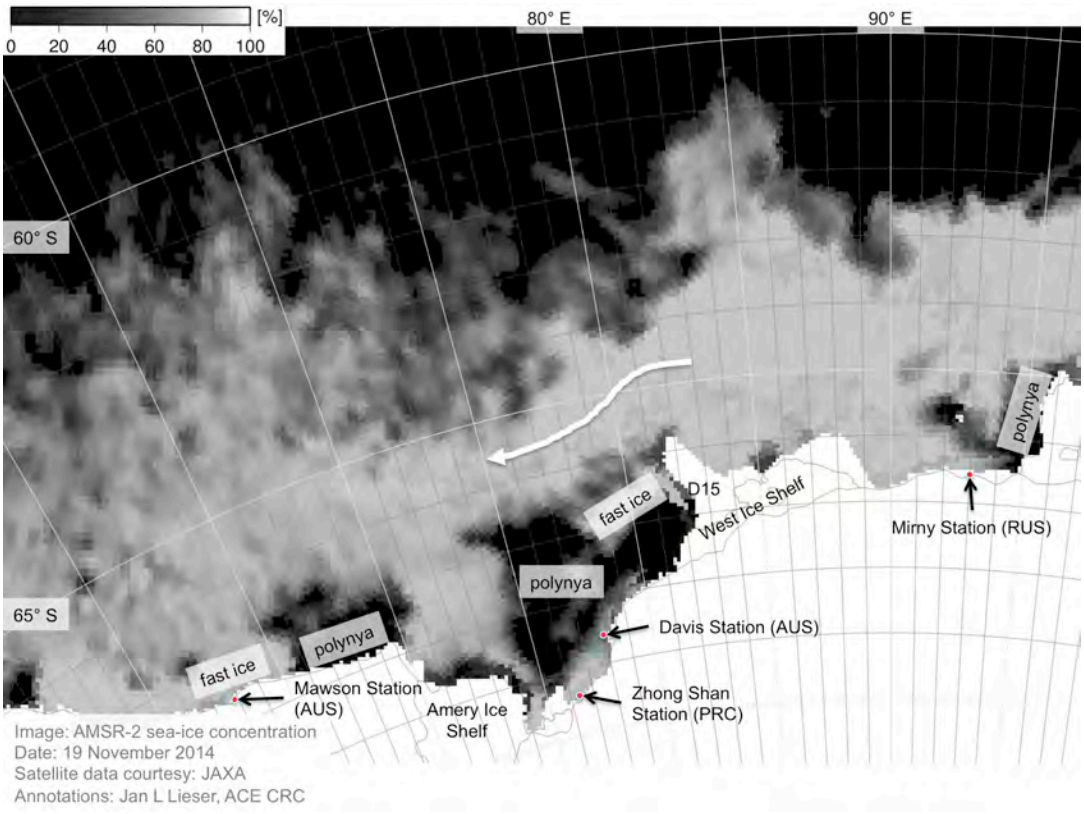


Figure 2: AMSR-2 image, acquired 19/11/2014 and provided by Drift & Noise Polar Services.

Sea Ice Report #27/2014

by the AAD/ACE CRC Sea Ice Group*

27/11/2014

This report examines sea-ice conditions off all Australian Antarctic stations and the regions of marine science interest for the upcoming Voyage-2 of RSV *Aurora Australis*.

- **Mawson Station**
  Sea ice is showing more signs of early summer retreat in Prydz Bay and north of Mawson Station. The western edge of the Prydz Bay polynya off the Vestfold and Larsemann hills has migrated about 50 nautical miles westward, from 75° E to about 73° E during the past week. At the same time, the northward drift of sea ice in western Prydz Bay (between 71° E and 73° E) has strengthened and more fast ice has broken off the eastern side of Cape Darnley.

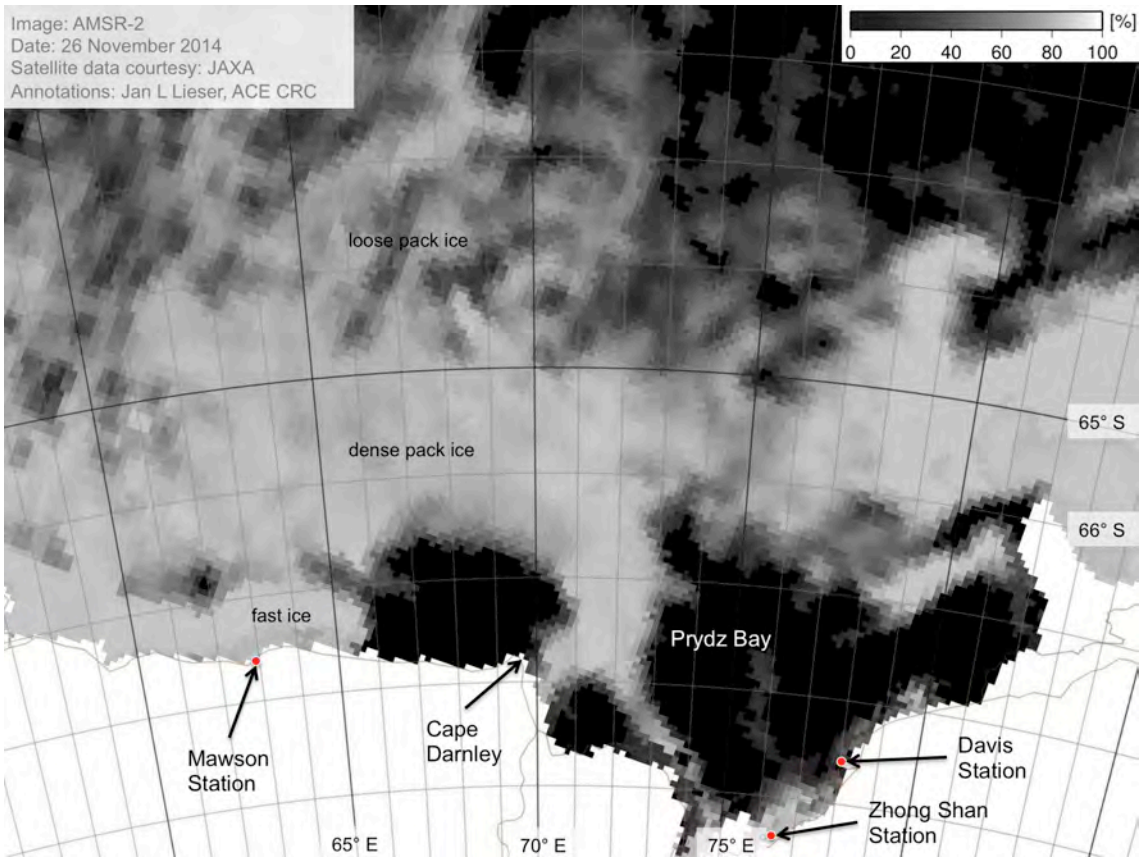


Figure 1: AMSR-2 image, acquired 26/11/2014 and provided by Drift & Noise Polar Services.

*Disclaimer: *While every effort has been made to ensure that data is accurate, the information is provided without warranty of any kind whatsoever including any warranties as to the accuracy of the data or its performance or fitness for a particular use or purpose whatsoever. Figures and charts provided in this report are not for navigation.*

- **Casey Station**
  North of 65° S and east of 109° E, the sea-ice concentration is only moderate to medium-high due to a recent low pressure system passing in the north. This area is marked with an orange shape in Figure 2. South of that area, fast ice (roughly outlined by the red line in Figure 2) remains attached to the northwestern side of Law Dome. Between 65° S and the northern edge of that fast ice at about 65° 25' S, a small band of potentially heavily deformed very high sea-ice concentration (100%) lies north of the polynya off Casey Station.

  Sea-ice conditions in the polynya west of the Dalton Iceberg Tongue remain largely unchanged. The northern sea-ice edge between 115° E and 125° E (and even further east) has been compacted recently and exhibits a very defined northern boundary.

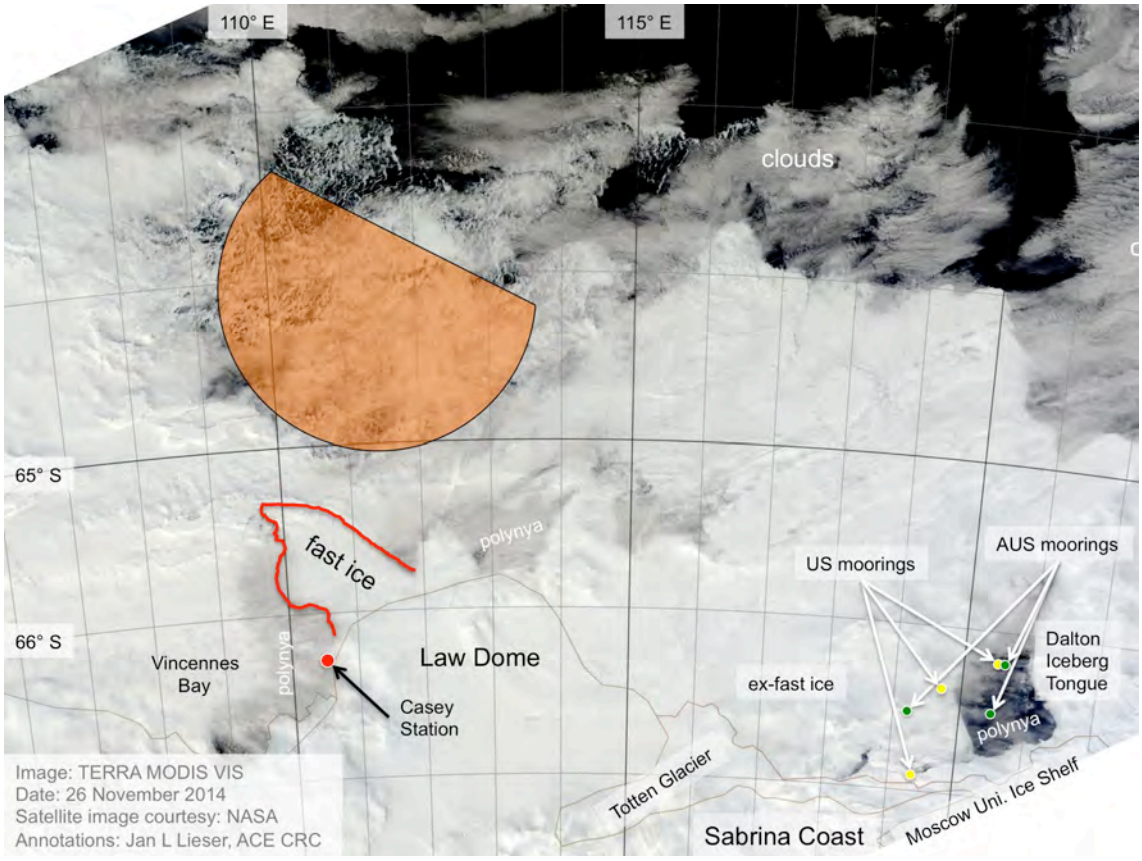


Figure 2: MODIS image, acquired 26/11/2014 and provided by NASA.

- **Commonwealth Bay**
  The overall fast ice distribution off Commonwealth Bay and Dumont d'Urville Station has not changed significantly during the past week, but small bits of fast ice are breaking away from the main body of fast ice north of iceberg B09B. Another large iceberg remains centred at 142° 57' E and 66° 09' S. The location of the ABOS mooring is still covered by fast ice to the southeast of this berg and about two

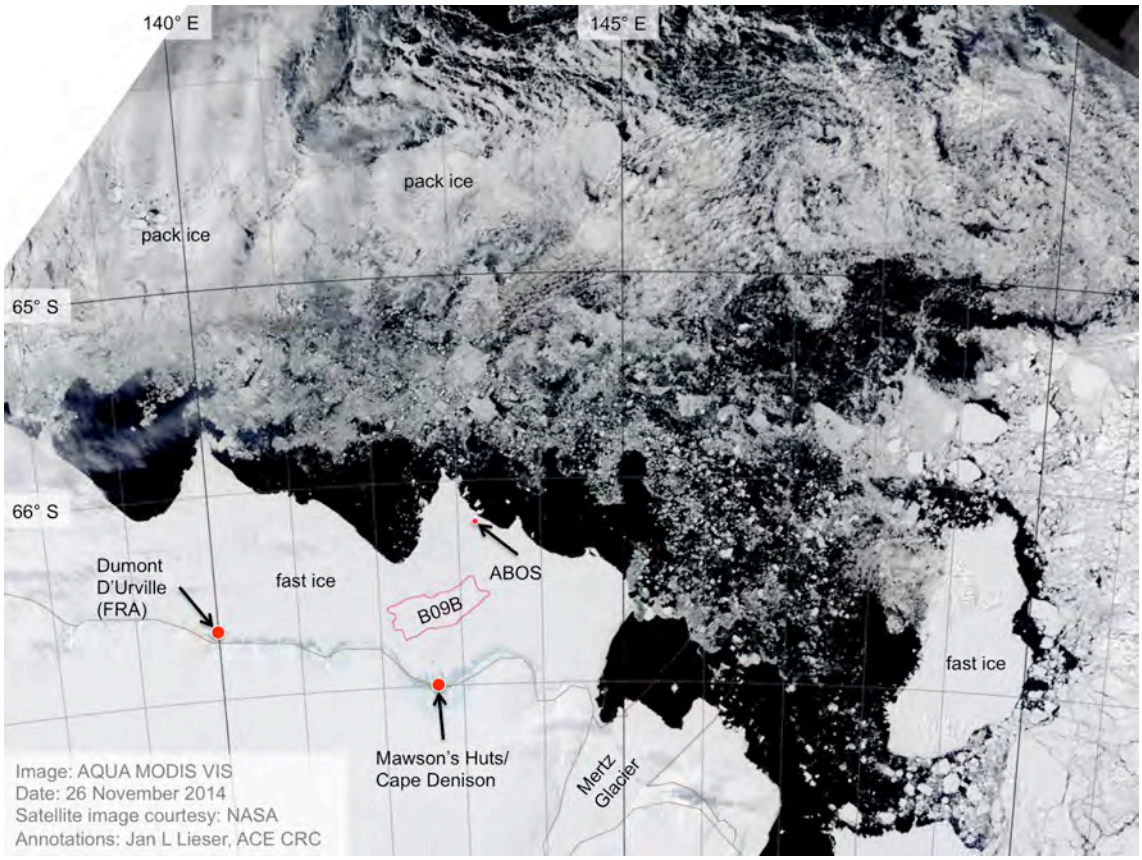


Figure 3: MODIS image, acquired 26/11/2014 and provided by NASA.

nautical miles (at a bearing of about 210°) south of the fast ice edge.

North of the Mertz Glacier Polynya, sea-ice concentration is low to moderate between 145° E and 150° E, especially south of 65° S. West of 145° E and north of 65° S, a band of high concentration sea ice remains.

With best regards,

Jan.

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Sea Ice Report #27a/2014

by the AAD/ACE CRC Sea Ice Group*

01/12/2014

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a sea-ice concentration map for the Ross Sea and adjacent areas. The blue and cyan lines indicate the 30-year (1981-2010) median sea-ice extent for November and December, respectively, in the region. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected currently.

  Overall, the sea ice edge as shown in the passive microwave data (AMSR-2) lies between the median lines for November and December, at the end of November (30/11/2014). The coastal polynya off the Ross Ice Shelf is starting to form and is indicated in the figure.

  Between 65° S and the Ross Ice Shelf polynya, the main body of the pack ice appears of very high concentration, especially west of 180° E. North of 67° S, the outer part of this pack ice is particularly dense with only minor cracks and openings criss-crossing the sea ice and only short strips and patches extending north from the sea-ice edge. West of 180° E and south of 67° S, some very large floes can be identified in visual imagery, but still at very high concentration with only small patches of openings around those floes.

  East of 180° E, sea-ice concentration appears to be a bit lower, but still at high levels between 75% and 90%. Again, the outer part of this region, north of 67° S, is highly compacted and of very high concentration.

With best regards,

Jan.

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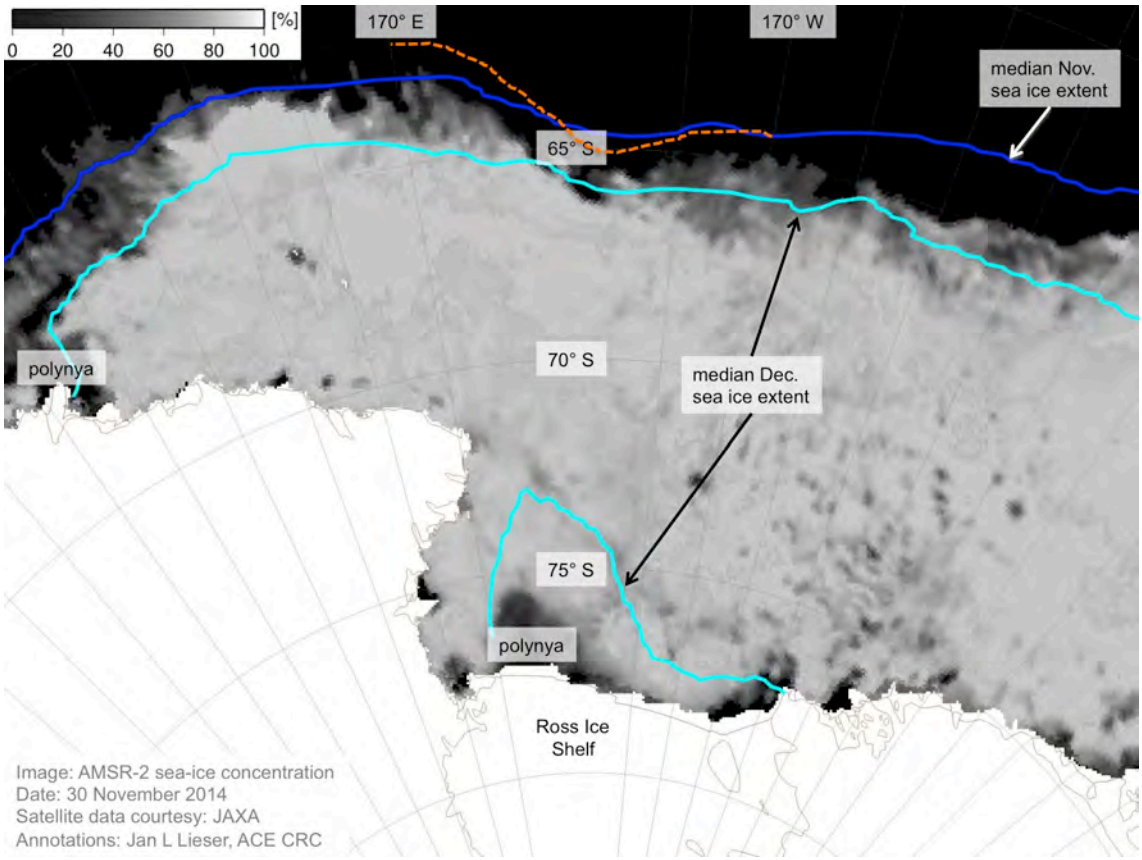

Figure 1: AMSR-2 image, acquired 30/11/2014 and provided by Drift & Noise Polar Services.

Sea Ice Report #28/2014

by the AAD/ACE CRC Sea Ice Group*

04/12/2014

This report examines sea-ice conditions off all Australian Antarctic stations and the regions of marine science interest for the upcoming Voyage-2 of RSV *Aurora Australis*.

- **Mawson Station**
  Figure 1 shows the Antarctic coast between Mawson and Davis stations. The extent of the fast ice off Mawson Station appears largely unchanged since last week, but the fast ice island in the middle of the Cape Darnley polynya (see Figure 1 of Sea Ice Report #26/2014 for reference) has disintegrated and more little bits of fast ice are breaking off the large body of fast ice to the east of Cape Darnley. A large iceberg is moving westward north of the fast ice edge off Mawson Station and is currently centred at about 66° 42' S and 63° 47' E.

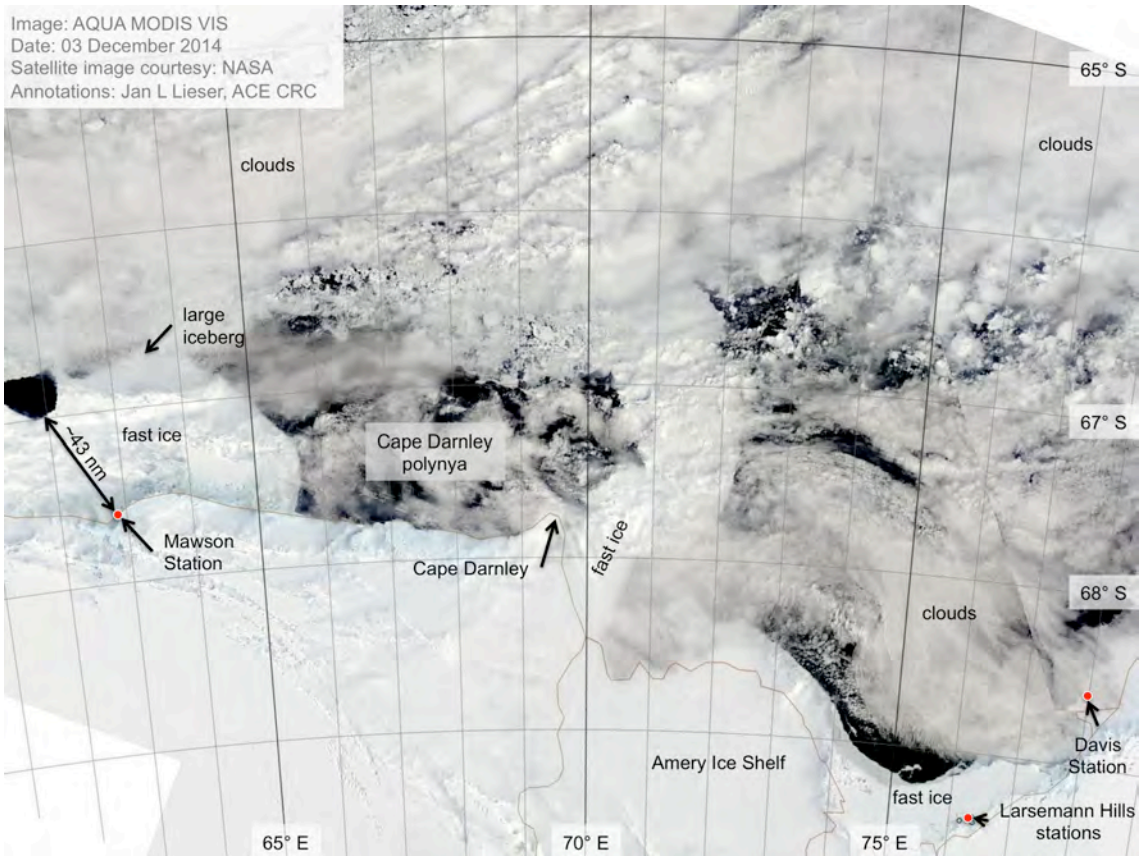

Figure 1: MODIS image, acquired 03/12/2014 and provided by NASA.

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In Prydz Bay, the pack ice is retreating further in general and the eastern edge of the pack ice, which is squeezing northward past the fast ice east of Cape Darnley, is about to cross 72° E westward.

- **Casey Station**
  The eastern part of Vincennes Bay (off Casey Station) remains largely sea ice free, while the western part is still fully covered by sea ice. During the past week, the extent of the fast ice attached to the northwestern side of Law Dome is largely unchanged, but the pack ice to the north of it is retreating further south. While some sea ice can be found north of 64° S, especially along 110° E, the band of very high concentration sea ice immediately north of the fast ice north of Casey Station (see Sea Ice Report #27/2014) has thinned in north-south extent. Its northern edge towards the very open pack ice is now south of 65° S, at about 65° 10' S between 109° 30' E and 111° 30' E.

  In the polynya west of the Dalton Iceberg Tongue, the ex-fast ice had broken into many pieces but has recently been pushed south again and compacted against the coast. The locations of six moorings are indicated in Figure 2. The three western moorings are under changing sea-ice cover, while the three eastern moorings are in the open water of the polynya.

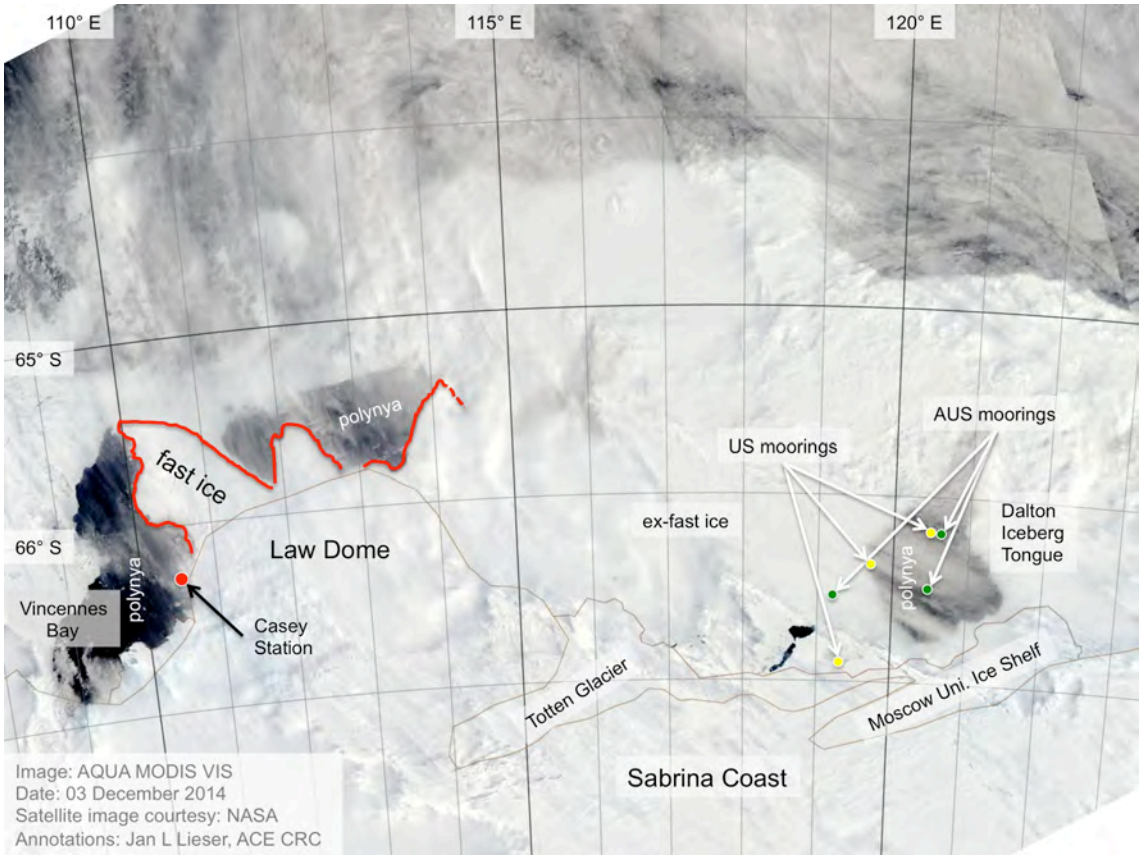

Figure 2: MODIS image, acquired 03/12/2014 and provided by NASA.

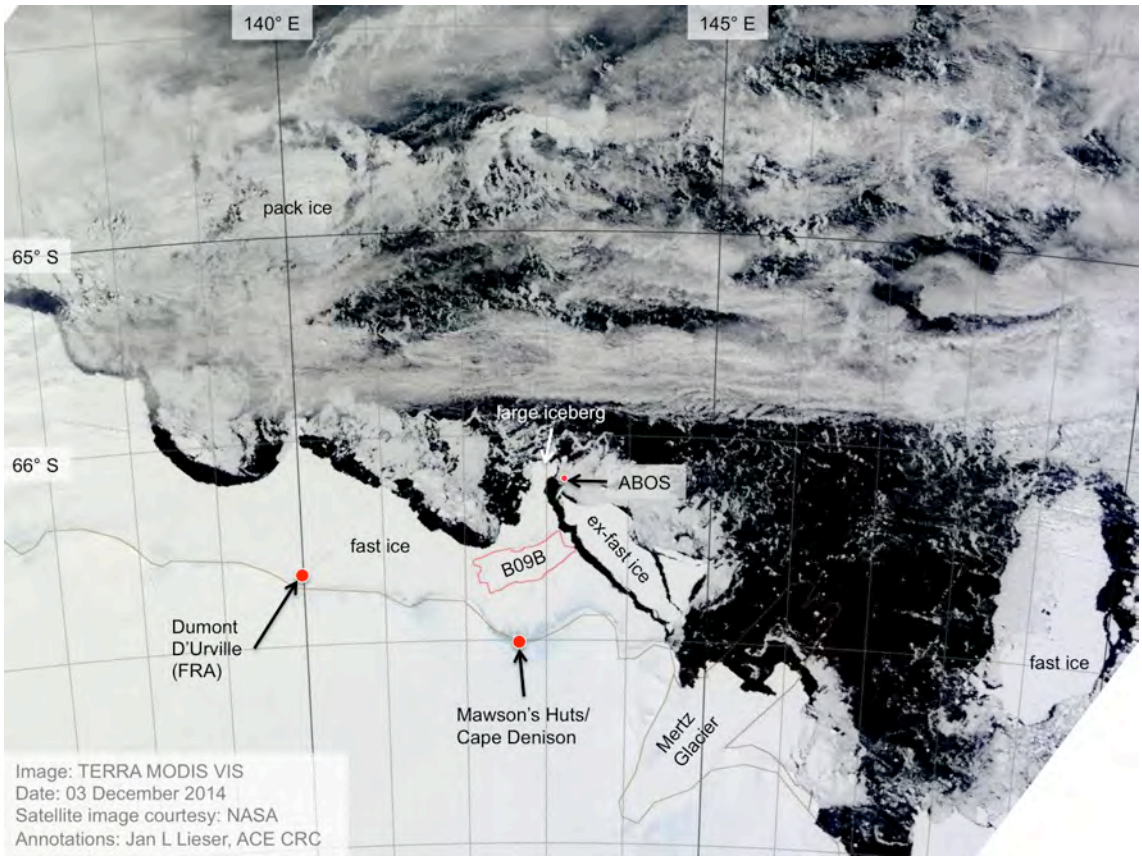

Figure 3: MODIS image, acquired 03/12/2014 and provided by NASA.

- **Commonwealth Bay**
  During the past week, significant pieces of fast ice have broken off from the large area of fast ice west of the Mertz Glacier, and further west between iceberg B09B and Dumont d'Urville Station, as well as to the west of 140° E. To the east of iceberg B09B alone, more than 5,000 square kilometres of old fast ice have broken away (about the size of Trinidad, or six times the size of iceberg B09B). As a result of this large scale break-off, the location of the ABOS mooring is now covered by drifting ex-fast ice. The large iceberg north of iceberg B09B remains still in place and attached to some fast ice connected to iceberg B09B.

  North of the fast ice edge, the pack ice shows further signs of reduction and declining concentration.

With best regards,

Jan.

Sea Ice Report #28a/2014

by the AAD/ACE CRC Sea Ice Group*

08/12/2014

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas. The cyan line indicates the 30-year (1981-2010) median sea-ice extent for December in the region. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected currently.

  The northern edge of the sea-ice zone has not shifted significantly during the past week. But between 160° E and 160° W, the general movement of the pack ice is in northerly directions. The non-movement of the northern edge of the sea-ice zone, in concert with the prevailing sea-ice drift indicates that sea ice is melting at the northern ice edge, which is consistent with summer conditions. However, the comparison of present sea-ice extent with the median sea-ice extent indicates that the area covered by sea ice is still above average in early December.

  The overall northward sea-ice drift has resulted in a further opening of the Ross Sea polynya off the Ross Ice Shelf, and the detachment of pack ice from fast ice between 160° E and 170° E. This separation and the associated coastal lead can clearly be seen in the sea-ice concentration map.

  In general, sea-ice conditions in the region are similar to last week's conditions. West of 180° E and between 65° S and 75° S, sea-ice concentration is typically higher than east of 180° E.

With best regards,

Jan.

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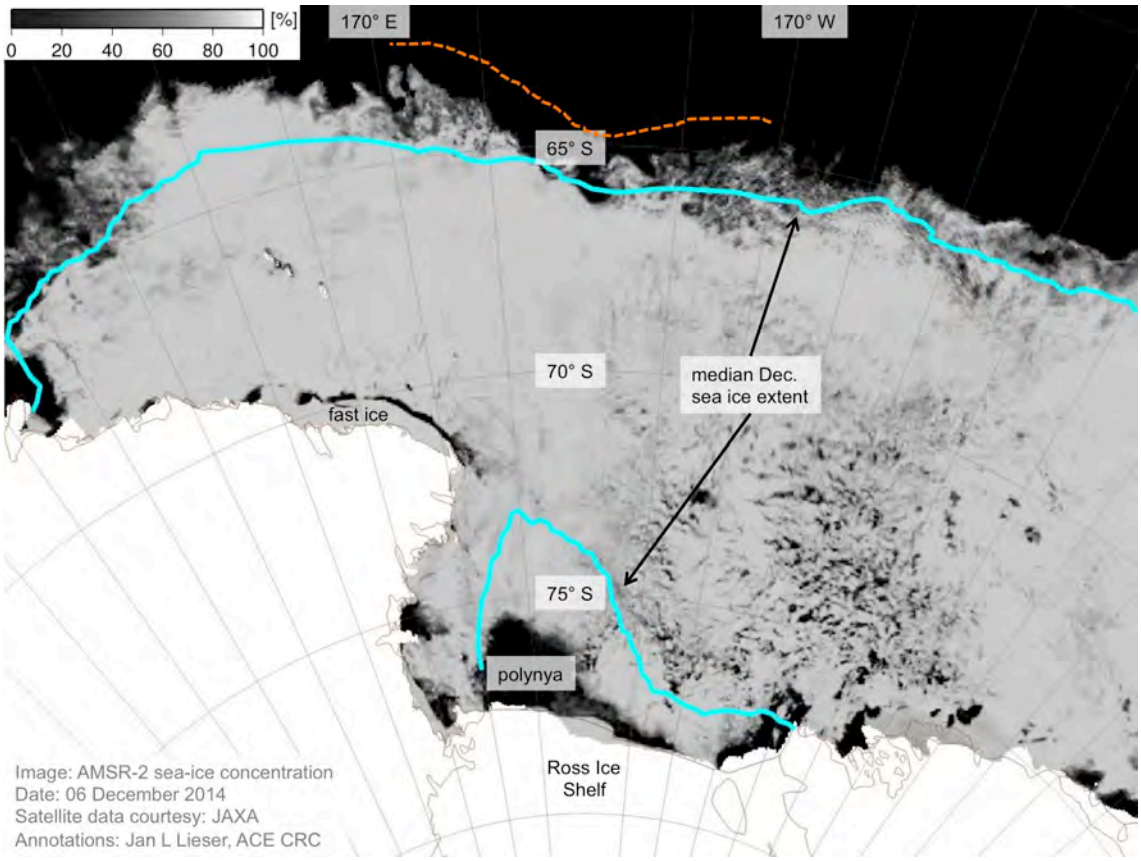

Figure 1: AMSR-2 image, acquired 06/12/2014 and provided by Universität Hamburg.

Sea Ice Report #28b/2014

by the AAD/ACE CRC Sea Ice Group*

04/12/2014

This report updates on sea-ice conditions in regions of Marine Science interest for Voyage-2 of RSV *Aurora Australis*.

- **Totten Glacier**
  Off the Totten Glacier, the ex-fast ice is quite dynamic. It has broken into further pieces but remains largely in the embayment between Law Dome and the Dalton Iceberg Tongue, north of Sabrina Coast. Three of the marked moorings in Figure 1 are in open water of the polynya, three are covered by broken ex-fast ice. To the east of the Dalton Iceberg Tongue, ex-fast ice has also broken further into smaller floes.

  Between 115° E and 125° E, the northern sea-ice edge is well defined and compacted.

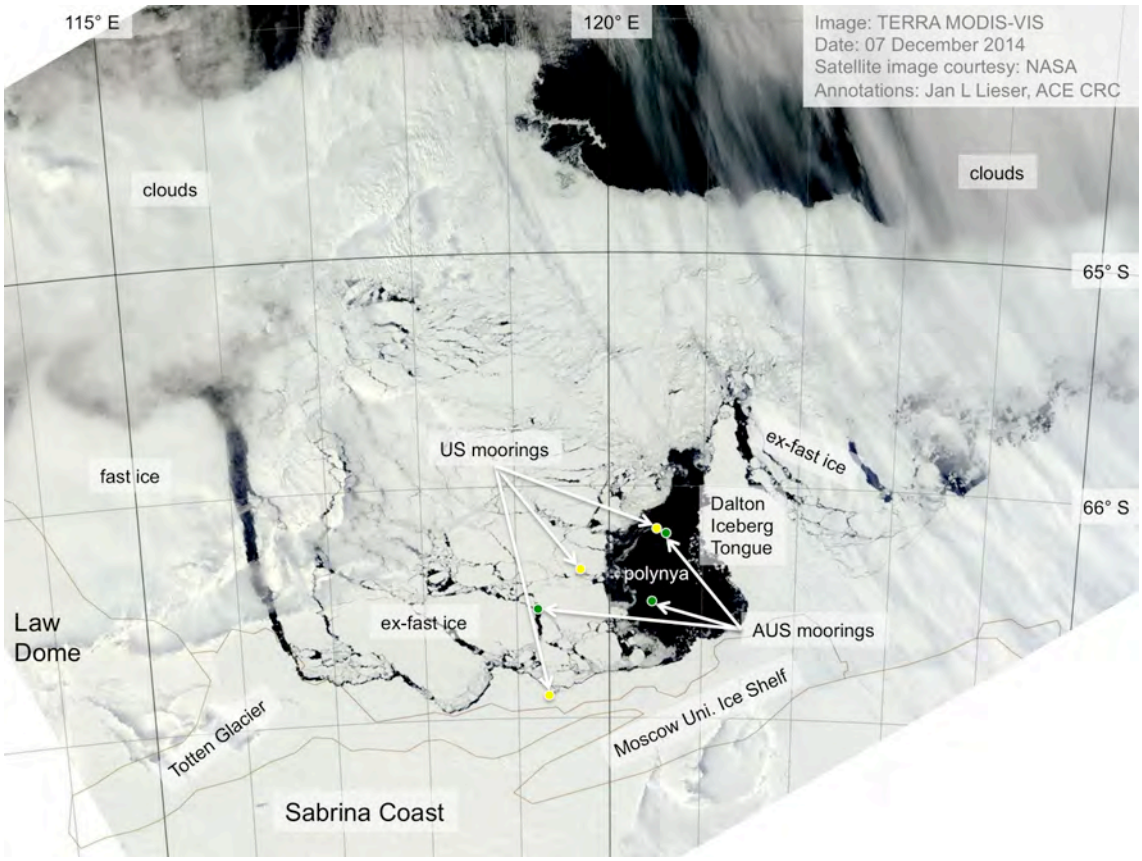

Figure 1: MODIS image, acquired 07/12/2014 and provided by NASA.

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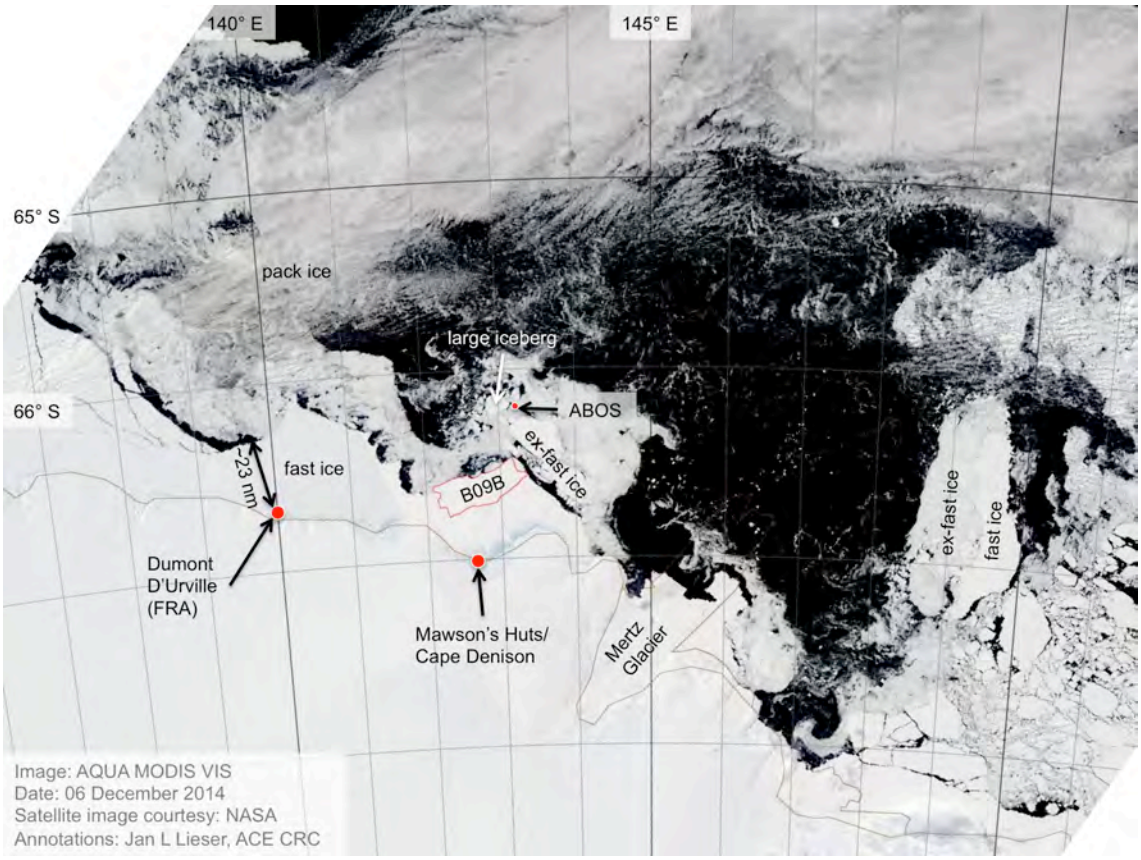

Figure 2: MODIS image, acquired 06/12/2014 and provided by NASA.

- **Commonwealth Bay**
  The break-up of fast ice in the region continues at a remarkable pace, see Figure 2. Further to the disintegration described in Sea Ice Report #28/2014, fast ice has shattered north of iceberg B09B and almost the entire northwestern length of the berg is now clear of any sea ice. The large iceberg north of iceberg B09B is now free of fast ice around it. The shortest distance between Dumont D'Urville Station and the polynya northwest of the station is has reduced to about 23 nautical miles, from about 34 nautical miles three days earlier (see Sea Ice Report #28/2014).

  Between 148° 30' E and 150° E, about two-thirds of the large fast ice island has shattered.

  The ABOS mooring is currently covered by ex-fast ice at a high concentration.

With best regards,

Jan.

Sea Ice Report #28c/2014

by the AAD/ACE CRC Sea Ice Group*

04/12/2014

This report updates on fast ice conditions off Mawson Station.

- **Mawson Station**
  Figure 1 shows an entirely cloud free scene of the Mawson Coast. The large iceberg drifting westward north of the fast ice edge can be seen centred at 61° 53' E and 66° 35' S. Its pointy southern end has recently collided with the northern tip of the fast ice off Mawson Station and shattered it (indicated by the red-shaded triangle).

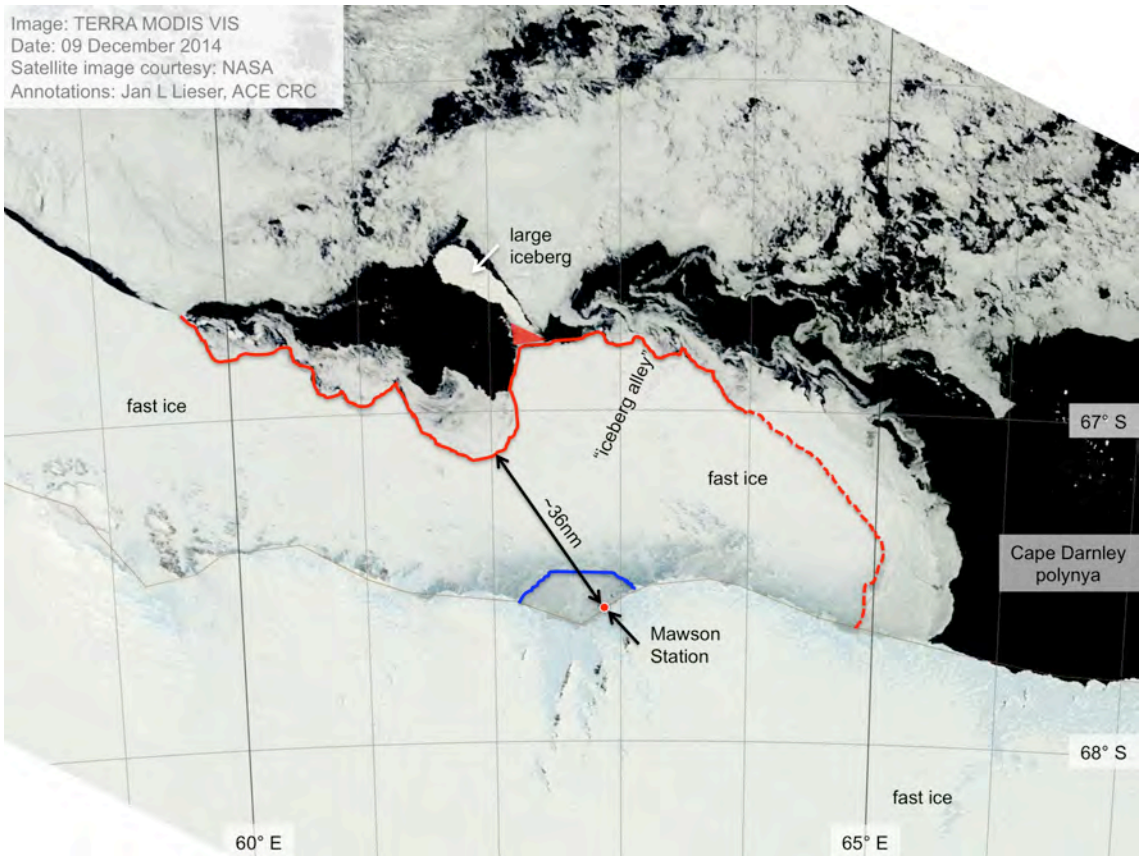

Figure 1: MODIS image, acquired 09/12/2014 and provided by NASA.

The large body of fast ice north of Mawson Station shows early signs of retreat. The largest proportion of fast ice has broken away from the edge of the so-called north-west polynya, reducing the distance between the fast ice edge and the station to about 36 nautical miles. The new fast ice edge is drawn as a red line in Figure 1. The dashed

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eastern end of the fast ice edge is only approximate, as some pack ice has accumulated at this side of the fast ice body.

Also, a distinct difference in the surface signature of the coastal fast ice can be seen in the visible image of Figure 1 and is indicated by the blue line.

With best regards,

Jan.

Sea Ice Report #29/2014

by the AAD/ACE CRC Sea Ice Group*

11/12/2014

This report examines sea ice conditions off Mawson, Casey and Dumont d'Urville stations and RSV *Aurora Australis*' Voyage 2 marine science interest.

- **Mawson Station**
  Off Mawson Station, fast ice continues to break up. The distance to the so-called northwest polynya is currently about 35 nautical miles (Figure 1). The large iceberg (annotated in the figure) continues its drift westward with a slight angular momentum.

  The pack ice is clearly separated from the fast ice and the coast, with the only exception to this east of the fast ice east of Cape Darnley. Summer conditions are more and more visible with general reduction of sea-ice concentration and major openings appearing in the pack ice, for example as indicated by the yellow double arrow.

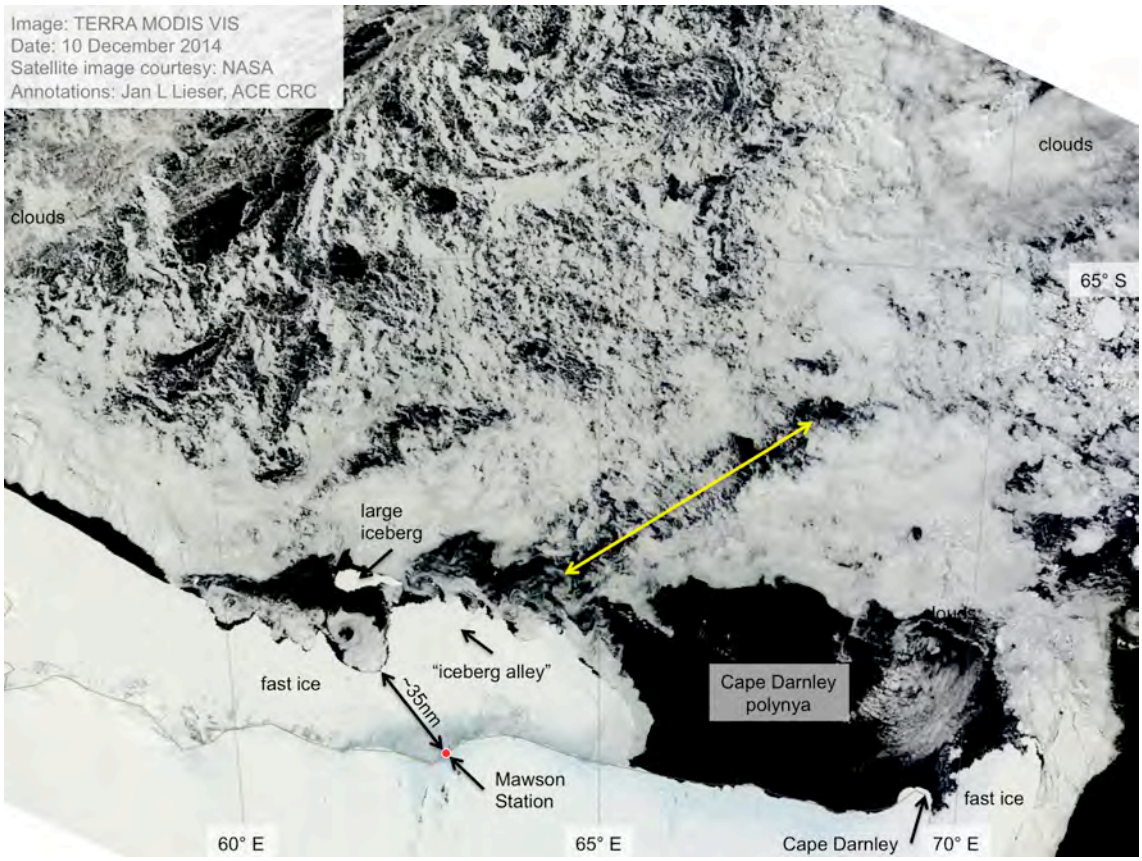

Figure 1: MODIS image, acquired 10/12/2014 and provided by NASA.

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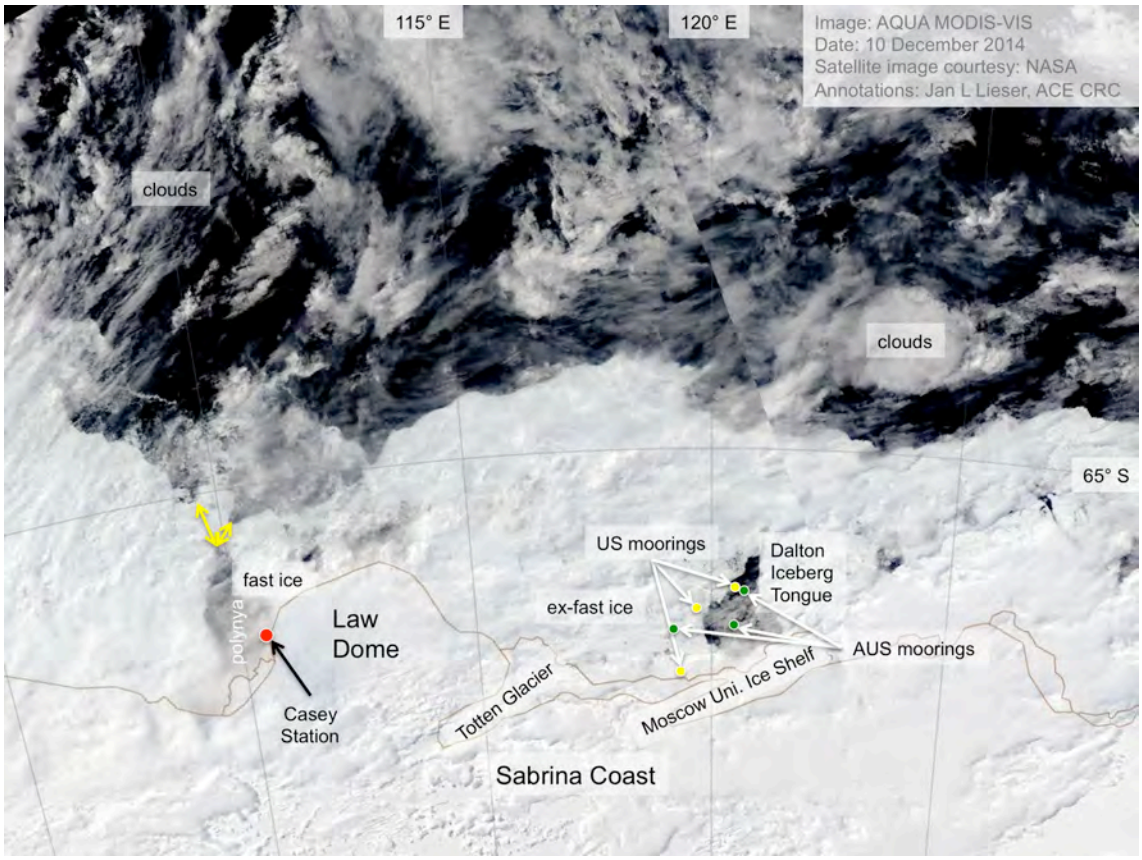

Figure 2: MODIS image, acquired 10/12/2014 and provided by NASA.

- **Casey Station**
  The polynya in the eastern part of Vincennes Bay off Casey Station is a persistent feature. The fast ice attached to the northwestern flank of Law Dome remains also approximately constant in shape. But the pack ice to the north of the northern tip of this fast ice is reducing further. The shortest distances between the open water in the north and the polynya through high concentration sea ice is between 14 nautical miles and 28 nautical miles (indicated with the two yellow double arrows northwest of Casey Station in Figure 2).

  North of Sabrina Coast, the pack ice has a sharply defined northern sea ice edge and appears to be pushing south against the ex-fast ice off the Totten Glacier and Moscow University Ice Shelf. The polynya west of the Dalton Iceberg Tongue appears well maintained. The distance between the open water in the north and the northern part of the polynya is about 70 nautical miles in north-south direction.

- **Commonwealth Bay**
  Fast ice break-up continues off Dumont d'Urville Station and Commonwealth Bay (Figure 3). Almost three sides of iceberg B09B are now free of fast ice and fast ice retreated almost back to the coast, west of the berg. The blue double arrow indicates a distance of about 4 nautical miles. The large iceberg north of iceberg B09B

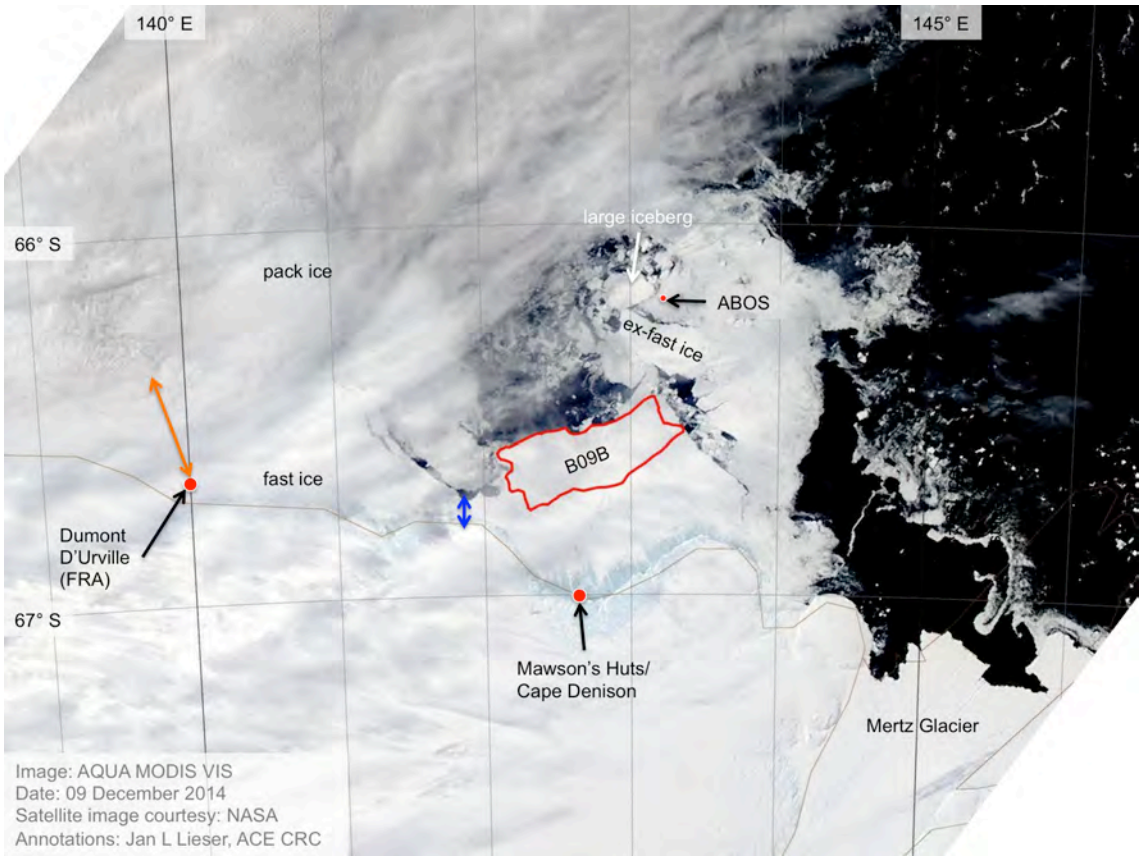

Figure 3: MODIS image, acquired 09/12/2014 and provided by NASA.

(annotated) remains grounded and a large sheet of ex-fast ice is still between these icebergs. The location of the ABOS mooring is covered by pieces of ex-fast ice with localised high concentration.

Northwest of Dumont d'Urville Station, the fast ice edge is about 19 nautical miles from the station, at about 139° 66' E and 66° 37' S (indicated by the orange double arrow).

With best regards,

Jan.

Sea Ice Report #29a/2014

by the AAD/ACE CRC Sea Ice Group*

15/12/2014

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas. The cyan line indicates the 30-year (1981-2010) median sea-ice extent for December in the region. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected currently. Figure 2 shows the same geographical frame as Figure 1, but MODIS visible imagery overlain on the sea ice concentration map. Large parts of the sea ice are obscured by clouds in the MODIS imagery.

  The northern edge of the sea-ice zone is retreating slowly southward, but is still north of the median extent. This is consistent with anomalously high sea-ice concentration that was observed throughout spring in the region. Also, the polynya off the face of the Ross Ice Shelf remains smaller than usual as a result of higher (more southward) sea-ice extent.

  The very high sea-ice concentration area of the Ross Sea has shifted about 5 degrees in longitude eastward. As a result the boundary between this region and the lower sea-ice concentration is now roughly at 175° W, south of 70° S, and at about 170° W, north of 70° S.

  Another feature of this general eastward sea-ice drift is the large body of open water east of the Balleny Islands clearly detectable in both, the sea-ice concentration map and the visible imagery (Figure 1 and Figure 2, respectively), centred at about 163° 45' E and 66° 25' S.

With best regards,

Jan.

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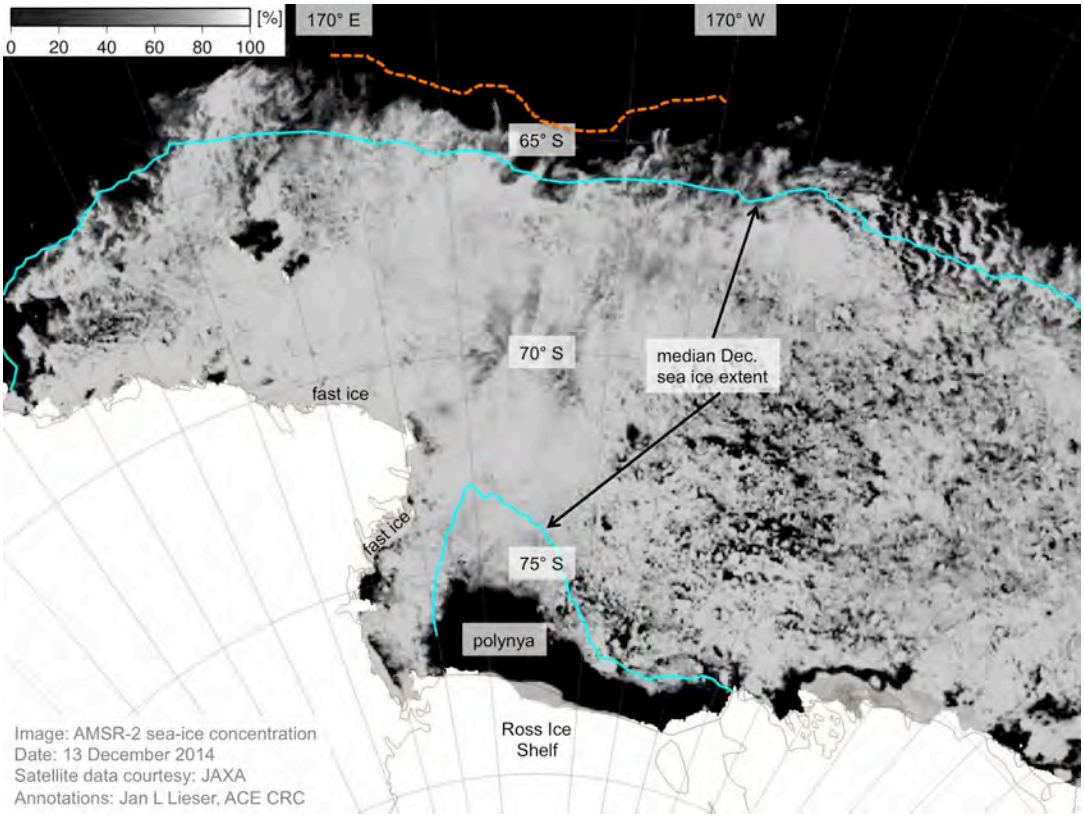

Figure 1: AMSR-2 image, acquired 13/12/2014 and provided by Universität Hamburg.

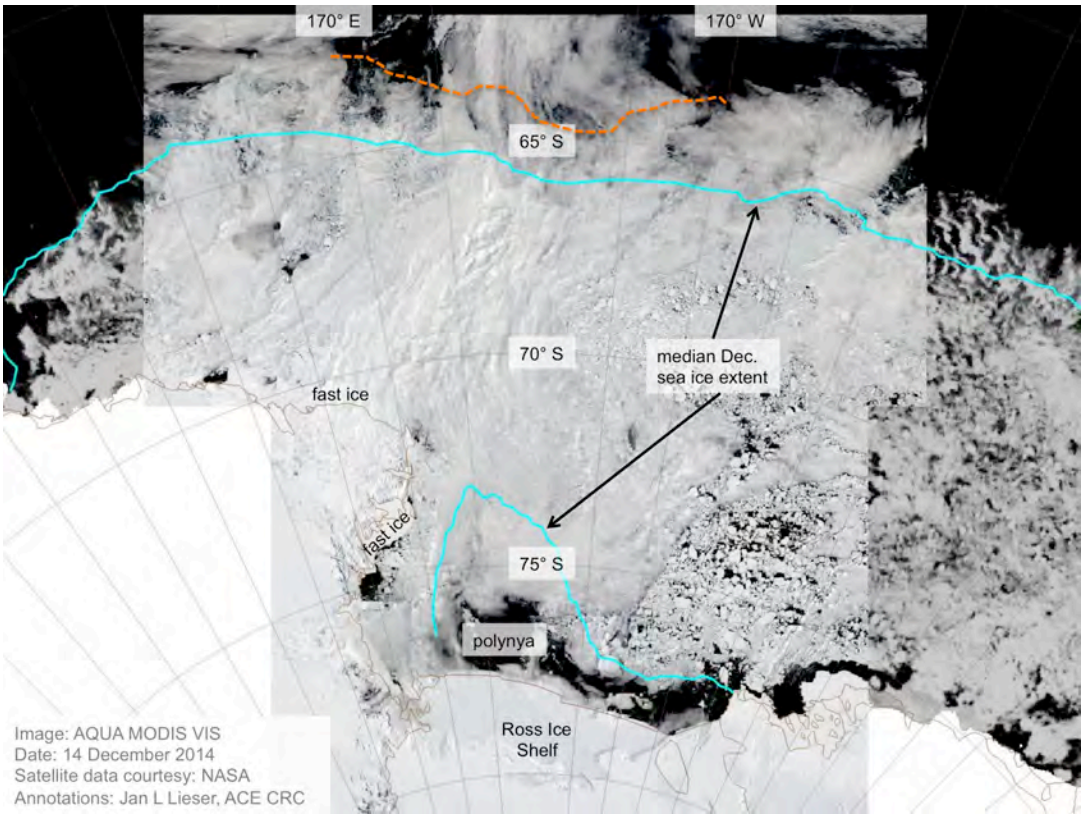

Figure 2: MODIS image, acquired 14/12/2014 and provided by NASA.

Sea Ice Report #30/2014

by the AAD/ACE CRC Sea Ice Group*

18/12/2014

This report examines sea ice conditions off Mawson, Casey and Dumont d'Urville stations and RSV *Aurora Australis*' Voyage 2 marine science interest.

- **Mawson Station**
  Off Mawson Station, fast ice continues to break up. The distance to the so-called northwest polynya is currently about 28 nautical miles (see yellow double arrow in Figure 1), down from about 35 nautical miles a week ago. The large iceberg (see Sea Ice Report #29/2014) continues its westward drift and is currently centred at about 60° 15' E and 66° 40' S.

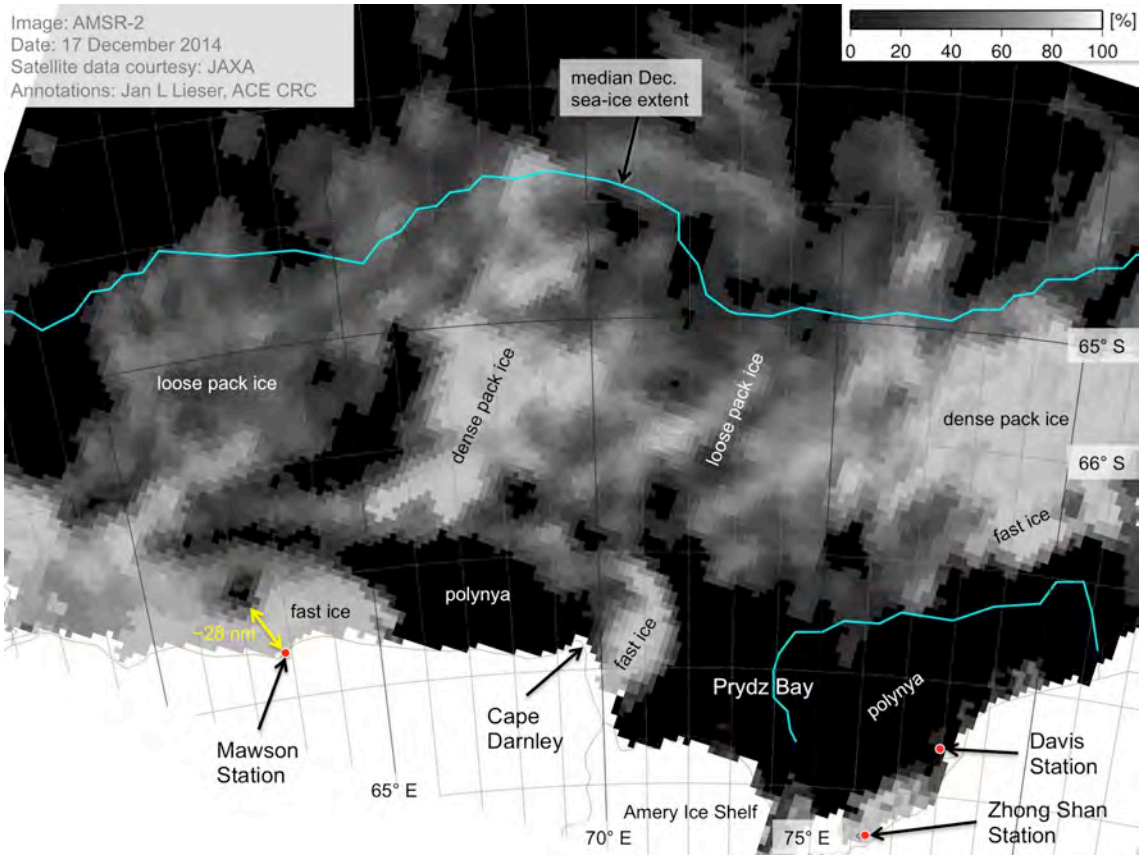

Figure 1: AMSR-2 image, acquired 17/12/2014 and provided by Drift & Noise Polar Services.

The cyan line in Figure 1 indicates the 30-year (1981-2010) median sea-ice extent for December. While the sea-ice edge (and therefore the sea-ice extent) is much further north than the median, the pack

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ice shows very patchy concentration and Prydz Bay polynya is much wider than usual.

- **Casey Station**
  Figure 2 provides a visible impression of the sea-ice conditions between Casey Station and the Dalton Iceberg Tongue. The northern and western part of the scene is obscured by clouds but the open water of polynyas and the open ocean shines through the clouds. The northern sea-ice edge can be clearly identified as a well defined boundary, between 25 nautical miles and 50 nautical miles south of the 30-year median sea-ice extent (marked as a cyan line in the figure).

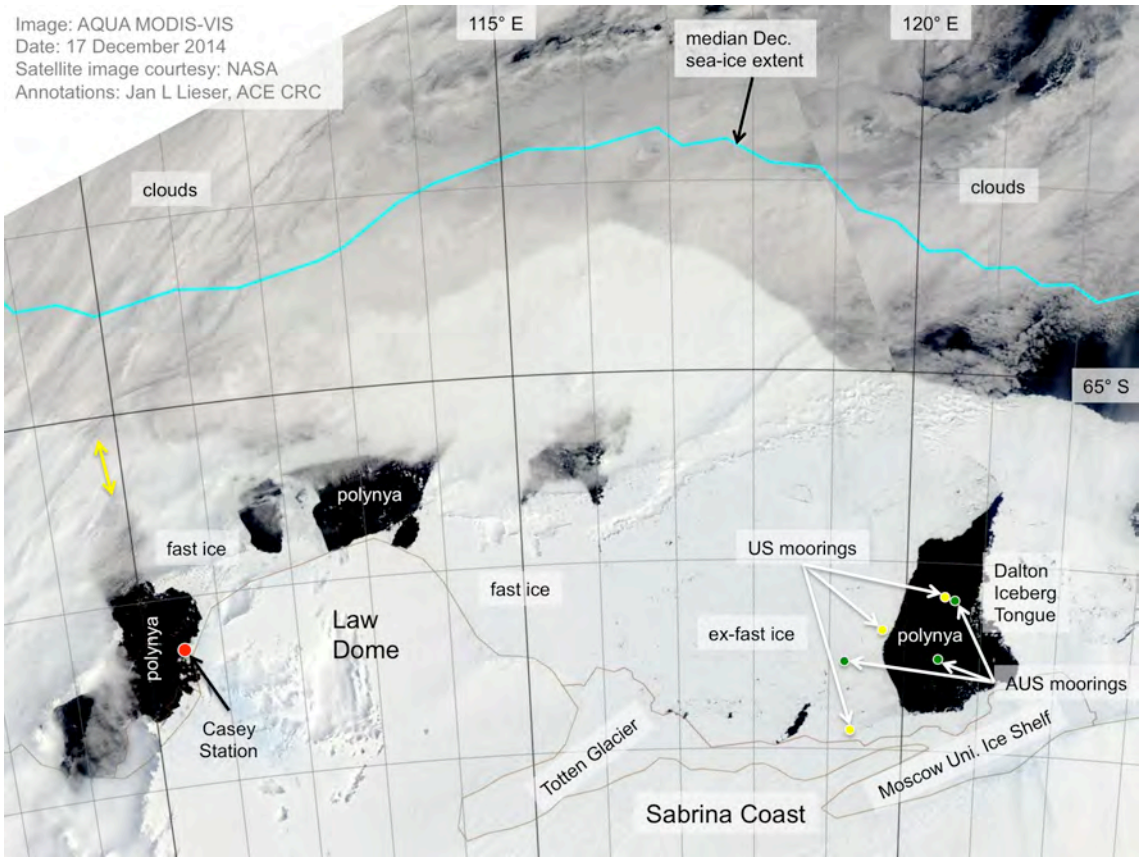

Figure 2: MODIS image, acquired 17/12/2014 and provided by NASA.

The polynya in the eastern part of Vincennes Bay off Casey Station is expanding slightly. The fast ice attached to the northwestern flank of Law Dome remains approximately constant in shape. But the sea-ice edge north of the northern tip of this fast ice is progressing southward. The shortest distance between the open water in the north and the polynya is about 20 nautical miles (indicated by the yellow double arrow northwest of Casey Station in Figure 2) through high concentration sea ice. The boundary between the fast ice off the eastern side of Law Dome and the ex-fast ice north of Sabrina Coast is undetermined but most likely along 116° E.

The polynya west of the Dalton Iceberg Tongue is separated from the open ocean by very high concentration pack ice extending about 30-50 nautical miles in north-south direction. The three western sites of the moorings marked in Figure 2 remain under sea-ice cover.

- **Commonwealth Bay**
  Off Dumont d'Urville Station and Commonwealth Bay, general fast ice conditions have not changed significantly. West of iceberg B09B, fast ice retreated further back to the coast, down to just over one nautical mile (for reference see the blue double arrow in Figure 3 of Sea Ice Report #29/2014). The location of the ABOS mooring is covered by high concentration of ex-fast ice east of the large grounded iceberg north of iceberg B09B.

  Northwest of Dumont d'Urville Station, the fast ice edge remains just under 19 nautical miles away from the station.

With best regards,

Jan.

Sea Ice Report #30a/2014

by the AAD/ACE CRC Sea Ice Group*

18/12/2014

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas. The cyan line indicates the 30-year (1981-2010) median sea-ice extent for December in the region. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected currently.

  The northern sea-ice edge is retreating slowly southward, but is still north of the median extent. The polynya off the face of the Ross Ice Shelf is growing in extent, but remains smaller than usual as a result of higher (more southward) sea-ice extent. Terra Nova Bay is now largely free of sea ice.

  Between 170° E and 170° W, and 65° S and 75° S, the pack ice shows general signs of summer conditions with decreasing (more patchy) sea-ice concentration. Some large and very large sea-ice floes (up to 20 nautical miles across) can be identified within the central part of the pack ice, which are embedded in a matrix of smaller floes, most of which are still large enough to be individually identified in visible remote sensing imagery (for example from MODIS instrument).

  The general eastward sea-ice drift is obvious in the large body of open water east of the Balleny Islands, at the downwind side of the islands, which act as obstacles. This polynya is centred at about 163° 45' E and 66° 15' S.

With best regards,

Jan.

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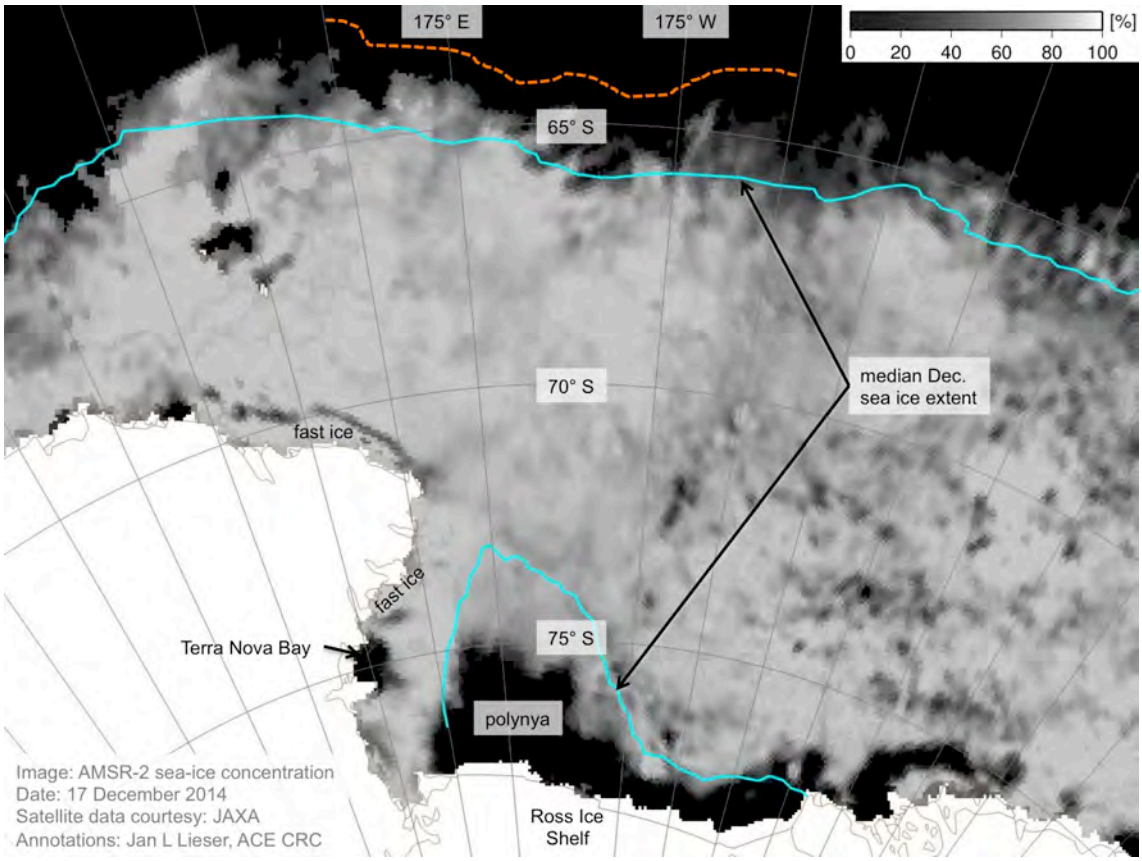

Figure 1: AMSR-2 image, acquired 17/12/2014 and provided by Drift & Noise Polar Services.

Sea Ice Report #30b/2014

by the AAD/ACE CRC Sea Ice Group*

21/12/2014

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas. The cyan line indicates the 30-year (1981-2010) median sea-ice extent for December in the region. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected currently.

  The northern sea-ice edge is continuing to retreat southward slowly. The polynya off the face of the Ross Ice Shelf is still growing in extent. Terra Nova Bay is remains largely free of sea ice.

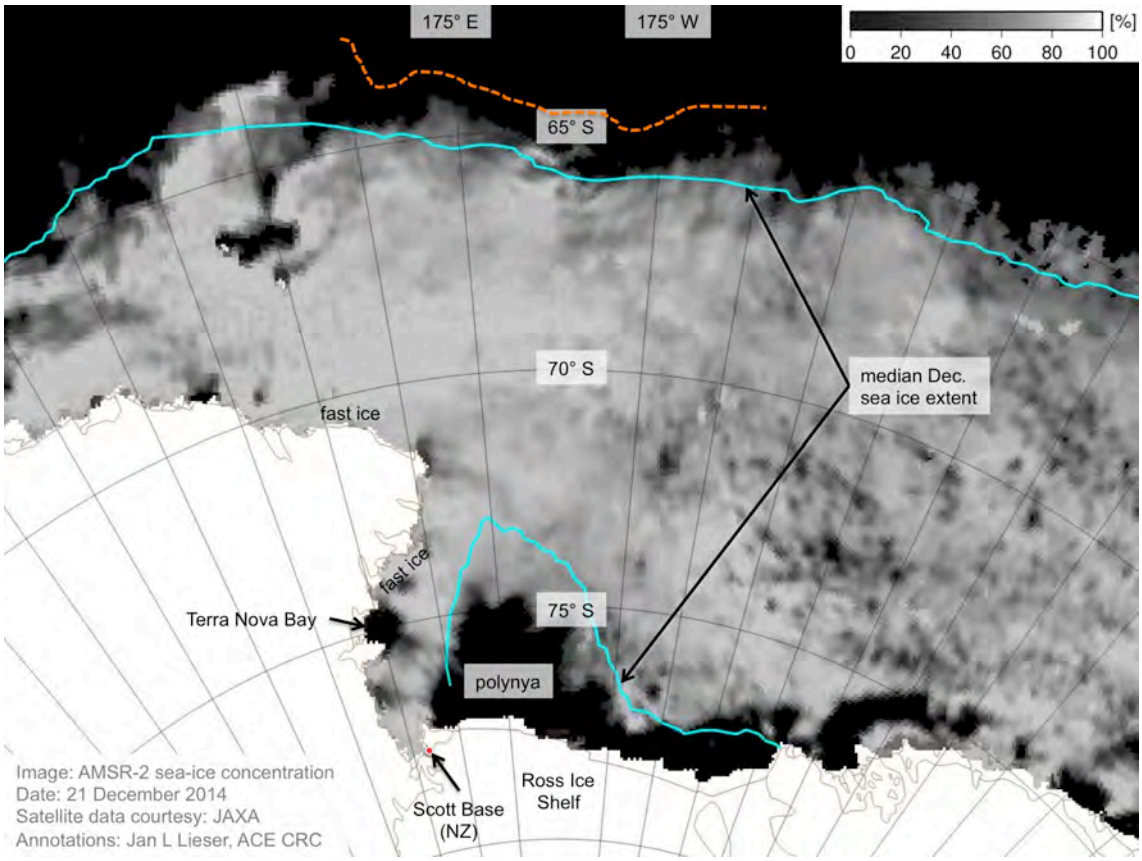

Figure 1: AMSR-2 image, acquired 21/12/2014 and provided by Drift & Noise Polar Services.

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The overall pack ice condition is not changing significantly, in the western Ross Sea. Some very large floes are within a matrix of smaller sea-ice floes, but as summer conditions are continuing to proceed floes are expected to be breaking up further. Even though sea-ice concentration is still high to very high in the region, it appears not to be under great horizontal pressure as gaps between floes are detectable in high resolution visible imagery.

East of the Balleny Islands, at the downwind side of the islands, open water can be seen in both, microwave and visible data, as these islands are obstacles in the general drift regime.

With best regards,

Jan.

Sea Ice Report #30c/2014

by the AAD/ACE CRC Sea Ice Group*

21/12/2014

This report examines sea-ice conditions off Mawson and Casey stations and RSV *Aurora Australis*' Voyage 2 marine science interest in the Dalton Iceberg polynya.

- **Mawson Station**
  Off Mawson Station, fast ice continues to break up. The distance to the so-called northwest polynya is currently about 24 nautical miles, down from about 28 nautical miles four days ago. The large iceberg (see Sea Ice Report #29/2014) has left the area and continues its westward drift. It is currently centred at about 58° 25' E and 66° 16' S. North of Mawson Coast, the pack ice shows further reduction and very patchy concentration. Prydz Bay polynya remains much larger than usual (see Figure 1).

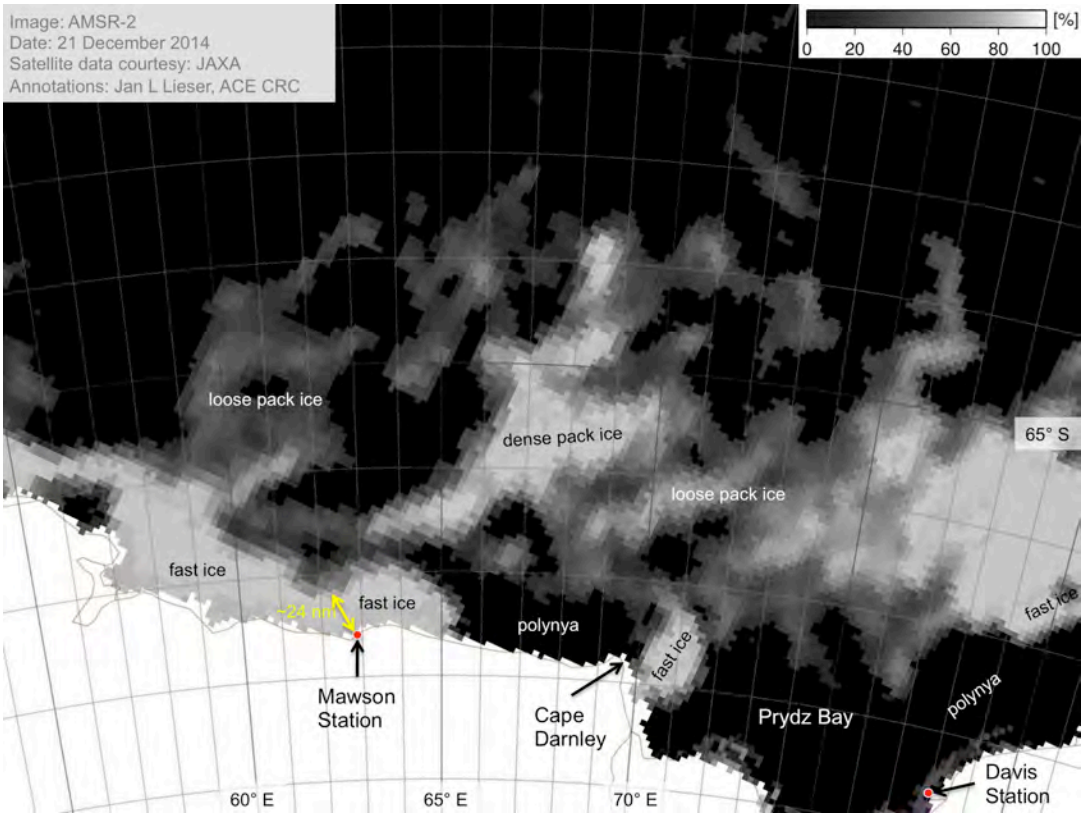

Figure 1: AMSR-2 image, acquired 21/12/2014 and provided by Drift & Noise Polar Services.

*Disclaimer: *While every effort has been made to ensure that data is accurate, the information is provided without warranty of any kind whatsoever including any warranties as to the accuracy of the data or its performance or fitness for a particular use or purpose whatsoever. Figures and charts provided in this report are not for navigation.*

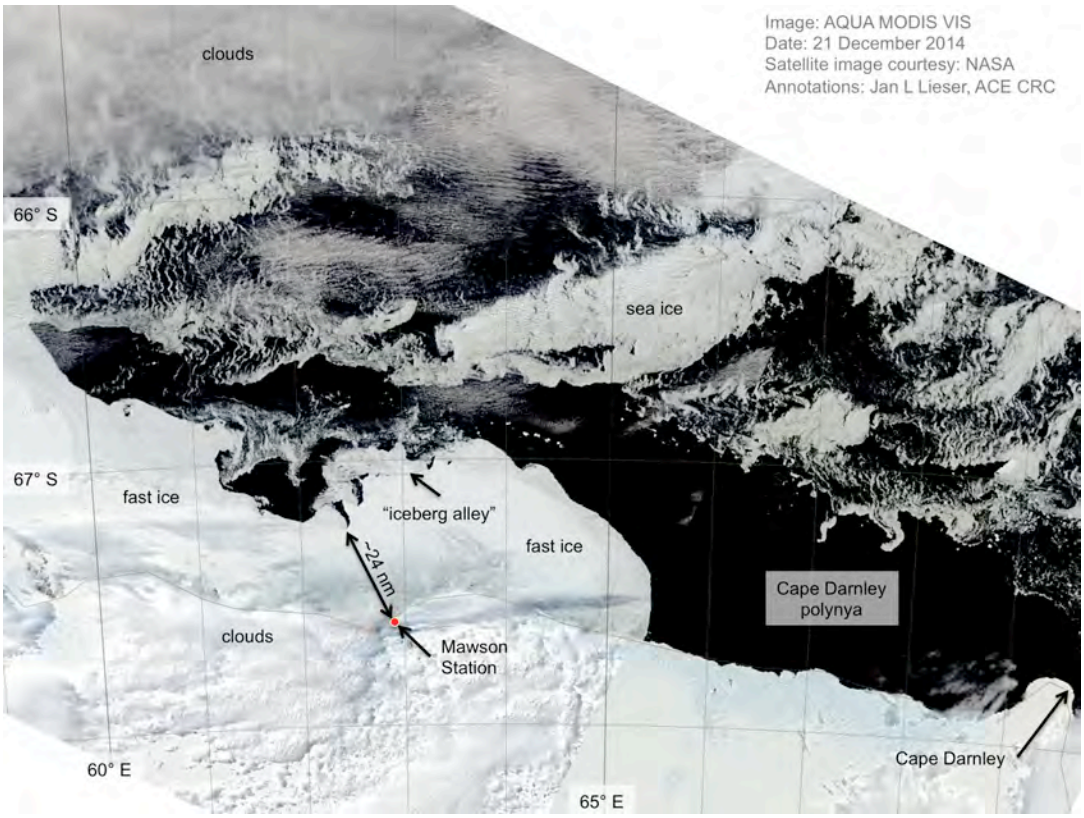

Figure 2: MODIS image, acquired 21/12/2014 and provided by NASA.

North of Mawson Station, the fast ice edge has progressed southward and is now south of 67° S (see Figure 2 and for comparison Sea Ice Report #28c/2014). The so-called 'iceberg alley' appears to be free of fast ice, even though broken up ex-fast ice is still in the area.

- **Casey Station**

  Figure 3 provides a visible image of the sea-ice conditions between Casey Station and the Dalton Iceberg Tongue. The entire scene is obscured by clouds but the open water of polynyas and the open ocean shines through the clouds. The northern sea-ice edge has been compacted and can be clearly identified as a well defined boundary. The orange dotted line marks the cruise track of RSV *Aurora Australis* (up until 22/12/2014 04:00 UT), after finishing the resupply of Casey Station.

  Figure 4 gives a high resolution (100 m pixel size) RADAR image of the polynya west of the Dalton Iceberg Tongue and the pack ice north of it. The sea-ice edge is well defined and can be identified as a white line (high roughness/deformation) at the northern boundary of the pack ice. Many linear kinematic features (deformation lines) are criss-crossing the interior pack ice zone. There is no overall predominant orientation of these features apparent in the image. Immediately south of the sea-ice edge, these deformation lines appear arched, most likely as a result of recent compression by northerly winds. Between about 119° E and 121° E and north of the

Dalton Iceberg polynya, linear features have a primary northeast-southwest orientation, but away from that zone no preferred orientation can be determined. Especially east of 121° E, these features are very dense with highly variable orientation.

Within the central pack ice, some very large old floes can be seen as dark patches in the sea-ice matrix. The area of sea ice in the southwest of the image, annotated 'ex-fast ice' in Figure 4, is compacted again against the coast, and might be therefore immobile again.

With best regards,

Jan.

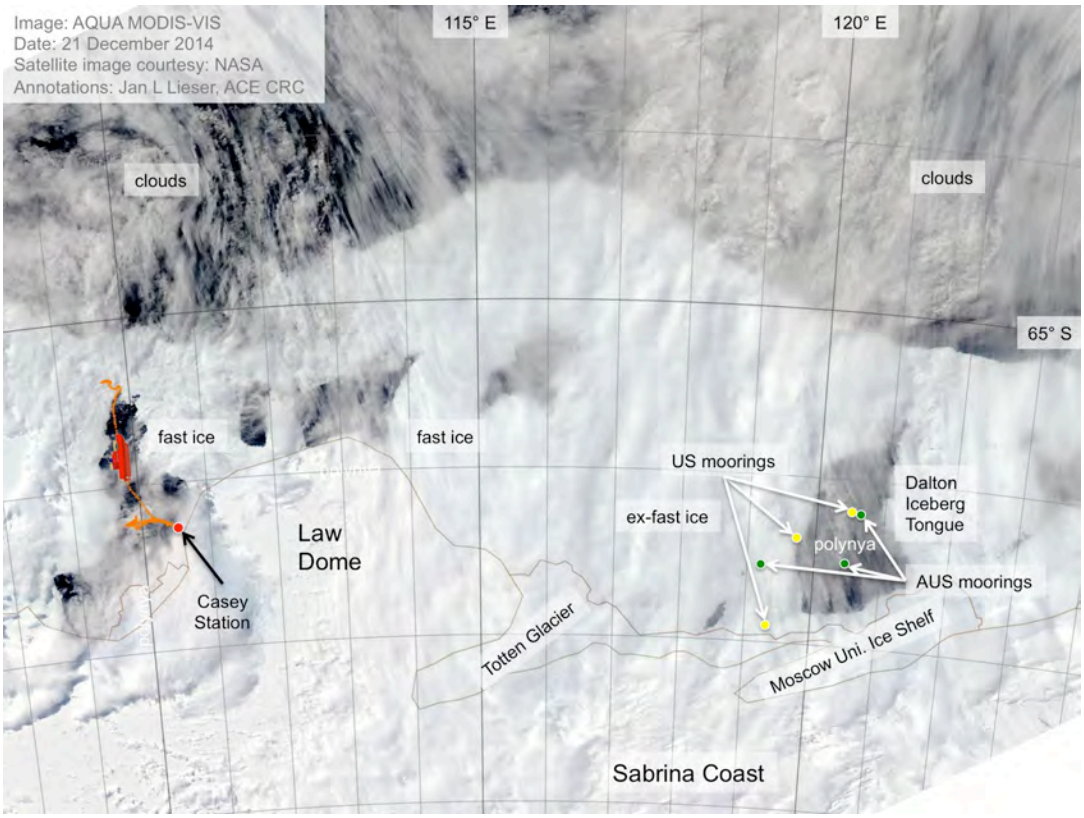

Figure 3: MODIS image, acquired 21/12/2014 and provided by NASA.

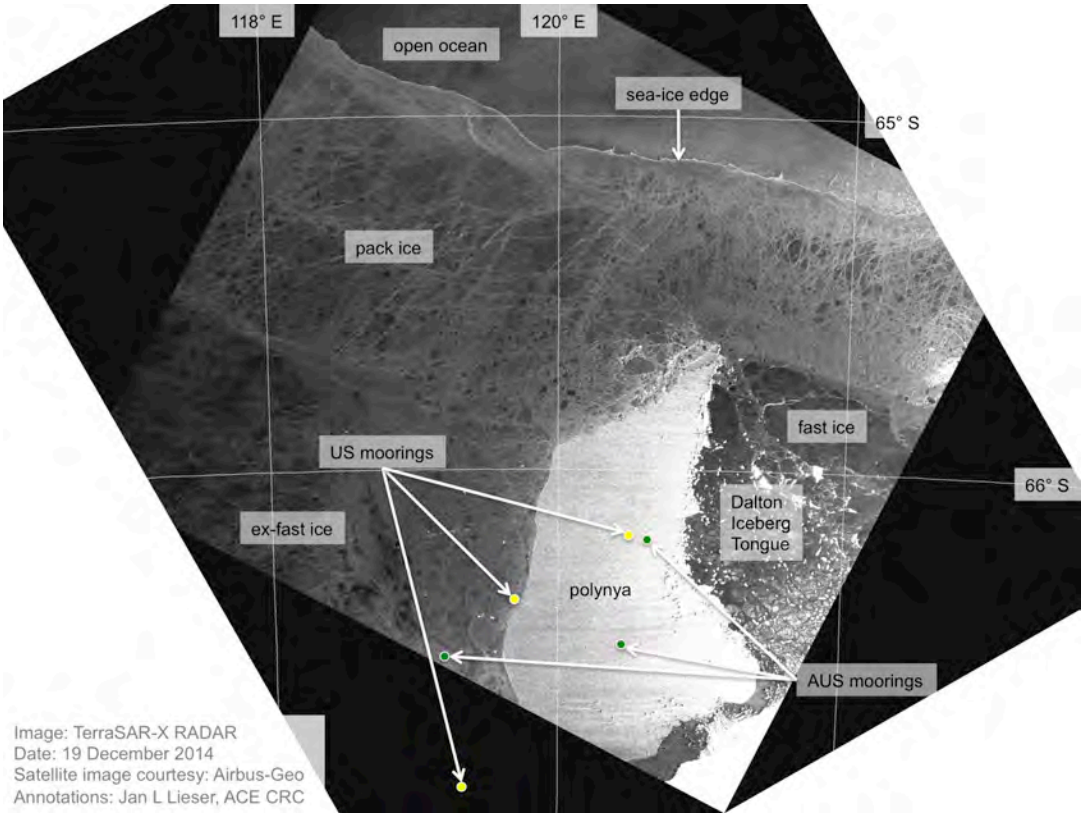

Figure 4: TerraSAR-X RADAR image, acquired 19/12/2014 and provided by Airbus-Geo.

Sea Ice Report #31/2014

by the AAD/ACE CRC Sea Ice Group*

24/12/2014

This report focusses on Australian regions of immediate interest.

- **Mawson Station**
  North of Mawson Station, fast ice continues to break up. Since early December, the fast ice edge progressed southward at a steady rate of approximately one nautical mile per day. Further to the north, the pack ice continues to disperse and reducing sea-ice concentration is seen in the passive microwave data.

- **Sabrina Coast**
  Figure 1 provides a visible impression of sea-ice conditions between Law Dome and the Dalton Iceberg Tongue. The orange dotted line denotes the recent cruise track of RSV *Aurora Australis* in the region (up until 24/12/2014 00:00 UT).

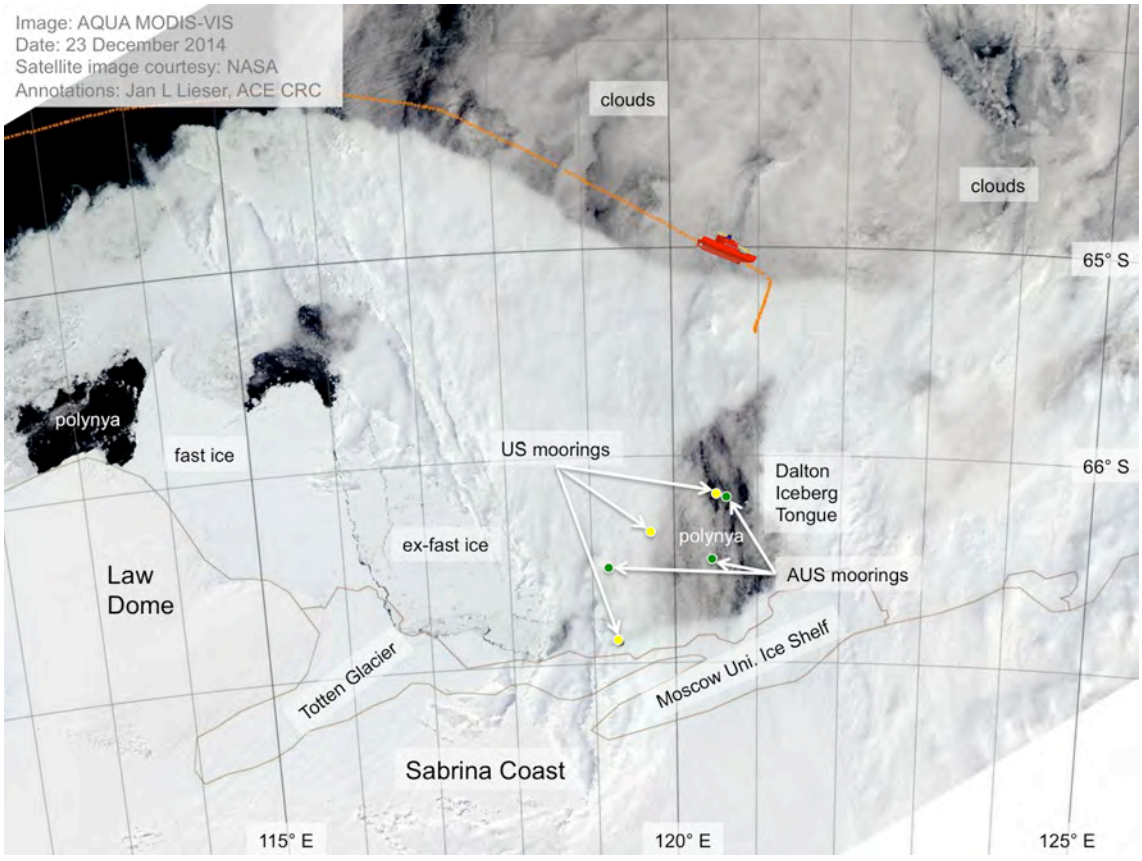

Figure 1: MODIS image, acquired 23/12/2014 and provided by NASA.

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A band of high concentration sea ice separates the polynya west of the Dalton Iceberg Tongue from the open ocean in the north. Off the Totten Glacier, the cloud-free part of the ex-fast ice shows signs of further break up into smaller pieces, however this part of the pack remains in the bay off Sabrina Coast.

- **Commonwealth Bay**
  Fast ice between Dumont d'Urville Station and the Mertz Glacier is breaking up more and more. West of iceberg B09B, the first few kilometres of coastline are exposed to the ocean at about 141° 48' E.

  Judging from yesterday's passive microwave data, the location of the ABOS mooring is still covered by sea ice, most likely ex-fast ice. However, the location of the large iceberg north of iceberg B09B (see for comparison Sea Ice Report #29/2014) could not be positively identified due to persistent cloud cover, recently.

With best regards,

Jan.

Sea Ice Report #31a/2014

by the AAD/ACE CRC Sea Ice Group*

24/12/2014

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas in the background. Overlain is a high resolution visible image with only minimal cloud cover obscuring the view of the sea ice. The cyan line indicates the 30-year (1981-2010) median sea-ice extent for December in the region. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected currently.

  The northern sea-ice edge continues to retreat slowly southward, but is still north of the median extent. The polynya off the face of the Ross Ice Shelf is growing in extent, but remains smaller than usual as a result of higher (more southward) sea-ice extent. Part of this polynya is covered by clouds, between 175° E and 175° W, south of 75° S. Terra Nova Bay remains largely free of sea ice.

  Between 170° E and 170° W, and 65° S and 75° S, the pack ice shows more signs of summer conditions with increasingly patchy sea-ice concentration. Very large sea-ice floes within the central part of the pack ice are breaking up. Especially off the Borchgrevink Coast and west of 175° E, sea-ice floes are small and the concentration signal is low to medium high. However, isolated large floes (of up to ten kilometres across) are still detectable in the region.

  The polynya east of the Balleny Islands, at the downstream side of the islands, is a consistent feature and some channels even connect to the open ocean.

  In the western part of the image (east of about 165° W and south of 70° S), the relation between individual sea-ice floes apparent in the visible image and patchiness of the sea-ice concentration signal can be seen.

With best regards,

Jan.

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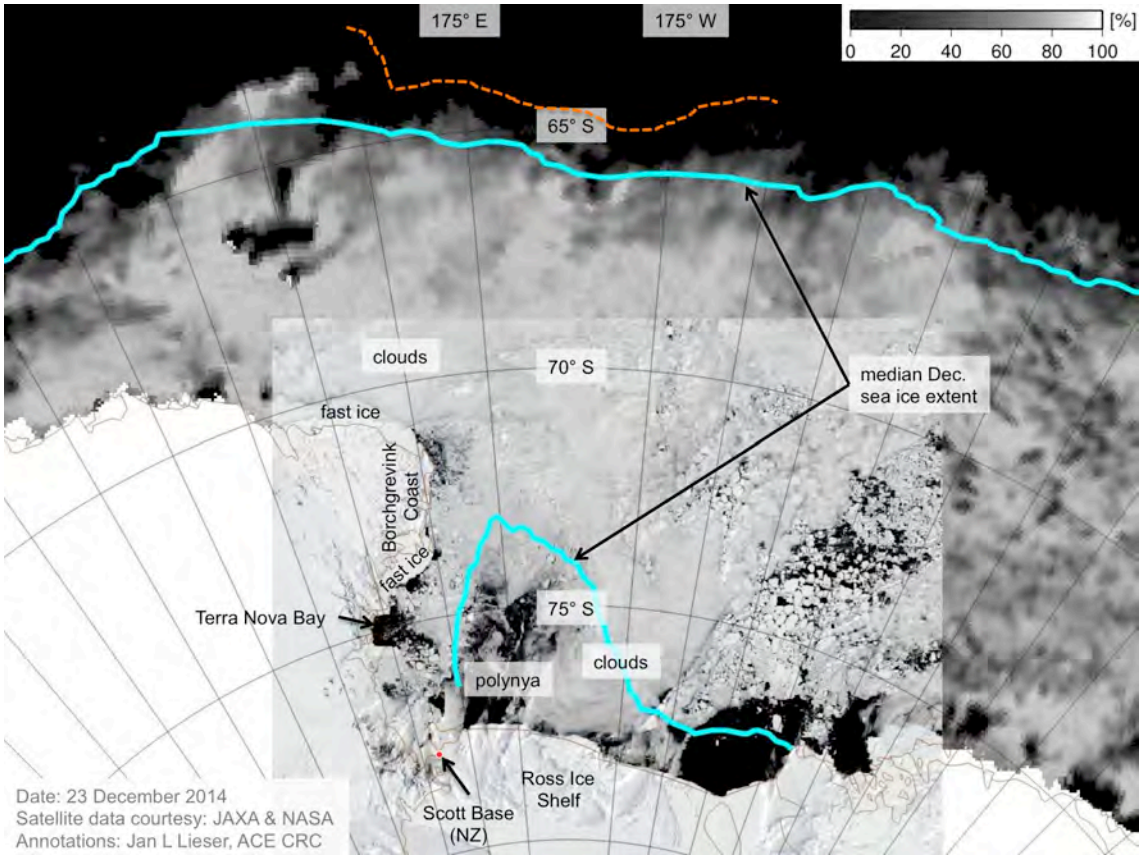

Figure 1: Background image: AMSR-2 sea-ice concentration, acquired 23/12/2014 and provided by Drift & Noise Polar Services. Foreground image: AQUA MODIS VIS, acquired 23/12/2014 and provided by NASA.

Sea Ice Report #31b/2014

by the AAD/ACE CRC Sea Ice Group*

29/12/2014

This report focusses on regions of immediate Australian interest.

- **Mawson Station**
  North of Mawson Station, fast ice continues to break up, but the pace has slowed down. Currently, the distance from the station to the so-called north-west polynya is about 22 nautical miles. Between 61° E and 65° E, only a narrow band of loose pack ice remains north of the fast ice, exposing the fast ice to the elements.

  In northern Prydz Bay, only loose patchy sea ice remains (see Figure 1). North of the Cape Darnley polynya, higher sea-ice concentration is reducing further.

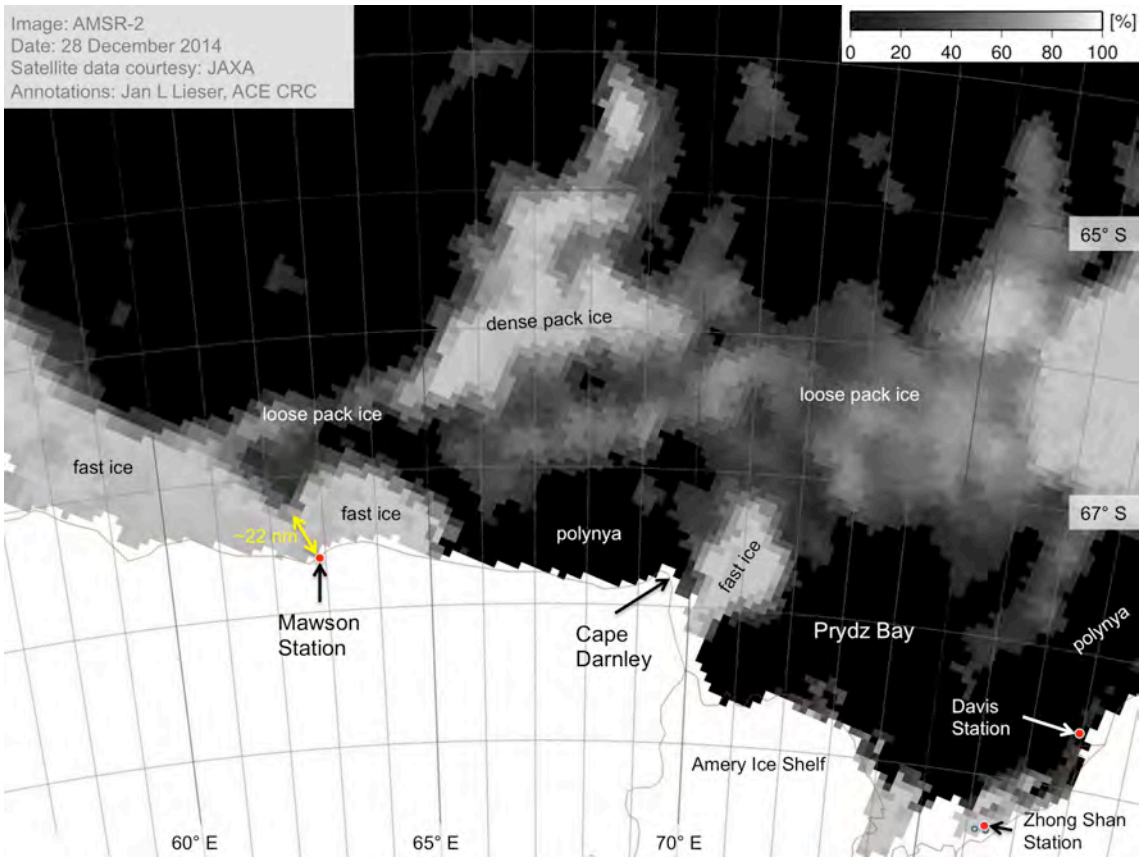

Figure 1: AMSR-2 image, acquired 28/12/2014 and provided by Drift & Noise Polar Services.

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- **Sabrina Coast**
  Figure 2 shows a high resolution RADAR image of sea-ice conditions west of the Dalton Iceberg Tongue. The orange dotted line denotes the recent cruise track of RSV *Aurora Australis* in the region (up until 29/12/2014 00:00 UT).

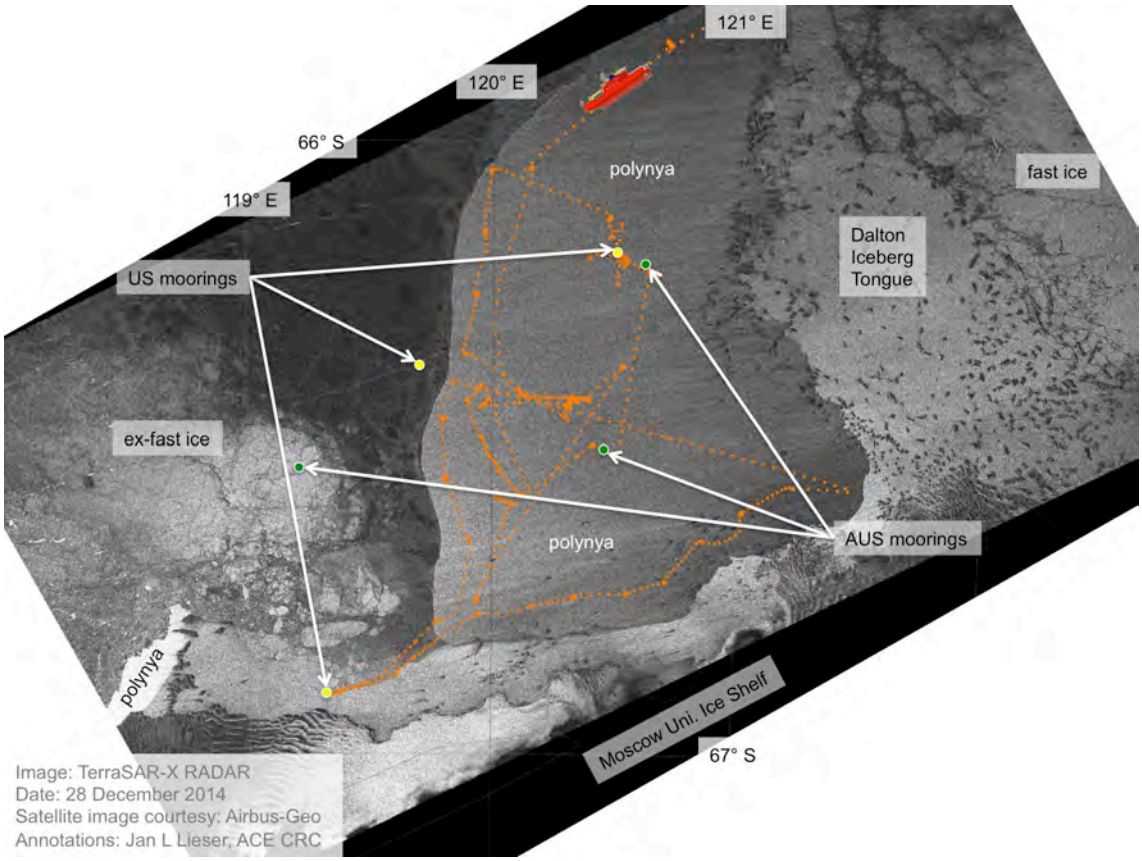

Figure 2: TerraSAR-X image, acquired 28/12/2014 and provided by Airbus-Geo.

The open water of the polynya can be clearly distinguished from the sea ice. Icebergs of the Dalton Iceberg Tongue can be identified. At the western edge of the tongue, fast ice from between the bergs is breaking up as individual bergs are surrounded by open water of the polynya. West of 120° E, two generally different ex-fast ice types can be distinguished by surface feature. Brighter reflectivity (whiter representation) shows older sea ice with a rougher surface. This type is covering the westernmost AUS mooring. Lower reflectivity (darker representation) shows comparatively younger ex-fast ice, most likely accumulated from young sea ice advected across the polynya by easterly winds. The near-shore fast ice covering the southernmost US mooring appears to be breaking up, but remains at high concentration locally.

The polynya is cut off from the open ocean by a narrowing band of sea ice with a still sharply defined northern edge. This band is about 30 nautical miles wide in north-south direction (and just outside Figure 2).

- **Commonwealth Bay**
  In Commonwealth Bay, fast ice continues to break up. The protective sea ice cover has gone entirely north of the Mertz Glacier (between 144° E and 149° E) and the fast ice south of iceberg B09B is now starting to break up at the eastern end of the berg. There are many free floating icebergs in the area.

  While most of the scene shown in Figure 3 is obscured by clouds, the location of the ABOS mooring can be seen covered by sea ice, which is surrounding the large iceberg that is still grounded north of iceberg B09B.

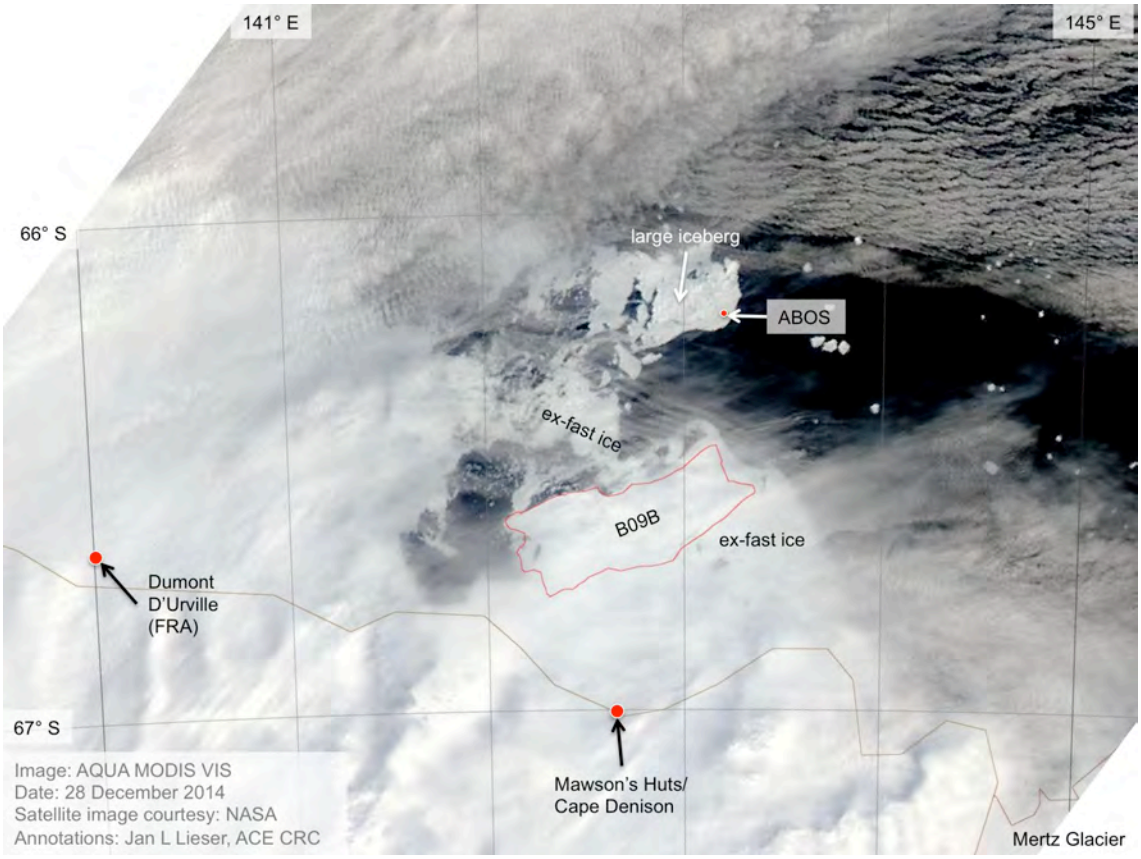

Figure 3: MODIS image, acquired 28/12/2014 and provided by NASA.

With best regards,

Jan.

Sea Ice Report #31c/2014

by the AAD/ACE CRC Sea Ice Group*

28/12/2014

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas. The cyan line indicates the 30-year (1981-2010) median sea-ice extent for December in the region. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected currently.

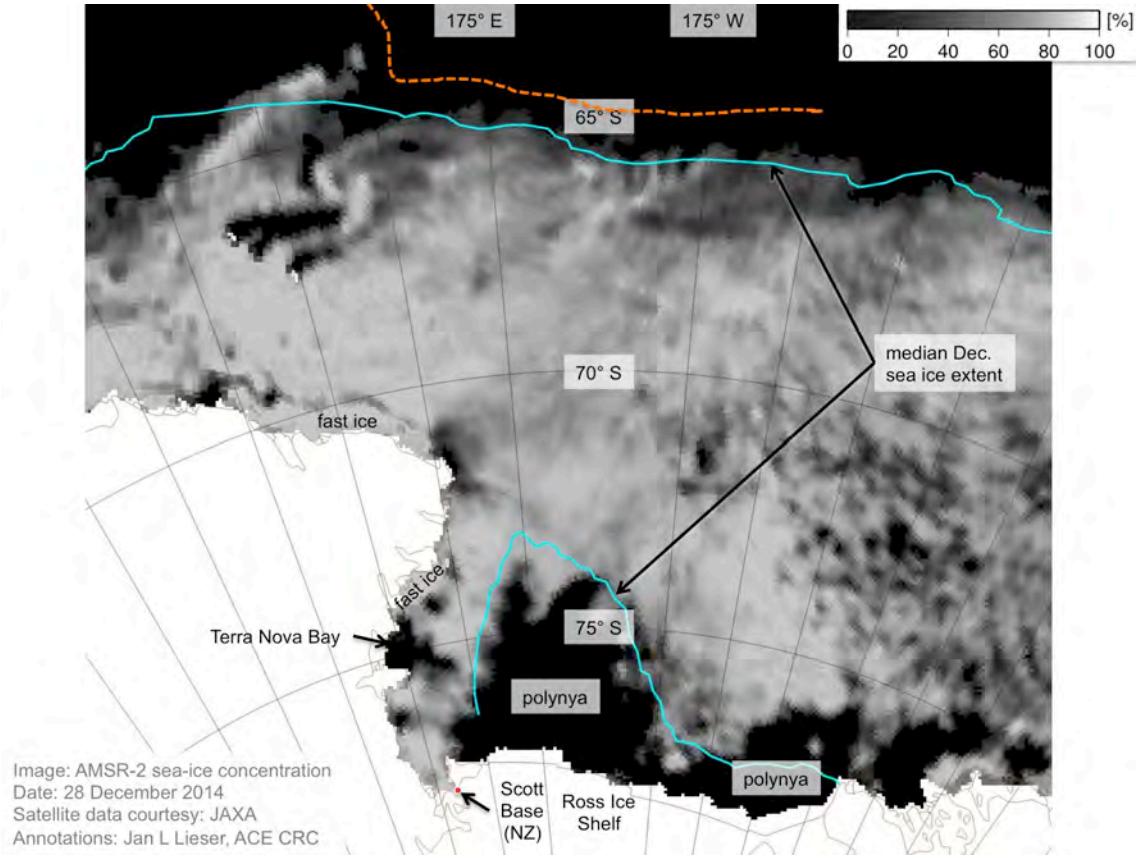

Figure 1: AMSR-2 image, acquired 28/12/2014 and provided by Drift & Noise Polar Services.

At the end of the month, the northern and southern sea-ice edges in the Ross Sea approach the long-term median distribution. The pack ice shows continuing signs of reduced sea-ice concentration. The

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northern part of the sea ice down to about 65° 45' S is more and more patchy, as is the pack ice east of 175° W.

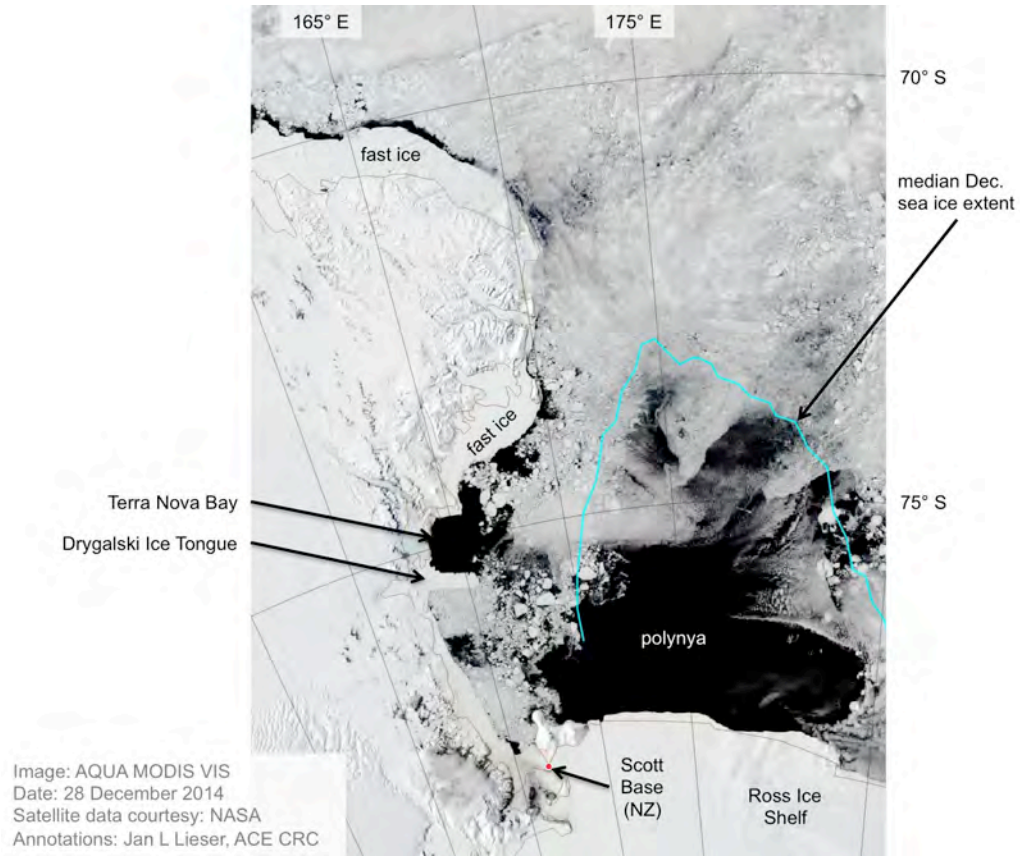

Figure 2: MODIS image, acquired 28/12/2014 and provided by NASA.

Most of the sea ice covered part of Figure 2 is obscured by clouds, but the coastal areas are cloud-free. Terra Nova Bay is free of sea ice. South of the Drygalski Ice Tongue, however, some broken sea ice still remains and a few very large floes can be seen between 165° E and 170° E, south of 75° S.

With best regards,

Jan.

Sea Ice Report #01/2015

by the AAD/ACE CRC Sea Ice Group*

01/01/2015

This report's focus is on regions of immediate Australian interest.

- **Mawson Station**
  Off Mawson Station, more fast ice is breaking up. During the last three days, the fast ice edge progressed southward and is now about 17 nautical miles away from the station. West of 65° E, some broken ex-fast ice remains close to the new fast ice edge (see Figure 1).

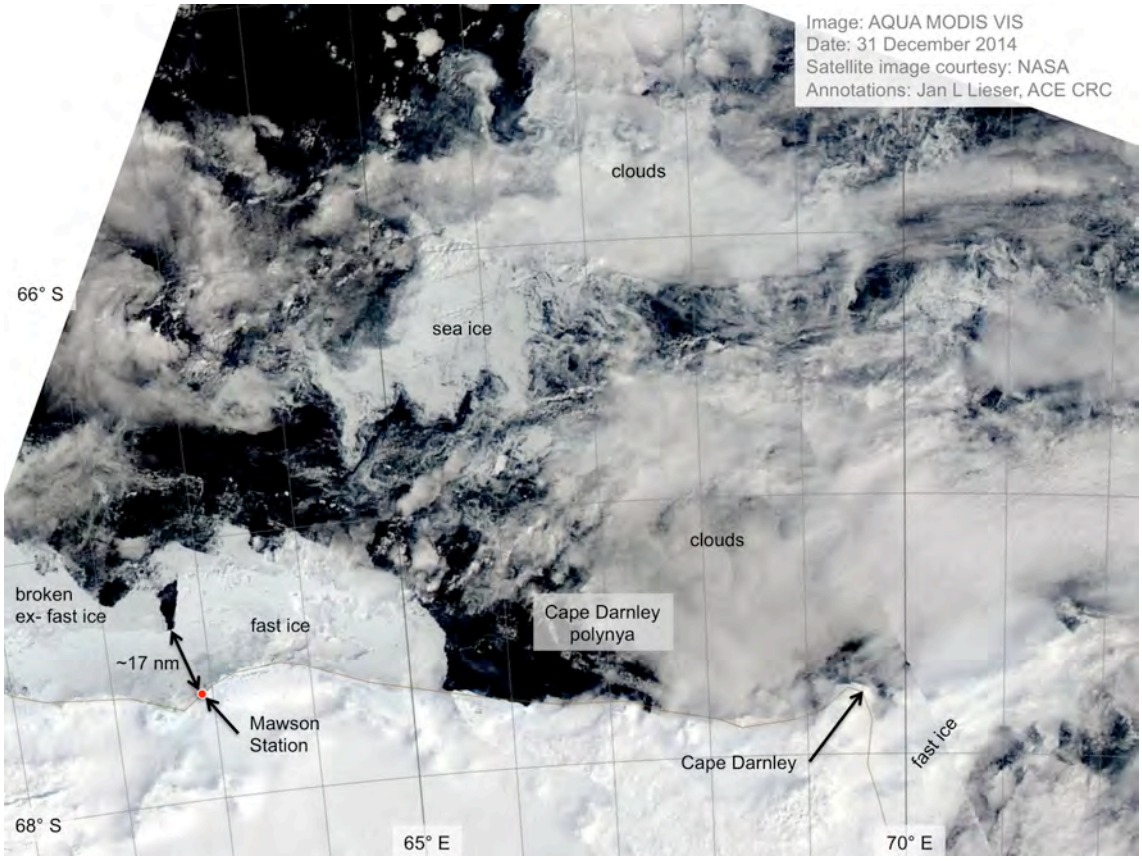

Figure 1: MODIS image, acquired 31/12/2014 and provided by NASA.

- **Sabrina Coast**
  Figure 2 shows a RADAR image of sea-ice conditions off Sabrina Coast and the Totten Glacier. The thin red line denotes the recent cruise track of RSV *Aurora Australis* in the region (up until 01/01/2015 00:00 UT).

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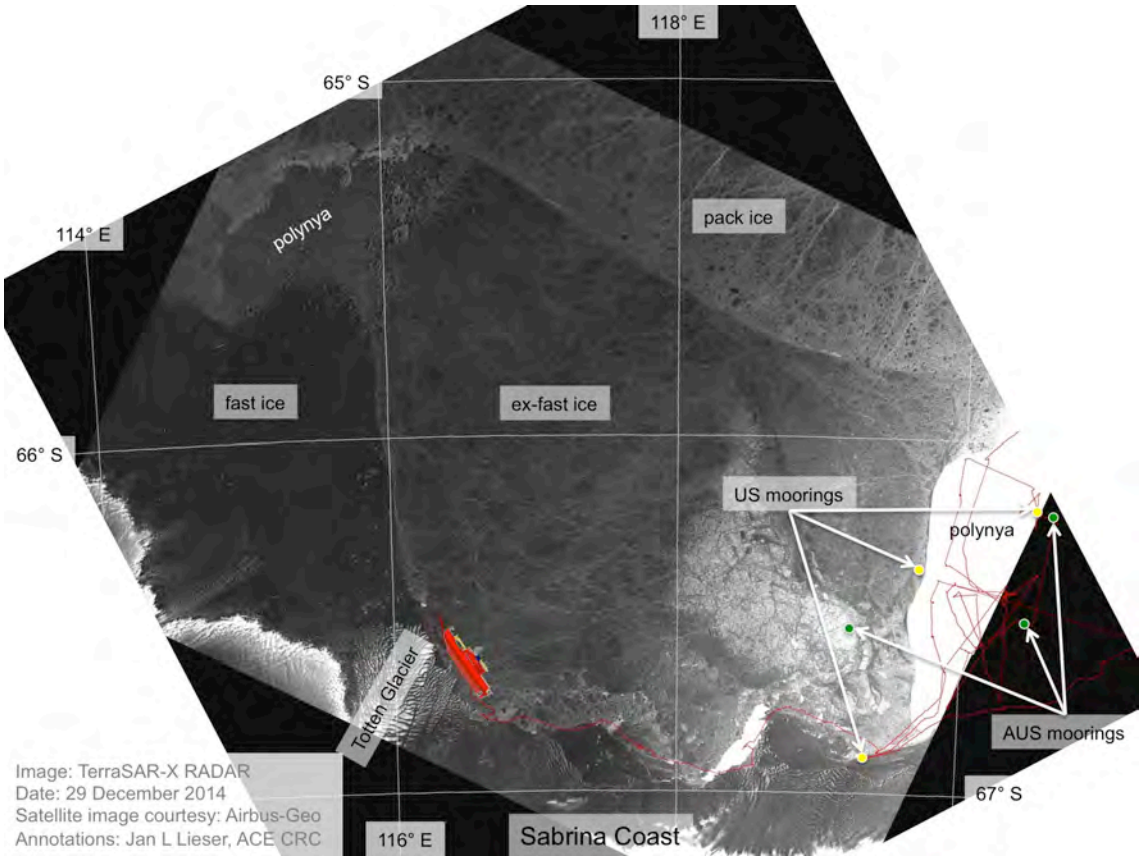

Figure 2: TerraSAR-X image, acquired 29/12/2014 and provided by Airbus-Geo.

Along 116° E, a boundary between fast ice locked to the eastern flank of Law Dome and ex-fast ice to the east of it can be seen. To the north of the fast ice, a polynya is a persistent feature west of a series of icebergs, that are grounded between 65° 12' S and 65° 40' S.

East of 116° E, within the ex-fast ice some floe boundaries can be seen as circumferential bright features. The pack ice to the north of it shows a preference to southwest-northeast oriented shear zones. This band of high concentration sea ice separates the polynya west of the Dalton Iceberg Tongue from the open ocean in the north.

At the western edge of the Dalton Iceberg polynya (along about 119° 42' E), the middle US mooring (as annotated in Figure 2) is currently about three nautical miles west of the ice edge, covered by sea ice.

- **Commonwealth Bay**
  The entire scene of the visible MODIS image (Figure 3) is obscured by clouds, but we note that the pack ice that surrounded the large iceberg north of iceberg B09B has moved away from the area. Therefore, the location of the ABOS mooring is currently not covered by sea ice.

  Further to the west, off Dumont d'Urville Station, the northern sea-ice edge is sharply defined. West of 140° E, some very small dark patches

are visible through the clouds. These patches can be interpreted as near-shore open water but are still about 13 nautical miles away from the station.

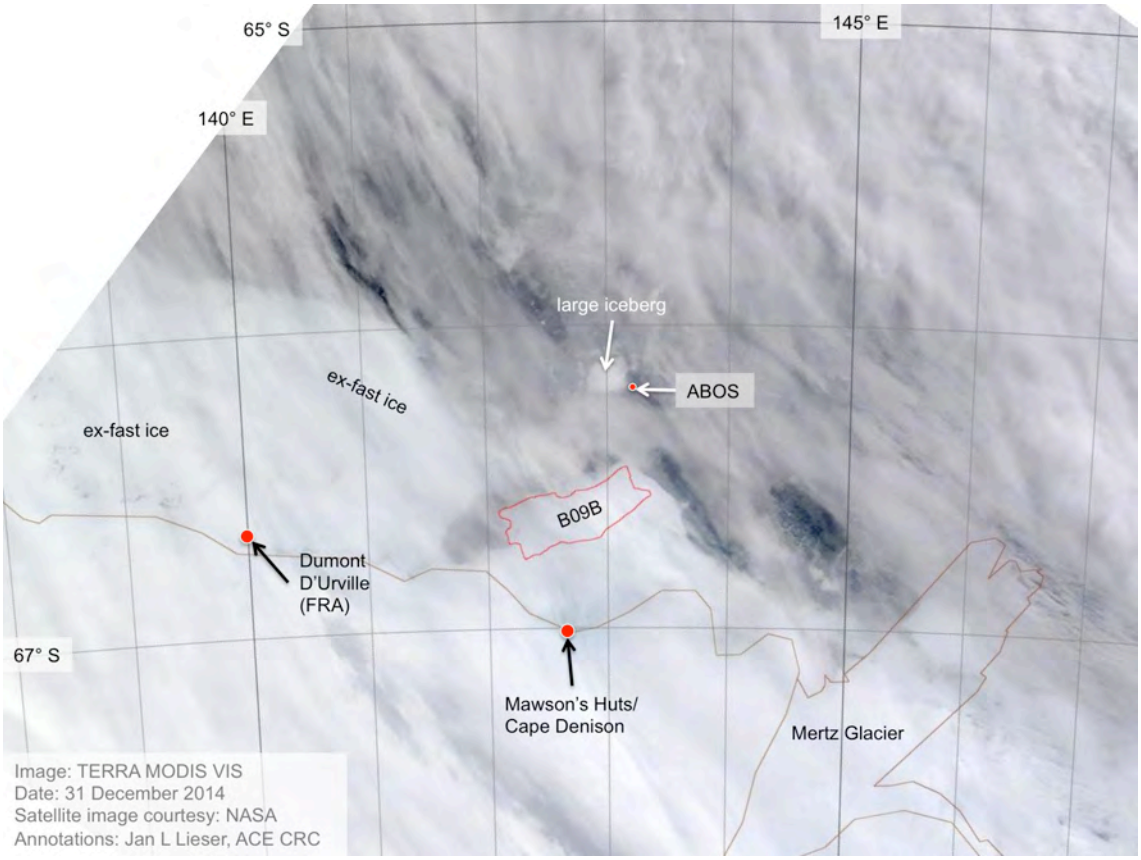

Figure 3: MODIS image, acquired 31/12/2014 and provided by NASA.

With best regards,

Jan.

Sea Ice Report #01a/2015

by the AAD/ACE CRC Sea Ice Group*

02/01/2015

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas. The cyan line indicates the 30-year median sea-ice extent for December in the region, the green line indicates the January median sea-ice extent. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected.

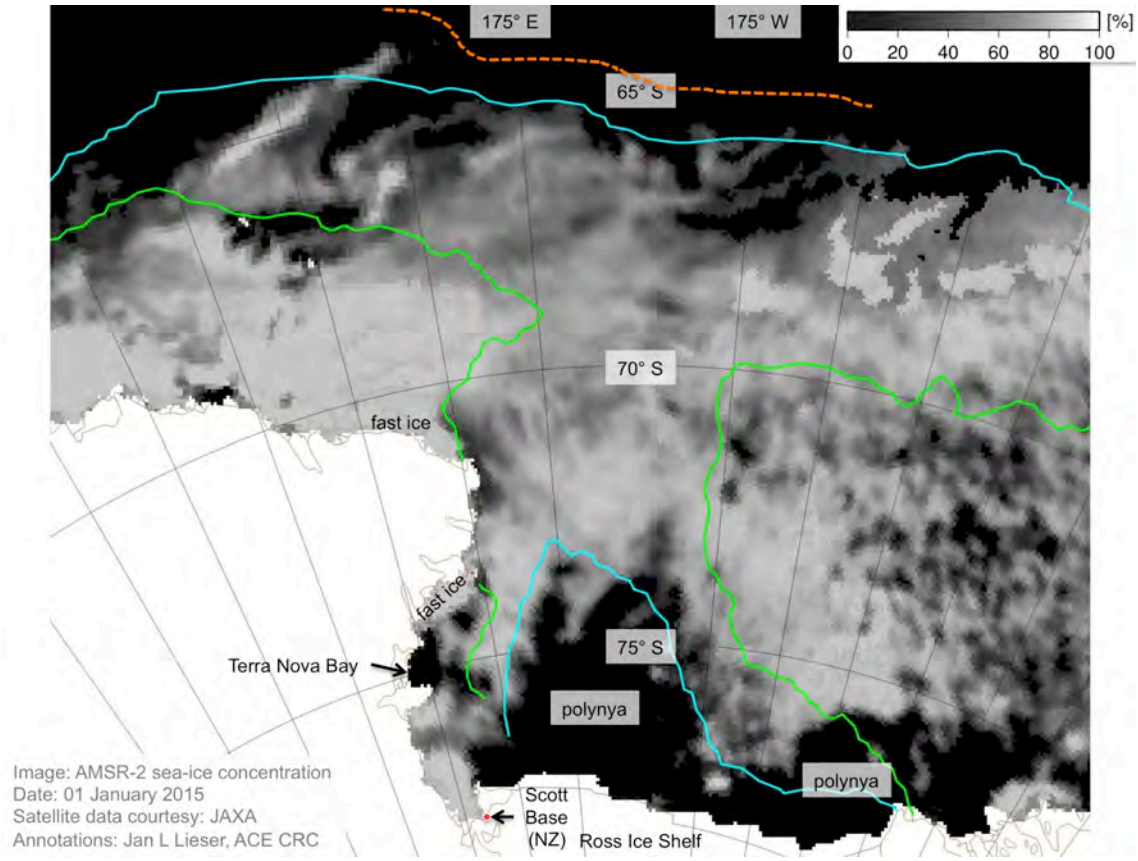

Figure 1: AMSR-2 image, acquired 01/01/2015 and provided by Drift & Noise Polar Services.

At the end of December 2014, the overall sea-ice extent around Antarctica has resumed its daily record breaking trend since satellite records began. While the circum-Antarctic picture reveals many

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regional deviations (positive and negative) from the average, around the entire Antarctic we note an unusual high (northward) extent of sea ice and the Ross Sea appears to be one of the areas where more sea ice remains locally than previously seen with respect to the 30-year (1981-2010) median.

But in the western Ross Sea, west of 175° W, sea-ice concentration becomes more and more patchy and larger sea-ice floes are breaking up. Persistent cloud cover during the last couple of days prevented a visual inspection of the sea-ice cover north of 70° S, but south of 70° S small floes can be identified and patches of open water abound.

With best regards,

Jan.

Sea Ice Report #01b/2015

by the AAD/ACE CRC Sea Ice Group*

05/01/2015

This report's focus is on regions of immediate Australian interest.

- **Mawson Station**
  The area of Mawson Station is under clouds (see Figure 1), but the synoptic analysis of available satellite imagery suggests that the fast ice edge is progressing further south, currently located about 14 nautical miles northwest of the station. Broken ex-fast ice remains close to the new fast ice edge.

  Close to the coast, some arching (dynamic lines of weakness through the sea ice between anchor points, coastal features) can be seen through the clouds. This is indicated by the orange lines in Figure 1. Further sings of apparent weakening of the fast ice can be detected along the coastline east of Mawson Station, for example at 67° 30' S and 63° 40' E.

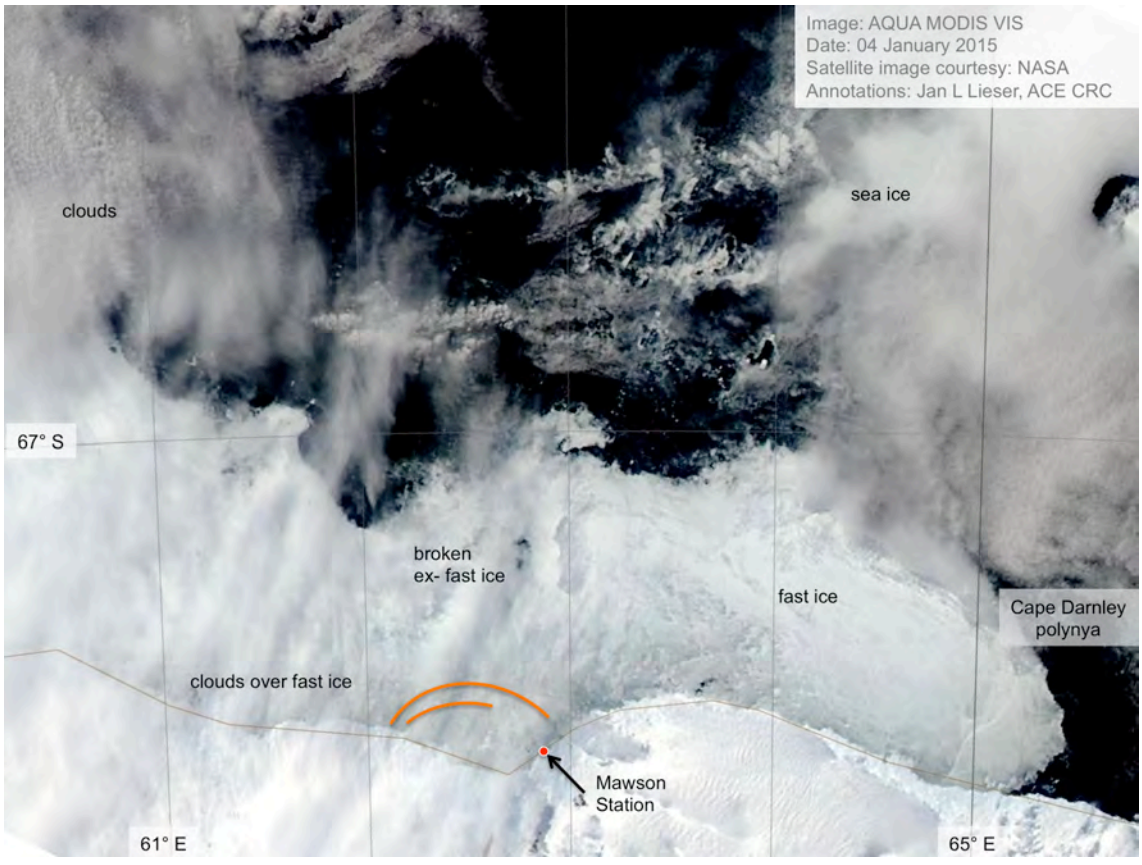

Figure 1: MODIS image, acquired 04/01/2015 and provided by NASA.

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- **Sabrina Coast**
  The scene of Figure 2 is almost entirely obscured by clouds, but an appreciation of sea-ice conditions off Sabrina Coast is possible. The orange dotted line denotes the recent cruise track of RSV *Aurora Australis* in the region (up until 05/01/2015 00:00 UT).

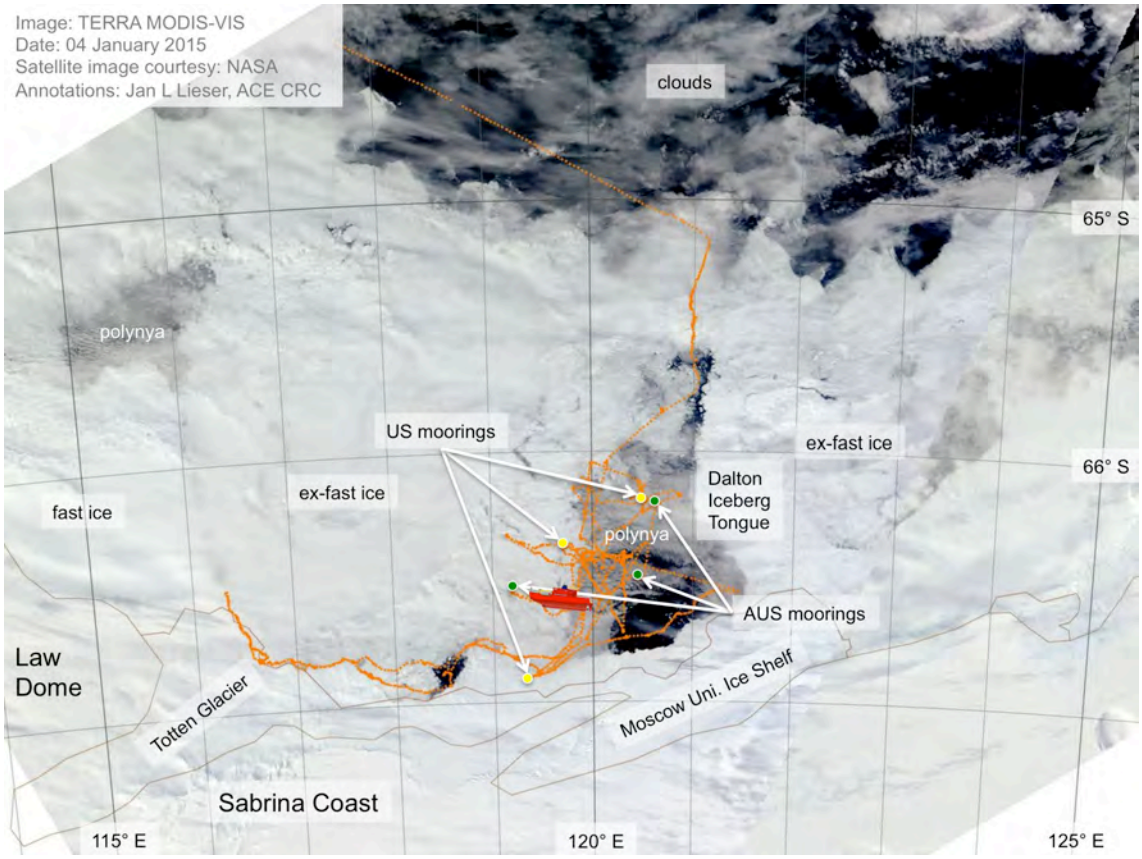

Figure 2: MODIS image, acquired 04/01/2015 and provided by NASA.

Between 116° E and 120° E, the ex-fast ice shows now many cracks and openings, but still remains at high concentration. The northern sea-ice edge of the pack ice north of the ex-fast ice is now in a zig-zag pattern, and not such a well defined line as before.

While the northern part of the polynya has back-filled with drifting pack ice, north of 66° S, the pack ice to the north of it appears loosened up a little and some major openings are detectable through the clouds

East of the Dalton Iceberg polynya, the fast ice edge is moving southward and some very large floes of ex-fast ice are drifting freely.

- **Commonwealth Bay**
  There is very little cloud cover in the visible MODIS image of Figure 3.

  West of 142° E, almost 7.5 nautical miles of coast are exposed to the ocean now, but west from there fast ice remains land locked. Also, fast ice in Commonwealth Bay remains stable, at least south of 66° 50' S.

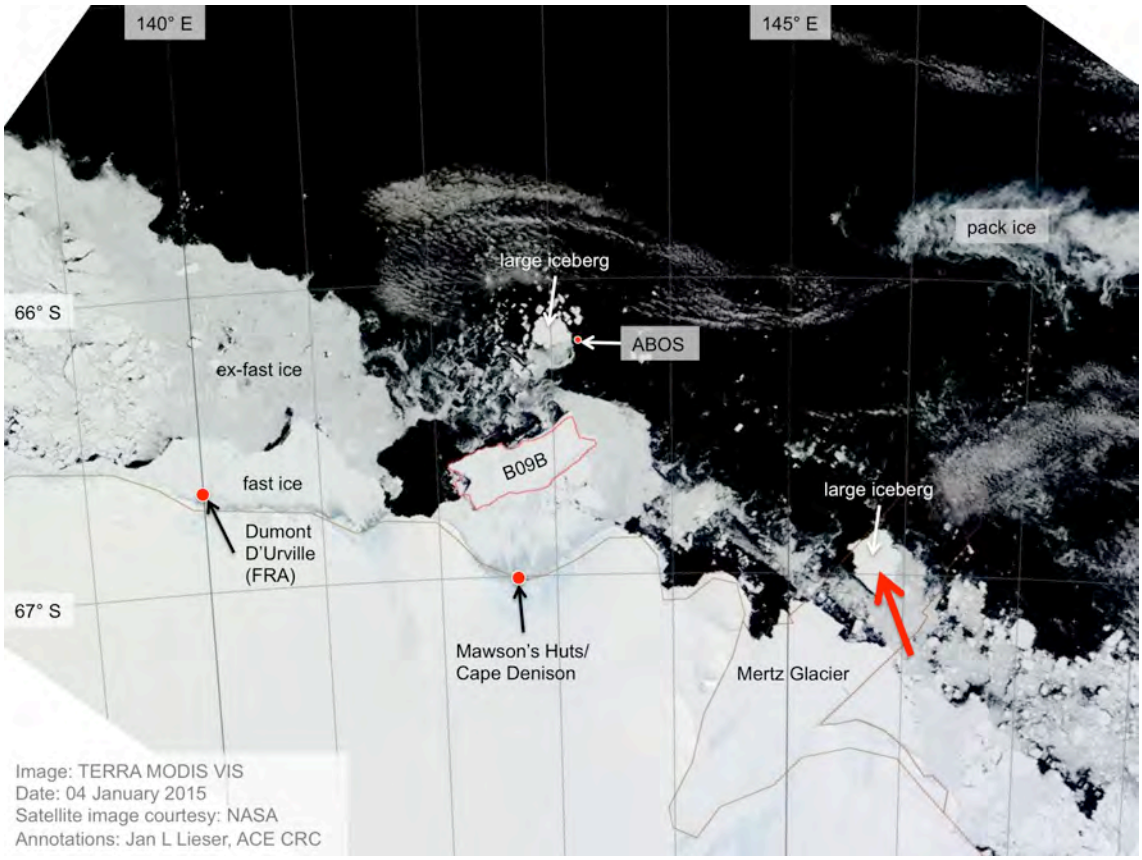

Figure 3: MODIS image, acquired 04/01/2015 and provided by NASA.

The location of the ABOS mooring continues to be free of sea ice.

In front of the Mertz Glacier, we notice that the very large berg that was grounded at the eastern edge of the glacier tongue, got loose on about 22/12/14 and drifted about 20 nautical miles in north-northwest direction (see the red arrow in Figure 3), before it grounded again close to its current location. However, the berg still exhibits some swivelling movement, which indicates it is not firmly resting on the sea bed.

With best regards,

Jan.

Sea Ice Report #01c/2015

by the AAD/ACE CRC Sea Ice Group*

05/01/2015

This report examines sea-ice conditions off the Mertz Glacier.

- **Commonwealth Bay**
  Figures 1 and 2 show the same geographical frame, between 135° E and 150° E, as seen by two different satellite sensors, yesterday. Figure 1 gives a visible impression from the high resolution MODIS sensor, Figure 2 show a derived product (sea-ice concentration) from AMSR-2 measurements. Note: the confused AMSR-2 signature around icebergs, and the outdated land-mask (in white) applied to the AMSR-2 data when computing sea-ice concentration.

  There is very little cloud cover in the visible MODIS image of Figure 1. Very little sea ice remains off the Mertz Glacier.

  West of 142° E, almost 7.5 nautical miles of coast are exposed to the ocean now, but west from there fast ice remains land locked. Also, fast ice in Commonwealth Bay remains stable, at least south of 66° 50' S.

  In front of the Mertz Glacier, we notice that the very large berg that was grounded at the eastern edge of the glacier tongue, got loose on about 22/12/14 and drifted about 20 nautical miles in north-northwest direction (see the red arrow in Figure 1), before it grounded again close to its current location. However, the berg still exhibits some swivelling movement, which indicates it is not firmly resting on the sea bed.

With best regards,

Jan.

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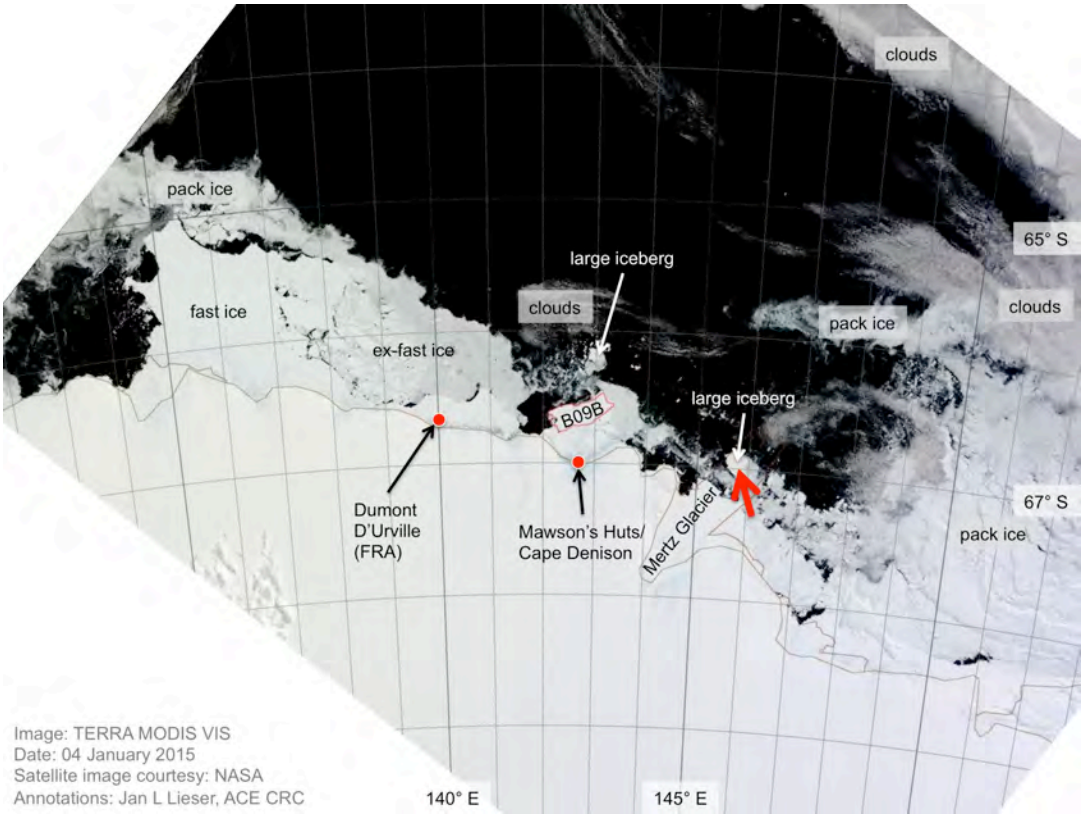

Figure 1: MODIS image, acquired 04/01/2015 and provided by NASA.

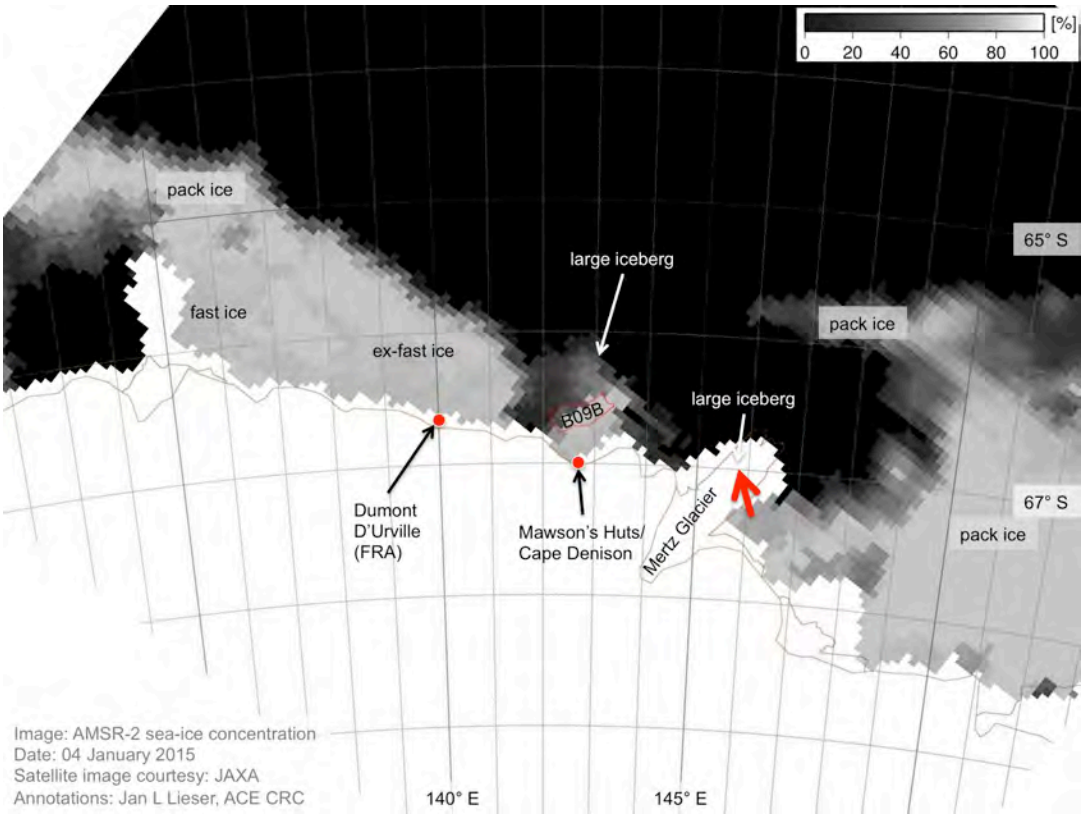

Figure 2: AMSR-2 sea-ice concentration image, acquired 04/01/2015 and provided by Drift & Noise Polar Services.

Sea Ice Report #01d/2015

by the AAD/ACE CRC Sea Ice Group*

05/01/2015

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas. The green line indicates the 30-year (1981-2010) median sea-ice extent for January. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected.

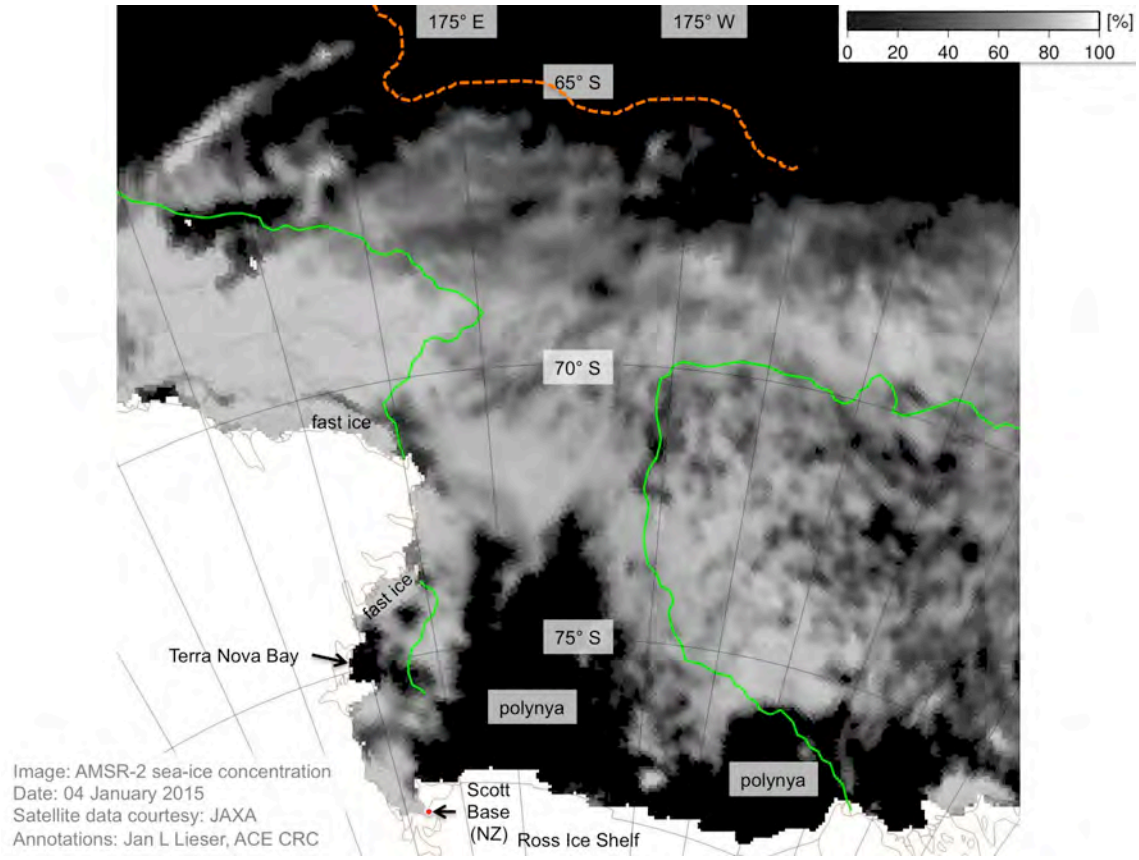

Figure 1: AMSR-2 image, acquired 04/01/2015 and provided by Drift & Noise Polar Services.

In the western part of the image, almost entirely encompassed by the green line of the January median extent, very high sea-ice concentration is found at the beginning of January. In the central part of Figure 1, patchy sea-ice concentration is seen, while in the

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eastern part of the image, and south of about 70° S, the sea ice is very loose and open water areas are common between the floes.

Overall, presence of sea ice remains high in Ross Sea for the time of year.

With best regards,

Jan.

Sea Ice Report #01e/2015

by the AAD/ACE CRC Sea Ice Group*

07/01/2015

This report examines sea-ice conditions between Dumont d'Urville Station and the Mertz Glacier.

- **Commonwealth Bay**
  Figures 1, 2 and 3 show the same geographical frame, between 139° E and 147° E, as seen by three different satellite sensors, yesterday. Figure 1 shows some of the first very high-resolution (25 m by 100 m) Synthetic Aperture RADAR (SAR) data for the region acquired with the new Sentinel-1A satellite, which is operated by the European Space Agency (ESA). Figure 2 gives a visible impression from the MODIS sensor and Figure 3 shows sea-ice concentration from AMSR-2 measurements.

  Off Dumont d'Urville Station and Commonwealth Bay, the fast ice edge is approximated by a yellow dashed line. The location of the Australian Bluewater Observing System (ABOS) mooring is also indicated in all the figures.

  Sea ice appears to be drifting freely around the large tabular iceberg B09B and the large berg to the north of it. Between 142° E and 144° E and south of 65° 40' S, some smaller icebergs can be seen in the area as bright white spots in the SAR image (Figure 1). South of 66° S, free floating icebergs are more prevalent, also further east.

  Since the large iceberg dislodged from the sea bed off the northeastern corner of the Mertz Glacier tongue, a mixture of ex-fast ice and pack ice is now free to drift across the face of the glacier tongue. The iceberg itself has rotated about one degree clockwise during the past two days.

With best regards,

Jan.

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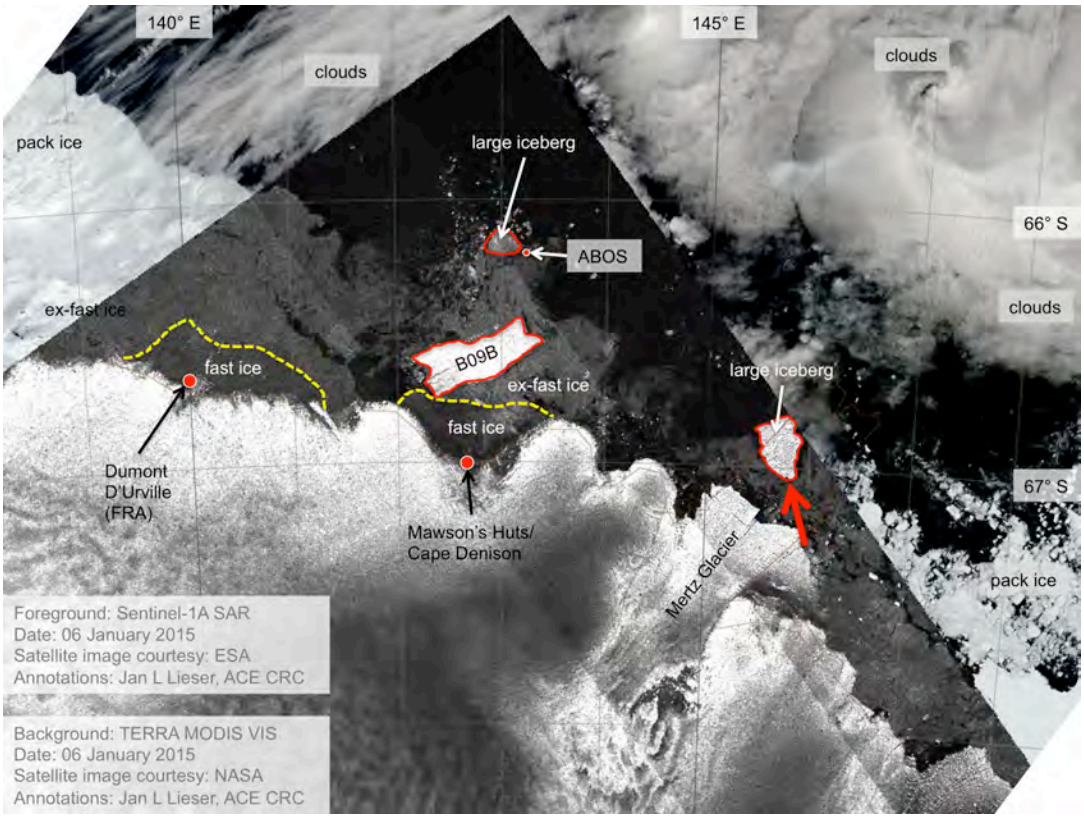

Figure 1: SAR image, acquired 06/01/2015 and provided by PolarView.

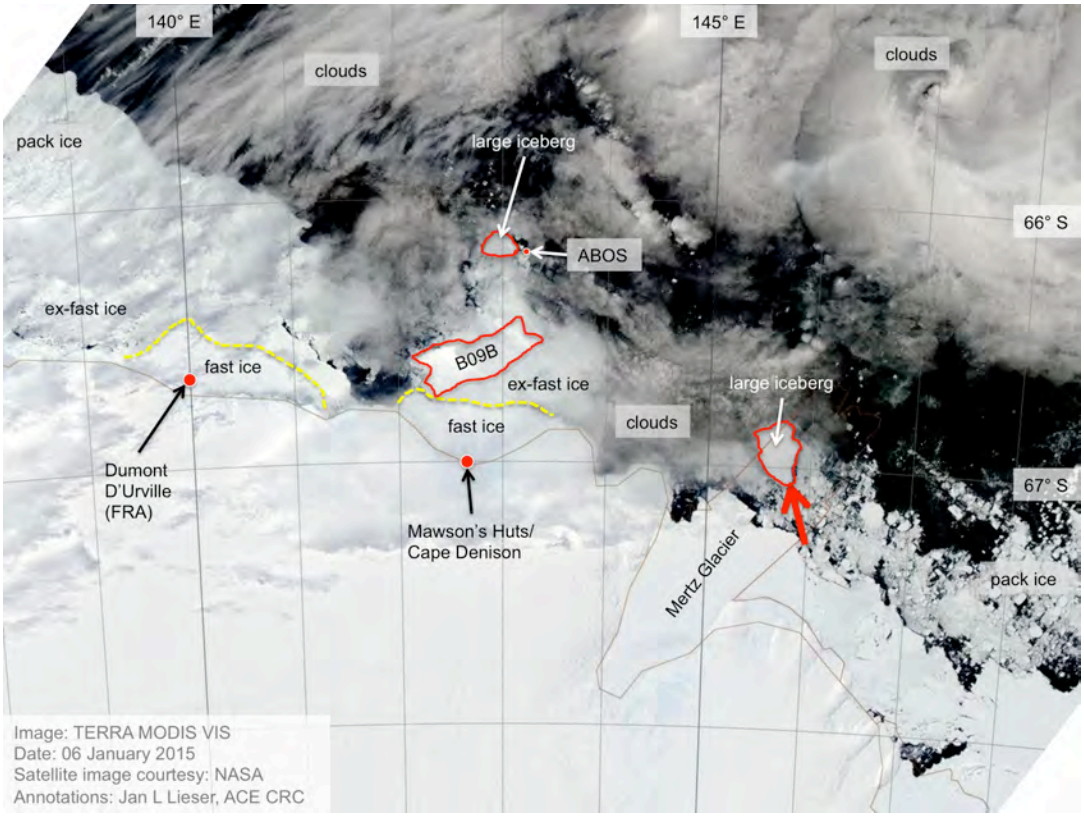

Figure 2: MODIS image, acquired 06/01/2015 and provided by NASA.

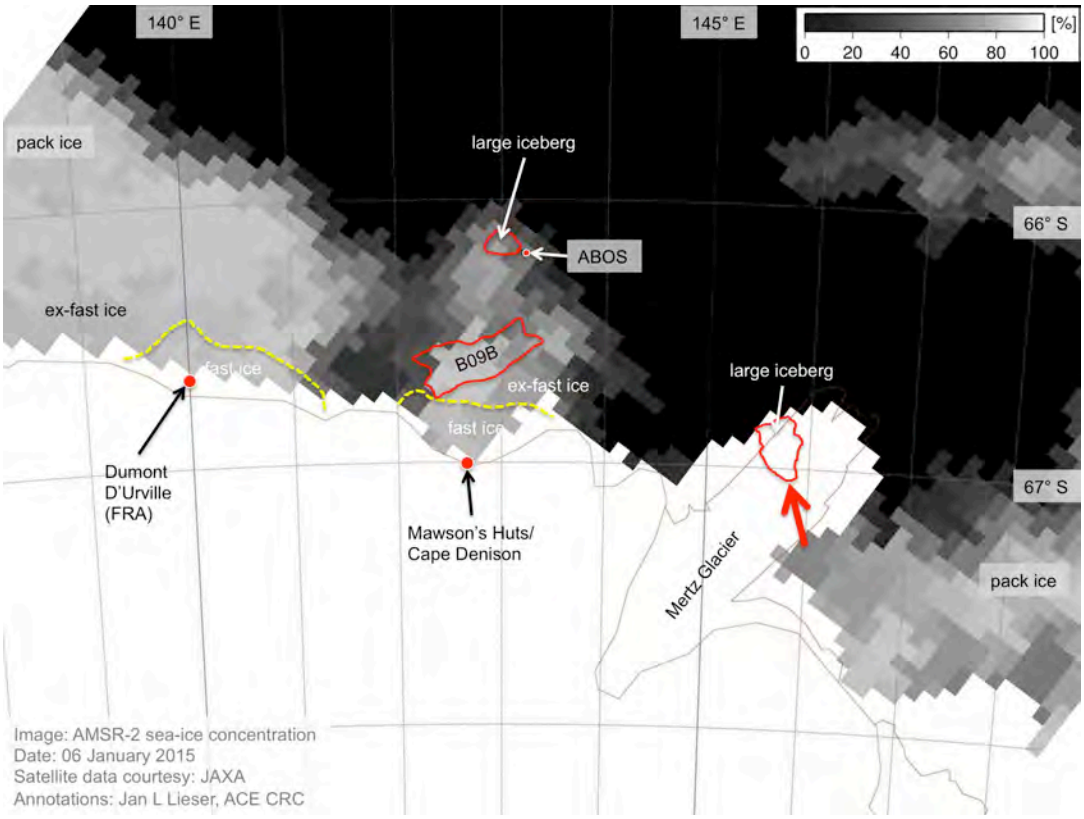

Figure 3: AMSR-2 sea-ice concentration image, acquired 06/01/2015 and provided by Drift & Noise Polar Services.

Sea Ice Report #02/2015

by the AAD/ACE CRC Sea Ice Group*

08/01/2015

This report's focus is on regions of immediate Australian interest.

- **Mawson Station**
  At the beginning of this week, fast ice off Mawson Station snapped and broke into many pieces. The current edge of the fast ice is approximated by the yellow dashed line in Figure 1. Even though the loosened ex-fast ice remains in the vicinity, larger areas of open water start to appear, for example at 63° 15' E and 67° 20' S.

  One large area of high concentration sea ice remains north of the (ex-)fast ice, centred at about 65° E and 66° 25' S.

  Further east, at the eastern side of Cape Darnley (outside Figure 1), fast ice is also breaking up in large chunks.

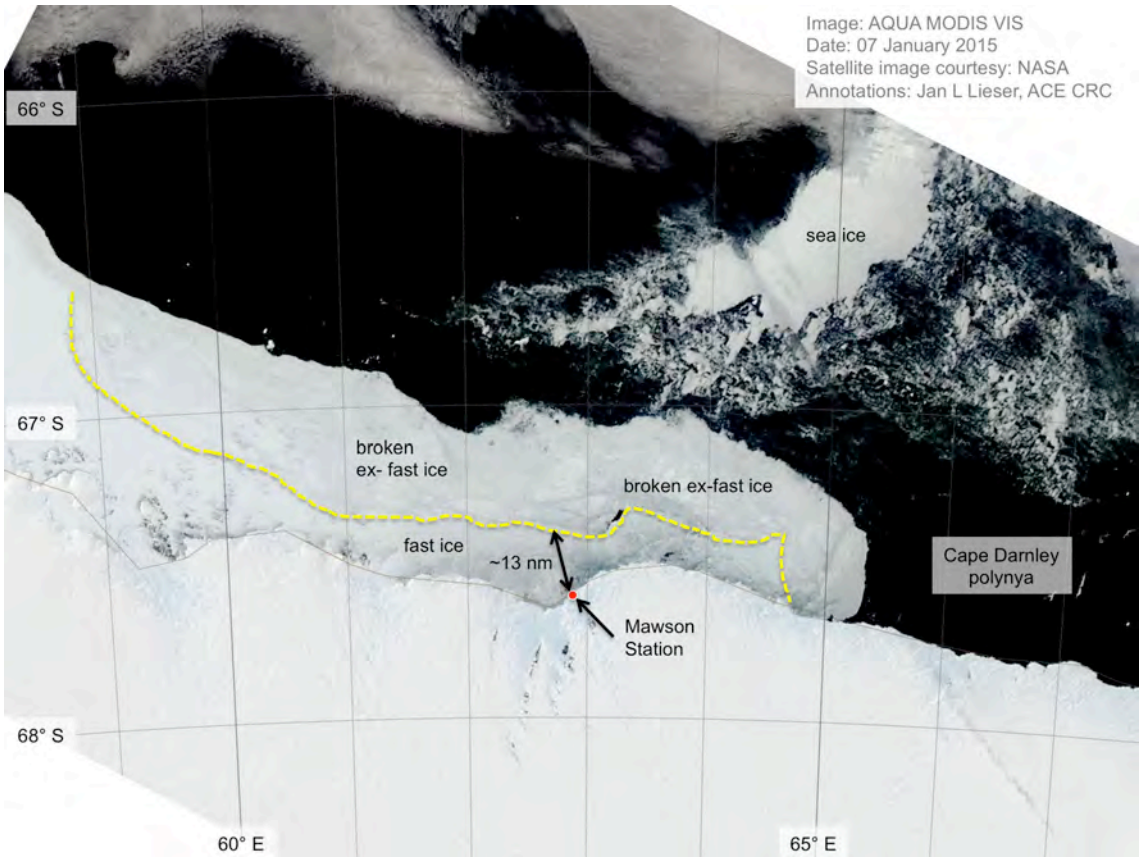

Figure 1: MODIS image, acquired 07/01/2015 and provided by NASA.

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- **Sabrina Coast**

  Figure 2 shows a RADAR image of sea-ice conditions off Sabrina Coast. It is superimposed over a visible image from MODIS sensor, that is obscured by clouds only in the northeastern part of the figure. The orange dotted line denotes the recent cruise track of RSV *Aurora Australis* in the region (up until 08/01/2015 00:00 UT).

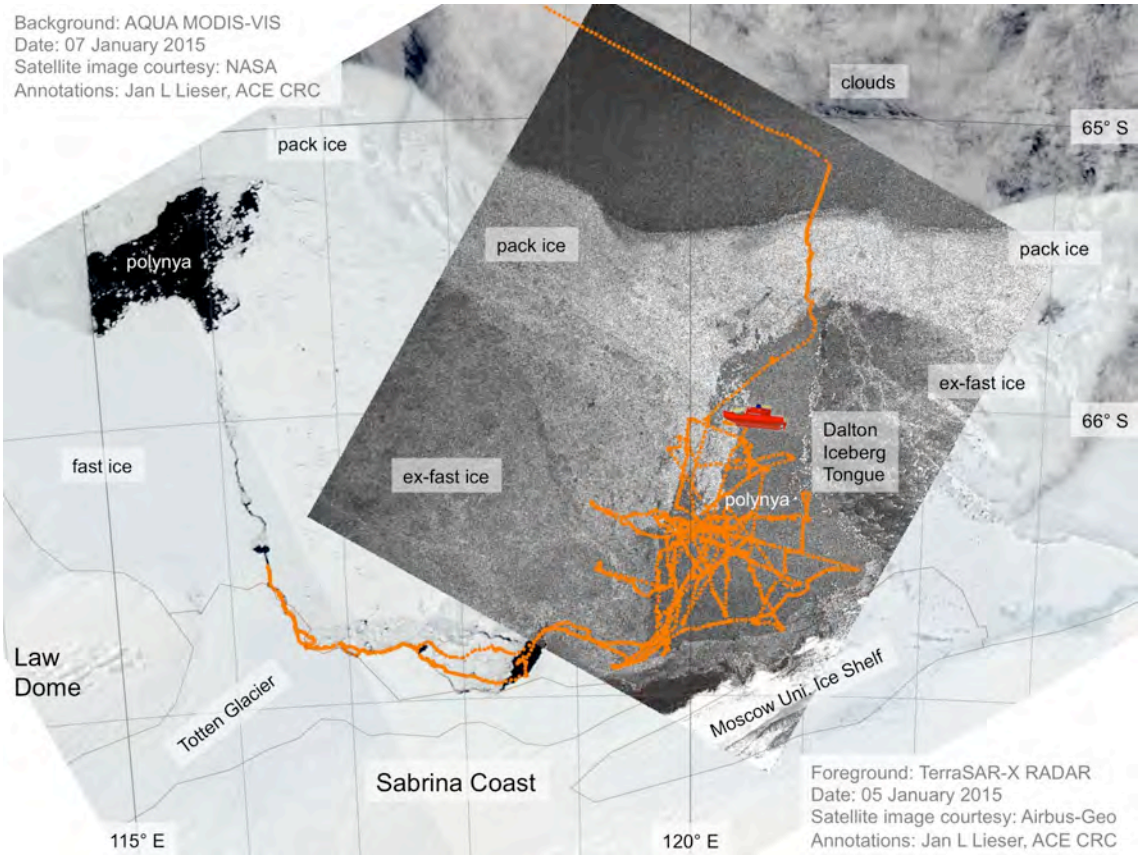

Figure 2: Foreground: TerraSAR-X image, acquired 05/01/2015 and provided by Airbus-Geo; Background: MODIS image, acquired 07/01/2015 and provided by NASA.

The northern edge of the sea ice is a well defined line again. At about 122° 30' E and 65° 20' S, the different location of the sea-ice edge between the two images is owed to the data acquisition time difference.

Within the sea ice west of the Dalton Iceberg Tongue polynya, roughly three different types of surface characteristics can be distinguished from the RADAR signatures (foreground image in Figure 2). The band of pack ice in the north shows relatively bright, rough conditions. The ex-fast ice in the west shows darker, less rough conditions, with a wedge of transitional surface conditions in the middle. Without providing a specific measure, these surface conditions can also be interpreted as young pack ice in the north, old fast ice in the west and intermediate age (most likely accumulated sea ice formed in the polynya, during the past winter) in between.

The width (north-south extent) of the pack ice separating the (ex-)fast ice/polynya from the open ocean is reducing as a result of general summer (melting) conditions in the region. From the northern tip of the Dalton Iceberg Tongue, this band is about 15 nautical miles wide at the moment.

With best regards,

Jan.

Sea Ice Report #02a/2015

by the AAD/ACE CRC Sea Ice Group*

08/01/2015

This report provides an assessment of sea-ice conditions of Prydz Bay.

- **Zhongshan Station**
  Since the beginning of this week, around the coastline of Prydz Bay, remaining fast ice has started to break up. Figure 1 shows shattered ex-fast ice to the north and west of the Larsemann Hills (Zhong Shan Station) and further north along the coast, up to 80° E as well. Also on the eastern side of Cape Darnley (northwest of the Amery Ice Shelf), fast ice is breaking up from the eastern edge of the fast ice attached to the coast. There, the approximate transition between fast ice and ex-fast ice is indicated by a yellow dashed line in Figure 1.

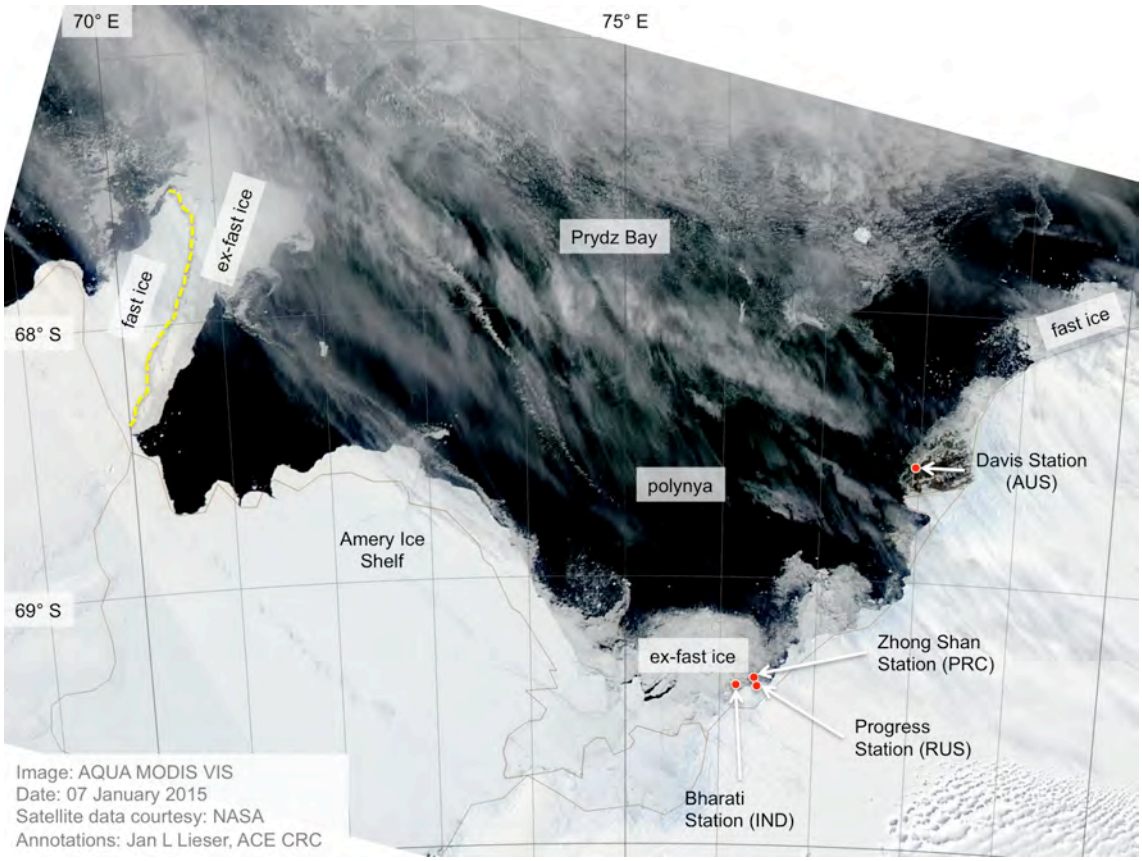

Figure 1: MODIS image, acquired 07/01/2015 and provided by NASA.

Northern Prydz Bay (see Figure 2) still holds some sea ice. Between 65° 30' S and 67° S and west of 80° E, very high sea-ice concentration

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is present, consisting of both, pack ice and fast ice. The latter – even though reducing in extent – remains attached to iceberg D15 (grounded north of the West Ice Shelf) and surrounding multi-year fast ice. Further between 65° 30' S and 67° S and between 62° E and 66° E, an area of combined pack ice and ex-fast ice is reducing gradually in concentration, from the very high (up to 100%) east of 65° E down to about 20% at its western margin.

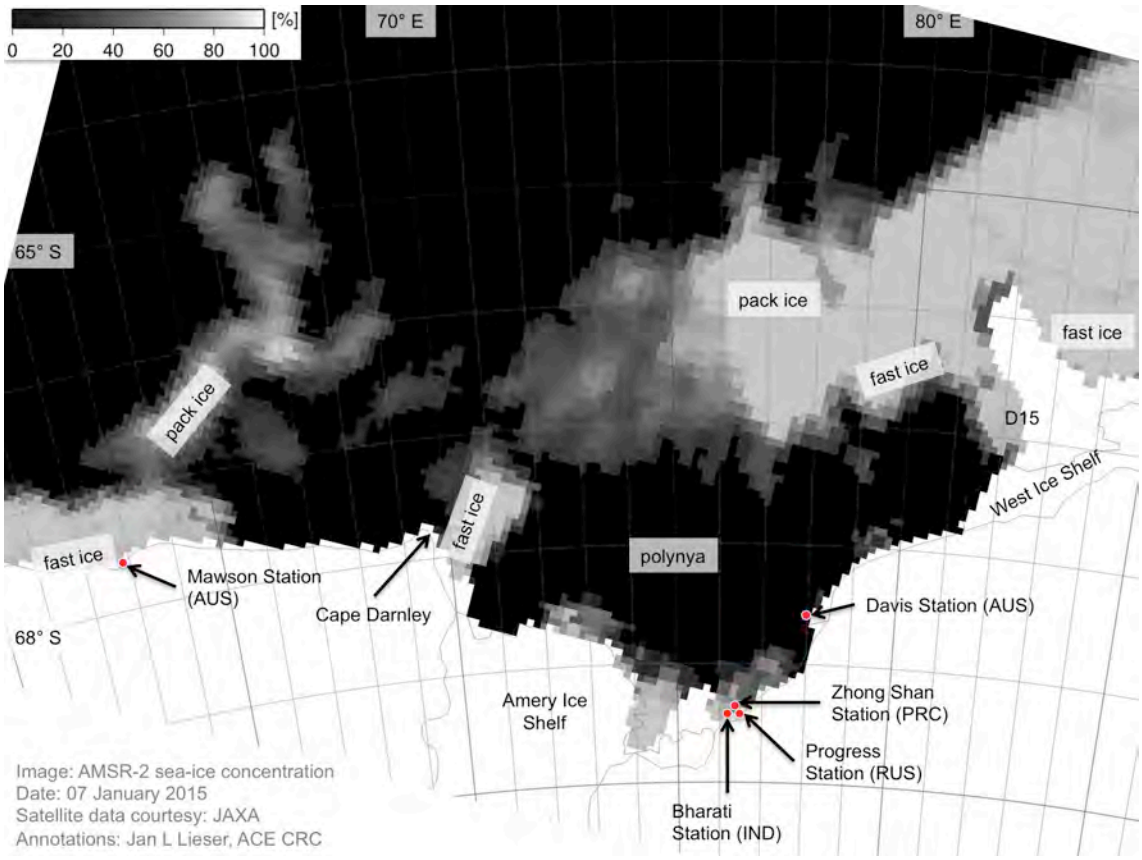

Figure 2: AMSR-2 image, acquired 07/01/2015 and provided by Drift & Noise Polar Services.

With best regards,

Jan.

Sea Ice Report #02b/2015

by the AAD/ACE CRC Sea Ice Group*

08/01/2015

This report examines sea-ice conditions in the Ross Sea with focus along 180° E.

- **Ross Sea**
  Figure 1 shows a map of sea-ice concentration for the Ross Sea and adjacent areas. The green line indicates the 30-year (1981-2010) median sea-ice extent for January. Between 170° E and 170° W, the orange dashed line marks the northern edge where sea ice can reasonably be expected.

  Summer trend continues in the Ross Sea region, with sea-ice concentration reducing and large floes breaking into smaller ones.

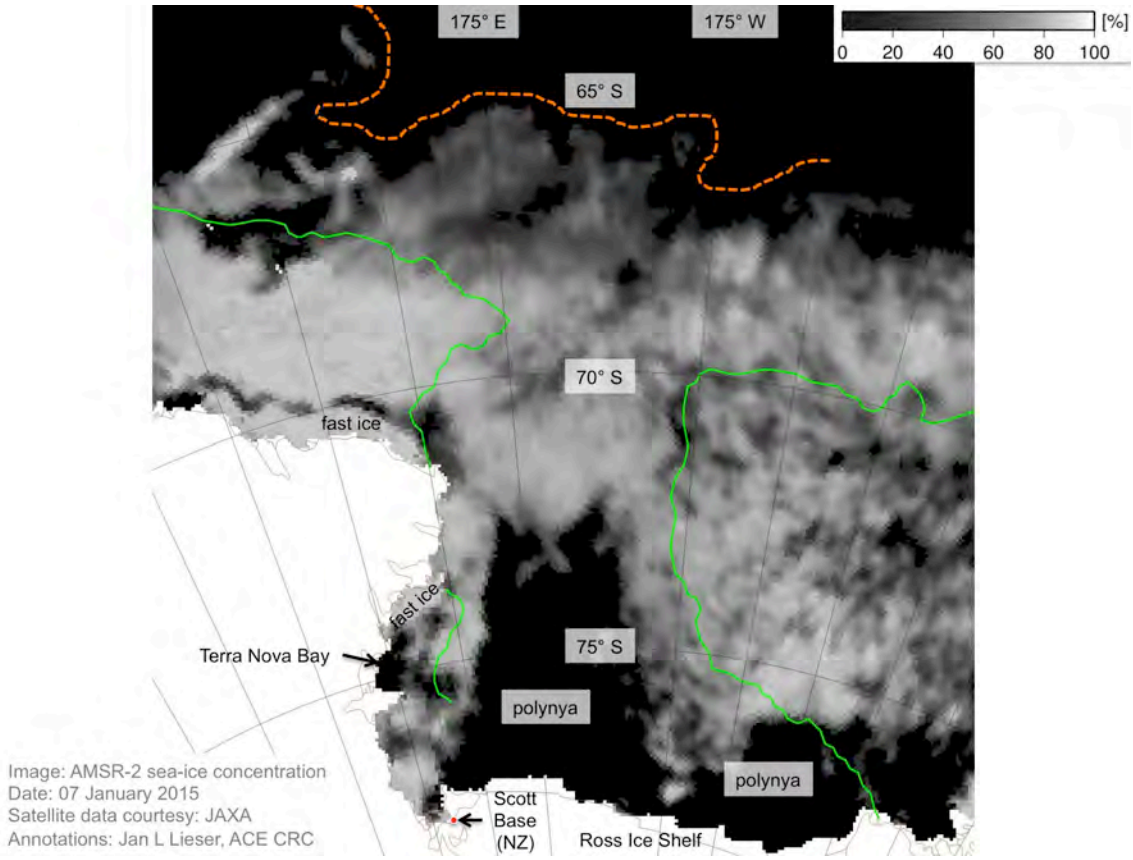

Figure 1: AMSR-2 image, acquired 07/01/2015 and provided by Drift & Noise Polar Services.

With best regards,

Jan.

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Sea Ice Report #02c/2015

by the AAD/ACE CRC Sea Ice Group*

13/01/2015

This report examines sea-ice conditions between Dumont d'Urville Station and the Mertz Glacier.

- **Commonwealth Bay**
  Figure 1 shows a combination of images from two different sensors, visible MODIS (background) and Synthetic Aperture Radar (SAR) (inset). The orange line denotes the cruise track of RSV *Aurora Australis* in the region (up to 13/01/2015 00:00 UT). The inset provides a view on the sea ice where the MODIS image is obscured by clouds.

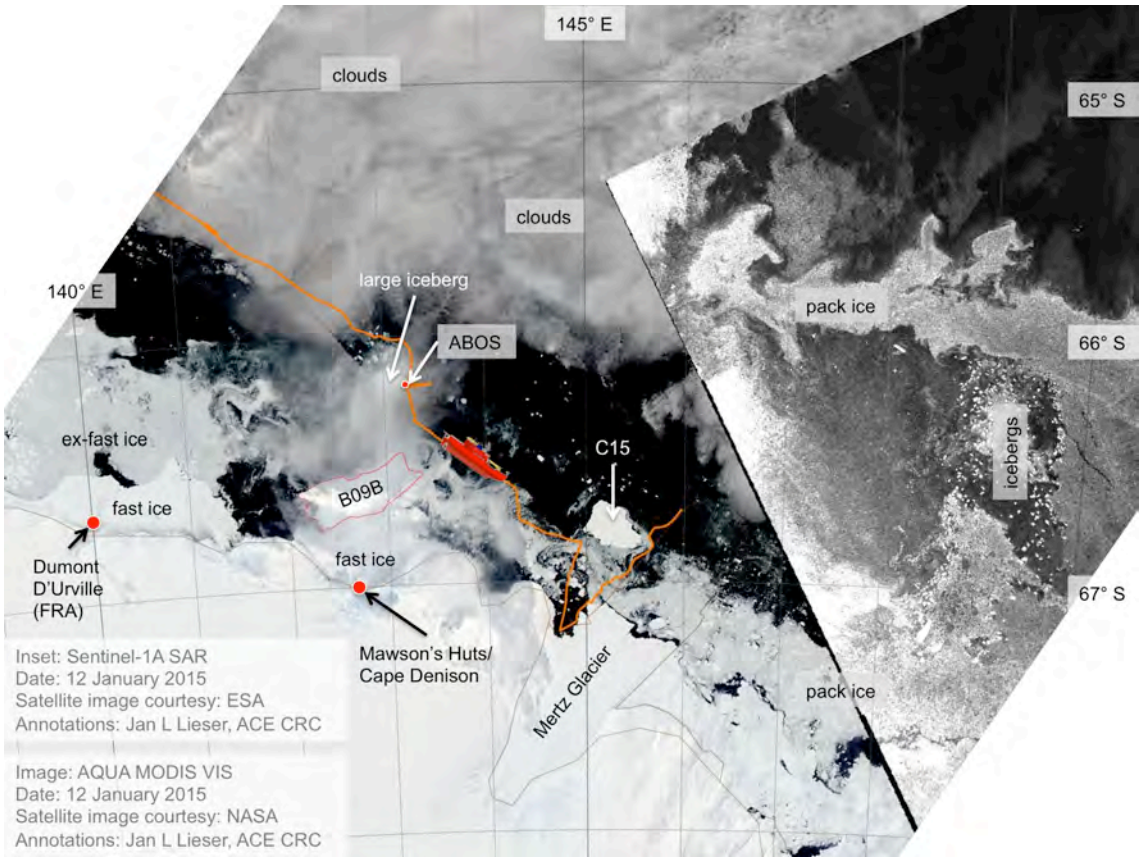

Figure 1: MODIS image, acquired 12/01/2015 and provided by NASA. Inset: SAR image, acquired 12/01/2015 and provided by PolarView.

Since 01/01/15, iceberg C15 has travelled about 17 nautical miles in northwest direction, across the face of Mertz Glacier.

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Between 140° E and 150° E, some sea ice can reasonably be expected south of 65° S. In the same sector, adjacent to the coast and off the fast ice edge, a mixture of broken pack ice and ex-fast ice is present. Along and north of 66° S, a band of pack ice extends from the east with its pointy end at about 144° E and 65° 30' S.

Off Dumont d'Urville Station and in Commonwealth Bay off Mawson's Huts, fast ice remains attached to the coast, even thought the length of the exposed coast between these two patches of fast ice is steadily increasing, currently about 12 nautical miles.

With best regards,

Jan.

Sea Ice Report #02d/2015

by the AAD/ACE CRC Sea Ice Group*

13/01/2015

This report updates on sea ice conditions off Mawson Station.

- **Mawson Station**
  Off Mawsons Station, the boundary between the fast ice attached to the coast and ex-fast ice is migrating southward still. The shortest distance between the station and this transition zone is currently just over nine nautical miles in northwesterly direction (see Figure 1). Also the fast ice off the eastern side of Cape Darnley continues to break away.

  Between 59° E and 65° E (and further to the west), the northern edge of the broken ex-fast ice shows a zig-zag formation. Of curious note is a plume-like pattern of sea ice apparently emerging from one of the peaks, looking like a pseudo-chimney, at about 61° 30' E and 66° 50' S. Going north and east from there, the northern boundary (towards the open ocean) of this plume-like patch of sea ice takes the shape of waves, some seemingly breaking. During the past few days, this pattern was in fact developing from the northeast down towards the fast ice edge, rather than the other way. Anyhow, it seems to be a visible surface manifestation of small scale eddy structures of various spatial dimensions in the uppermost layer of the ocean.

  Figure 2 is provided for reference and comparison. The eddy and wave structures are not so obvious in this coarser resolution microwave data set. Notwithstanding that it provides a good, unclouded impression of presence and absence of sea ice in the region.

With best regards,

Jan.

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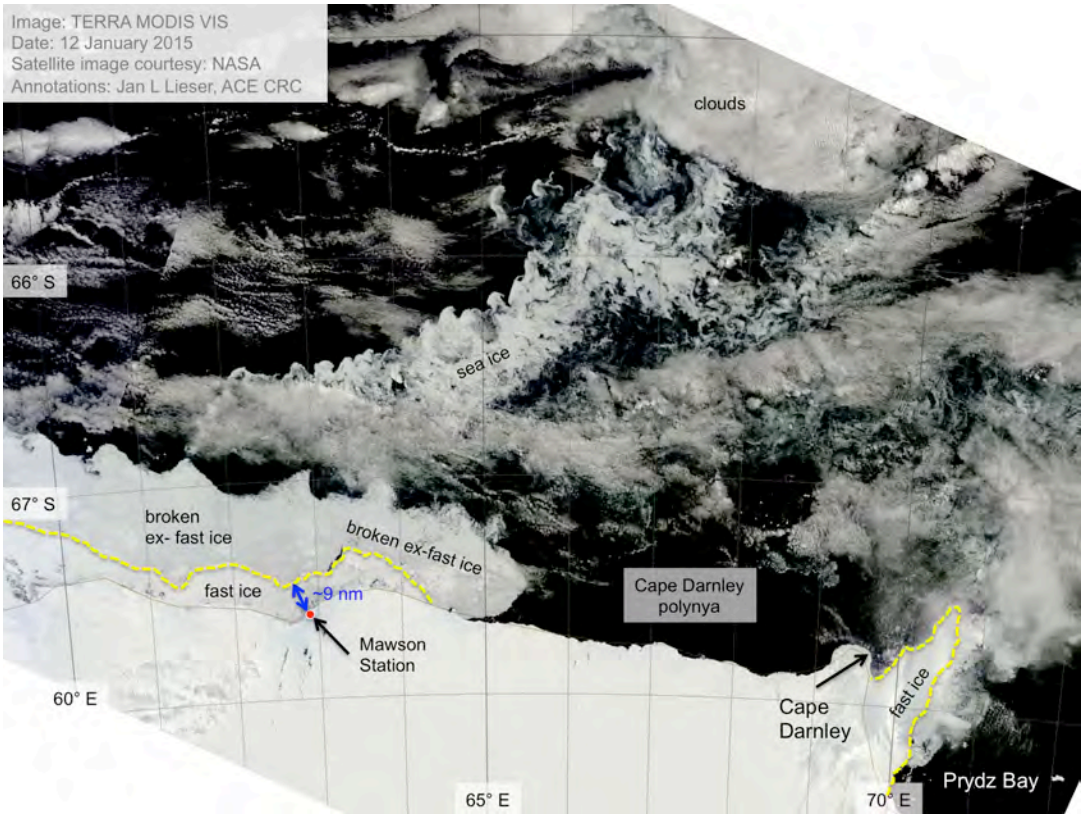

Figure 1: MODIS image, acquired 12/01/2015 and provided by NASA.

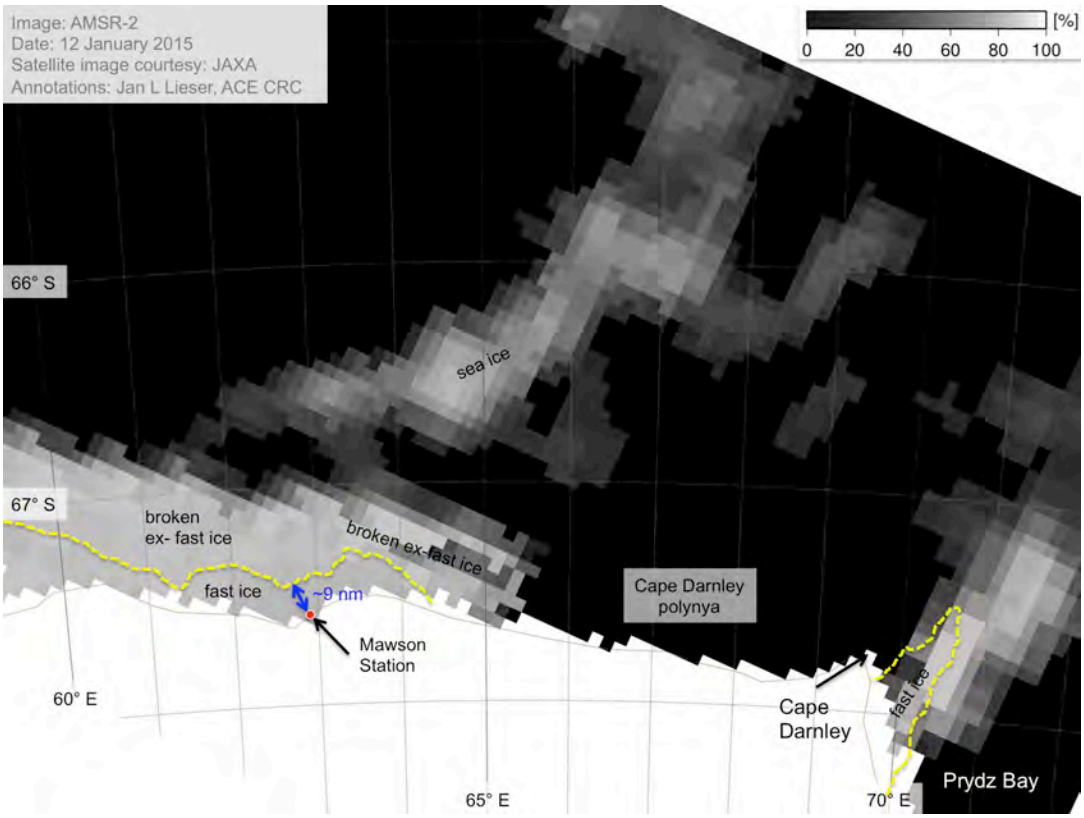

Figure 2: AMSR-2 sea-ice concentration image, acquired 12/01/2015 and provided by Drift & Noise Polar Services.

Sea Ice Report #02e/2015

by the AAD/ACE CRC Sea Ice Group*

14/01/2015

This report examines sea-ice conditions in the western Ross Sea.

- **Ross Sea**
  Figures 1 and 2 depict the same geographical frame, as seen by two different satellite sensors. Figure 1 presents the relatively coarse resolution (about 6 km) sea-ice concentration product based on microwave data, Figure 2 has overlain a high-resolution (about 100 m) Synthetic Aperture RADAR (SAR) scene from the same day.

  We note the general good agreement of the high and low sea-ice concentration areas in both scenes. The SAR allows, however, for a much more detailed analysis of the low sea-ice concentration patches. It is clear, that even areas that are classified as open water in the microwave data set are covered by some sea ice, even though it is little and therefore below the detection limit of the microwave instrument. Examples for this are between 171° E and 175° E, north of 68° S and a patch centred at about 169° E and 70° 25' S.

  Sea ice in the entire area appears to consist of small to very small floes, except for the near-shore fast ice. Overall, there remains more sea ice than usual, in the region at this time of year. But it still shows signs of retreat, which is consistent with continuing summer conditions.

With best regards,

Jan.

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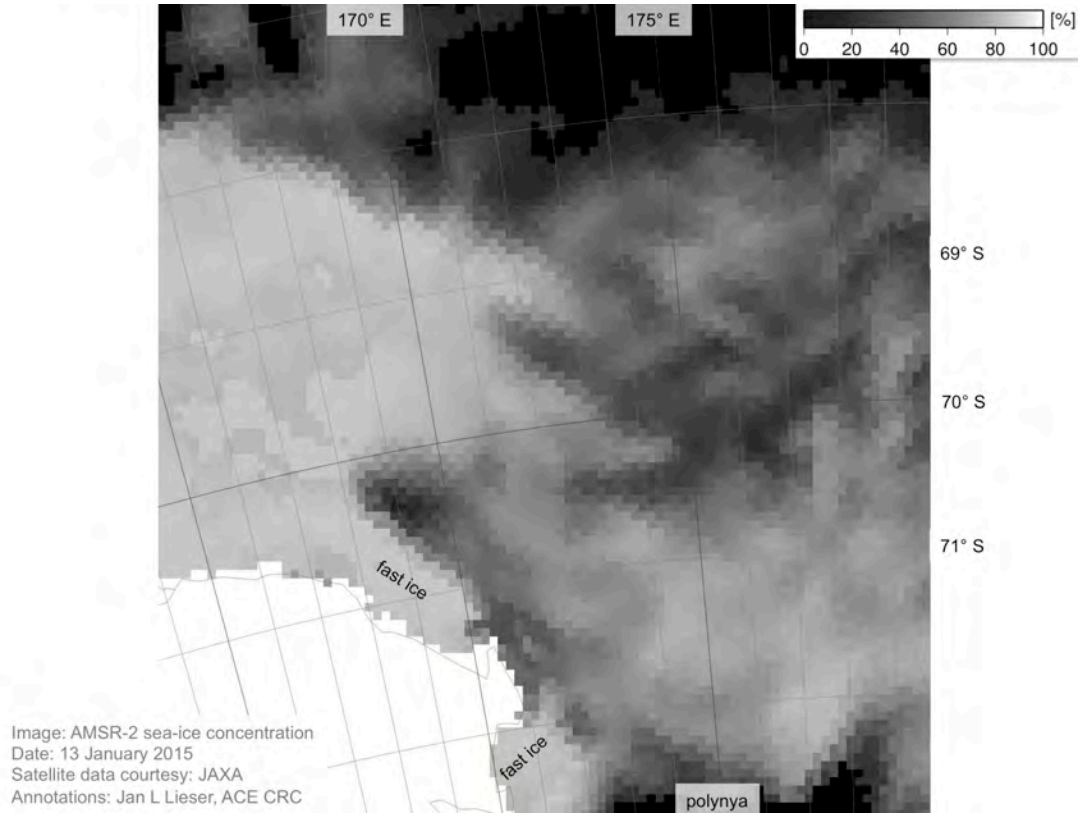

Figure 1: AMSR-2 image, acquired 13/01/2015 and provided by Drift & Noise Polar Services.

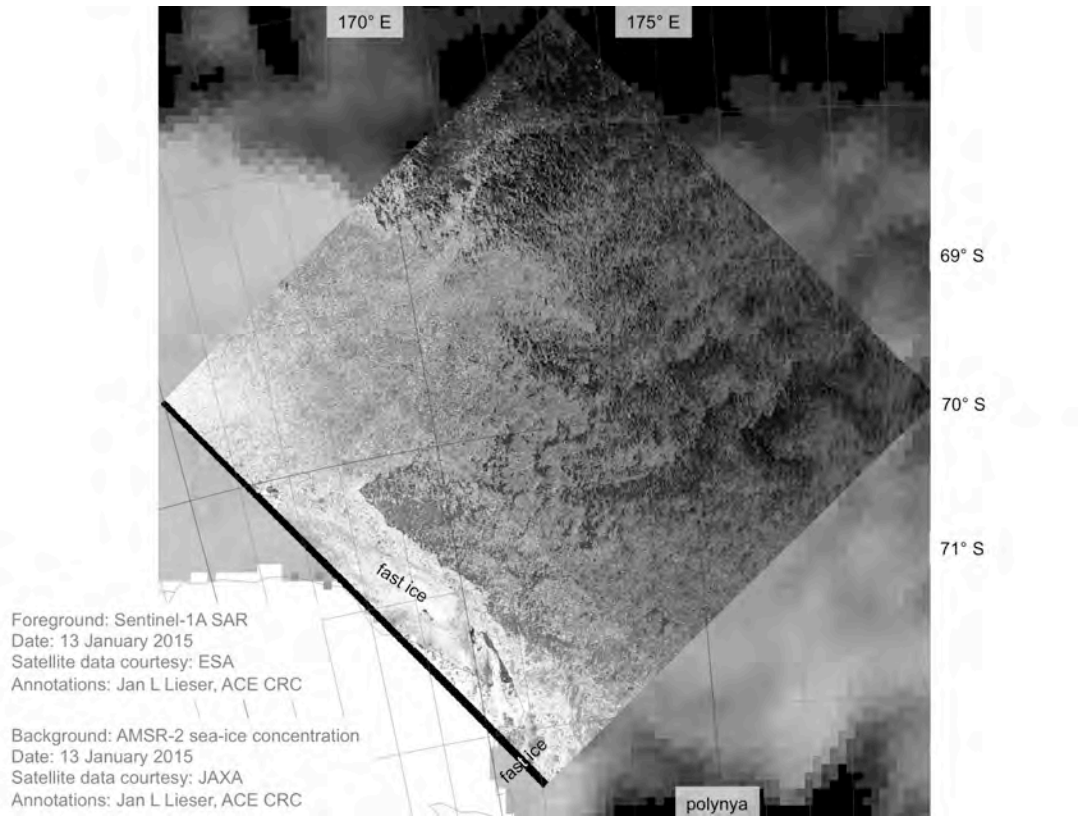

Figure 2: SAR image, acquired 13/01/2015 and provided by PolarView.

Sea Ice Report #03/2015

by the AAD/ACE CRC Sea Ice Group*

15/01/2015

This report's focus is on regions of immediate Australian interest.

- **Mawson Station**
  Even though a detailed view is prevented due to cloud cover, today, sea-ice conditions appear by and large unchanged off Mawson Station. The fast ice edge can not be approximated from the microwave data (Figure 1).

  The plume-like pattern of sea ice described in Sea Ice Report #02d/2015 remains in the region and appears highly mobile.

  West of 73° 30' E, northern Prydz Bay is covered by medium high to high concentration of sea ice, which is also highly mobile and consists of predominantly small floes. Within this pack, one large iceberg is

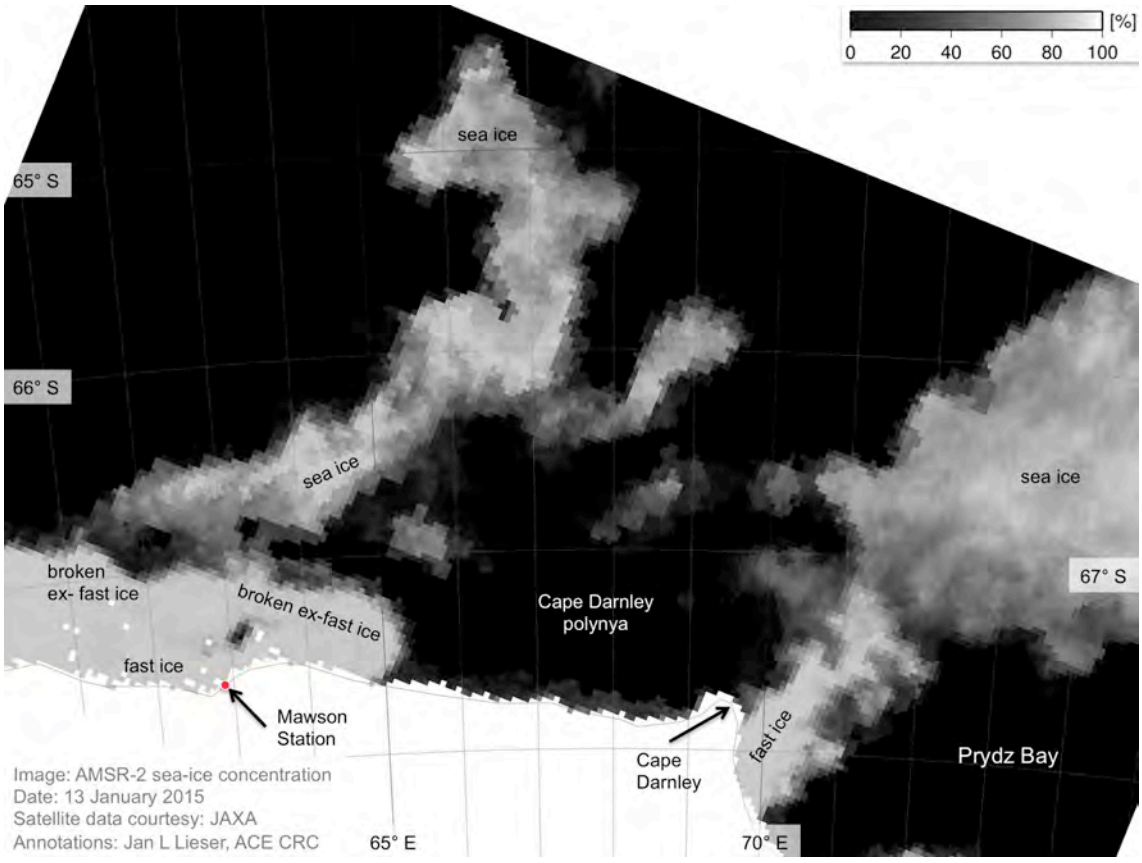

Figure 1: AMSR-2 image, acquired 13/01/2015 and provided by Universität Hamburg.

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drifting in northwesterly direction at a speed of about two nautical miles per day, currently located at about 74° 50' E and 66° 30' S.

- **Commonwealth Bay**
  Figure 2 provides a largely unobscured visible impression of the sea ice between Dumont d'Urville Station and the Mertz Glacier. The thin orange line denotes the recent cruise track of RSV *Aurora Australis* (up to 15/01/2015 00:00UT). The fast ice edge is approximated with a yellow dashed line.

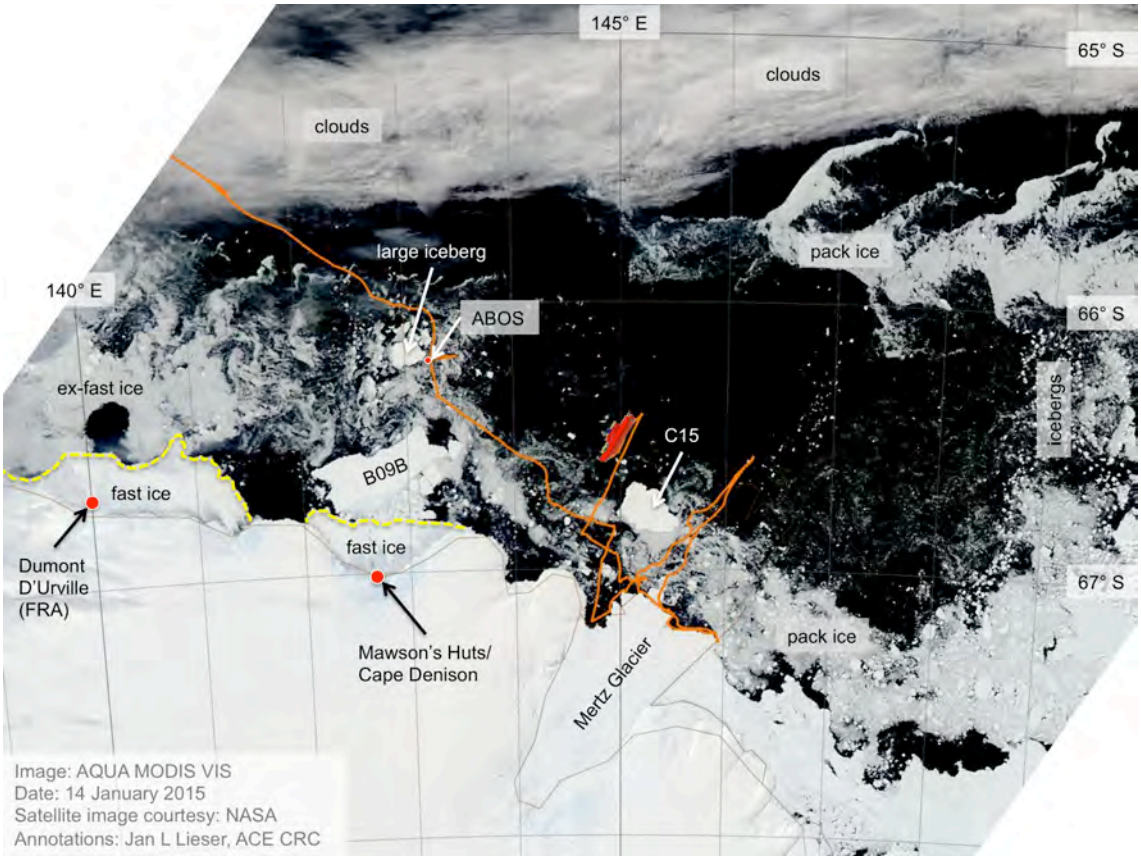

Figure 2: MODIS image, acquired 14/01/2015 and provided by NASA.

North of Commonwealth Bay, iceberg B09B is not surrounded by fast ice anymore. The sea ice around the berg has broken up, but remains local south of B09B, between the berg and the fast ice of the bay.

Iceberg C15 has temporarily slowed in its westward drift, possibly due to ocean floor topography.

With best regards,

Jan.

Sea Ice Report #03a/2015

by the AAD/ACE CRC Sea Ice Group*

15/01/2015

This report examines sea-ice conditions between Dumont D'Urville Station and the Mertz Glacier.

- **Commonwealth Bay**
  Figures 1 and 2 show the same geographical frame, the sea-ice zone between 135° E and 155° E. Figure 1 gives a visible impression, where sea ice is obscured by clouds only west of 141° E. Figure 2 provides a map of sea-ice concentration derived from AMSR-2 instrument at 3.125 km resolution (note: the outdated, white land mask still showing the extent of the Mertz Glacier tongue prior to the calving event in February 2010). Three large icebergs are annotated in both figures, namely B09B, which is grounded north of Commonwealth Bay, C15 currently drifting across the front of Mertz Glacier in northwesterly direction and an unnamed large tabular berg grounded north of B09B.

  West of the Mertz Glacier, the fast-ice edge is approximated by a yellow dashed line. The orange dashed line marks the northern boundary of the sea-ice zone, where some ice can reasonably be expected.

  While a large region north of the Mertz Glacier appears generally free of sea ice, many small to medium sized icebergs can be identified in the visible imagery (Figure 1), between 144° E and 149° E and south of 66° S .

With best regards,

Jan.

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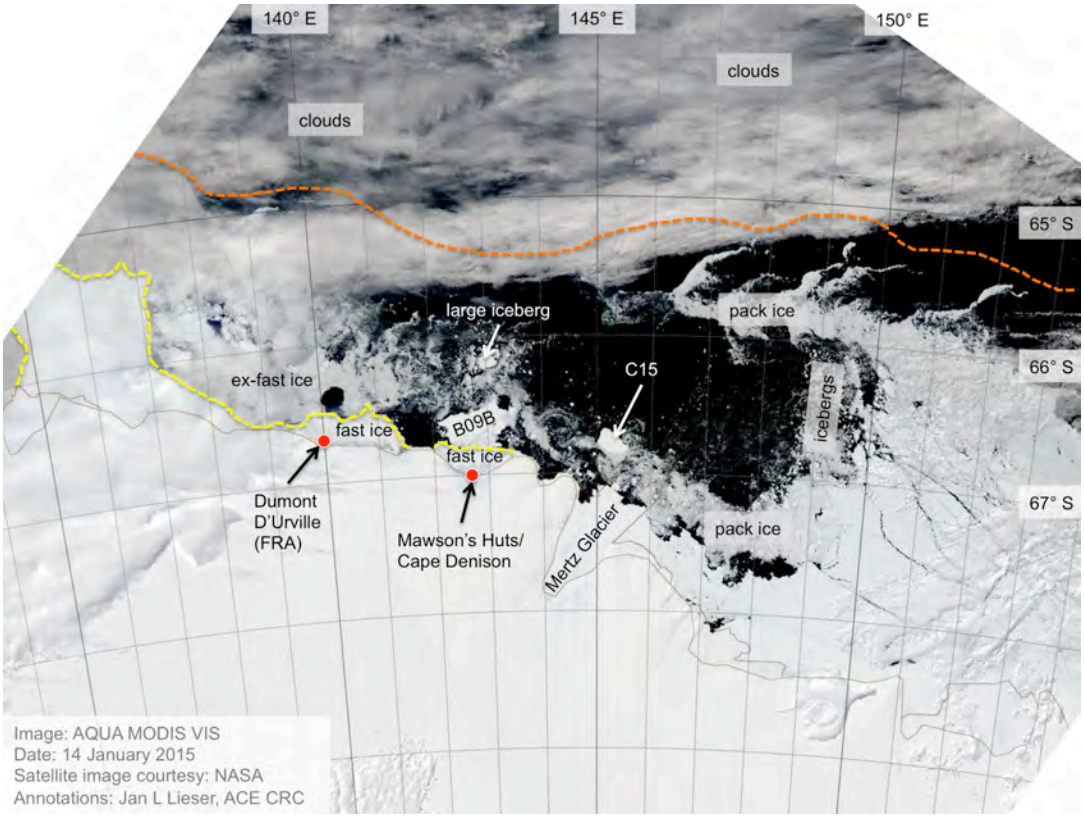

Figure 1: MODIS image, acquired 14/01/2015 and provided by NASA.

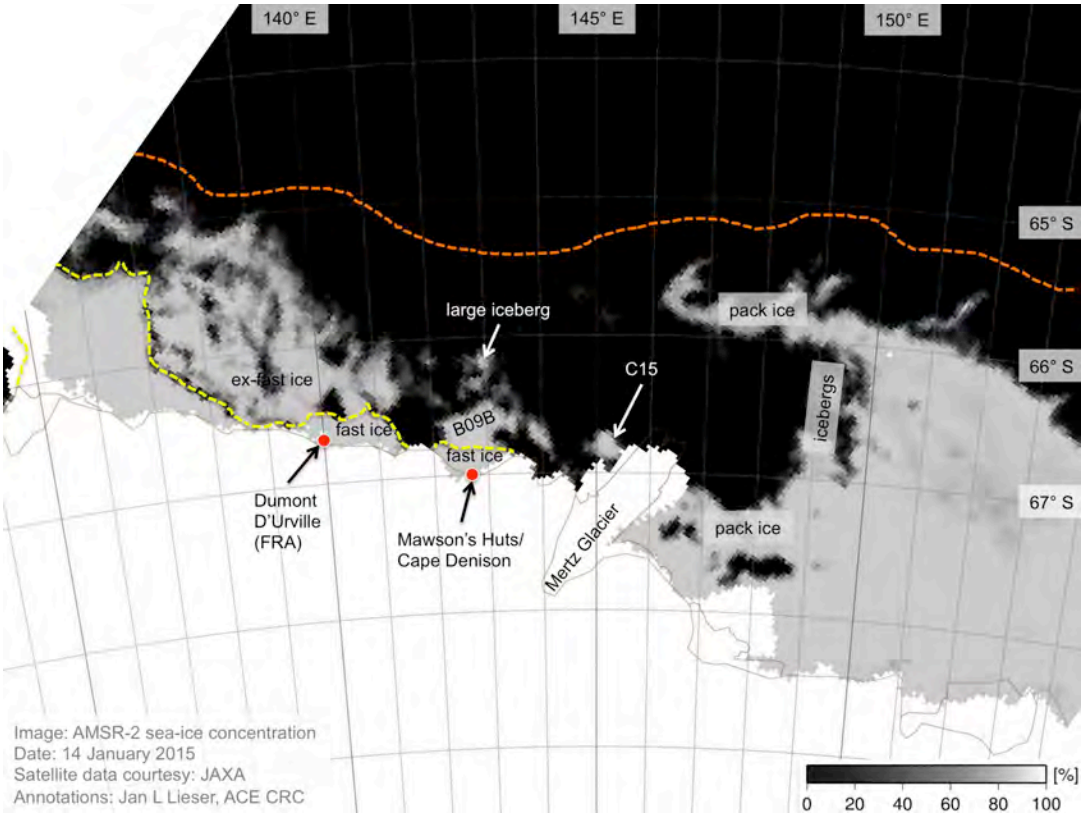

Figure 2: AMSR-2 image, acquired 14/01/2015 and provided by Universität Hamburg.

Sea Ice Report #03b/2015

by the AAD/ACE CRC Sea Ice Group*

19/01/2015

This report's focus is on regions of immediate Australian interest.

- **Mawson Station**
  Off Mawson Station, the width (north-south extent) of the fast ice remains more or less constant during the past few days. But we notice further east (63° 41' E, 67° 30' S) and west (61° 20' E, 67° 25' S) the fast ice continues to crumble (see Figure 1).

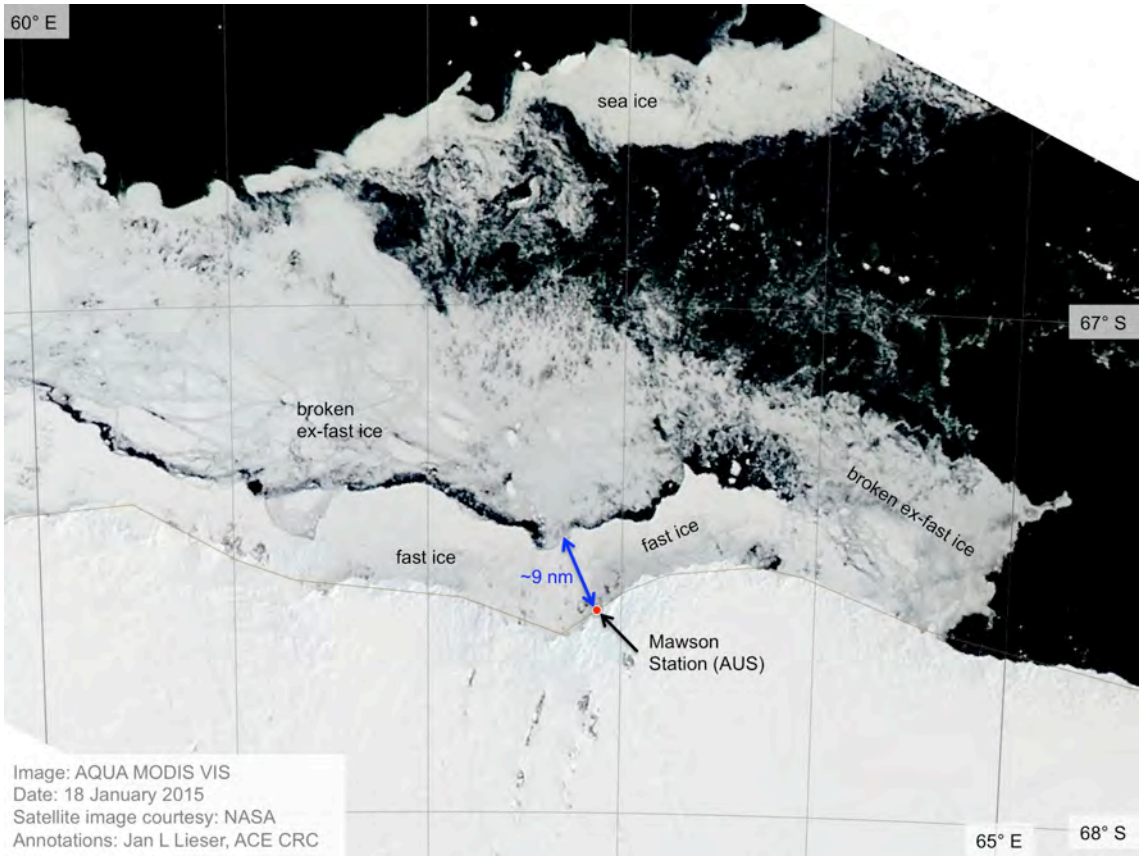

Figure 1: MODIS image, acquired 18/01/2015 and provided by NASA.

Close to the coast at Mawson Station, the fast ice is also deteriorating, as can be seen from station's web-cam imagery. A few larger icebergs are drifting freely, north of 67° S.

- **Commonwealth Bay**
  Figure 2 provides a largely unobscured visible impression of the sea ice between Dumont d'Urville Station and the Mertz Glacier. The thin

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orange line denotes the recent cruise track of RSV *Aurora Australis* (up to 19/01/2015 00:00UT).

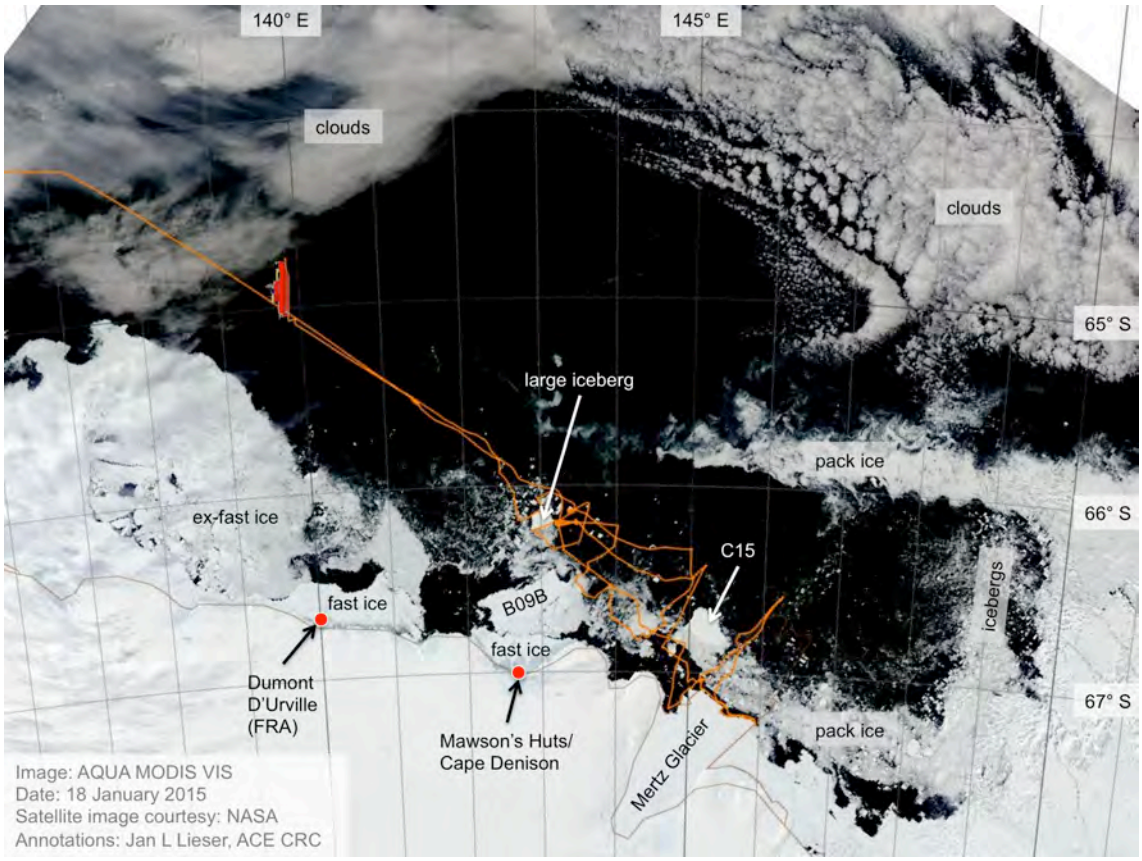

Figure 2: MODIS image, acquired 18/01/2015 and provided by NASA.

Sea-ice conditions in the region remain overall unchanged since our last report. Iceberg C15 appears to be on the move again at a rate of about 0.5 nautical miles per day in northerly direction.

With best regards,

Jan.

Sea Ice Report #03c/2015

by the AAD/ACE CRC Sea Ice Group*

19/01/2015

This report examines sea-ice conditions off Commonwealth Bay and in the Ross Sea.

- **Commonwealth Bay**
  Figures 1 and 2 show the same geographical frame as shown in Sea Ice Report #03a/2015. The sea-ice zone between 135° E and 155° E is by and large cloud free in Figure 1. Figure 2 provides a map of sea-ice concentration derived from AMSR-2 instrument at 6 km resolution (note: the outdated, white land mask still showing the extent of the Mertz Glacier tongue prior to the calving event in February 2010). Three large icebergs (B09B, C15 and an unnamed one) are annotated in both figures.

  The fast-ice edge is approximated by a yellow dashed line. The orange dashed line marks the northern boundary of the sea-ice zone, where some ice can reasonably be expected. At about 143° 15' E and 65° 15' S, some sea ice can be seen extending northward. While this bit of sea ice can be clearly identified in the visible imagery (Figure 1), it appears to be below the detection limit of the microwave sensor (Figure 2).

  Many small to medium sized icebergs are in region north of the Mertz Glacier, between 144° E and 149° E and south of 66° S .

- **Ross Sea**
  Figures 3 and 4 show the same geographical frame. Figure 4 has a recent RADAR acquisition overlain as inset. The green line marks the median sea-ice extent for January. Between 170° E and 170° W, the orange dotted line marks the northern boundary of the sea-ice zone, where some ice can reasonably be expected.

  Sea-ice extent is still above the average in the region, particularly in the western part of Ross Sea. The RADAR inset in Figure 4 shows clearly how the close coexistence of sea ice and open water translates into a concentration value of the microwave instrument.

With best regards,

Jan.

*Disclaimer: *Every effort is made to ensure the data provided in this report are accurate at the date of publication; however the report is provided without warranty of any kind. The figures and charts provided in this report are intended only as a guide to ice conditions and are not suitable for navigation.*

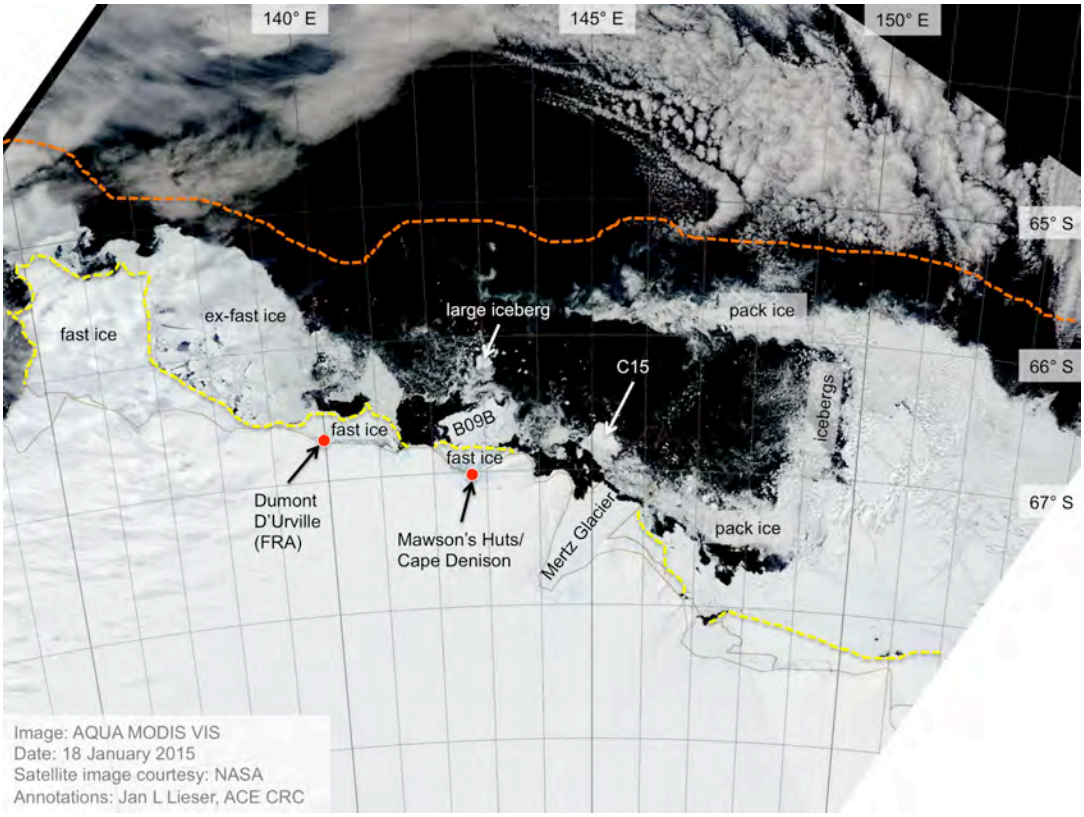

Figure 1: MODIS image, acquired 18/01/2015 and provided by NASA.

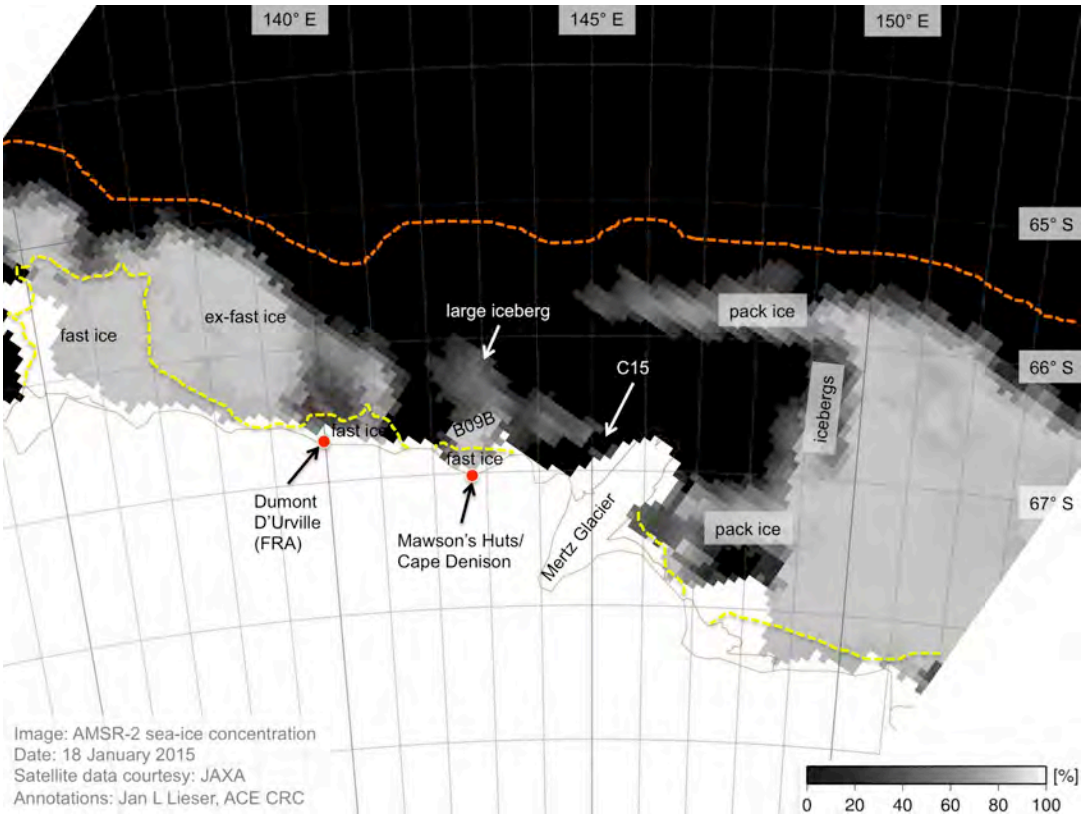

Figure 2: AMSR-2 image, acquired 18/01/2015 and provided by Drift & Noise Polar Services.

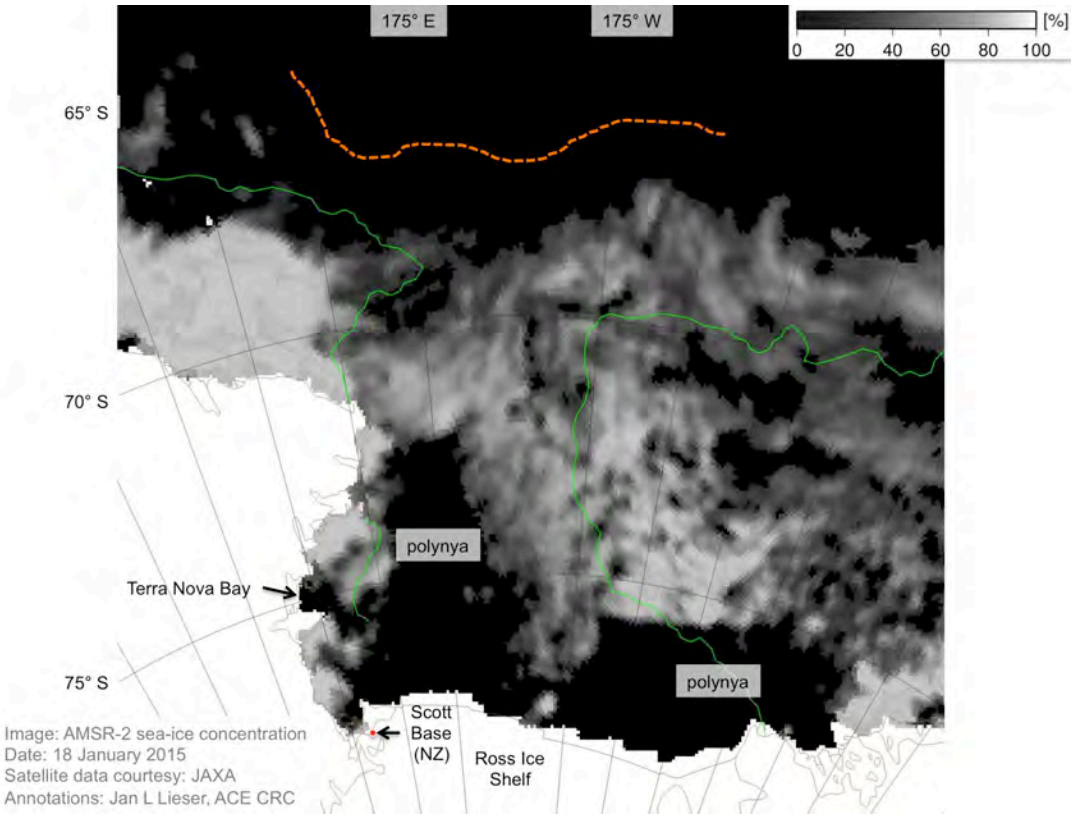

Figure 3: AMSR-2 image, acquired 18/01/2015 and provided by Drift & Noise Polar Services.

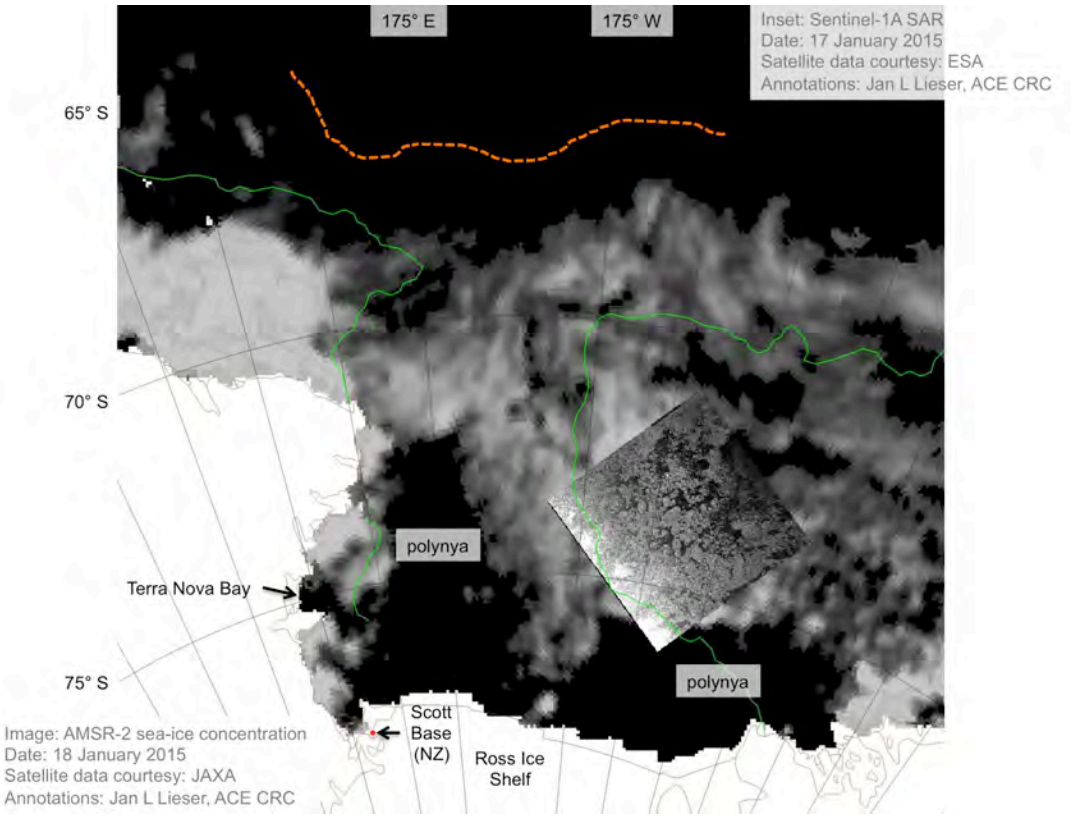

Figure 4: Same as Figure 3, plus inset: RADAR image, acquired 17/01/2015 and provided by ESA.

Sea Ice Report #04/2015

by the AAD/ACE CRC Sea Ice Group*

22/01/2015

This report's focus is on regions of immediate Australian interest.

- **Mawson Station**
  Figure 1 shows an almost entirely cloud-free scene of the Mawson Coast and the sea-ice conditions offshore. The fast-ice edge is approximated by a yellow dashed line. The shortest distance between the fast-ice edge and Mawson Station remains steady at about nine nautical miles. The broken ex-fast ice north of the fast ice edge continues to break up further and disperse. The band of sea ice north of the broken ex-fast ice thins and scatters also.

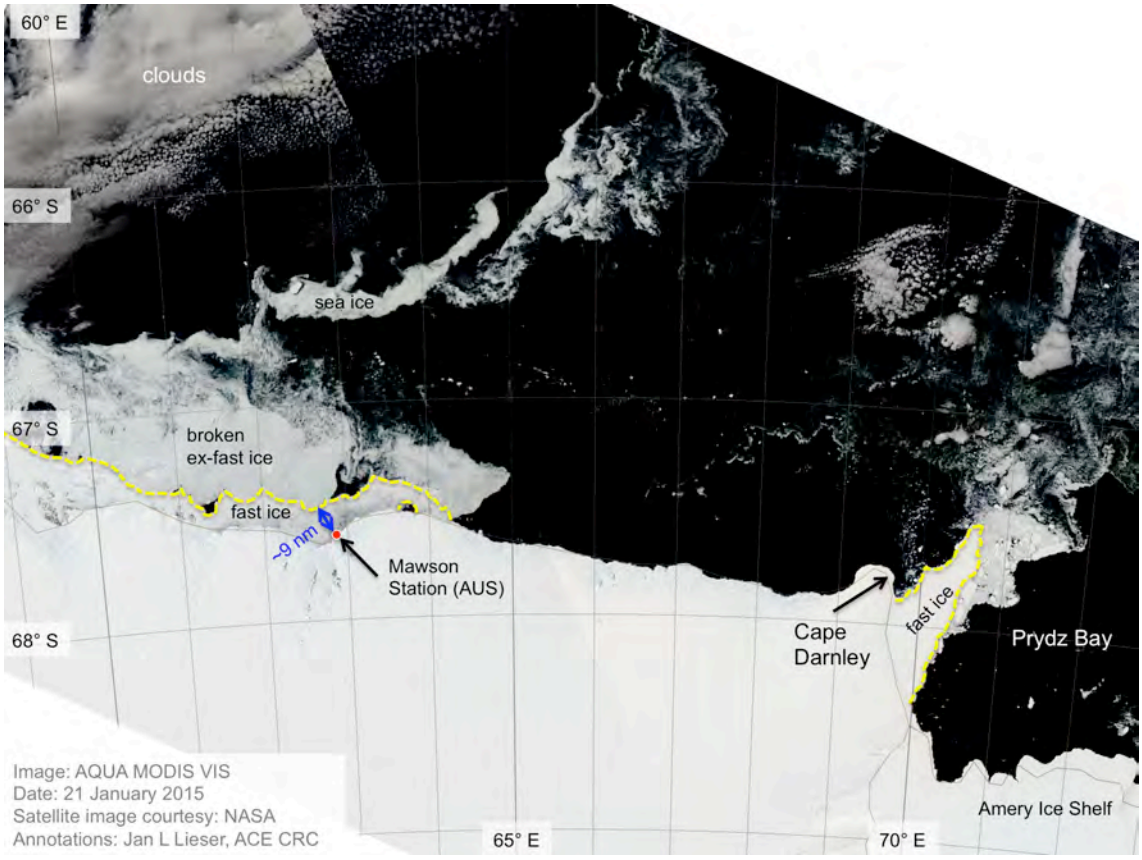

Figure 1: MODIS image, acquired 21/01/2015 and provided by NASA.

We note an eddy structure of sea ice at about 63° E and 67° 30' S as a visible sign of oceanographic dynamics in the area. Off the eastern side of Cape Darnley, fast ice also continues to break up and spreads northward.

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- **Davis Station**
  In northern Prydz Bay, sea ice can be generally characterised by two different regimes. The transition line is indicated by the orange line in Figure 2. To the west of this line, sea ice is scattered far and wide and some ocean eddy structures can be seen in the swirls of the sea ice. East of the transition line, sea ice remains at higher concentration, but consists mostly of relatively small floes. This eastern regime shows also swirling structures at the edges.

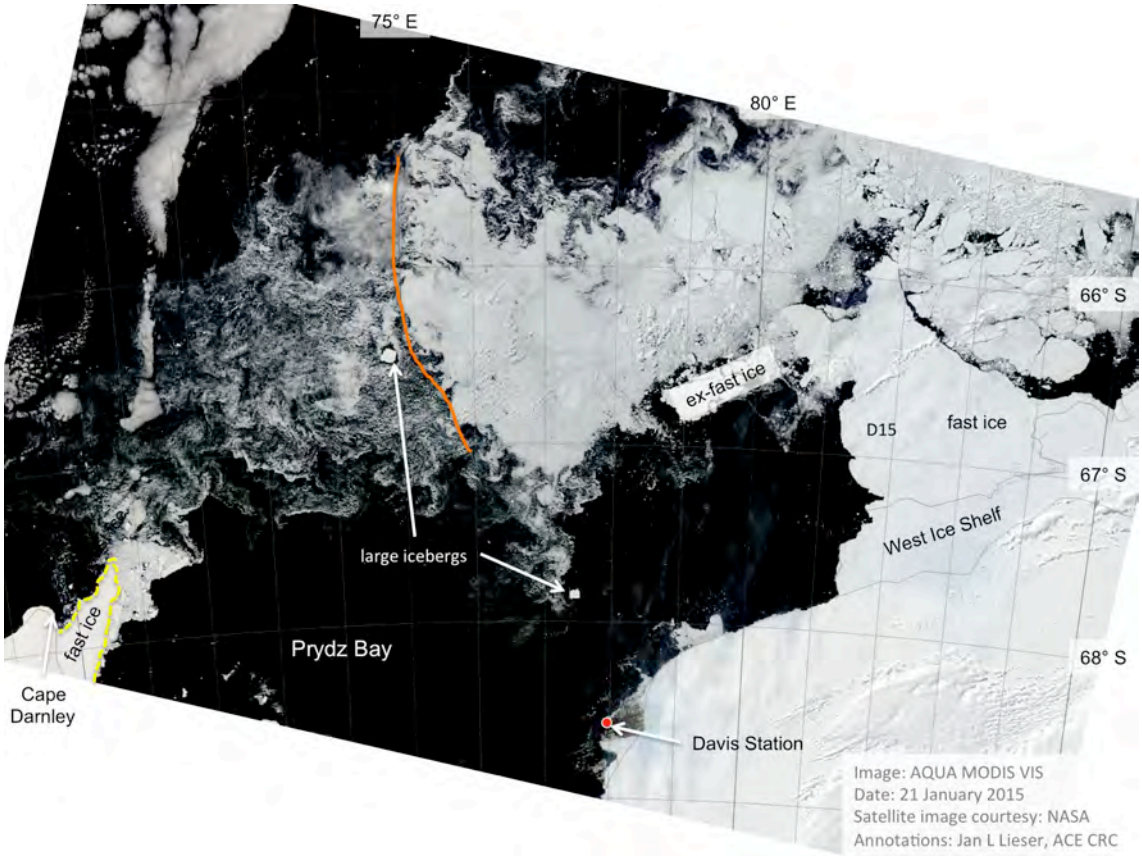

Figure 2: MODIS image, acquired 21/01/2015 and provided by NASA.

The long protruding fast-ice tongue that was attached to a large body of fast ice to the north and east around iceberg D15 has broken into many pieces. However, the westernmost end of this fast-ice tongue remains local, centred at about 79° E and 66° 42' S.

The large iceberg mentioned in Sea Ice Report #03/2015 is drifting northward very slowly and is currently located at 74° 48' E and 66° 30' S. Another large iceberg is annotated in Figure 2 at about 77° 26' E and 67° 50' S.

- **Commonwealth Bay**
  Figure 3 shows a detailed view of Commonwealth Bay and iceberg B09B. The fast ice edge is approximated with the yellow dashed line. At the western end of the bay, fast ice is breaking out as indicated by the orange triangle in the figure. Heading west towards Dumont

d'Urville Station, about 37 nautical miles of coast are now exposed to the ocean as indicated by the blue line.

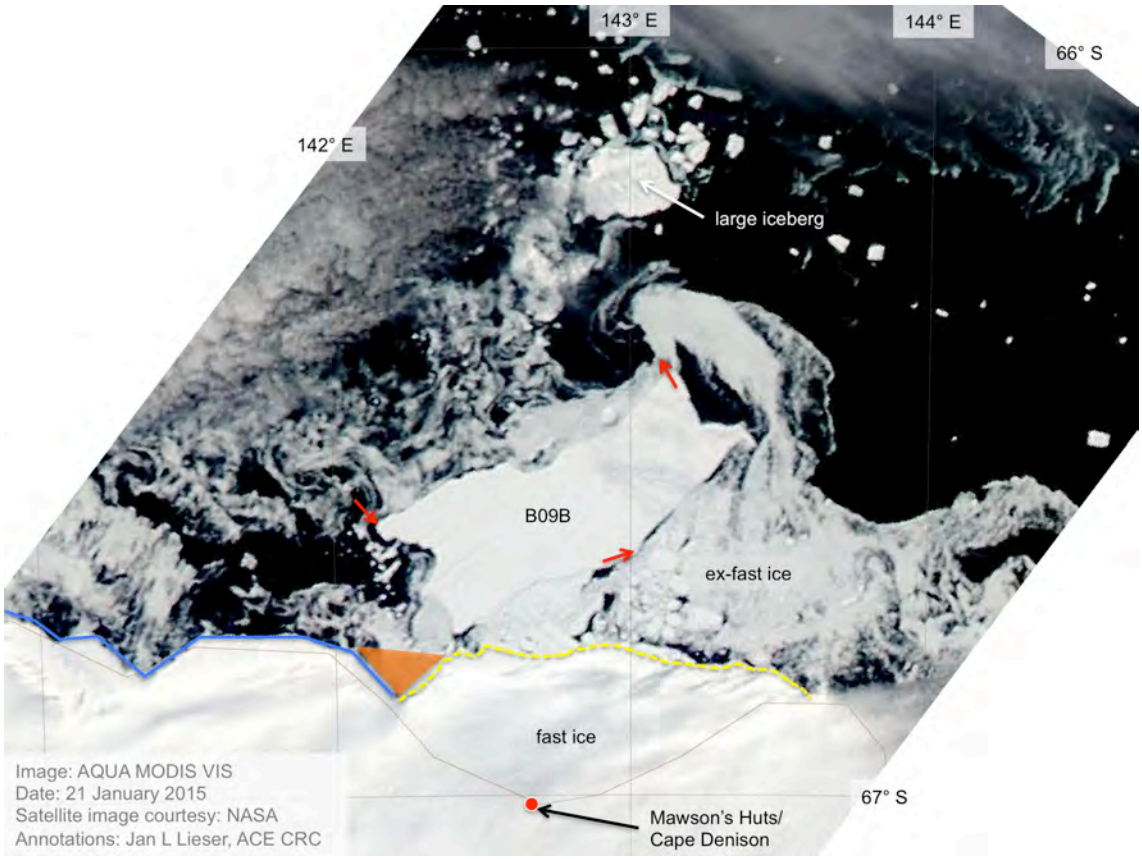

Figure 3: MODIS image, acquired 21/01/2015 and provided by NASA.

Since the beginning of the year, the large tabular iceberg B09B started to shift its position slightly. This movement appears to coincide with the break up of fast ice at the eastern and southern side of the berg. The onset of this fast ice break-up was between 21/12/2014 and 23/12/2014. We detect an anti-clockwise rotational movement of about seven degrees. Note: the red arrows in Figure 3 indicate the displacement direction of feature points of the berg and are not to scale. The long axis of the berg has shifted about two nautical miles in northeasterly direction.

With best regards,

Jan.

Sea Ice Report #04a/2015

by the AAD/ACE CRC Sea Ice Group*

22/01/2015

This report provides an assessment of sea-ice conditions of Prydz Bay.

- **Zhongshan Station**
  In northern Prydz Bay, sea ice can be generally characterised by two different regimes. The transition line is indicated by the orange line in Figure 1. To the west of this line, sea ice is scattered far and wide and some ocean eddy structures can be seen in the swirls of the sea ice. East of the transition line, sea ice remains at higher concentration, but consists mostly of relatively small floes. This eastern regime shows also swirling structures at the edges.

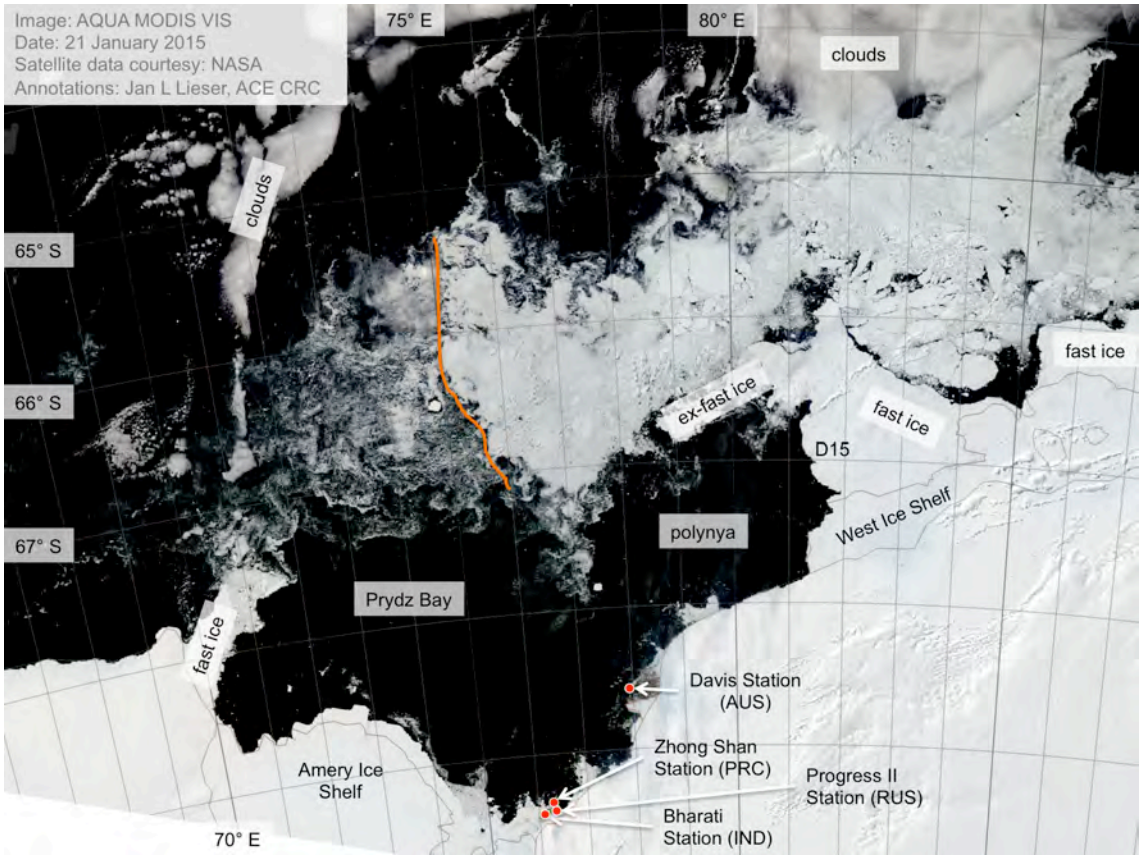

Figure 1: MODIS image, acquired 21/01/2015 and provided by NASA.

The long protruding fast-ice tongue that was attached to a large body of fast ice to the north and east around iceberg D15 has broken into many pieces. However, the westernmost end of this fast ice tongue remains local, centred at about 79° E and 66° 42' S.

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Two large iceberg are noticed in the area. One is drifting northward very slowly and is currently located at 74° 48' E and 66° 30' S, the second one is at about 77° 26' E and 67° 50' S.

The northern edge of Larsemann Hills, the location of Zhongshan, Progress II and Bharati stations, is exposed to the ocean (free of sea ice or fast ice), as well as the face of Dålk Glacier. The seaward edge of Vestfold Hills, the location of Davis Station, and the face of Sørsdal Glacier are also free of sea ice or fast ice, as is the seaward side of Rauer Group, south of the Vestfold Hills.

With best regards,

Jan.

Sea Ice Report #04b/2015

by the AAD/ACE CRC Sea Ice Group*

23/01/2015

This reports provides an update on fast ice off Mawson Station.

- **Mawson Station**
  Figure 1 shows a very high-resolution (about 30 m spatial resolution) visible image of the fast ice off Mawson Station. The fast-ice edge is clearly visible. The majority of ex-fast ice has broken into small floes, typically of about 100 m diameter. Only occasional very large floes remain in the mix.

  Wind scouring on the surface of the fast ice can be seen west of the station, and immediately east of the station, close to the coast. The surface of the fast ice shows some old break-out lines (as indicated by the orange line) that are potential weak points.

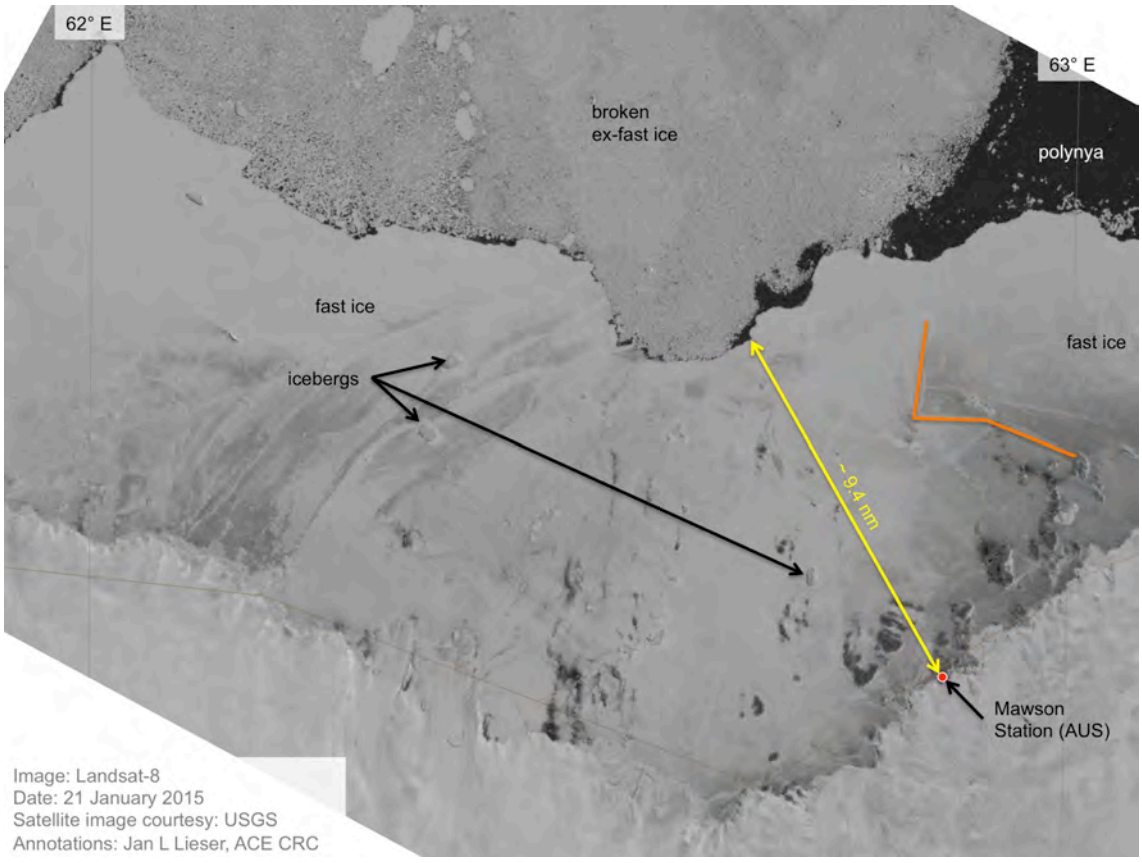

Figure 1: Landsat-8 image, acquired 21/01/2015 and provided by USGS.

With best regards,

Jan.

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Sea Ice Report #05.1/2015

by the AAD/ACE CRC Sea Ice Group*

27/01/2015

This report provides an assessment of sea ice in the Ross Sea.

- **Ross Sea**
  Figure 1 shows a high resolution (3.125 km horizontal resolution) sea-ice concentration chart for the Ross Sea. In Figures 1 and 2, the green and magenta lines denote the median sea-ice extent for January and February, respectively.

  This summer season had a slow start towards melting conditions, which resulted in above average sea-ice concentration in the region. But during the second half of January, sea-ice concentration reduced markedly along 175° E and further east from there. While west of 175° E and north of 70° S, sea-ice extent appears to be well below (south) of the median, some sea ice remains north of the current distinctive sea-ice edge in that area, but below the detection limits of the AMSR-2 instrument. North of Balleny Islands, two patches of sea ice are seen in Figure 1, and can be confirmed through the cloud cover as a spit-like feature (connected patches) in the visible imagery of Figure 2. The inset of Figure 2 provides a very high resolution Synthetic Aperture RADAR look onto the sea ice through the clouds. From this it is verified that there is more sea ice than is resolved by the microwave (AMSR-2) data, for example in the region around 176° E and 69° S. and further east from there.

With best regards,

Jan.

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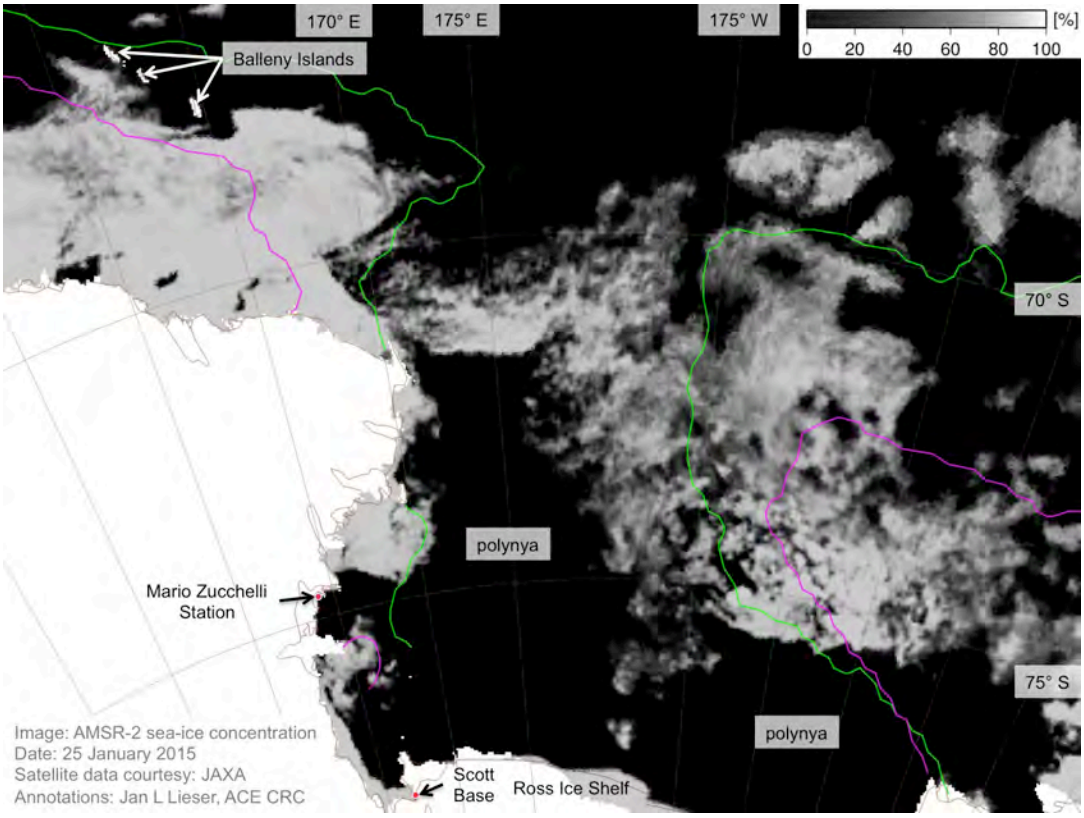

Figure 1: AMSR-2 sea ice concentration, acquired 25/01/2015 and provided by Universität Hamburg.

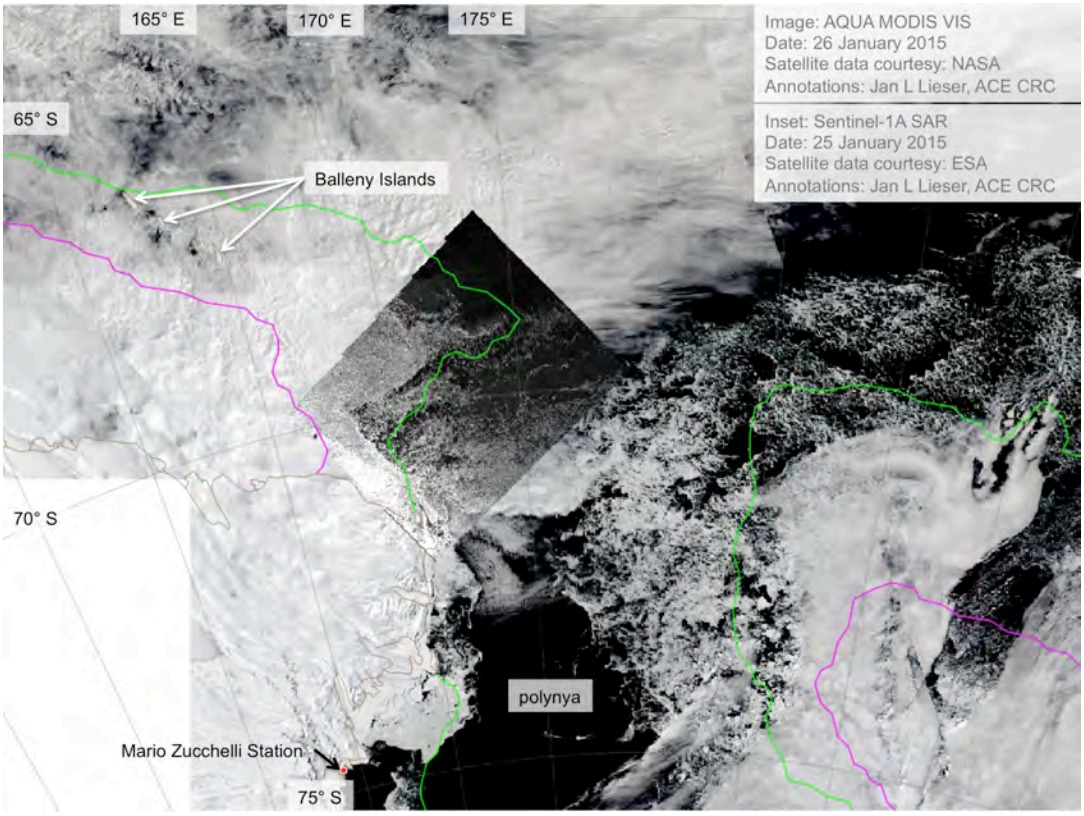

Figure 2: MODIS image, acquired 26/01/2015 and provided by NASA; inset: Sentinel-1a SAR, acquired 25/01/2015 and provided by PolarView.

Sea Ice Report #05.2/2015

by the AAD/ACE CRC Sea Ice Group*

28/01/2015

This report provides a general assessment of sea ice in East Antarctica.

- **Zhongshan**
  Figure 1 shows a sea-ice concentration chart for East Antarctica, between the Amery Ice Shelf and Mertz Glacier. The thin green line denotes the recent cruise track of RSV *Xue Long* (up to 28/01/2015 03:00 UT). Major tabular iceberg locations are marked with red-rimmed white dots.

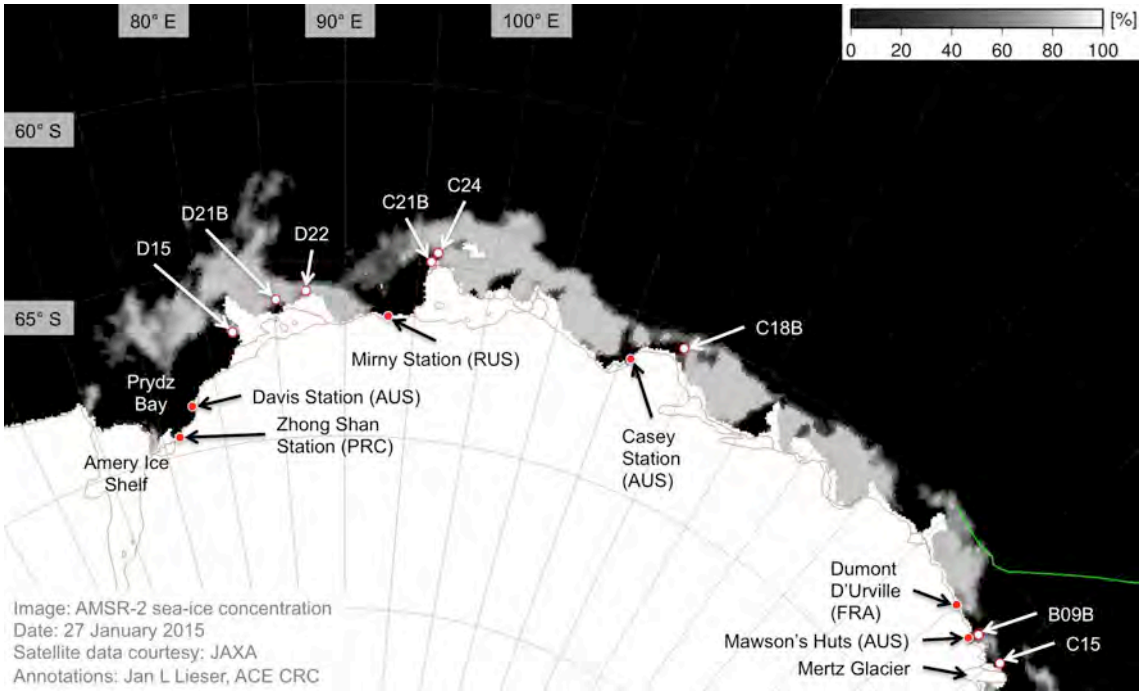

Figure 1: AMSR-2 sea ice concentration, acquired 27/01/2015 and provided by Universität Hamburg.

In general, sea-ice concentration is nearing end of summer conditions. Southern Prydz Bay is largely free of sea ice. Around the Larsemann Hills (home of Zhongshan Station) some fast ice still remains, but the eastern edge of the hills (Dålkøy Bay) and Nella Fjord appeared to be sea ice free in recent visible imagery.

With best regards,

Jan.

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Sea Ice Report #05.3/2015

by the AAD/ACE CRC Sea Ice Group*

29/01/2015

This report's focus is on regions of Australian Antarctic operations interest.

- **Mawson Station**
  During the past week, visible imagery of Mawson Coast was largely obscured by clouds. After a few days of higher wind speeds recently, yesterday's visible image (Figure 1) suggests a further break up of fast ice, particularly between 63° E and 64° E, but potentially also north of the station (as marked by the orange shape in the figure). The new fast-ice edge could be as close to the shore as 3 nautical miles.

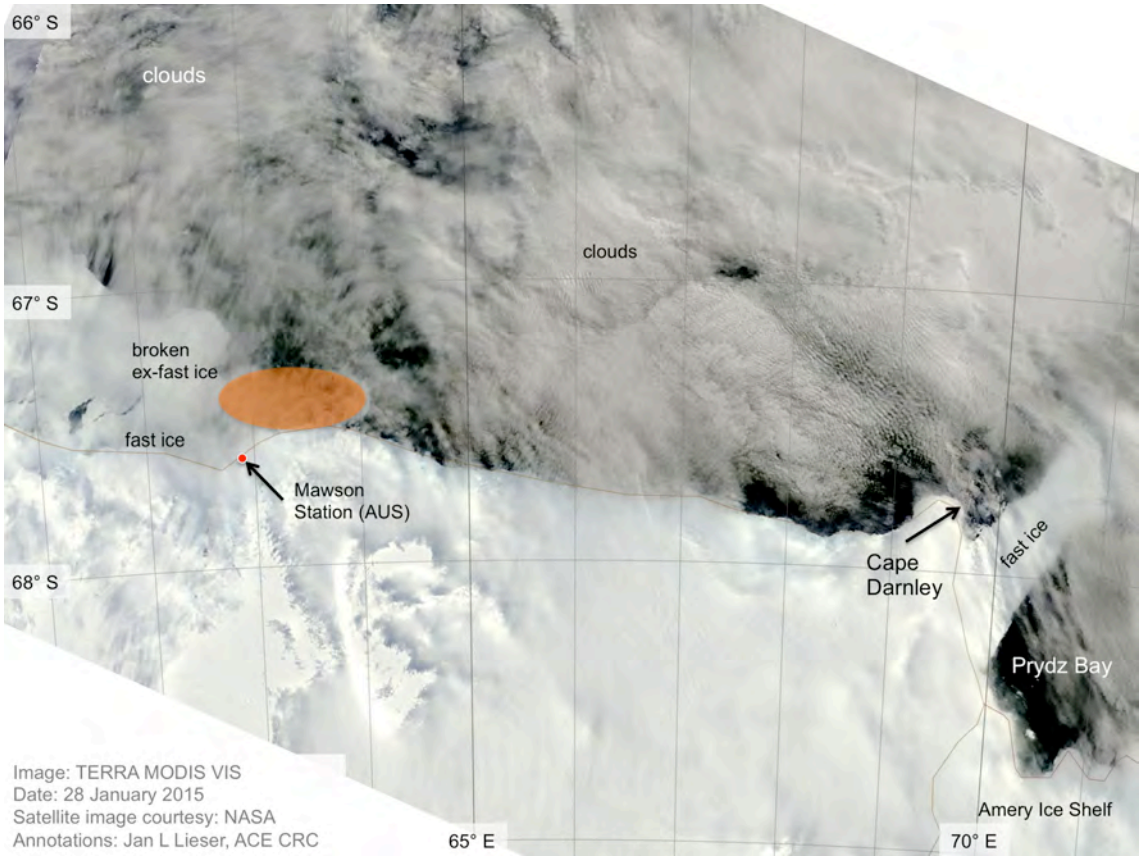

Figure 1: MODIS image, acquired 28/01/2015 and provided by NASA.

The entire region between 63° E and 72° E appears generally free of sea ice in the microwave data based sea-ice concentration charts (see also Figure 2), except for the fast ice off the eastern side of Cape Darnley, and bits of ice breaking off it. But some isolated patches of sea ice might remain in the region.

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- **Davis Station**
  The southern part of Prydz Bay is largely sea ice free (Figure 2). North of about 67° S, some high concentration pack ice continues to exist but it appears to be mostly confined to longitudes east of 74° E. Off the West Ice Shelf, the conglomerate of iceberg D15 and old fast ice remains local and has a confused signature in the AMSR-2 sea-ice concentration data.

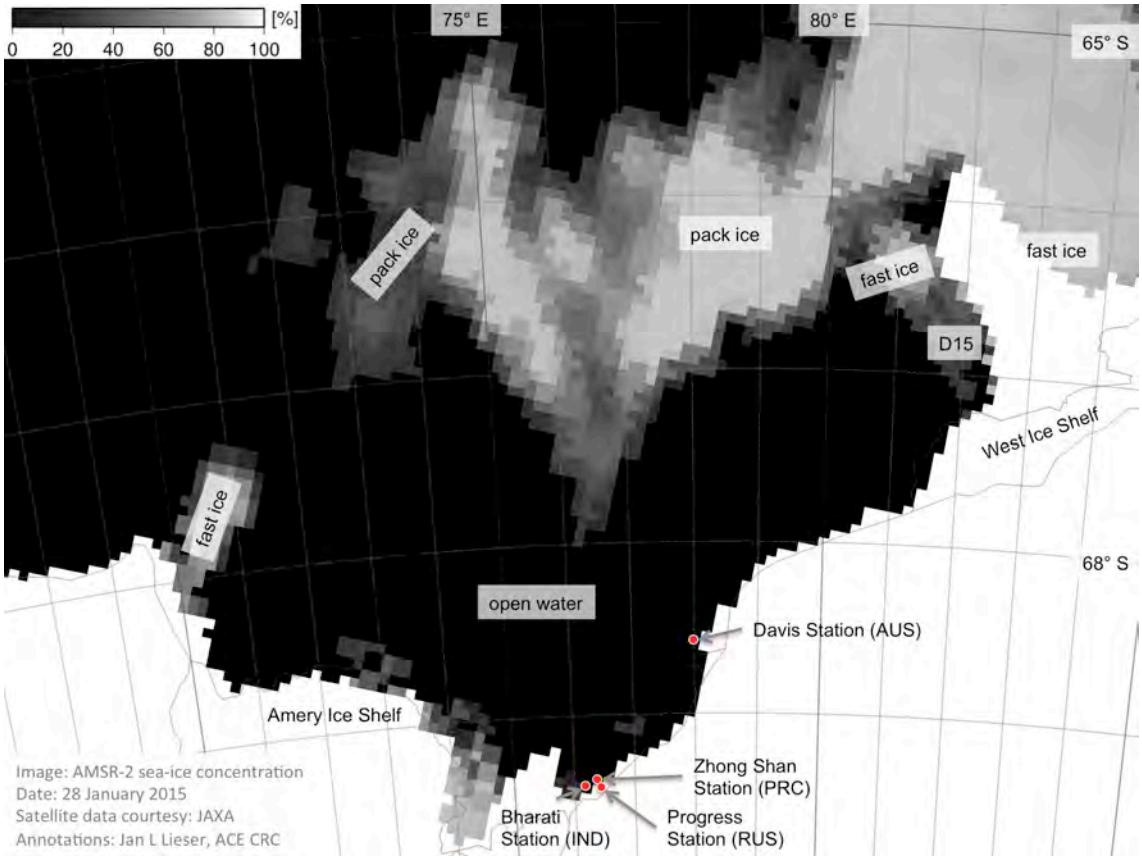

Figure 2: AMSR-2 image, acquired 28/01/2015 and provided by Drift & Noise Polar Services.

- **Commonwealth Bay**
  More fast ice is breaking out of Commonwealth Bay, during the past week. In the western corner of the bay, the area of open water has approximately doubled in size during that time (see the orange triangle in Figure 3).

  Iceberg B09B is still moving very slightly, but has changed direction, as indicated by the little red arrow (not to scale) in Figure 3. Iceberg C15 is cruising at a speed of about 1 nautical mile per day in westerly direction and exhibits a bit of angular momentum too.

  There are numerous smaller icebergs in the entire region visible in Figure 3. Most of them appear to be accumulating around the large (unnamed) iceberg north of B09B (annotated in Figure 3). But many more are drifting freely in the region or are grounded, for example

along a virtual extension of the long axis of Mertz Glacier with a northern end at about 147° E and 66° 15' S.

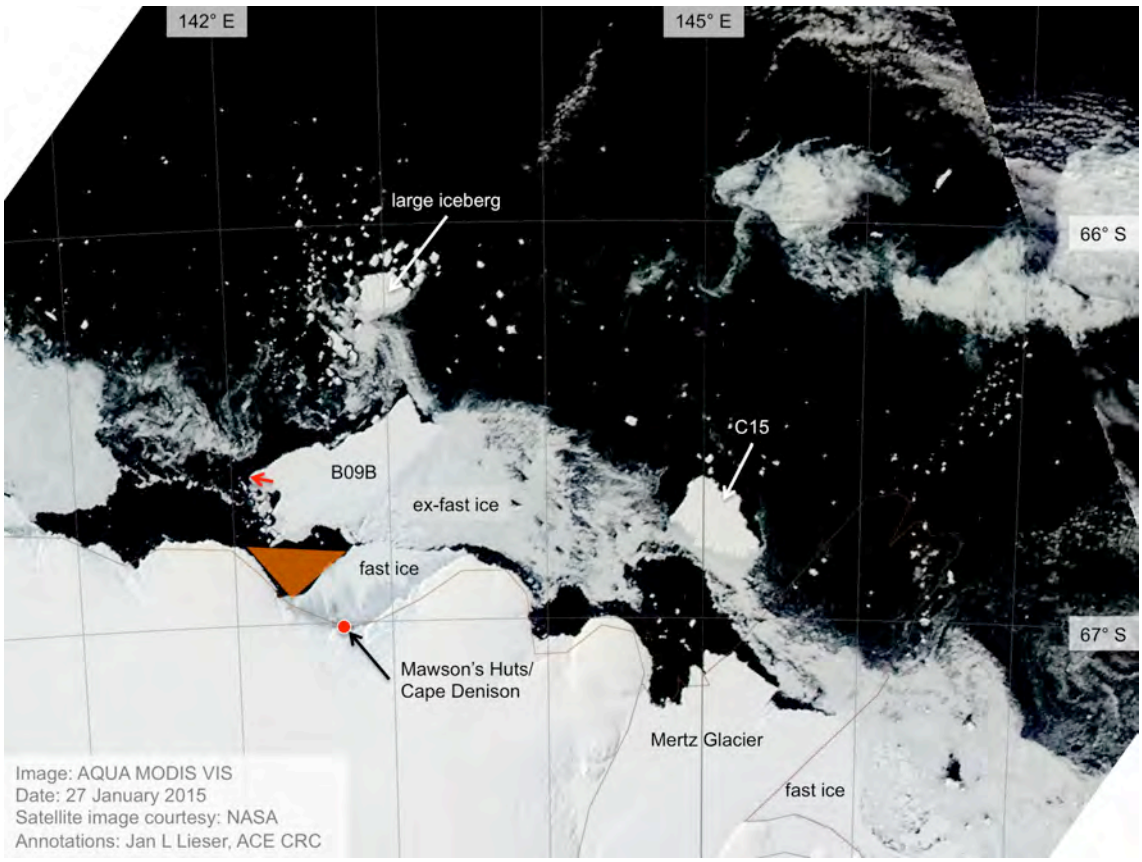

Figure 3: MODIS image, acquired 27/01/2015 and provided by NASA.

With best regards,

Jan.

Sea Ice Report #05.4/2015

by the AAD/ACE CRC Sea Ice Group*

29/01/2015

This report provides an assessment of sea-ice conditions west of the Ross Sea.

- **Balleny Islands**
  Figure 1 shows a very high resolution Synthetic Aperture RADAR (SAR) image of the sea-ice zone around the Balleny Islands. It is overlain on a background showing a sea-ice concentration chart based on AMSR-2 data.

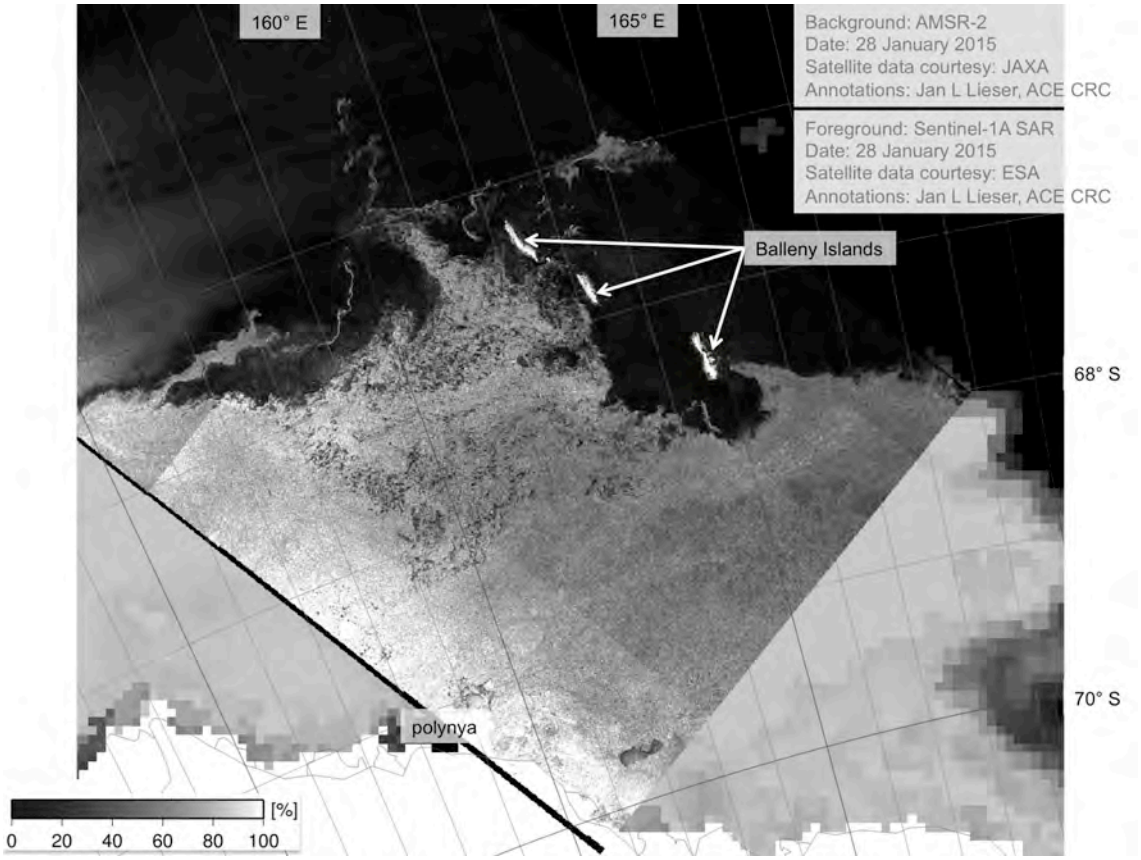

Figure 1: Foreground: Sentinel-1a SAR, acquired 28/01/2015 and provided by PolarView; Background: AMSR-2 sea-ice concentration, acquired 25/01/2015 and provided by Drift & Noise Polar Services.

The coastlines of the islands appear to be mostly free of sea ice, but to the west and south of the group of islands, small sea-ice floes are abundant in high to very high concentration. The spit-like patch of sea ice along 66° S is still visible (see Sea Ice Report #5.1/2015 for

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reference). Apart form this structure, the northeastern region shown in Figure 1 appears generally free of sea ice, or at least below the detection limit of the AMSR-2 sensor (nominally 15% sea-ice concentration).

Small scale eddy structures manifest themselves in hook-like sea-ice patterns, most prominently west of Young and Buckle islands, the northern two of the Balleny Islands. Another hook-like structure can be seen around the southern tip of Struge Island, the southernmost island.

With best regards,

Jan.

Sea Ice Report #05.5/2015

by the AAD/ACE CRC Sea Ice Group*

30/01/2015

This report provides an update of sea-ice conditions off Mawson Station.

- **Mawson Station**
  Further to Sea Ice Report #5.3/2015, Figure 1 offers a cloud free view of Mawson Coast and the sea ice off shore. A large portion of fast ice to the east of 63° E has disintegrated. Close to the shore, the new fast-ice edge is not a straight line, but shows a harbour-like structure with the nearest open water about three nautical miles away from the station in northeasterly direction (at about 62° 55' E and 67° 30' S).

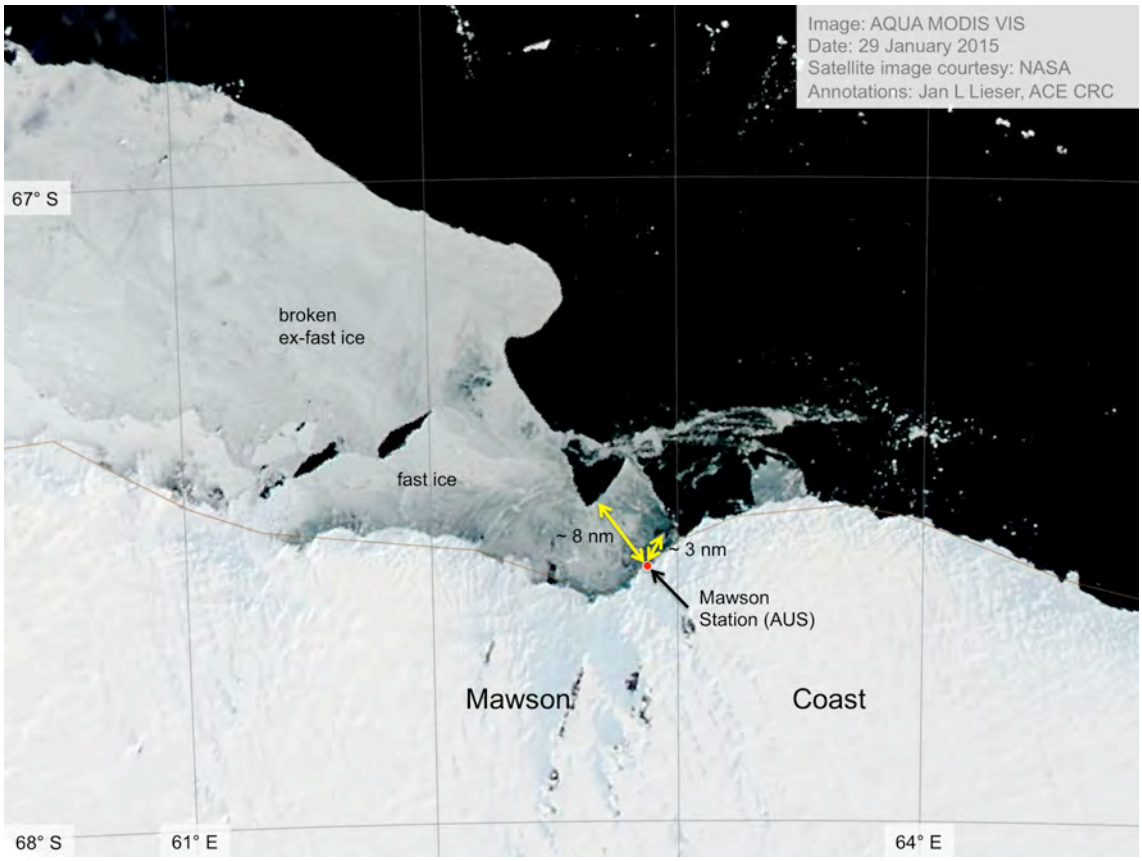

Figure 1: MODIS image, acquired 29/01/2015 and provided by NASA.

With best regards,

Jan.

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Sea Ice Report #05.6/2015

by the AAD/ACE CRC Sea Ice Group*

30/01/2015

This report provides an update of sea-ice conditions along 140° E.

- **140° E**
  The northern and western part of Figure 1 is covered by thin clouds but the southern and eastern part provides an unobscured view on the sea-ice zone. East of 140° E and between of 65° S and 66° S, only very little sea ice can be seen in the visible imagery of Figure 1. West of the large tabular iceberg B09B is an area of about 40 nautical miles of exposed coast, but north of that region remains a band of low sea-ice concentration, centred at about 66° 25' S.

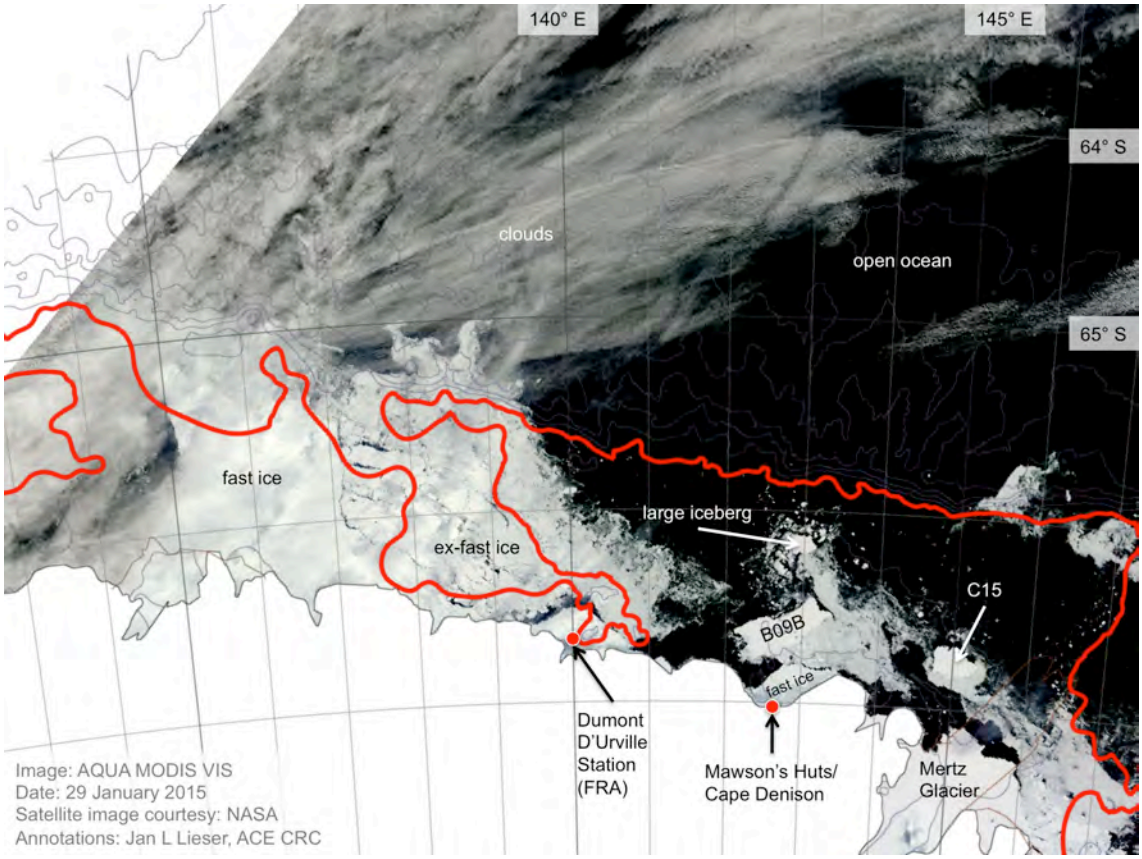

Figure 1: MODIS image, acquired 29/01/2015 and provided by NASA.

Iceberg B09B exhibits a slight wiggle movement, locally. Iceberg C15 is cruising at a speed of about one nautical mile per day in westerly direction and shows a little angular momentum too.

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There are numerous smaller icebergs in the entire region south of the continental shelf break. Most of them appear to be accumulating around the large (unnamed) iceberg north of B09B (annotated in Figure 1). But many more are drifting freely in the region or are grounded, for example along a virtual extension of the long axis of Mertz Glacier with a northern end at about 147° E and 66° 15' S. Their occurrence is largely confined to water depths less than 500 m (red isobath in Figure 1; purple isobaths are provided at 500 m intervals).

With best regards,

Jan.

Sea Ice Report #06.1/2015

by the AAD/ACE CRC Sea Ice Group*

02/02/2015

This report provides an assessment of sea-ice conditions in the Prydz Bay.

- **Zhongshan Station**
  Figure 1 shows a visible MODIS image of Prydz Bay. The thin green line denotes the cruise track of RSV *Xue Long*, up until 02/02/2015 00:00UT. Most of the sea-ice zone is obscured by thin clouds, but the pack ice in eastern Prydz Bay can be clearly identified.

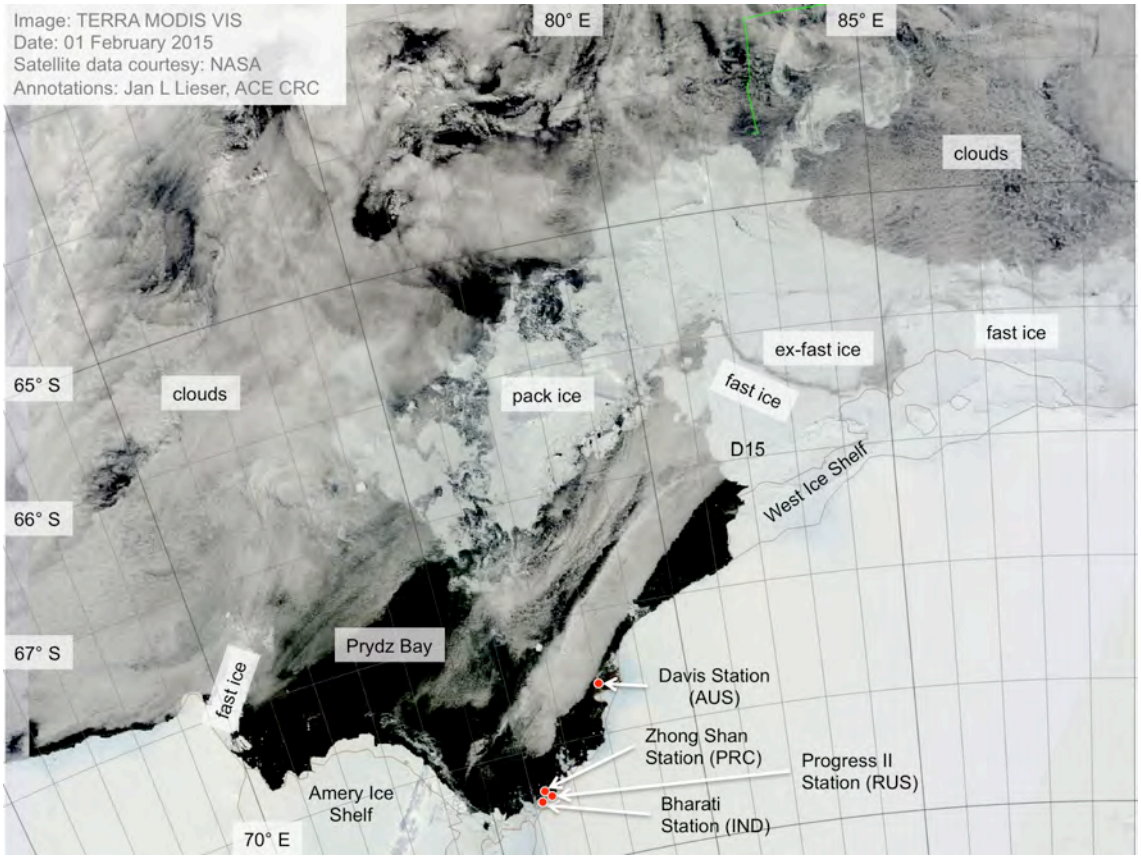

Figure 1: MODIS image, acquired 01/02/2015 and provided by NASA.

Medium high to high concentration sea-ice extents as far west as 73° 30' E, but a winding channel of low sea-ice concentration stretches between 76° E and 77° E, from about 66° S to 67° S. The southern part of Prydz Bay is largely free of sea ice, but at least one large tabular iceberg is drifting in the area, currently located at 76° 55' E and 68° 11' S.

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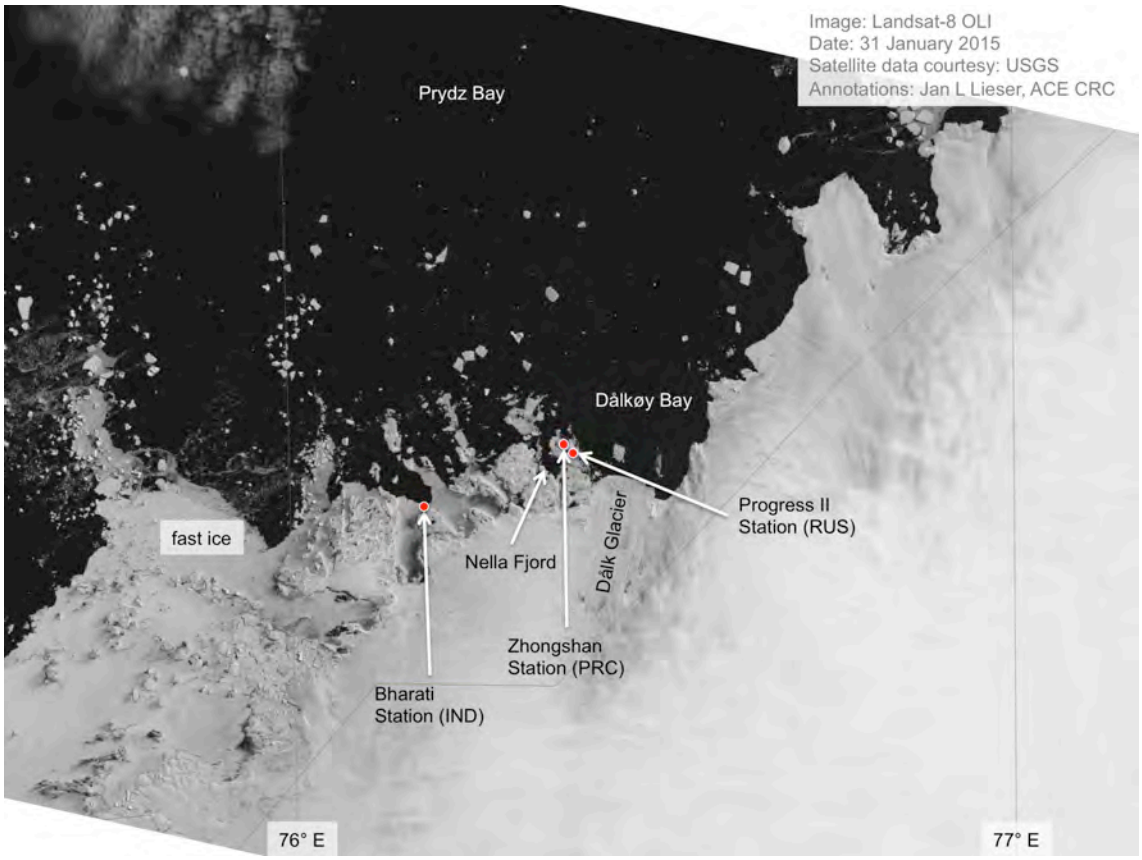

Figure 2: Landsat-8 Operational Land Imager (OLI) image, acquired 31/01/2015 and provided by US Geological Survey.

A very high resolution (30 m horizontal resolution) visible image of the Larsemann Hills is given in Figure 2. It was acquired by Landsat-8 satellite's Operational Land Imager (OLI). Dålkøy Bay is mostly free of sea ice, as well as Nella Fjord. North of Larsemann Hills, some icebergs are present and melting ex-fast ice.

With best regards,

Jan.

Sea Ice Report #06.2/2015

by the AAD/ACE CRC Sea Ice Group*

03/02/2015

This report examines sea-ice conditions around the Balleny Islands and the Ross Sea.

- **Ross Sea**
  In general, sea ice in the Ross Sea and adjacent areas still shows signs of summer retreat. However, overall more sea ice (higher concentration) remains in the region when compared to the 30-year (1981-2010) median of sea-ice extent. In Figure 1, the January and February median sea-ice extent is indicated by the thin green and magenta lines, respectively.

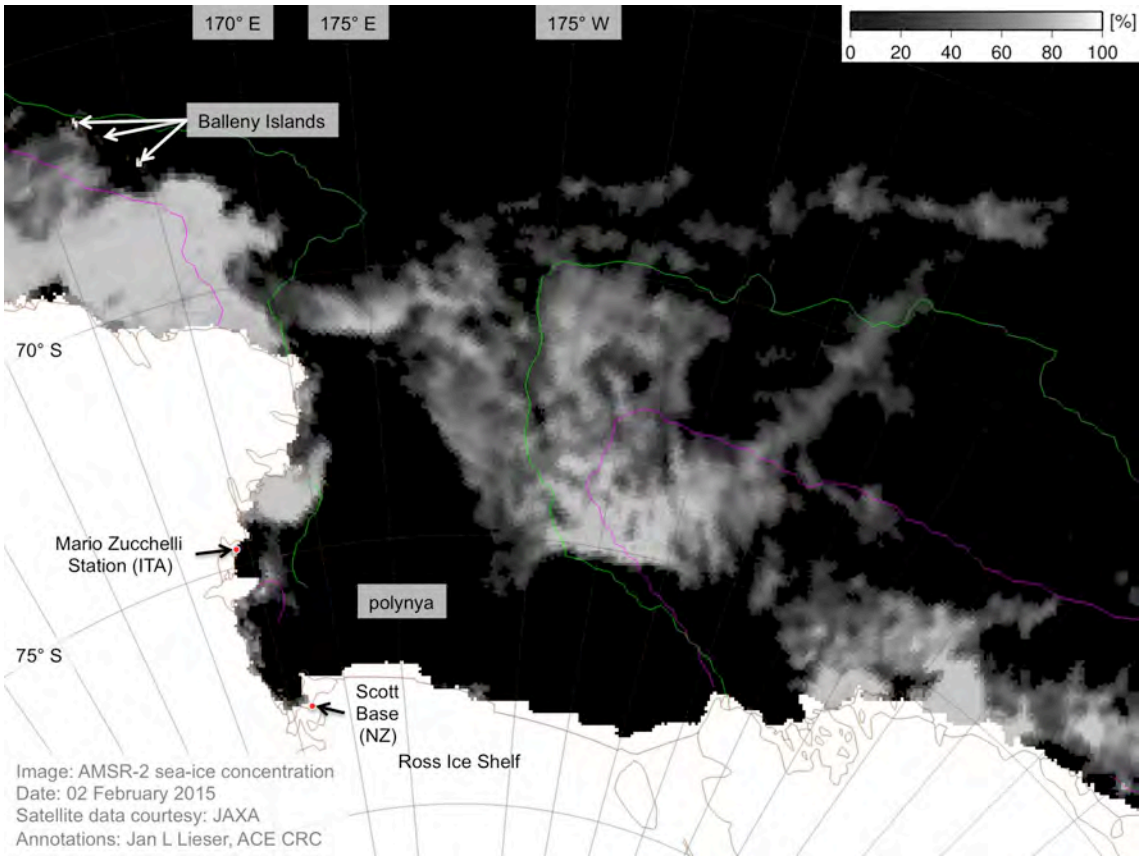

Figure 1: AMSR-2 image, acquired 02/02/2015 and provided by JAXA.

To the north and east of the Balleny Islands, sea ice is below the detection limit of the AMSR-2 instrument and the cloud cover (see Figure 2) does not allow for a visual confirmation.

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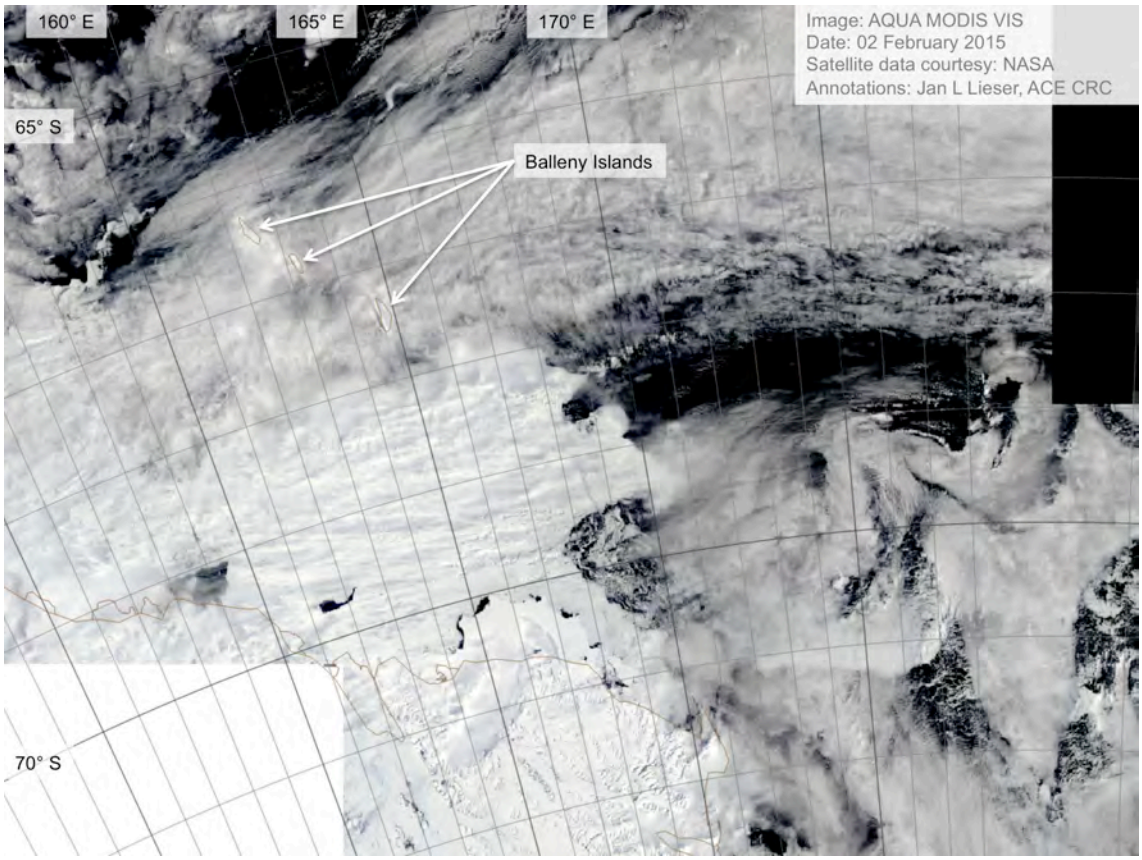

Figure 2: MODIS image, acquired 02/02/2015 and provided by NASA.

The central southern and western part of the Ross Sea is largely free of sea ice (Figure 1). But one patch of high concentration sea ice, currently centred between 172° E and 177° E at about 71° S, separates the polynya of the Ross Sea from the open ocean north of 69° S. This patch is slowly moving in northerly direction. During the past week, the southern boundary of this patch has migrated about 25 nautical miles north, along 175° E.

Between 170° E and 172° E, a narrow band of lower concentration sea ice exists. This band is almost following the January median sea-ice extent contour in the region.

With best regards,

Jan.

Sea Ice Report #06.3/2015

by the AAD/ACE CRC Sea Ice Group*

05/02/2015

This report examines sea-ice conditions around Prydz Bay.

- **Mawson Station**
  The approach into Mawson Station, as indicated by the orange dashed line in both, Figure 1 and Figure 2, is mostly free of sea ice. Only a thin sheet of old ex-fast ice remains inside Horseshoe Harbour. Three mooring locations off Cape Darnley, as indicated by yellow dots in both figures, are covered by only minimal sea ice, which is below the detection limit of the AMSR-2 sensor (see Figure 2). Fast ice attached to the eastern side of Cape Darnley is still breaking up and sea-ice floes originating from this are drifting westward, across the mooring locations.

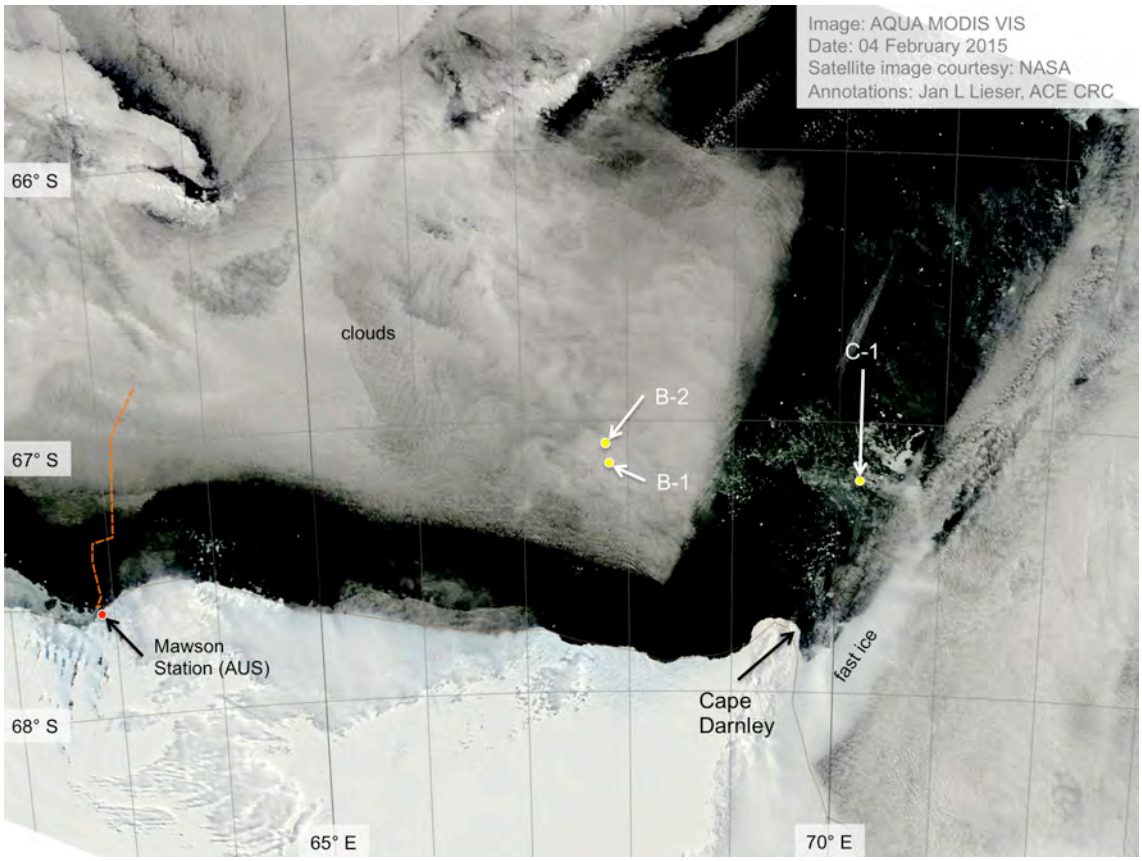

Figure 1: MODIS image, acquired 04/02/2015 and provided by NASA.

Figure 2 provides a larger-scale overview of sea-ice conditions in Prydz Bay. Whale-1 mooring is located about 140 nautical miles

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north of the sea-ice edge. Whale-2 mooring is under a persistent high concentration sea-ice cover.

The seaward side of the Vestfold Hills (Davis Station) is clear of sea ice.

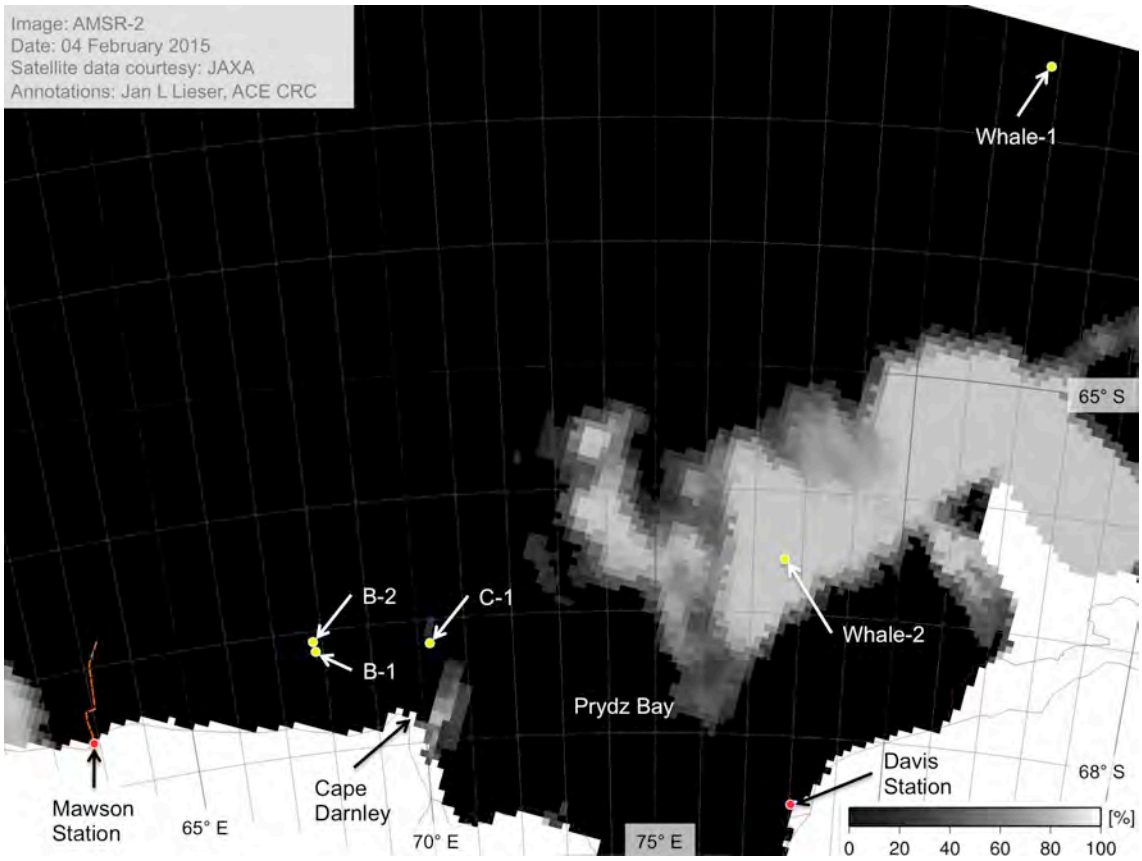

Figure 2: AMSR-2 image, acquired 04/02/2015 and provided by JAXA.

With best regards,

Jan.

Sea Ice Report #06.4/2015

by the AAD/ACE CRC Sea Ice Group*

05/02/2015

This report examines sea-ice conditions off Commonwealth Bay.

- **Commonwealth Bay**
  Figures 1 and 2 show the same geographical frame as seen by the AMSR-2 and MODIS instrument, respectively, between 135° E and 150° E. The yellow dashed line in both figures gives the boundary south of which some sea ice can reasonably be expected.

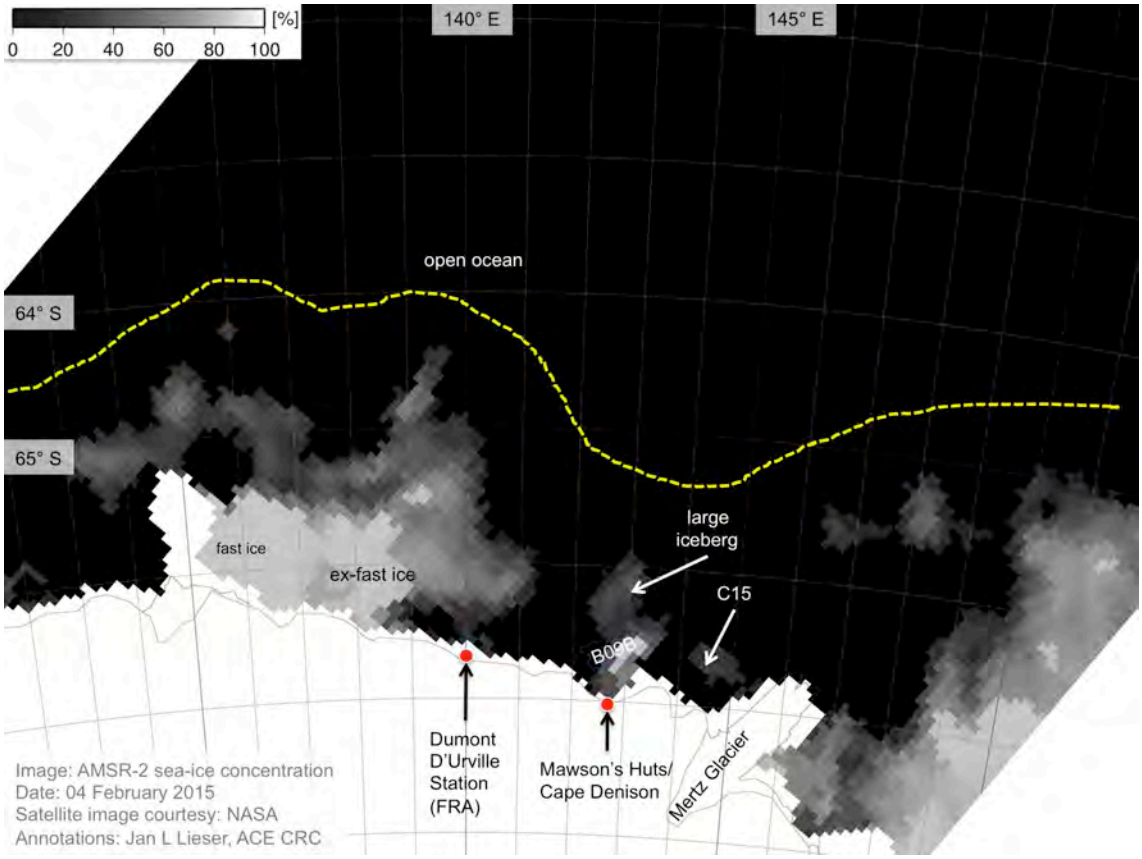

Figure 1: AMSR-2 image, acquired 04/02/2015 and provided by JAXA.

Along 142° E appears to be a relatively ice free passage to the coast in Figure 1, but some sea-ice floes below the detection limit (nominally 15%) of the sea-ice concentration algorithm applied to the AMSR-2 data is still in the area.

The cloud pattern of a local low pressure system can be seen in Figure 2, with its centre at about 142° 50' E and 65° 19' S. These

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clouds obscure the view on to the sea ice in that area. The low pressure system has the potential to move sea-ice floes around quite effectively.

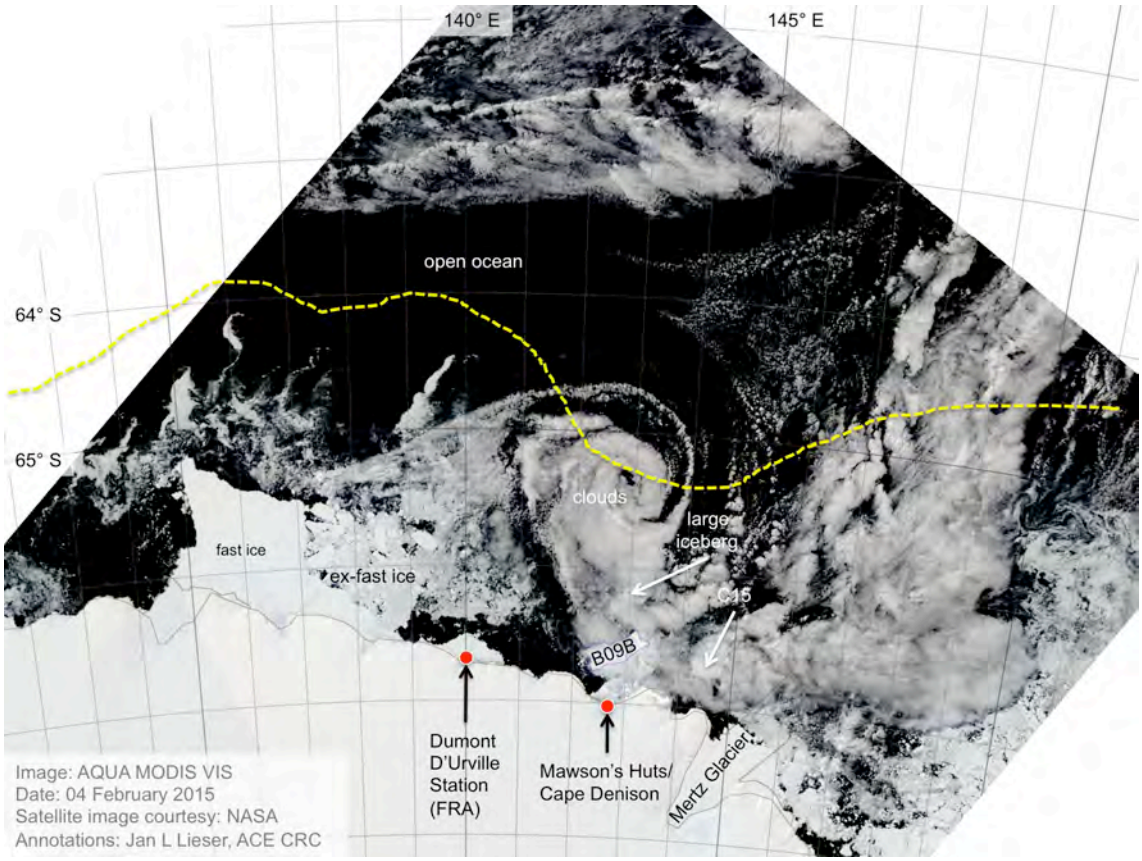

Figure 2: MODIS image, acquired 04/02/2015 and provided by NASA.

Since 29/01/2015, iceberg C15 has traveled 13 nautical miles in westerly direction, heading towards the eastern edge of iceberg B09B.

With best regards,

Jan.

Sea Ice Report #06.5/2015

by the AAD/ACE CRC Sea Ice Group*

06/02/2015

This report examines sea-ice conditions west of Ross Sea.

- **Balleny Islands**
  The region east of the Balleny Islands is largely free of sea ice (see Figure 1). East of 165° E, the sea-ice edge is a relatively well defined line. West of Buckle Island (the middle one of the three major islands that make up the Balleny Islands), an opaque cloud patch obscures the view on to the sea ice, but the large-scale sea-ice concentration map based on AMSR-2 data (not shown) suggests medium-high to high concentration in that area.

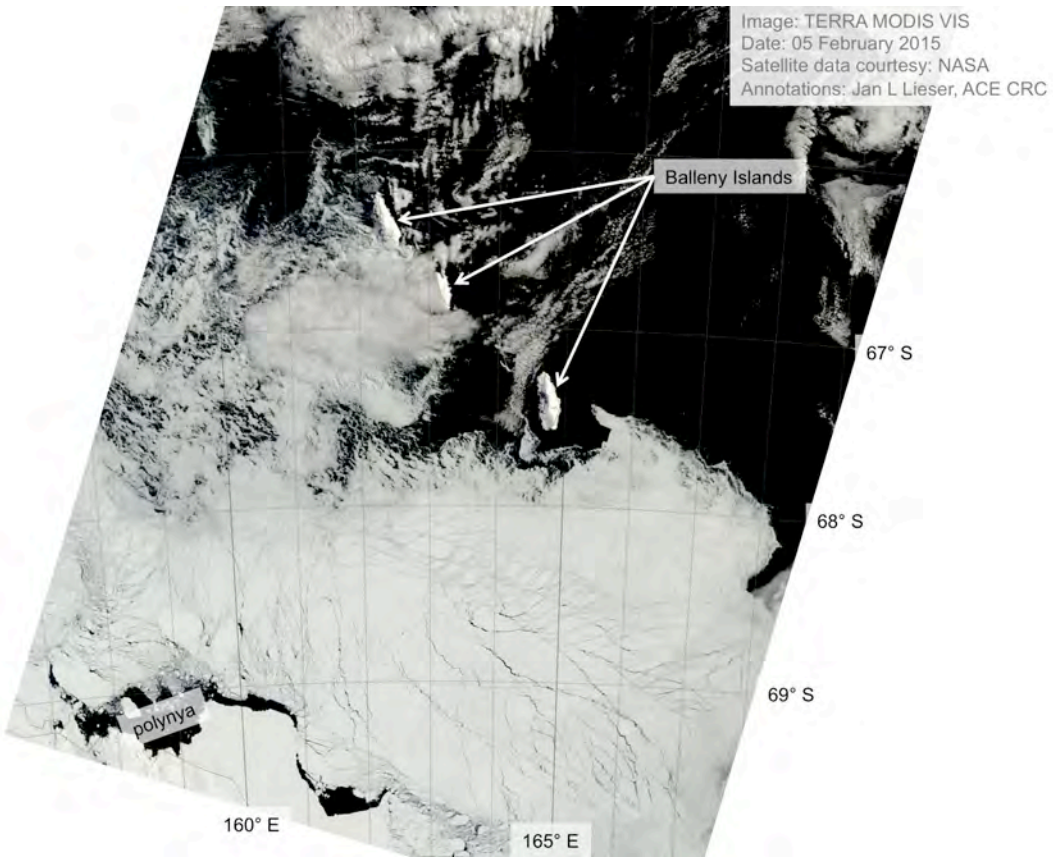

Figure 1: MODIS image, acquired 05/02/2015 and provided by NASA.

In addition to the image of Figure 1, Figure 2 provides two consecutive SAR scenes illuminating the sea ice to the south and west of the Balleny Islands. Mostly small sea-ice floes can be identified to the east of about 152° E.

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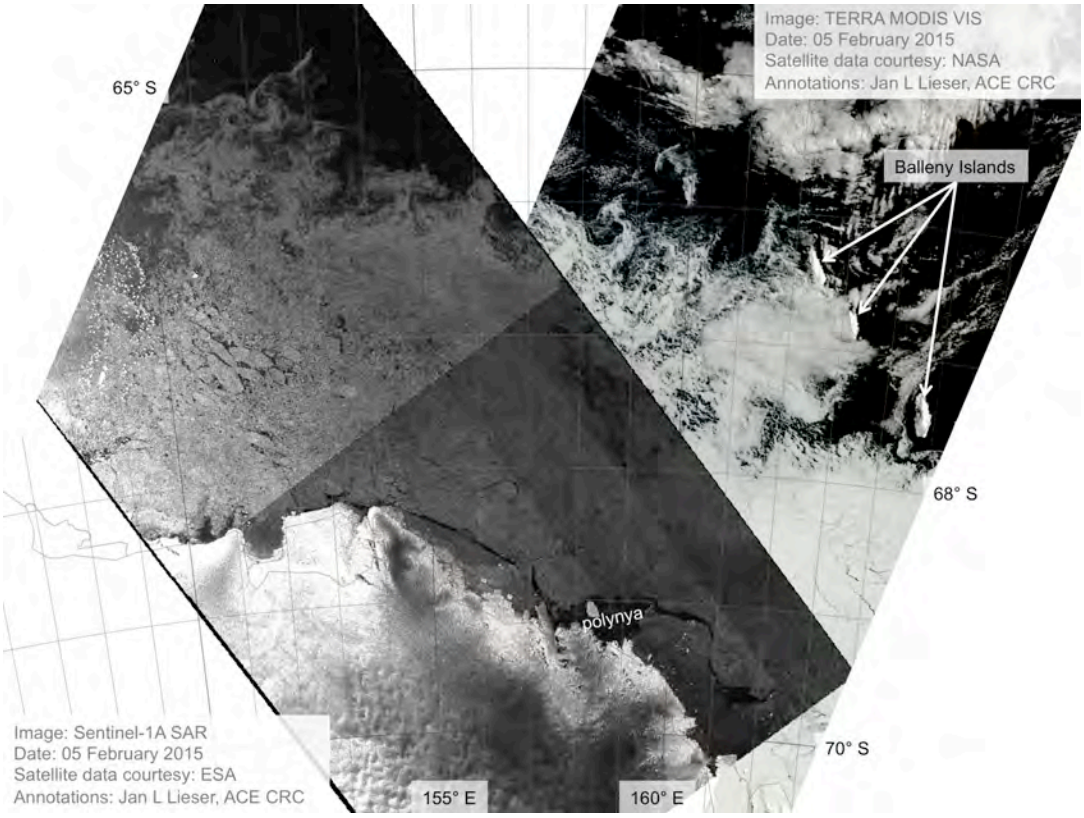

Figure 2: Same as Figure1 plus overlain Sentinel-1A SAR images, acquired 05/02/2015 and provided by PolarView.

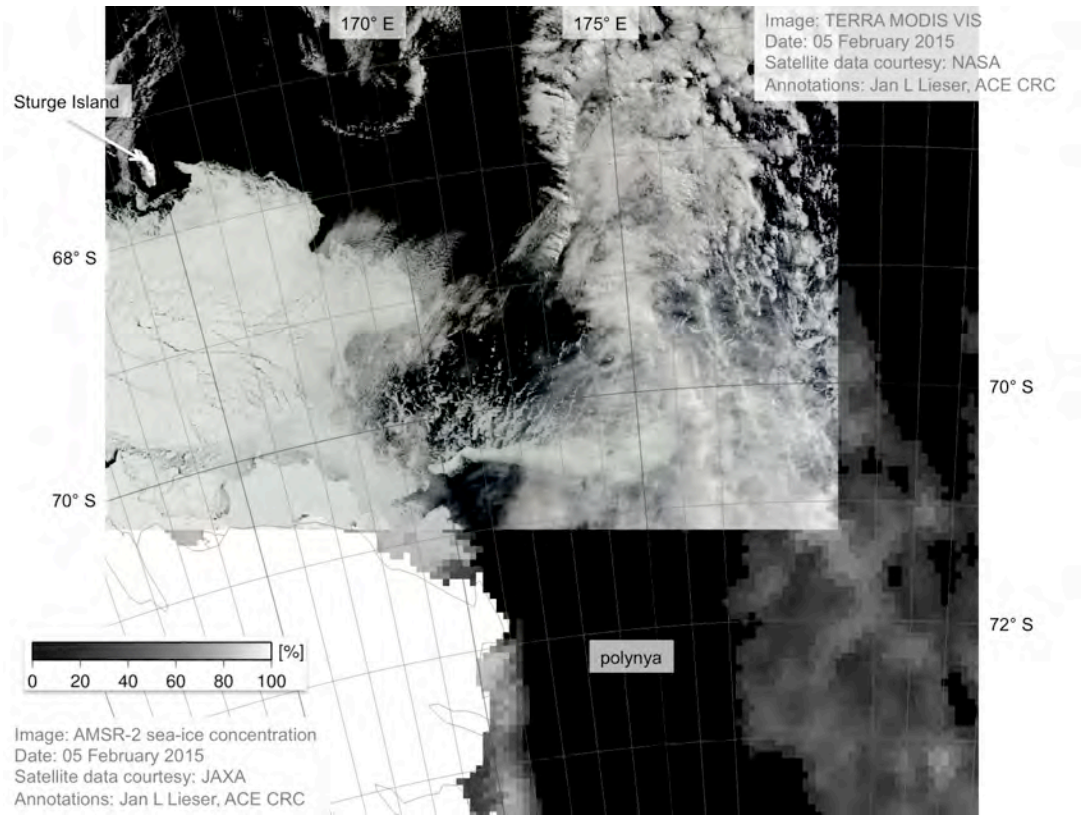

Figure 3: Same as Figure1 plus background of sea-ice concentration map, acquired 05/02/2015 and provided by Drift & Noise Polar Services.

West of 150° E, a large group of icebergs can be seen as bright spots, between 66° S and 67° 30' S (Figure 2).

Figure 3 shows that the band of sea ice separating the large polynya of western Ross Sea from the open ocean has migrated further north and is thinning. The band is currently centred along 70° 20' S, between 169° 30' E and 176° E.

With best regards,

Jan.

Sea Ice Report #07.1/2015

by the AAD/ACE CRC Sea Ice Group*

10/02/2015

This report examines sea-ice conditions of western Ross Sea.

- **Ross Sea**
  Figure 1 shows a sea-ice concentration chart for the Ross Sea and surrounding areas. The thin green line denotes the long-term (1981-2010) median sea-ice extent for February in the region.

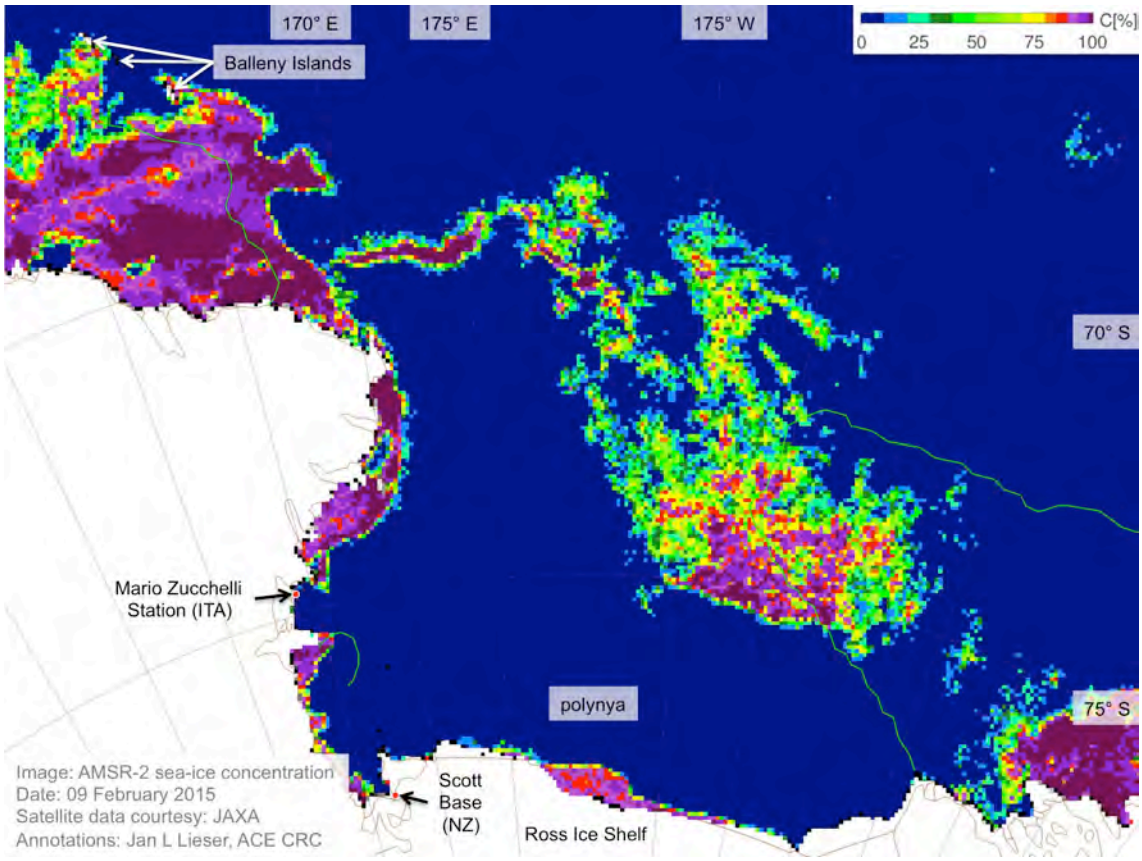

Figure 1: AMSR-2 image, acquired 09/02/2015 and provided by Universität Bremen.

Western Ross Sea is largely free of sea ice, some fast ice remains attached to the coast. Between 170° E and 176° E, a band of very localised high concentration sea ice still separates the southern Ross Sea from the open water of the Southern Ocean. This band has moved about 17 nautical miles northwards during the past five days, has thinned and is currently just south of 70° S.

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Further east and south from there, sea ice is very patchy and easily pushed around by wind and wave action.

Overall, sea ice shows still signs of summer retreat, even though in some areas the extent is outside the median extent for February.

With best regards,

Jan.

Sea Ice Report #07.2/2015

by the AAD/ACE CRC Sea Ice Group*

11/02/2015

- **Ross Sea**
  Further to Sea Ice Report #7.1/2015, Figure 1 shows a sea-ice concentration chart for the Ross Sea and surrounding areas, plus two high resolution SAR scenes (combined adjacent to each other) of the area around and to the southeast of the Balleny Islands, as an overlay.

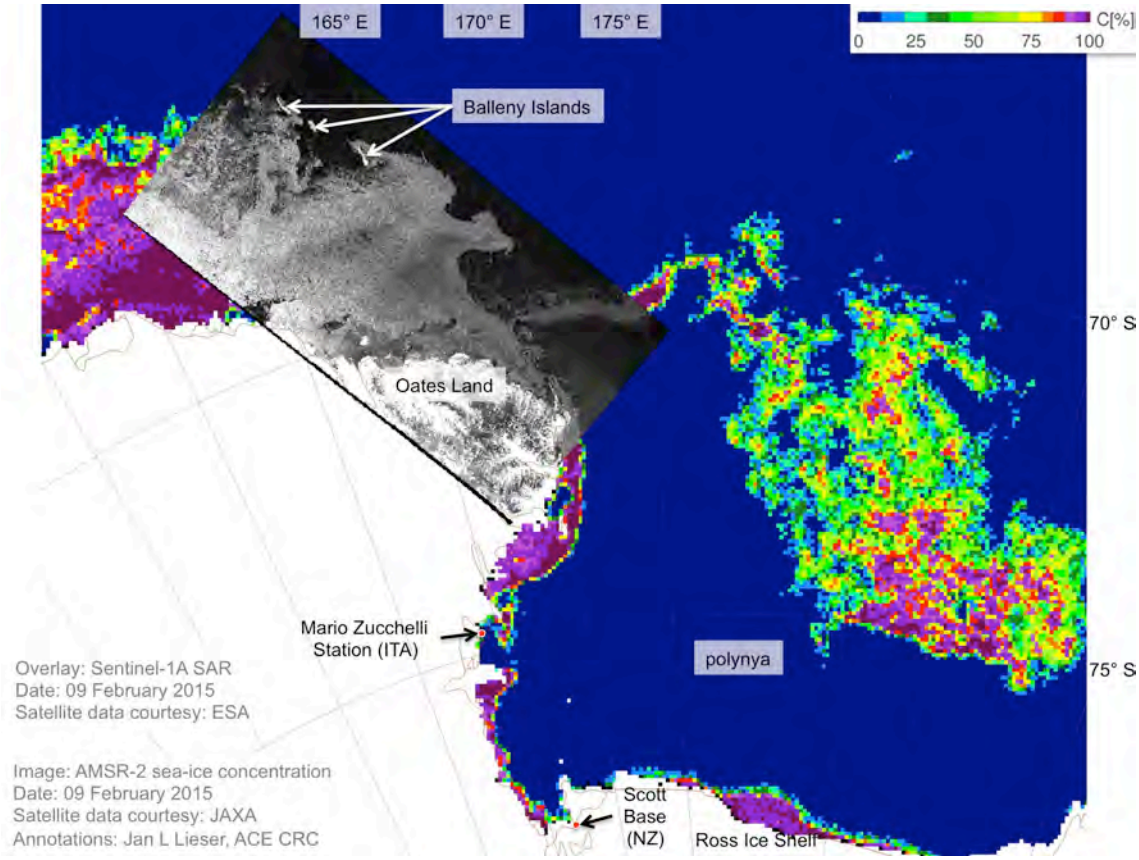

Figure 1: AMSR-2 image, acquired 09/02/2015 and provided by Universität Bremen; overlay: Sentinel-1A SAR, acquired 09/02/2015 and provided by PolarView.

Around the islands, the sea-ice pack consists generally of small floes, but still at high to very high concentration. Only occasionally very large floes remain in the mix. Not more than a few iceberg can be identified in the pack ice, mostly confined to the coast off Oates Land, where they are surrounded by fast ice.

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The thin band of high concentration sea ice can be seen just south of 70° S, between 170° E and 176° E. The northern edge of this band appears very frayed, with its fringe reaching up to 25 nautical miles further north than the main band.

Figure 2 shows the same setup as Figure 1, but for 10/02/15. Two SAR scenes (combined adjacent to each other) were acquired for the eastern Ross Sea.

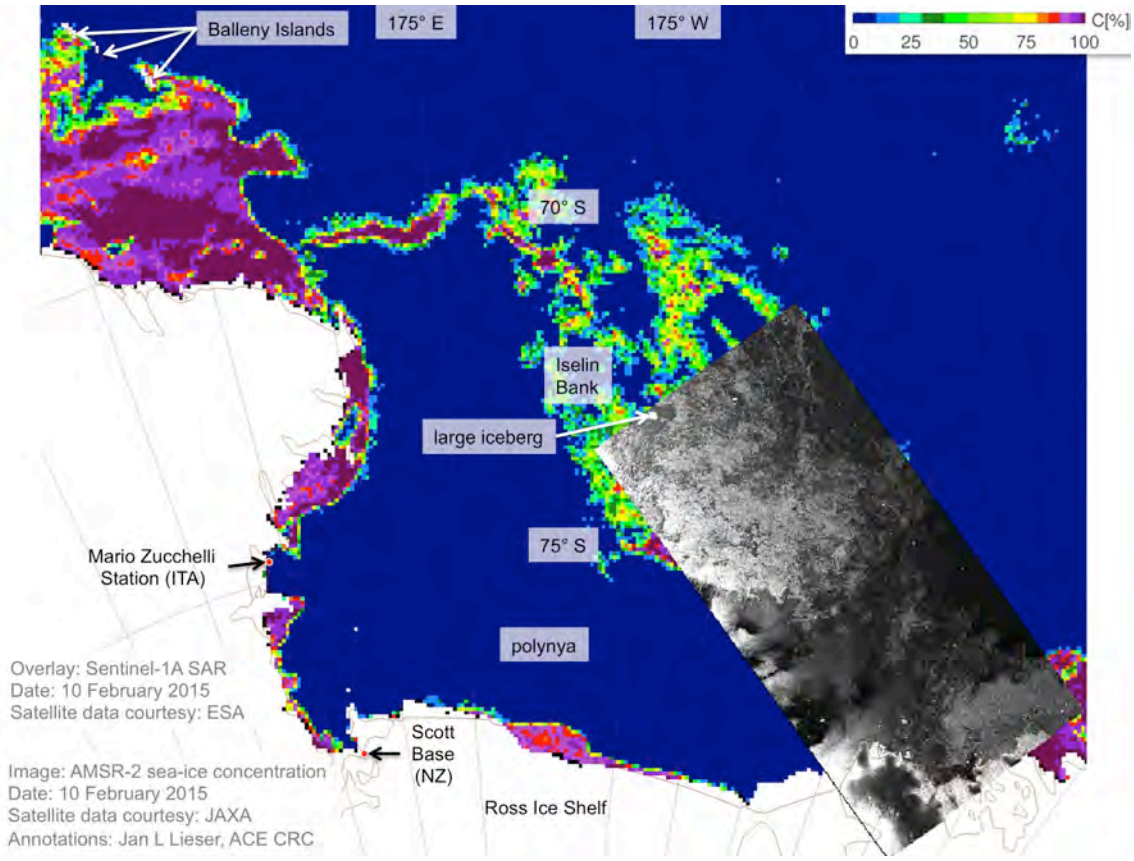

Figure 2: AMSR-2 image, acquired 10/02/2015 and provided by Universität Bremen; overlay: Sentinel-1A SAR, acquired 10/02/2015 and provided by PolarView.

As for the region southeast of the Balleny Islands, the SAR scenes show mostly small sea-ice floes in the pack, but at lower concentration. The frayed structures can clearly be seen in the high resolution imagery.

We note that this region has a much higher abundance of freely drifting icebergs. One very large tabular iceberg can be identified in the central part of the pack ice, located at 174° 30' W and 73° S.

With best regards,

Jan.

Sea Ice Report #07.3/2015

by the AAD/ACE CRC Sea Ice Group*

12/02/2015

- **Prydz Bay**
  In southern Prydz Bay, only minimal sea ice remains but a large number of free floating icebergs can be identified as white dots on the dark open water in Figure 1. Two particularly large icebergs are annotated in the figure, the one at 77° 7' E and 68° 30' S has a surface area of approximately 10 nautical miles^2 (~34 km^2).

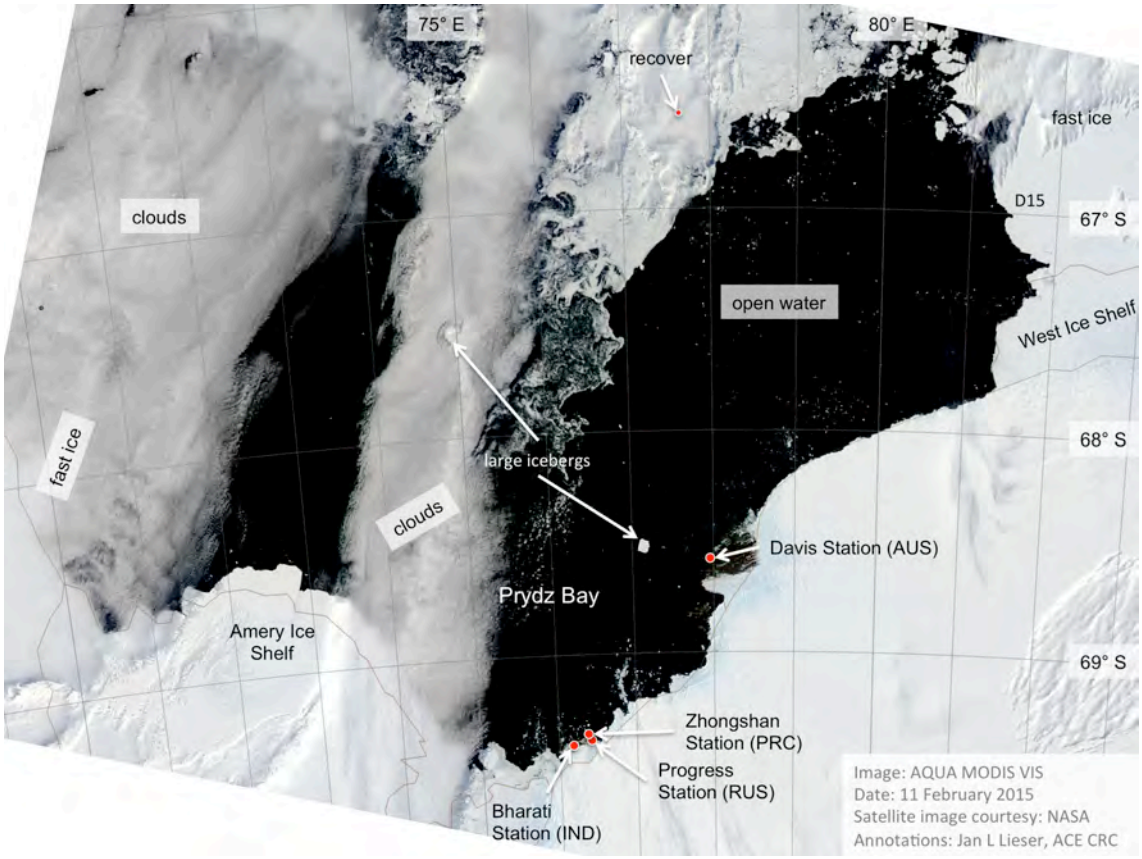

Figure 1: MODIS image, acquired 11/02/2015 and provided by NASA.

West of the Amery Ice Shelf, some fast ice remains attached to the eastern side of Cape Darnley, but is still breaking up. The seaward edges of the Vestfold and Larsemann hills (home of the annotated stations in Figure 1) are free of sea ice. The location of the due to be recovered 'whale mooring' is covered by high concentration sea ice.

With best regards,

Jan.

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Sea Ice Report #07.4/2015

by the AAD/ACE CRC Sea Ice Group*

13/02/2015

- **Prydz Bay**
  Figure 1 shows a sea-ice concentration chart of the region between Enderby Land and the West Ice Shelf. The contour lines denote ocean bathymetry (at 500 m intervals); the 1000 m bathymetry line is highlighted in red. Small green dots indicate mooring locations of interest during *Aurora Australis*' Voyage 3 in the region.

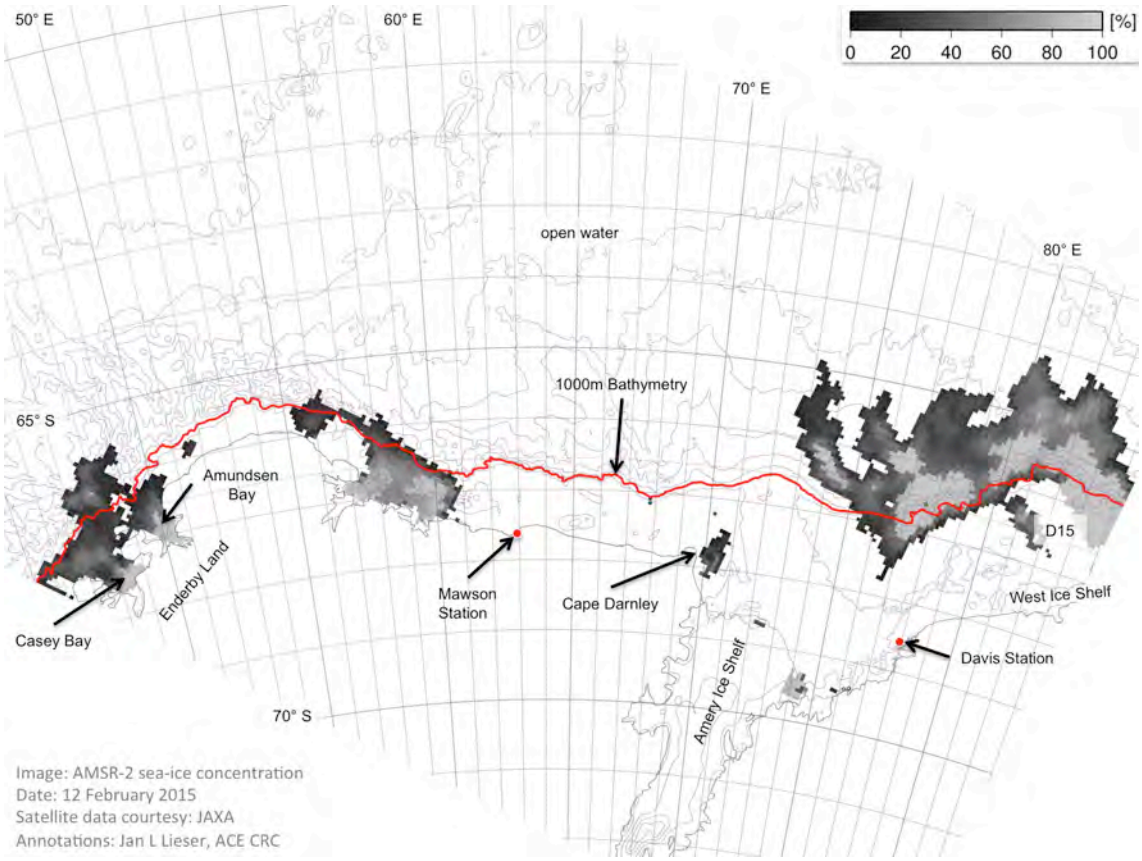

Figure 1: AMSR-2 image, acquired 12/02/2015 and provided by Drift & Noise Polar Services.

Off Enderby Land, sea ice shows quite variable concentration, during the past week, but generally still summer melting conditions. Fast ice appears to be locked in Casey Bay and Amundsen Bay.

West of Mawson Station, between 55° E and 61° E, the sea-ice edge almost co-locates with the 1000 m bathymetry.

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Off the eastern side of Cape Darnley, fast ice attached to the coast appears wrongly classified as low concentration sea ice.

North of Davis Station, almost all of the remaining sea ice is north of the 1000 m bathymetry contour.

With best regards,

Jan.

Sea Ice Report #08.1/2015

by the AAD/ACE CRC Sea Ice Group*

17/02/2015

- **Ross Sea**
  Figures 1 and 2 show the same geographical frame, as seen by the AMSR-2 and MODIS instruments, respectively. Between 180° E and 175° W and 70° 30' S and 73° S, both figures show proposed stations of RV *Tangaroa* as light green dots with red connectors. Additionally, Figure 1 also shows a colour-coded bathymetry with contours marked at 500 m intervals.

  The area of operations is under clouds (Figure 2), but the microwave data (Figure 1) allow for an assessment independent of cloud cover. The region has medium high sea-ice concentration that is moving slowly as a pack in north-easterly direction. It is also still showing signs of summer retreat as we are nearing the summer minimum sea-ice extent.

  McMurdo Sound and its entrance are now largely free of sea ice.

With best regards,

Jan.

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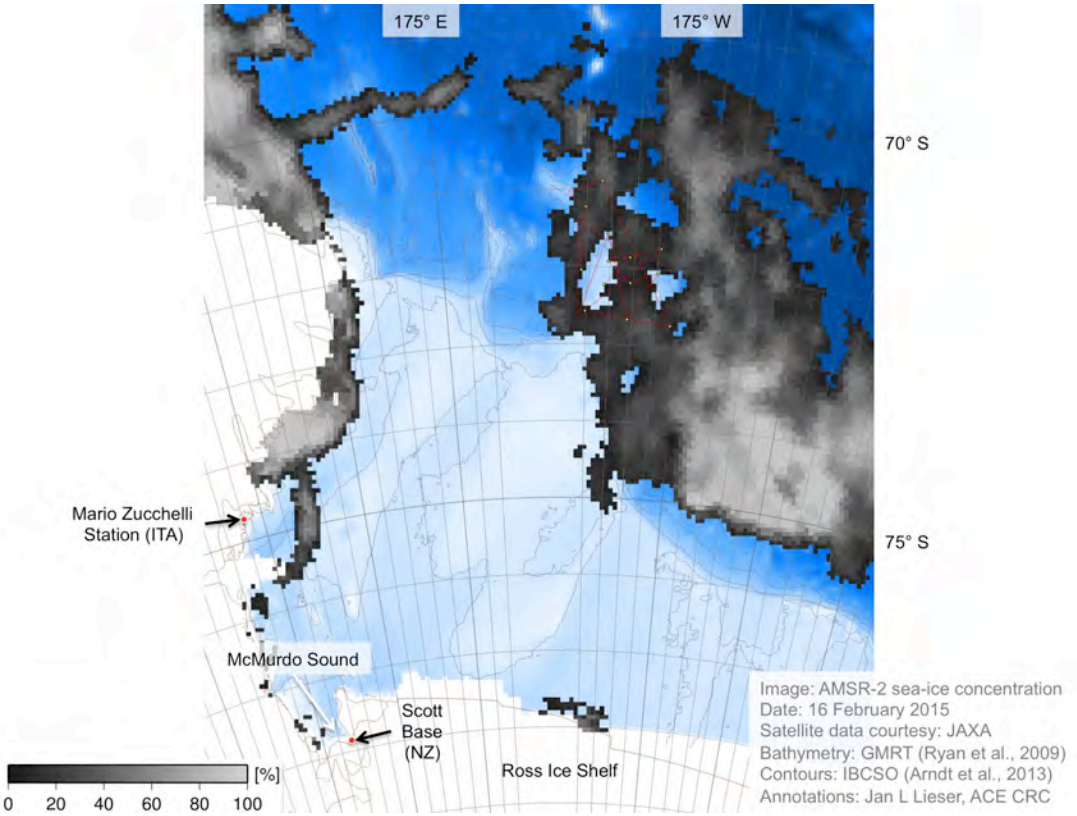

Figure 1: AMSR-2 image, acquired 16/02/2015 and provided by Drift & Noise Polar Services.

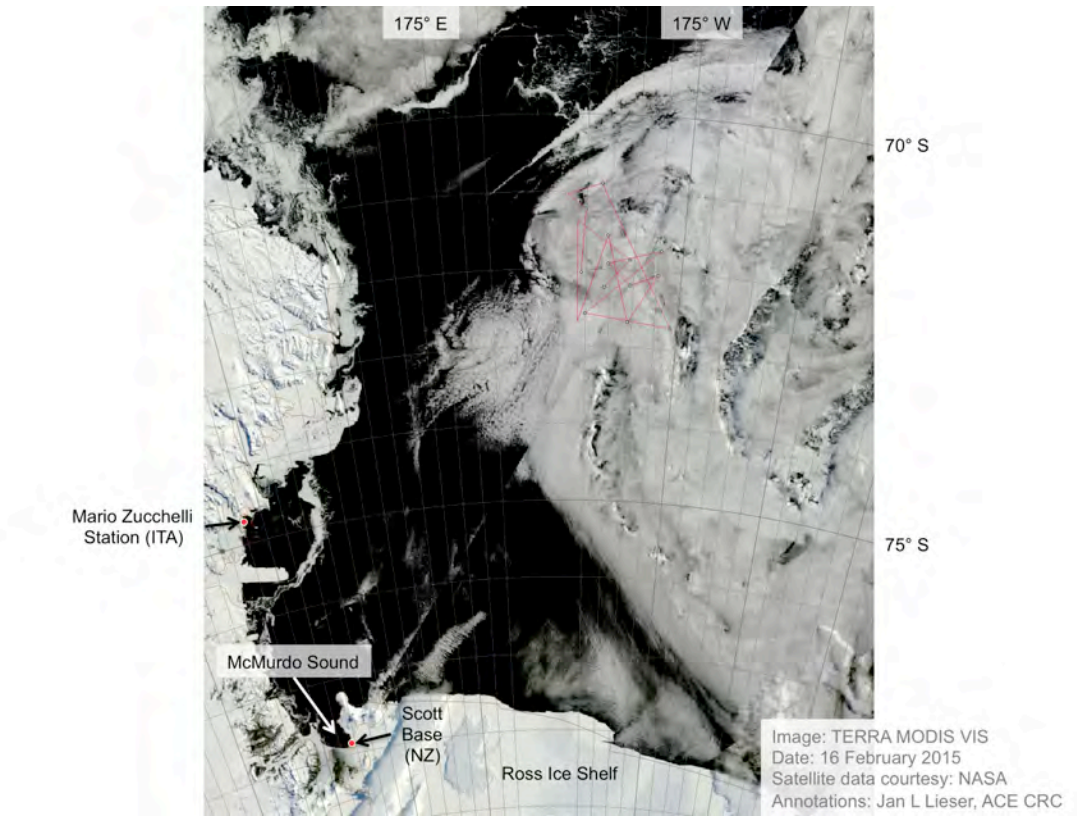

Figure 2: MODIS image, acquired 16/02/2015 and provided by NASA.

Sea Ice Report #08.2/2015

by the AAD/ACE CRC Sea Ice Group*

17/02/2015

- **Mawson Station**
  Figures 1 and 2 show the same geographical frame, as seen by the MODIS and AMSR-2 instruments, respectively. Additionally, Figure 2 also shows a colour-shaded bathymetry with depth contours marked at 500 m intervals. Locations of moorings of interest during Voyage 3 of RSV *Aurora Australis* are marked with yellow dots.

  There is no significant sea ice off Mawson Station. However, Figure 1 shows a string of sea-ice floes just north of 67° S, between 60° E and Cape Darnley. These floes originate most likely from the fast-ice body that is still attached to the coast, east of Cape Darnley. These floes are below the detection limit of the AMSR-2 instrument, but can still be of solid thickness as ex-fast ice.

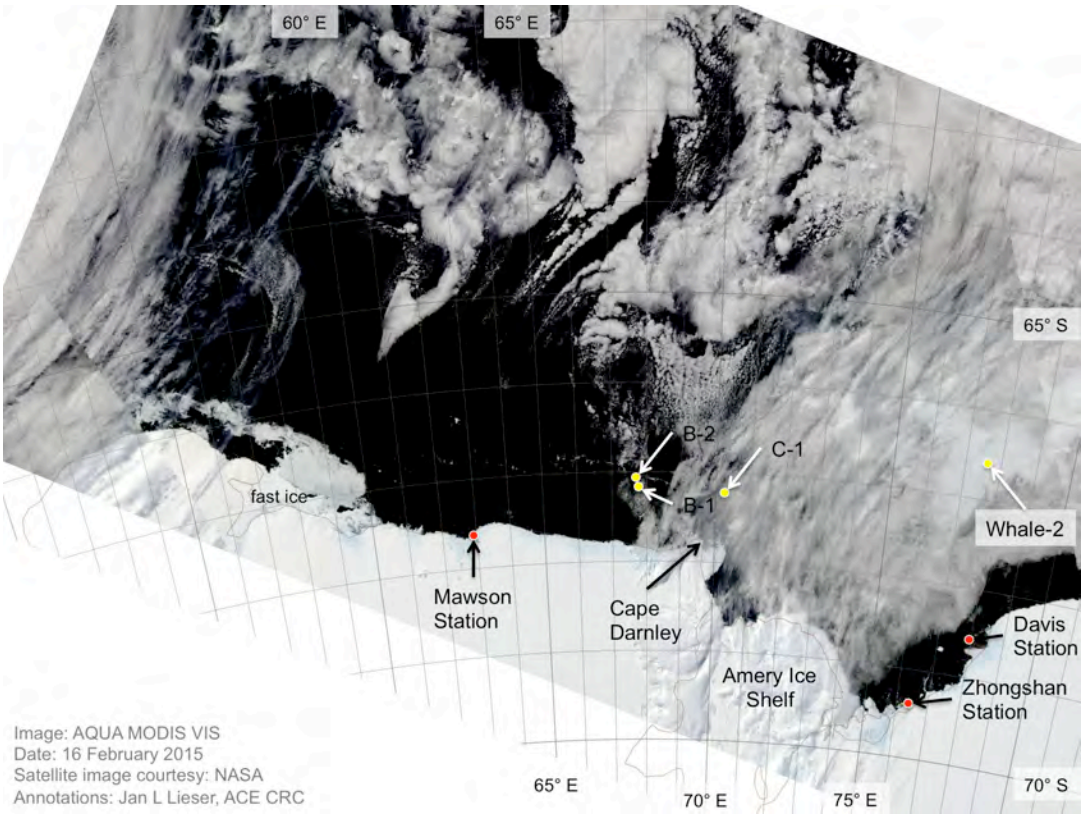

Figure 1: MODIS image, acquired 16/02/2015 and provided by NASA.

The seaward side of the Vestfold and Larsemann hills (home of Davis and Zhongshan stations, respectively) are free of sea ice and fast ice.

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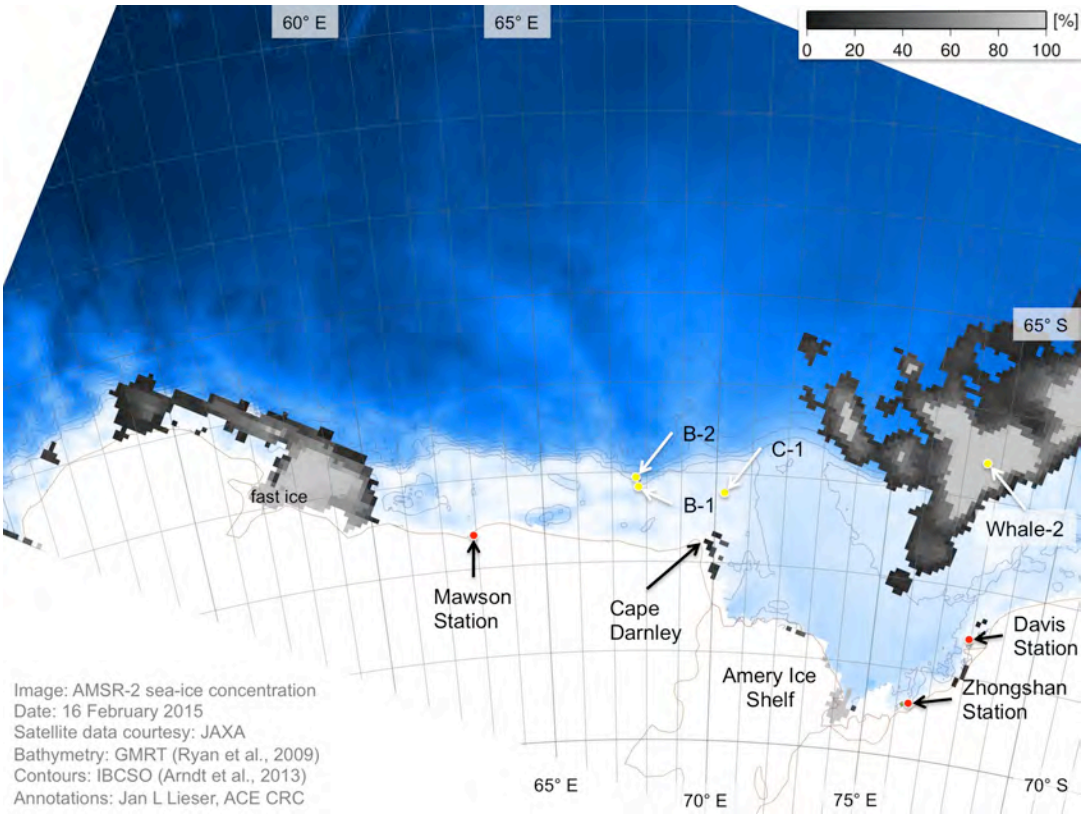

Figure 2: AMSR-2 image, acquired 16/02/2015 and provided by Drift & Noise Polar Services.

North of Davis Station, the mooring 'Whale-2' remains covered by very high concentration sea ice.

With best regards,

Jan.

Sea Ice Report #08.3/2015

by the AAD/ACE CRC Sea Ice Group*

19/02/2015

This report examines sea-ice conditions between 58° E and 80° E.

- **Mawson Station**
  Figures 1 and 2 show the region off Mawson Coast and the Amery Ice Shelf, as seen by the MODIS (with SAR overlay) and AMSR-2 instruments, respectively. Additionally, Figure 2 also shows a colour-shaded bathymetry with depth contours marked at 500 m intervals. In both figures, red survey lines indicate proposed marine science during Voyage 3 of RSV *Aurora Australis* and are named according to geographical region onshore. Also, locations of moorings of interest during that voyage are marked with yellow dots.

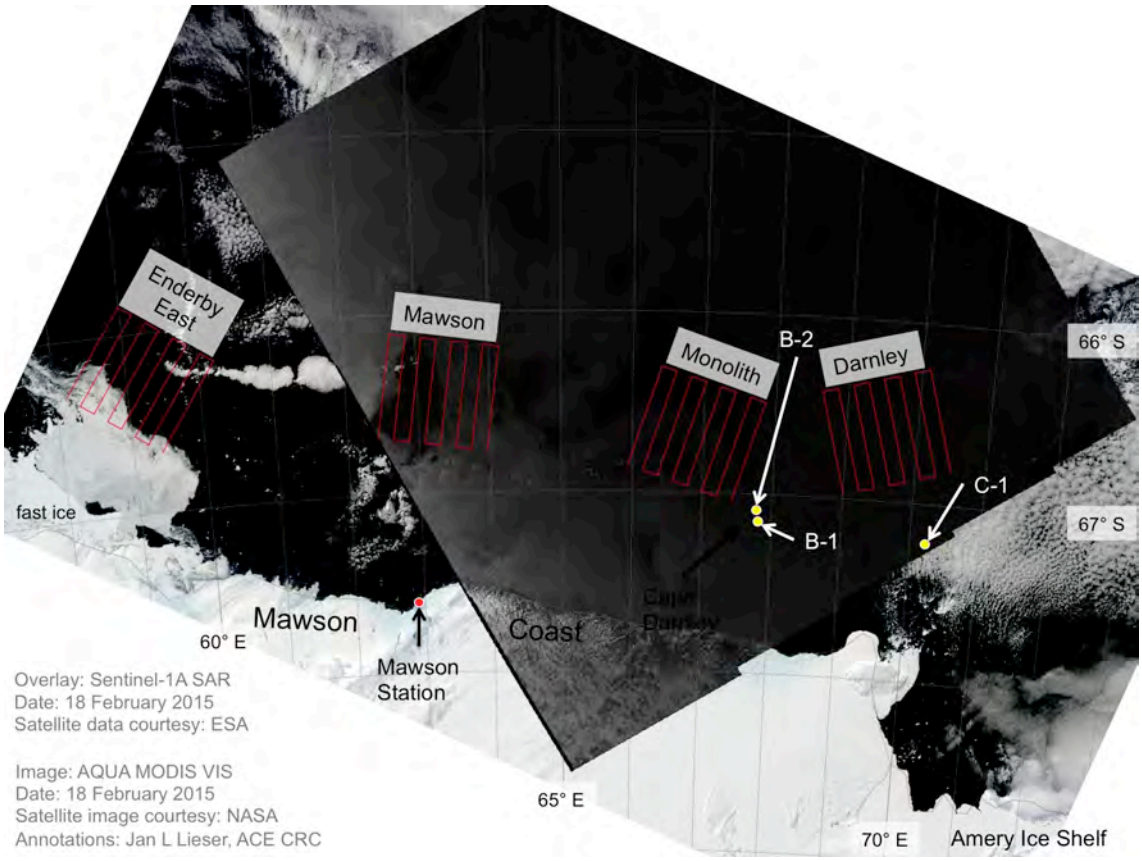

Figure 1: MODIS image, acquired 18/02/2015 and provided by NASA; overlay: Sentinel-1A SAR, acquired 18/02/2015 and provided by PolarView.

The proposed 'Enderby East' survey area is still covered by sea ice at the southern ends of the survey lines. This part of the pack ice appears

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quite mobile and of medium-high concentration.

There is no significant sea ice off Mawson Station, but the westernmost proposed 'Mawson' survey lines are impacted by a large iceberg (white spot in the SAR overlay of Figure 1).

The proposed 'Monolith' and 'Darnley' surveys are free of sea ice, as are the locations of 'B-1', 'B-2' and 'C-1' moorings.

North of Davis Station, the proposed 'Davis' survey area and mooring 'Whale-2' are covered by a very high (up to and including 100%) concentration of sea ice.

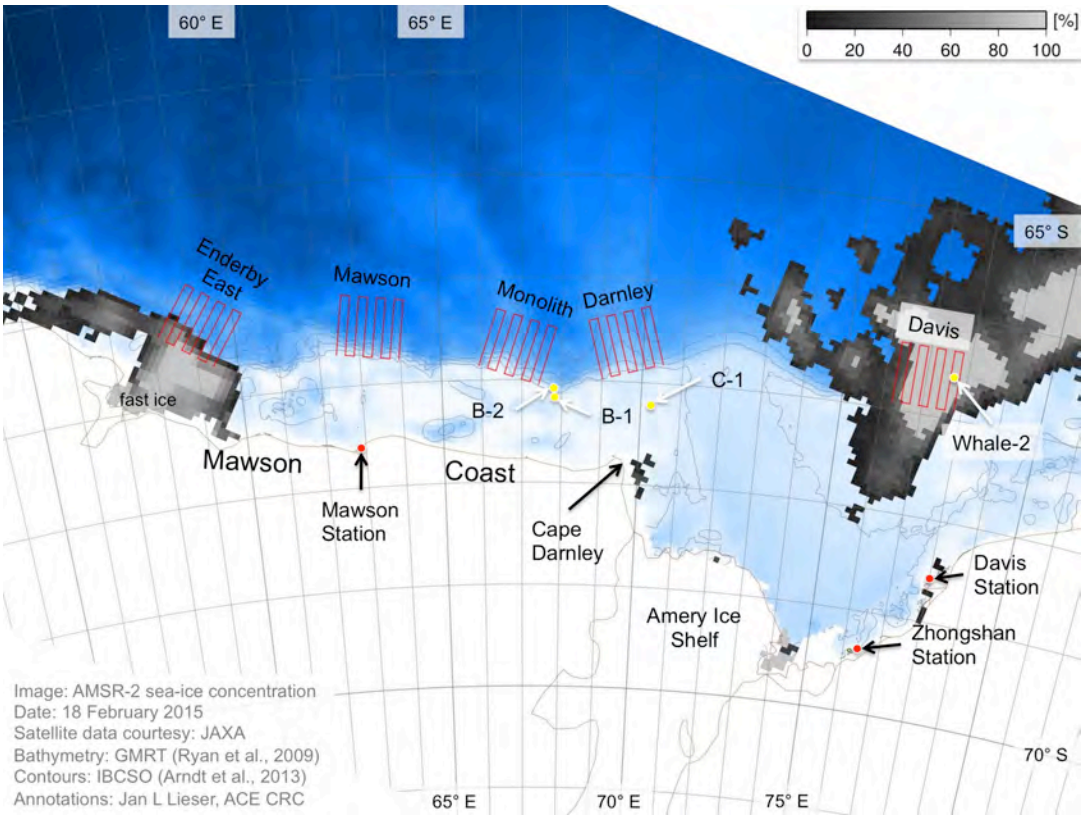

Figure 2: AMSR-2 image, acquired 18/02/2015 and provided by Drift & Noise Polar Services.

The seaward side of the Vestfold and Larsemann hills (home of Davis and Zhongshan stations, respectively) are free of sea ice and fast ice.

With best regards,

Jan.

Sea Ice Report #08.4/2015

by the AAD/ACE CRC Sea Ice Group*

19/02/2015

- **Commonwealth Bay**
  Further to Sea Ice Report #06.4/2015, we note that iceberg C15 (circa 350 km^2) has impacted on the eastern edge of iceberg B09B (circa 900 km^2), most likely on 16/02/2015 under a blanket of clouds. Figure 1 shows both bergs now roughly aligned along one axis and touching at the northern corner of B09B/western edge of C15. It is estimated that C15 has knocked off approximately 5 km^2 from the eastern corner of B09B and has rotated about 90 degrees anticlockwise.

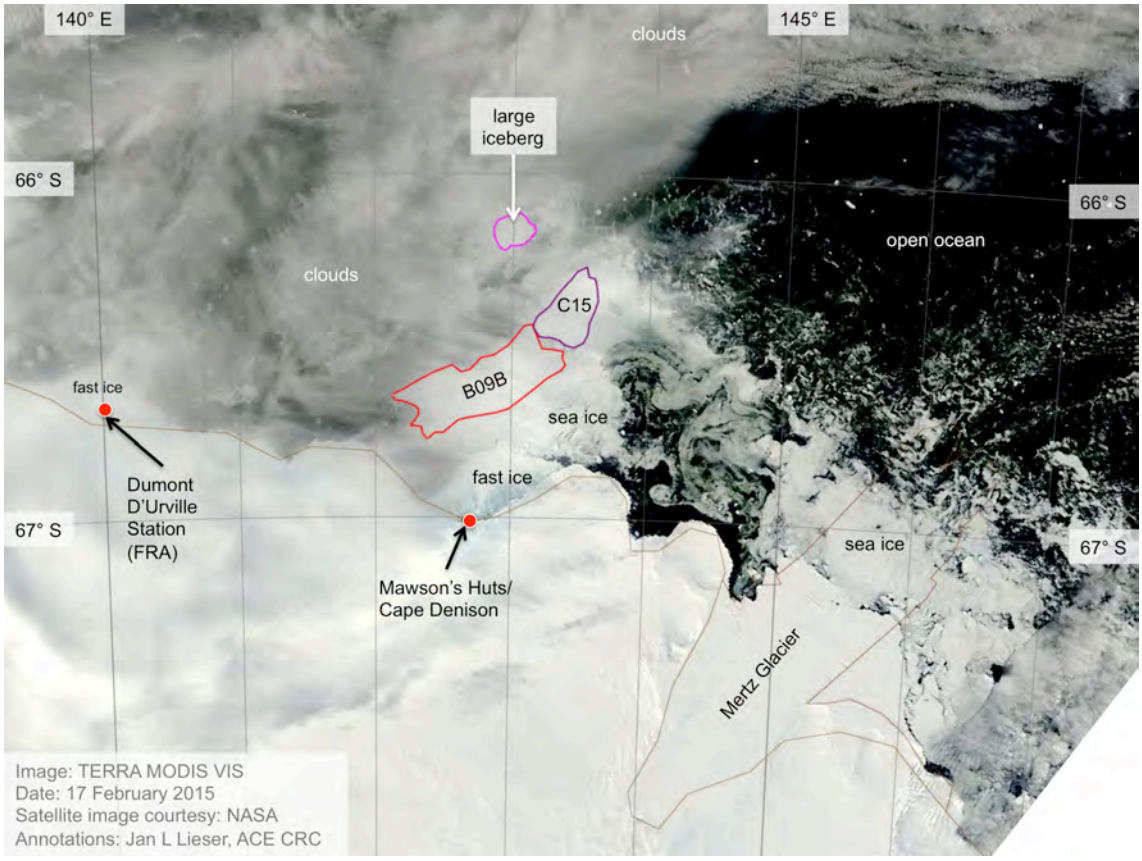

Figure 1: MODIS image, acquired 17/02/2015 and provided by NASA.

If iceberg C15 is not resting on the seabed or against iceberg B09B now, it is likely to impact the large iceberg (circa 114 km^2; annotated in the figure) as well.

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Fast ice conditions off Dumont d'Urville Station and in Commonwealth Bay are not affected immediately by this event.

With best regards,

Jan.

Sea Ice Report #09.1/2015

by the AAD/ACE CRC Sea Ice Group*

23/02/2015

This report examines sea-ice conditions between 58° E and 80° E.

- **Mawson Station**
  Figure 1 shows the region off Mawson Coast and the Amery Ice Shelf, as seen by the AMSR-2 instrument. Additionally, the figure also shows a colour-shaded bathymetry with depth contours marked at 500 m intervals. Purple survey lines indicate proposed marine science during Voyage 3 of RSV *Aurora Australis* and are named according to geographical region onshore. The orange track indicates the recent cruise track of RSV *Aurora Australis* in the region (up until 23/02/2015 01:00 UT). Also, locations of moorings of interest during that voyage are marked with yellow dots.

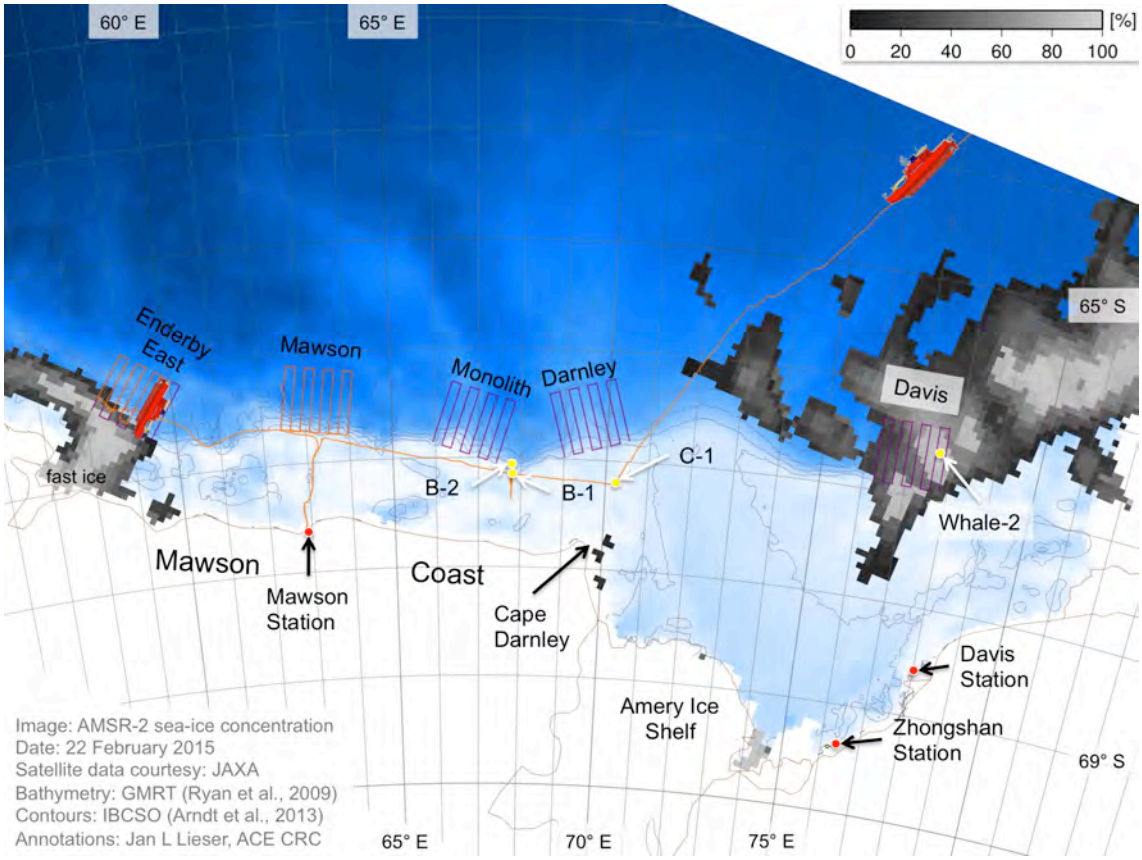

Figure 1: AMSR-2 image, acquired 18/02/2015 and provided by Drift & Noise Polar Services.

The 'Enderby East' survey is almost complete. A potential extension

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of this survey to the southeast (adding two transect lines) should be largely uninfluenced by sea ice. The 'Mawson' survey is complete.

The proposed 'Monolith' and 'Darnley' surveys are free of sea ice, as are the locations of 'B-1', 'B-2' and 'C-1' moorings.

North of Davis Station, the recent transit of a low pressure system has loosened the pack ice over the proposed 'Davis' survey area and mooring 'Whale-2'. Now, only the eastern half of the proposed survey is covered by very high (up to and including 100%) concentration sea ice.

The seaward side of the Vestfold and Larsemann hills (home of Davis and Zhongshan stations, respectively) are free of sea ice and fast ice.

With best regards,

Jan.

Sea Ice Report #09.2/2015

by the AAD/ACE CRC Sea Ice Group*

25/02/2015

This report examines sea-ice conditions in western Ross Sea.

- **Ross Sea**
  Between 170° E and 179° W, a thin band of scattered, low sea-ice concentration remains, along 70° S (Figure 1). The region of Iselin Bank is still covered by some sea ice, but the western edge of this patch of sea ice is retreating eastward.

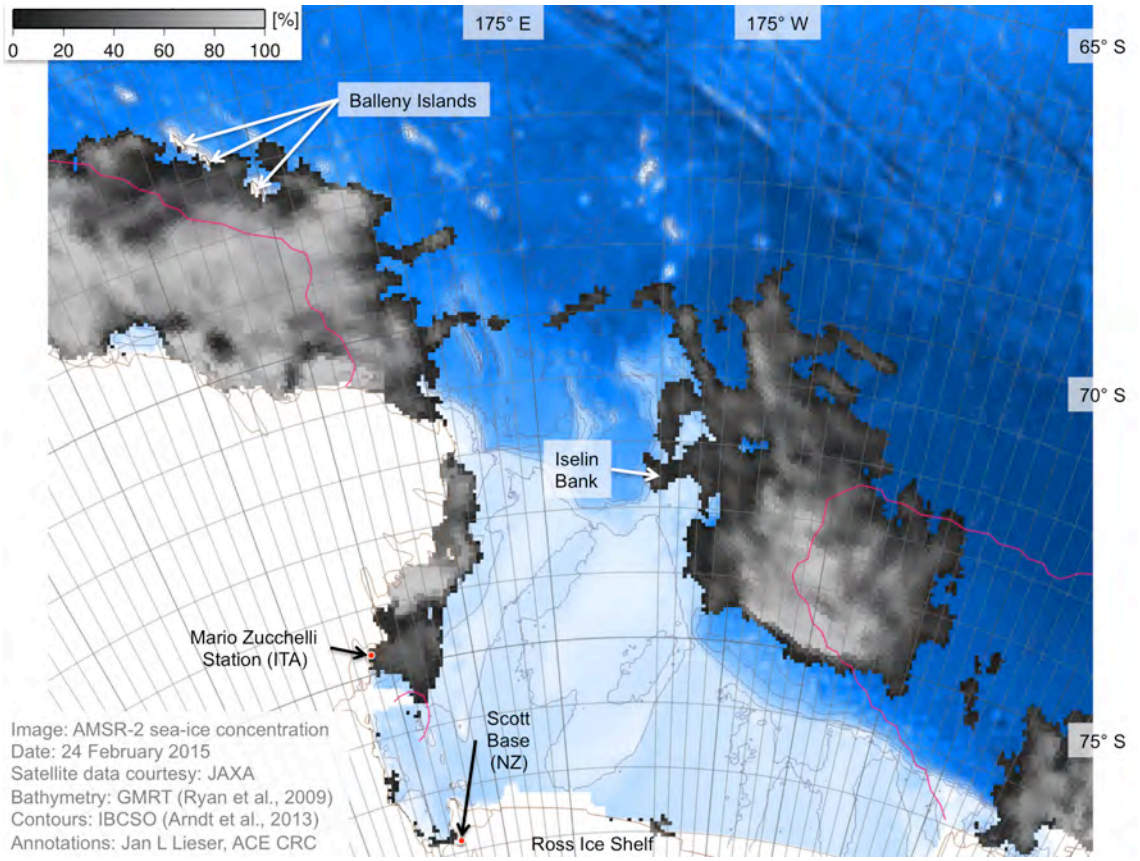

Figure 1: AMSR-2 image, acquired 24/02/2015 and provided by Drift & Noise Polar Services.

During the past five days, more sea ice appears to be surrounding the Balleny Islands, arriving there with an eastward drift.

In general, sea-ice extent is slightly above the February median for the region (pink line in Figure 1), and differently distributed.

With best regards,

Jan.

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Sea Ice Report #09.3/2015

by the AAD/ACE CRC Sea Ice Group*

26/02/2015

- **Mawson Station**
  Figure 1 shows a sea-ice concentration map off Mawson Coast and Prydz Bay, with respect to proposed survey grids of RSV *Aurora Australis* given in red. The orange line denoted the cruise track of the vessel, up until 26/02/2015 00:00 UT. The 'Enderby East' survey has been completed and a repeat of the 'Mawson' survey is underway.

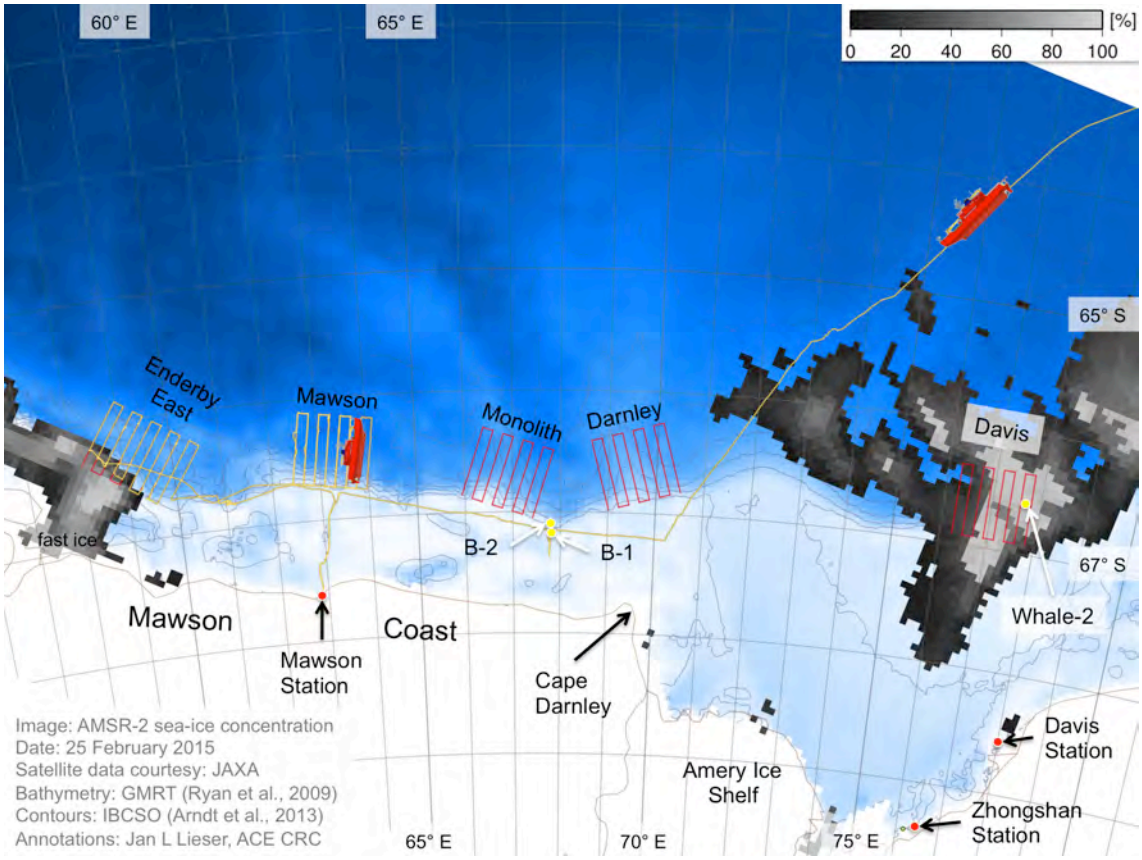

Figure 1: AMSR-2 image, acquired 25/02/2015 and provided by Drift & Noise Polar Services.

The 'Monolith' and 'Darnley' survey areas remain largely free of sea ice, as well as the locations of moorings 'B-1' and 'B-2'. The 'Davis' survey area is still largely covered by sea ice, but only the eastern part of the proposed grid is under very high concentration sea ice. The location of 'Whale-2' mooring is also covered by up to 100% of sea ice.

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The fast ice that was attached to the eastern side of Cape Darnley has disintegrated during the past days and many ex-fast ice floes are now drifting freely locally and northward.

- **Commonwealth Bay**
  Off Commonwealth Bay, iceberg C15 has spun around about 50 degrees clockwise after it had made contact with iceberg B09B (see Sea Ice Report #08.4/2015), and hit the large (annotated) iceberg to the north, on 23/02/2015. Since then, it has rotated about 30 degrees anticlockwise again and now sits in the middle between B09B and the big berg to the north. The most recent TERRA MODIS acquisition (not shown) confirms C15 has rotated anticlockwise further and is now almost completely closing the gap, leaving less than 3 km wide openings between these three large bergs.

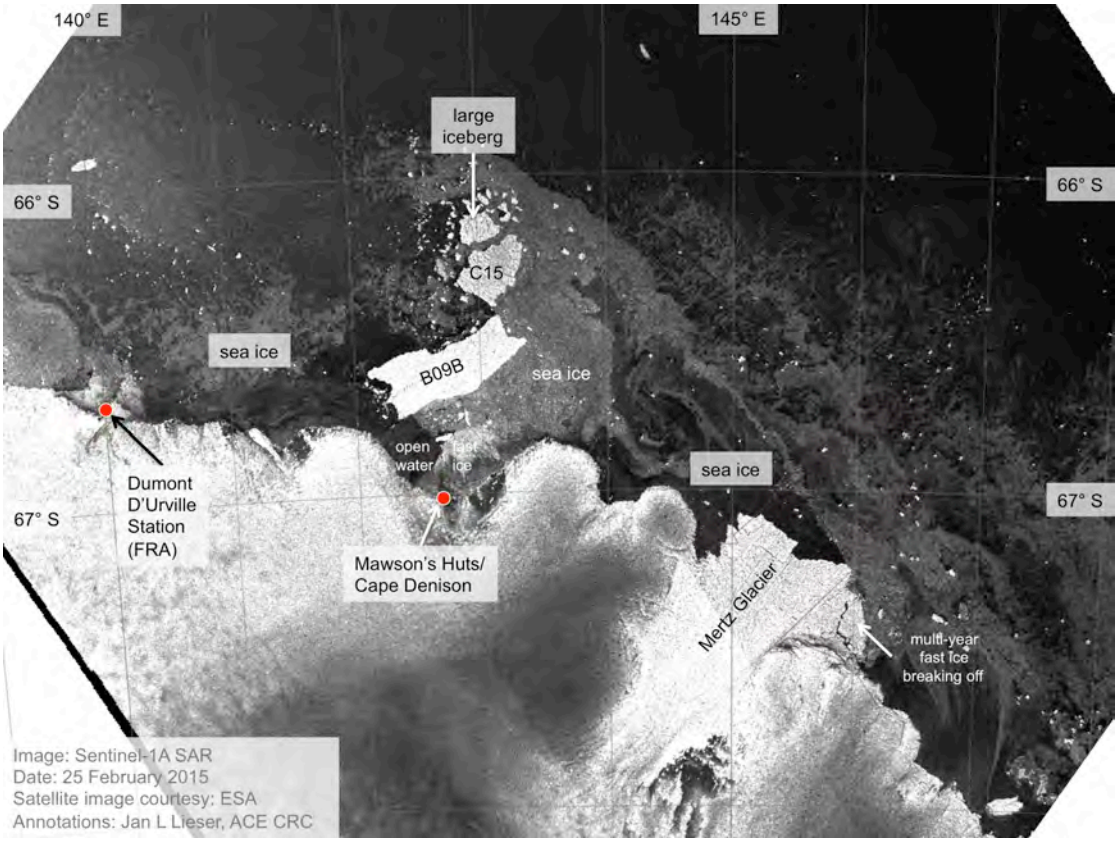

Figure 2: Sentinel-1a image, acquired 25/02/2015 and provided by PolarView.

On or near 23/02/2015, approximately 140 km^2 of multi-year fast ice broke away from the eastern side of Mertz Glacier. Because this ice has been local for many years it has accumulated a substantial thickness, with estimates ranging from 10 m to 50 m. Therefore those new floes can be regarded as mini icebergs, even though this ice is not exclusively of meteoric origin. This ice can now enter the general westward drift of sea ice in the region.

With best regards,

Jan.

Sea Ice Report #10.1/2015

by the AAD/ACE CRC Sea Ice Group*

02/03/2015

- **Mawson Station**
  Figure 1 shows a sea-ice concentration map off Mawson Coast and Prydz Bay, with respect to proposed survey grids of RSV *Aurora Australis* given in red. The orange line denotes the cruise track of the vessel, up until 02/03/2015 01:00 UT.

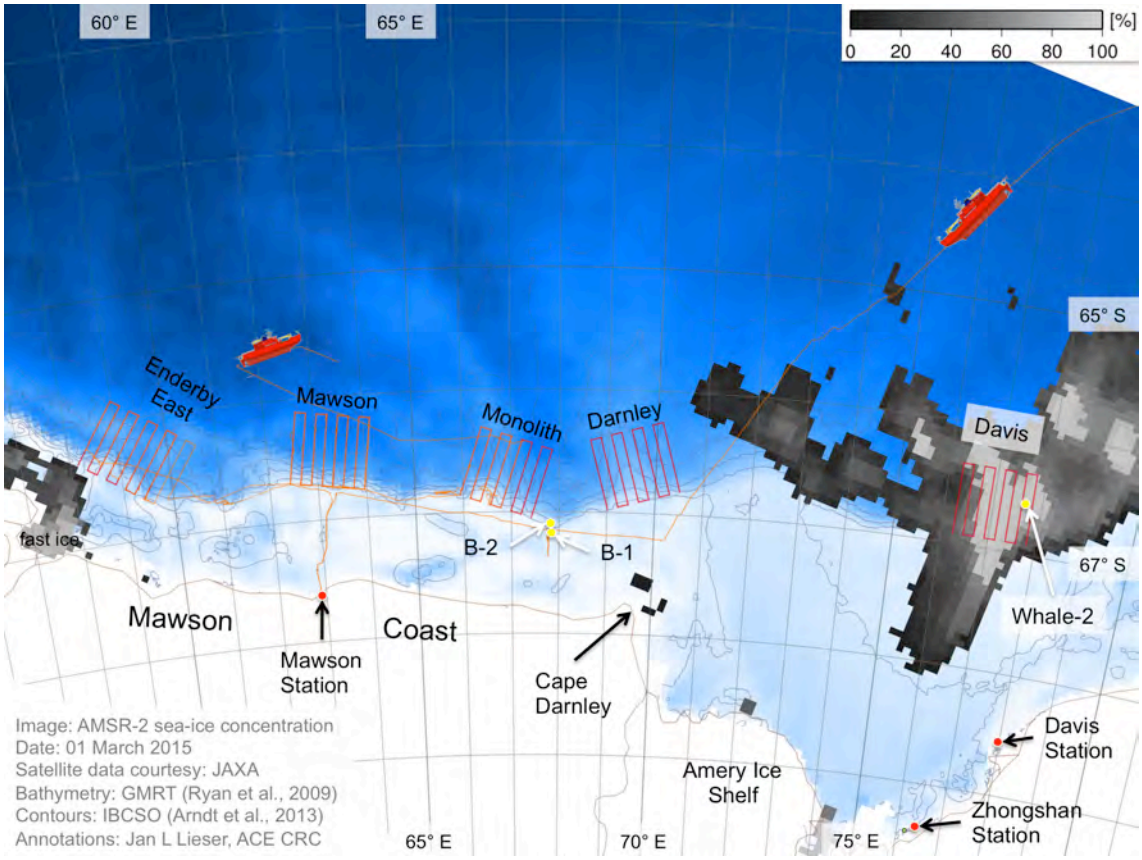

Figure 1: AMSR-2 image, acquired 01/03/2015 and provided by Drift & Noise Polar Services.

The remaining part of the 'Monolith' survey and the 'Darnley' survey area remain largely free of sea ice, as well as the locations of moorings 'B-1' and 'B-2'. The 'Davis' survey area is increasingly covered by very high sea-ice concentration.

Ex-fast ice floes originating from the eastern side of Cape Darnley are drifting freely locally and northwestward.

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- **Davis Station**
  Figure 2 shows a high resolution (50 m by 100 m) SAR image of the sea ice, north of Davis Station. The proposed 'Davis' survey (see Figure 1) is given in red. The location of the 'Whale-2' mooring is indicated by a yellow dot.

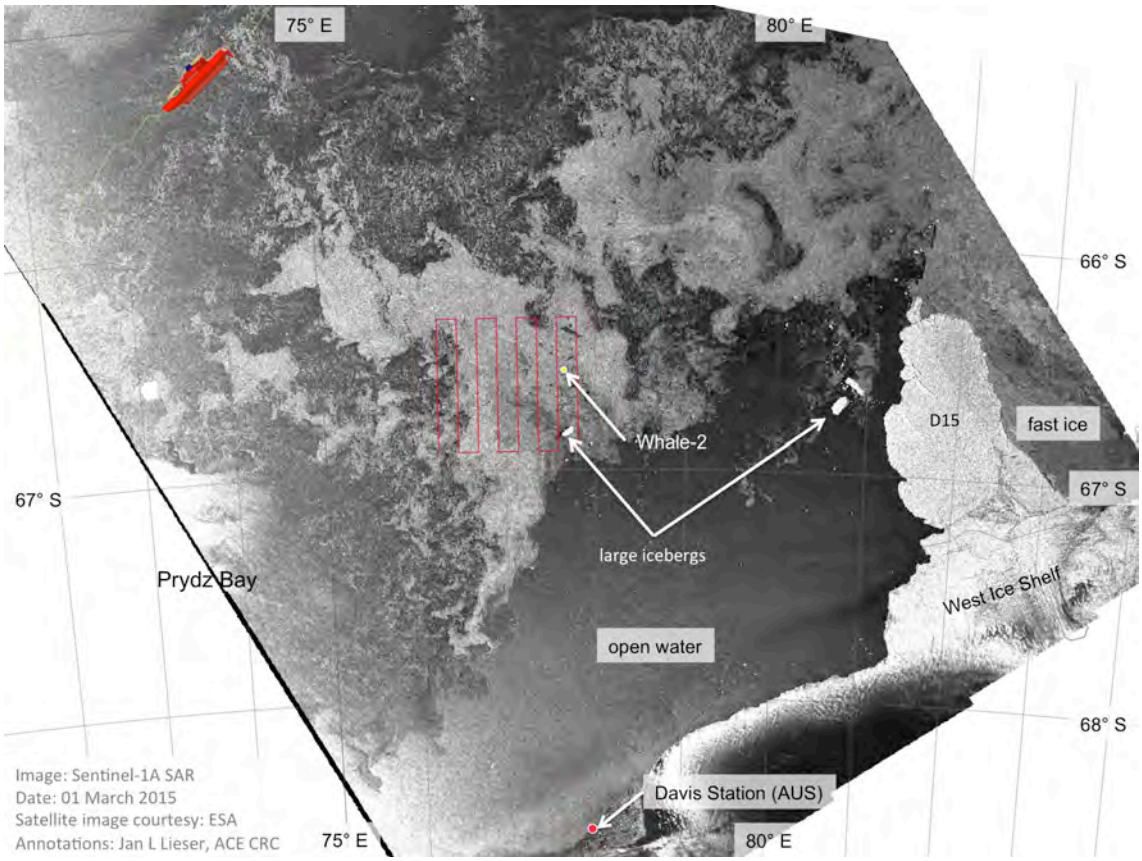

Figure 2: Sentinel-1a SAR image, acquired 01/03/2015 and provided by PolarView.

As already stated in the previous section, the survey area and the 'Whale-2' mooring are covered by very high concentration of sea ice. This pack consists mostly of small to medium sized floes with a few icebergs in the mix. Two particularly large icebergs are pointed out by arrows.

With best regards,

Jan.

Sea Ice Report #10.2/2015

by the AAD/ACE CRC Sea Ice Group*

03/03/2015

- **Mawson Station**
  Following on from Sea Ice Report #10.1/2015, Figures 1 and 2 show a visible image and a SAR image of the region between Mawson Station and the Amery Ice Shelf, respectively. Proposed survey grids of RSV *Aurora Australis* are given in red. The orange line denotes the cruise track of the vessel, up until 03/03/2015 01:00 UT. Yellow dots are mooring locations.

  The trail of ex-fast ice originating from the eastern side of Cape Darnley and drifting northwestward can clearly be seen as a line of white dots in the dark ocean (Figure 1), in the gap between the clouds between 67° E and 70° E, south of 67° S. Mooring location 'B-2' is likely to be affected by floes of old fast ice passing by.

  Between 70° E and 71° 15' E, the SAR scene (Figure 2) shows a large number of icebergs northeast of Cape Darnley that are obscured by clouds in Figure 1.

With best regards,

Jan.

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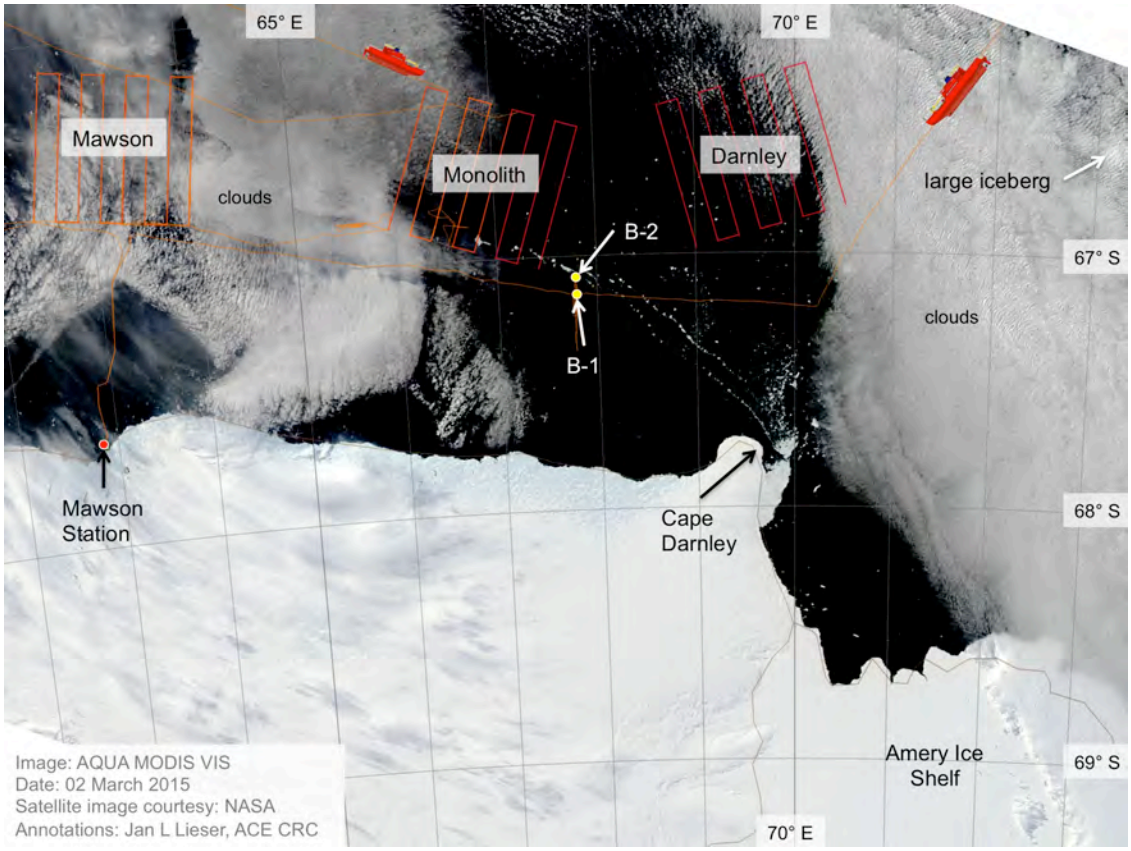

Figure 1: MODIS image, acquired 02/03/2015 and provided by NASA.

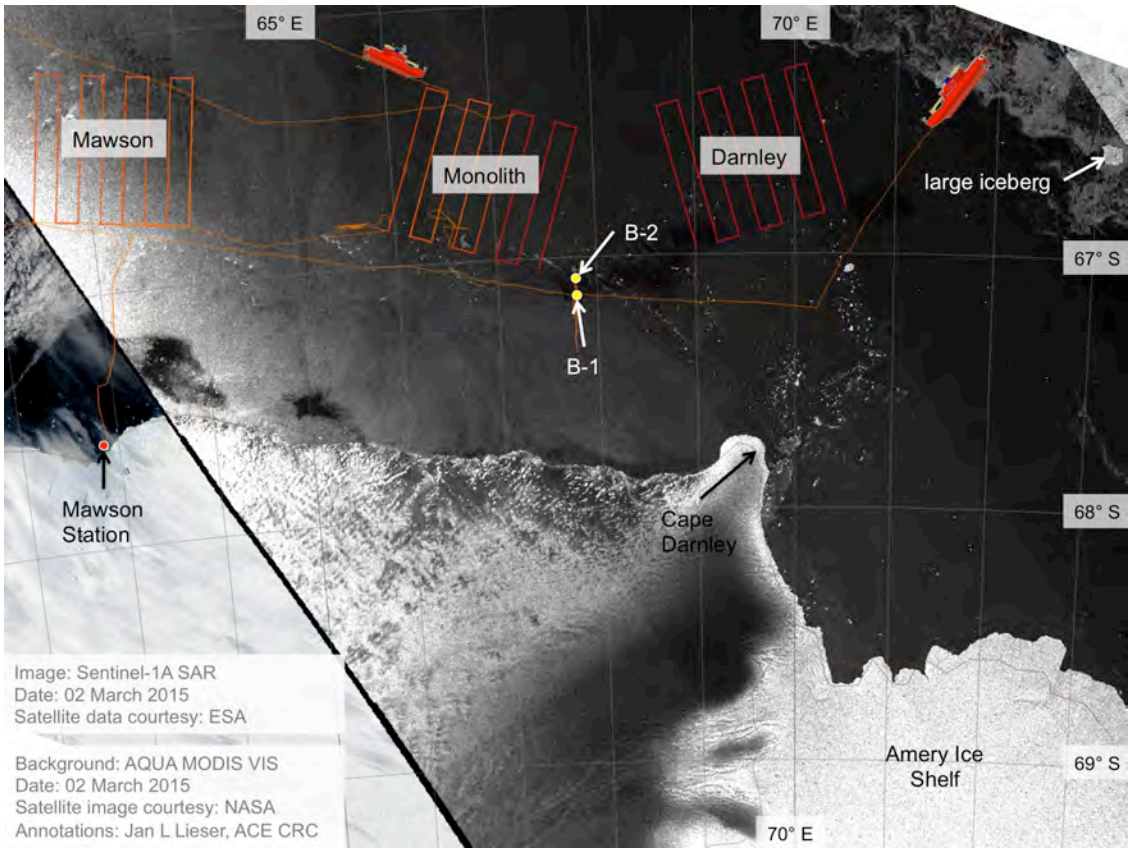

Figure 2: MODIS image, acquired 02/03/2015 and provided by PolarView.

Sea Ice Report #10.3/2015

by the AAD/ACE CRC Sea Ice Group*

05/03/2015

- **Mawson Station**
  Figure 1 shows a sea-ice concentration map with respect to proposed (red) and completed (orange) marine science survey lines of RSV *Aurora Australis*' Voyage 3 (cruise track given in yellow). Three mooring locations are indicated by yellow dots.

  The algorithms calculating sea-ice concentration in near-real time from AMSR-2 data are currently affected by less-than-optimal atmospheric corrections. This results in an overestimation of sea-ice cover, particularly west of 75° E. The lack of cloud-free visible images or RADAR data precludes confirmation of concentration estimates.

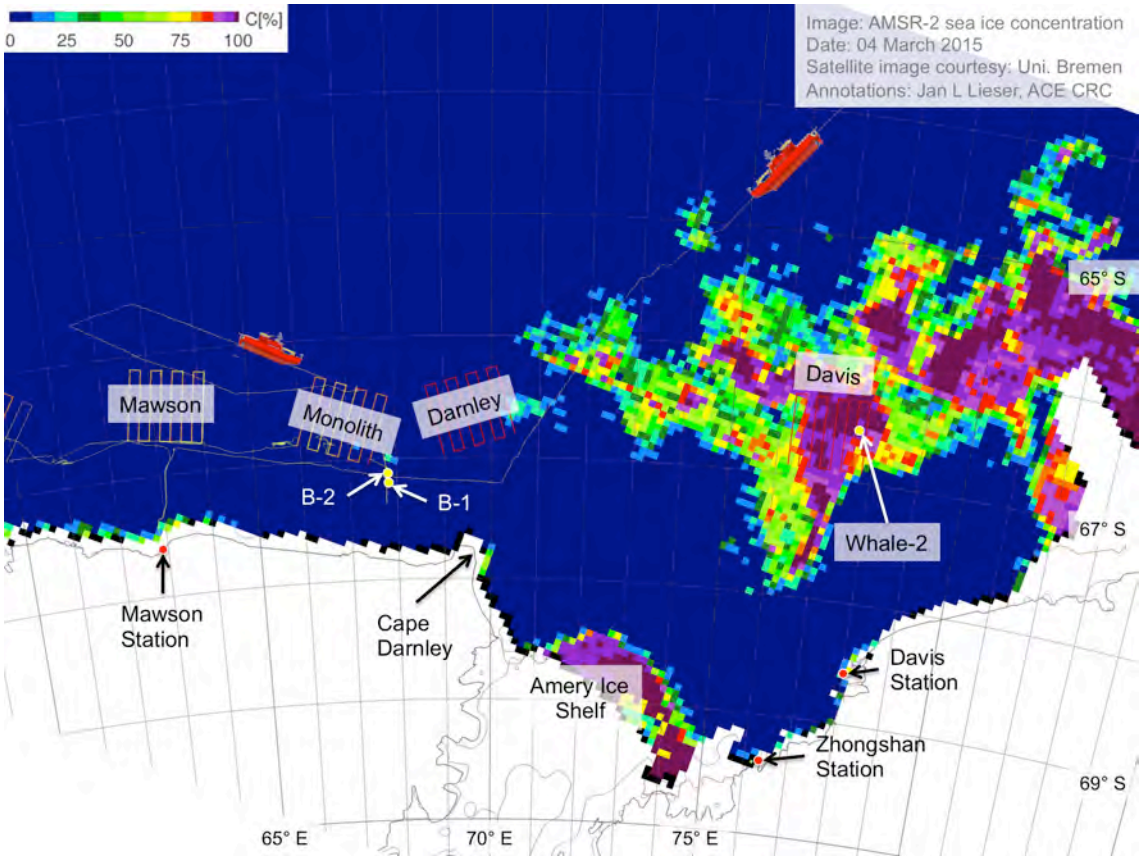

Figure 1: AMSR-2 image, acquired 04/03/2015 and provided by PolarView.

Now that the beginning of autumn has set in, the 'Davis' survey area is covered by increasing sea ice. The 'Whale-2' mooring remains under a very high (up to and including 100%) concentration of sea ice.

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- **Totten Glacier**
  The region between Law Dome and the Dalton Iceberg Tongue is shown in Figure 2. Off the Totten Glacier, the ex-fast ice is still mobile and a lead of variable width (both, in space and time) is separating the large ex-fast ice body form the continent/shelf front. North of the Moscow University Ice Shelf, a polynya is largely maintained, but a few larger sea-ice floes and smaller icebergs are drifting freely there.

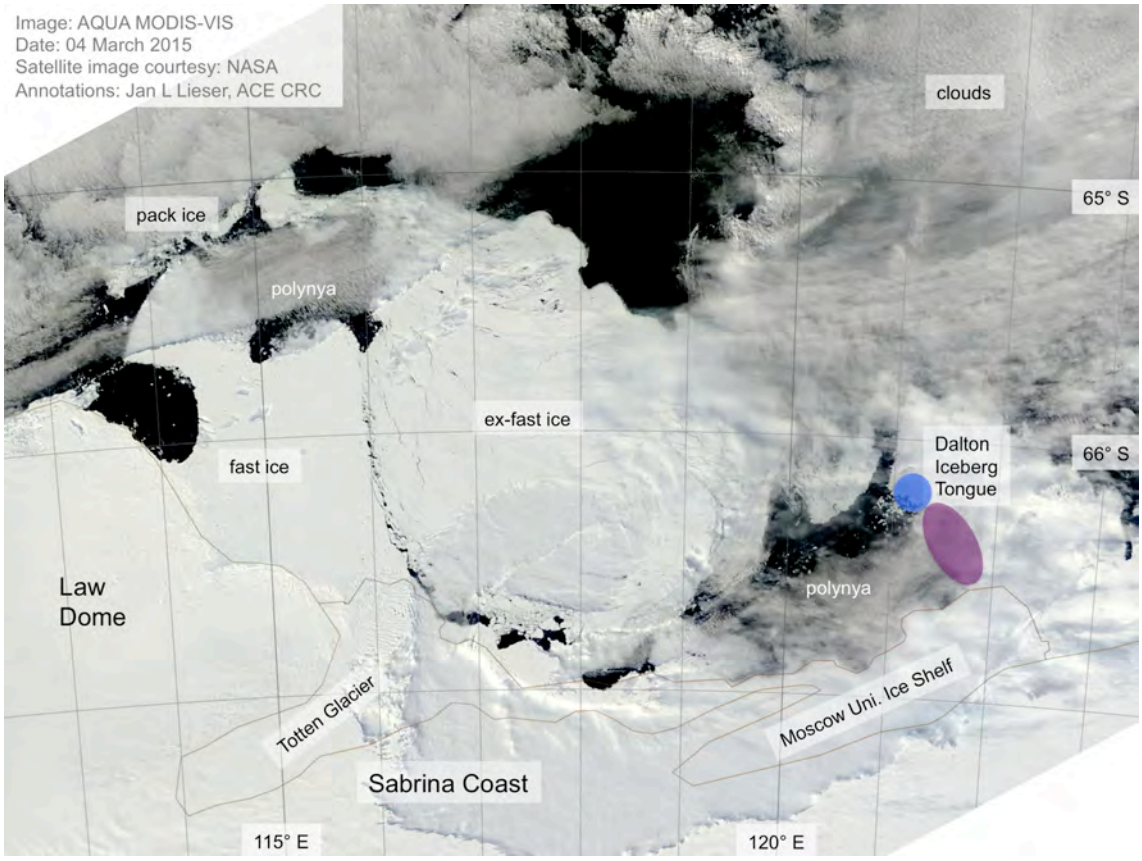

Figure 2: MODIS image, acquired 04/03/2015 and provided by NASA.

Since early February 2015, we note two events regarding the fast ice of the Dalton Iceberg Tongue, which consists of a large number of icebergs enclosed by fast ice. Between 04/02/2015 and 08/02/2015, a suspected large swell event snapped the fast ice in-between the icebergs that make up the tongue. While the majority of fast ice remains trapped between the icebergs, approximately 800 km^2 of fast ice broke free from the southern side of the Dalton Iceberg Tongue (indicated by the purple shade in Figure 2), releasing ex-fast ice floes into the polynya. Between 02/03/2015 and 04/03/2015, an additional 230 km^2 (indicated by the blue shade in Figure 2) of fast ice broke free, to the north of the above mentioned breakout.

- **Commonwealth Bay**
  While the line-up of three major tabular icebergs north of Commonwealth Bay remains largely unchanged, with iceberg C15

still unsettled between B09B in the south and an unnamed berg in the north, some fast ice is still breaking up inside the bay (Figure 3). One third of the bay is ice free and the shortest distance between the fast ice edge and Mawson's Huts is just under 6 nautical miles.

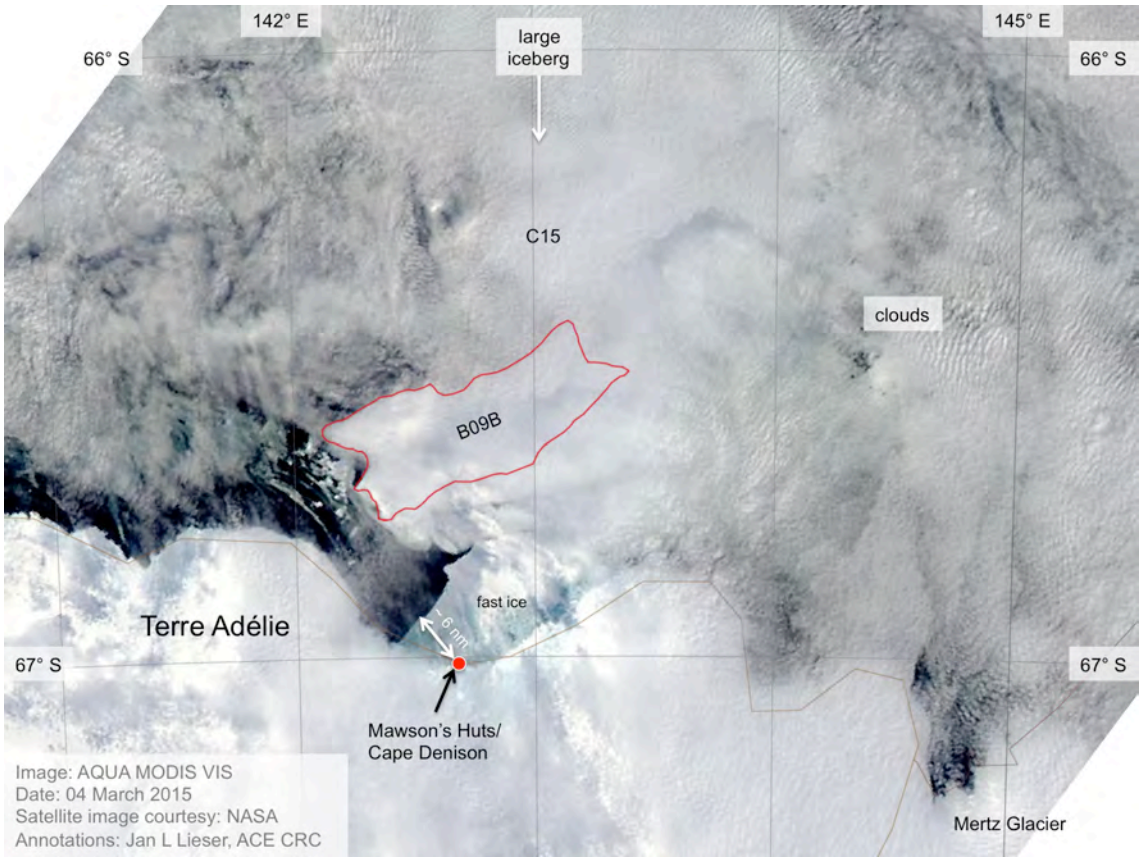

Figure 3: MODIS image, acquired 04/03/2015 and provided by NASA.

With best regards,

Jan.

Sea Ice Report #11.1/2015

by the AAD/ACE CRC Sea Ice Group*

12/03/2015

This report examines sea-ice conditions in Prydz Bay, between the Australian Mawson and Davis stations.

- **Davis Station**
  Figure 1 shows a sea-ice concentration map and the recent cruise track of RSV *Aurora Australis* in the region (up to 12/03/2015 00:00 UT). The lack of cloud-free visible images or RADAR data precludes confirmation of sea-ice concentration estimates, as the algorithm still might overestimate the sea-ice concentration. However, the general pattern of sea ice presence appears to be consistent between different algorithms.

  Of note regarding Figure 1 is the outdated land-mask applied to the Amery Ice Shelf, which results in wrong sea-ice concentration estimates off the face of the shelf.

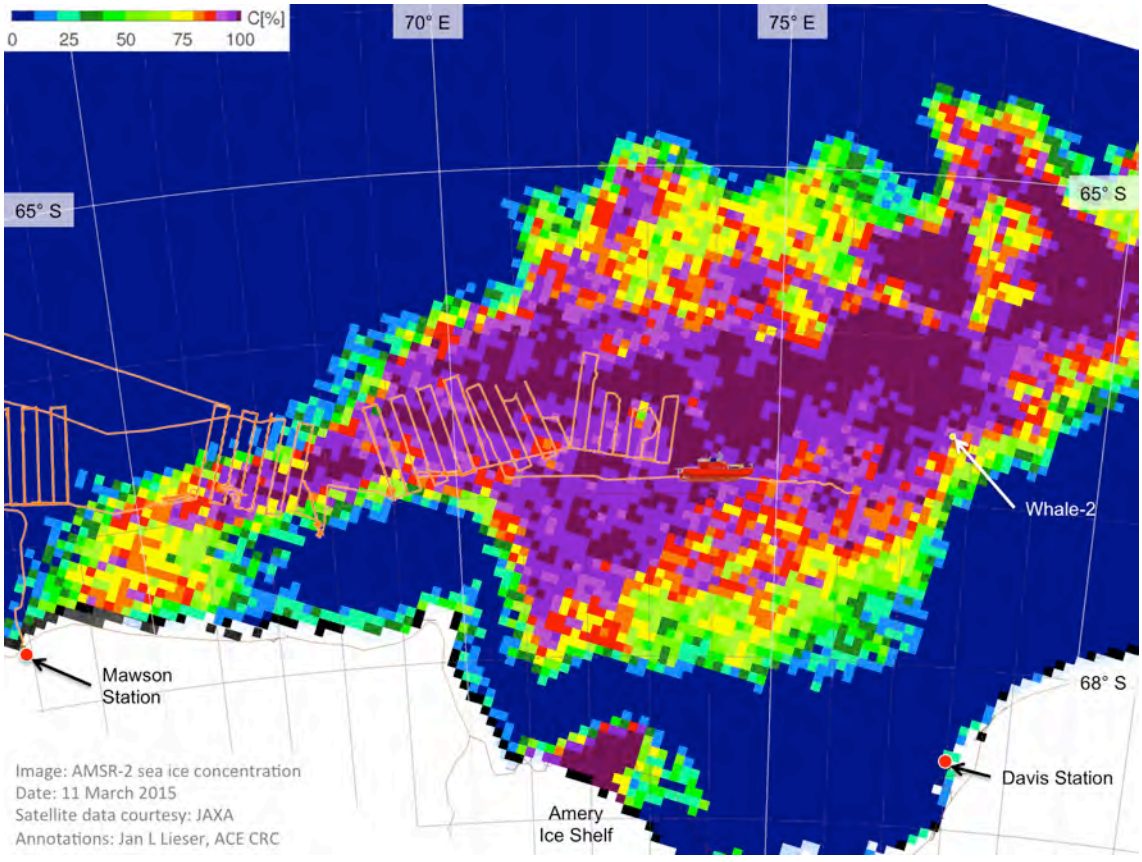

Figure 1: AMSR-2 image, acquired 11/03/2015 and provided by PolarView.

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The 'Whale-2' mooring remains at the fringe of very high (up to 100%) sea-ice concentration. Off Davis Station, sea ice appears to be minimal.

With best regards,

Jan.

Sea Ice Report #11.2/2015

by the AAD/ACE CRC Sea Ice Group*

13/03/2015

This report updates on sea-ice conditions off Cape Denison, in Commonwealth Bay.

- **Commonwealth Bay**
  Further to our Sea Ice Report #10.3/2015, an additional 125 km^2 of fast ice have broken away from inside Commonwealth Bay, as indicated by the blue shaded shape in Figure 1. This leaves less than half of the bay covered by fast ice. It is expected that no fast ice is currently in front of Mawson's Huts.

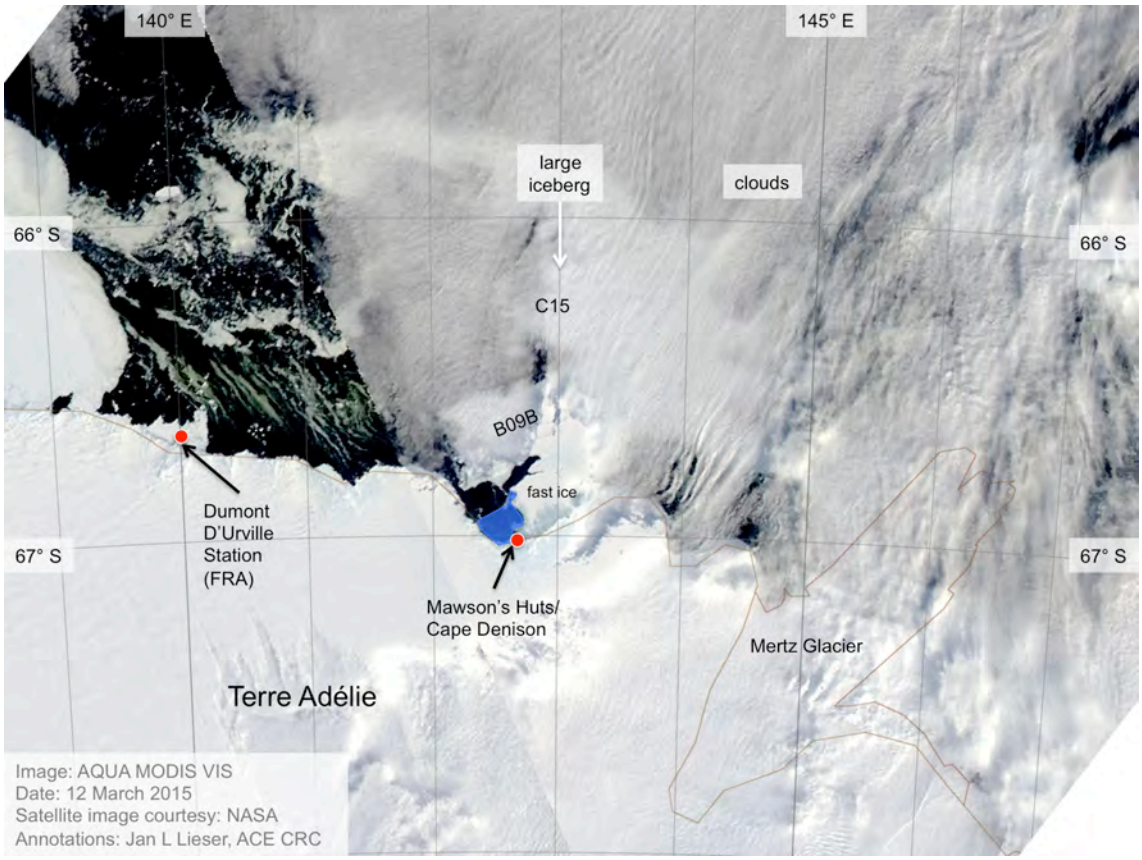

Figure 1: MODIS image, acquired 12/03/2015 and provided by NASA.

With best regards,

Jan.

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Sea Ice Report #12.1/2015

by the AAD/ACE CRC Sea Ice Group*

16/03/2015

- **Davis Station**
  The sea-ice growth season has well and truly started in Antarctica. Figure 1 shows a combination of visible MODIS data with an overlay of sea-ice concentration derived from AMSR-2 data. Both data sets compare well, except for low concentration areas and the Amery Ice Shelf, which is incorrectly classified as very high concentration sea ice.

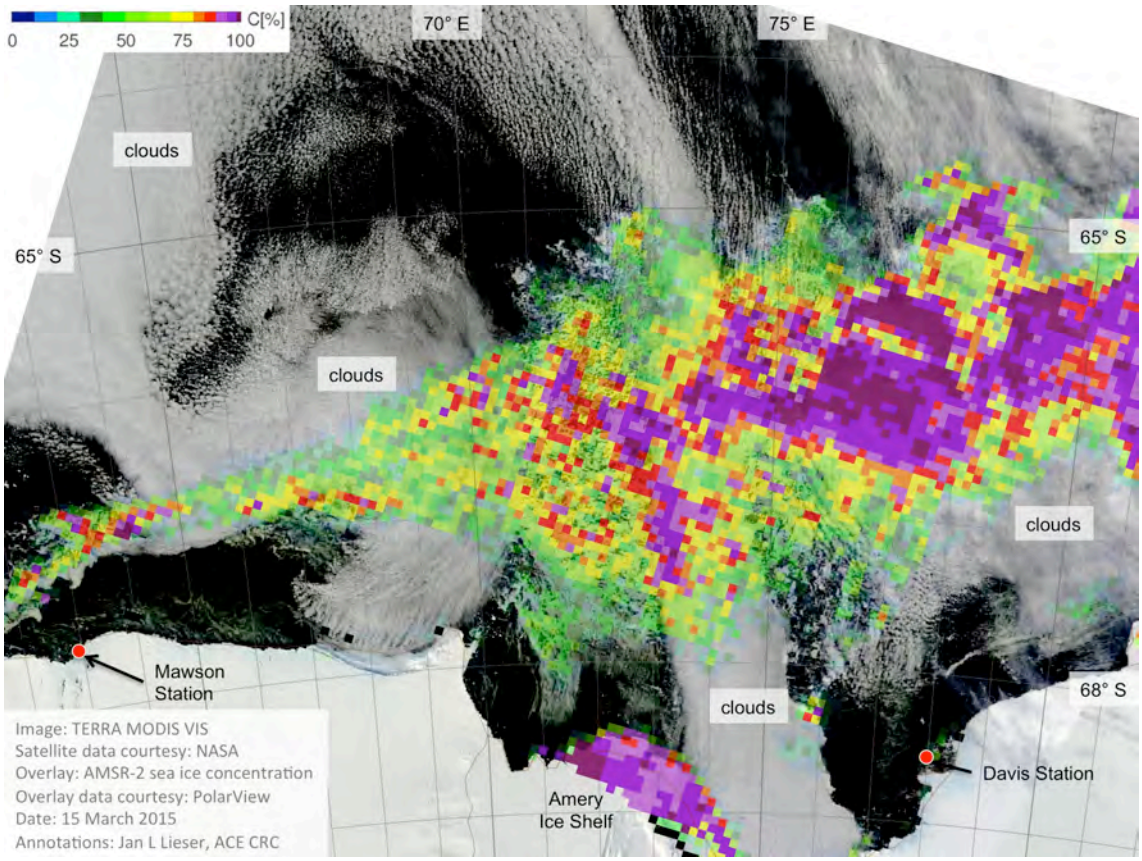

Figure 1: MODIS image, acquired 15/03/2015 and provided by NASA; overlay: AMSR-2 sea-ice concentration, acquired 15/03/2015 and provided by PolarView.

The central part of the pack ice in Prydz Bay, north of Davis Station, which is classified as very high concentration with purple colours, is most likely consisting for the most part of sea ice that has survived the recent summer melt.

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As a side note, Figure 2 shows the same frame as Figure 1, except without the sea-ice concentration overlay, to illustrate the 'last hurrah' of biological primary productivity, for this season, that can be seen from space. The greenish tint discolouration in the sea-ice zone between 20 nautical miles and 60 nautical miles offshore, particularly west of 73° E (in western Prydz Bay and off Mawson Coast), is caused primarily by ice associated algae. Between 62° E and 67° E, another patch of darker green in-between new sea ice can be seen, hugging the coastline.

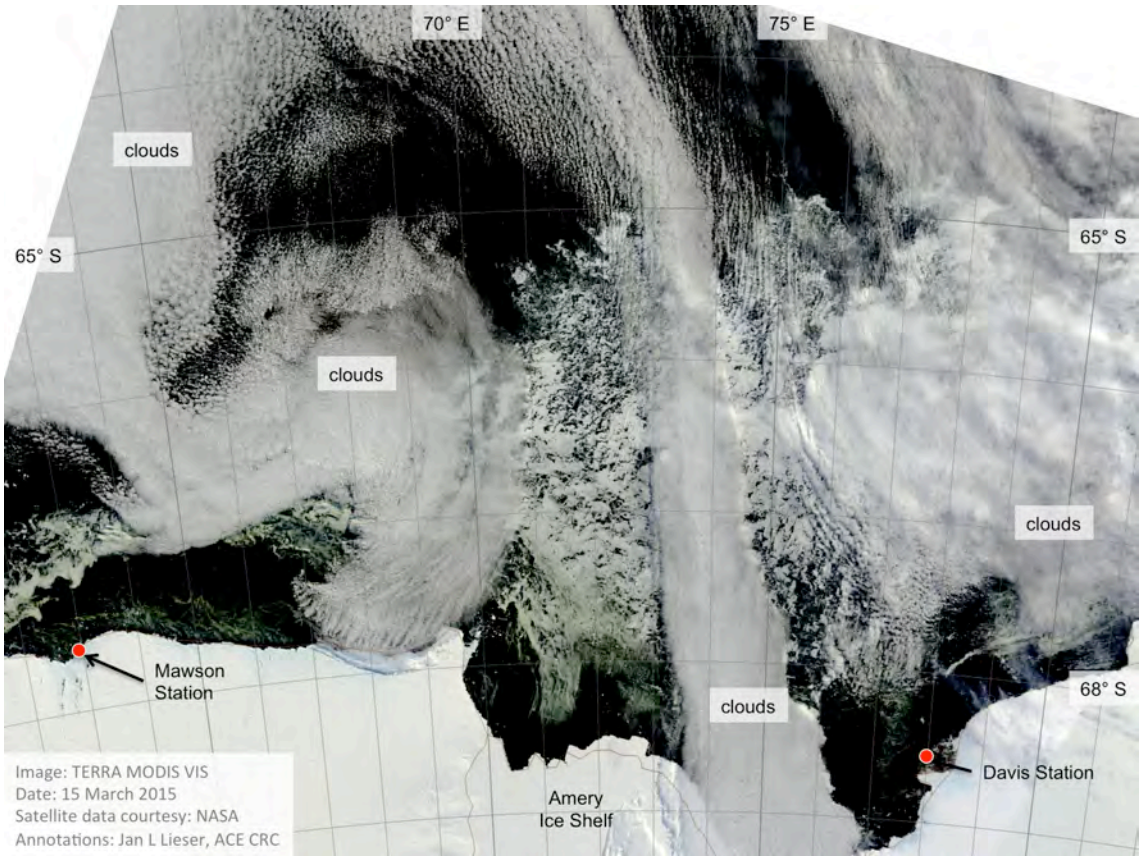

Figure 2: MODIS image, acquired 15/03/2015 and provided by NASA.

With best regards,

Jan.

Sea Ice Report #12.2/2015

by the AAD/ACE CRC Sea Ice Group*

16/03/2015

- **Commonwealth Bay**
  A cloud-free scene of the region between Dumont d'Urville Station and the Mertz Glacier is given in Figure 1. The troika of icebergs B09B, C15 and the large berg to the north of the two can clearly be seen. They are arranged as a north-south oriented barrier to the general westward sea-ice drift close to the coast.

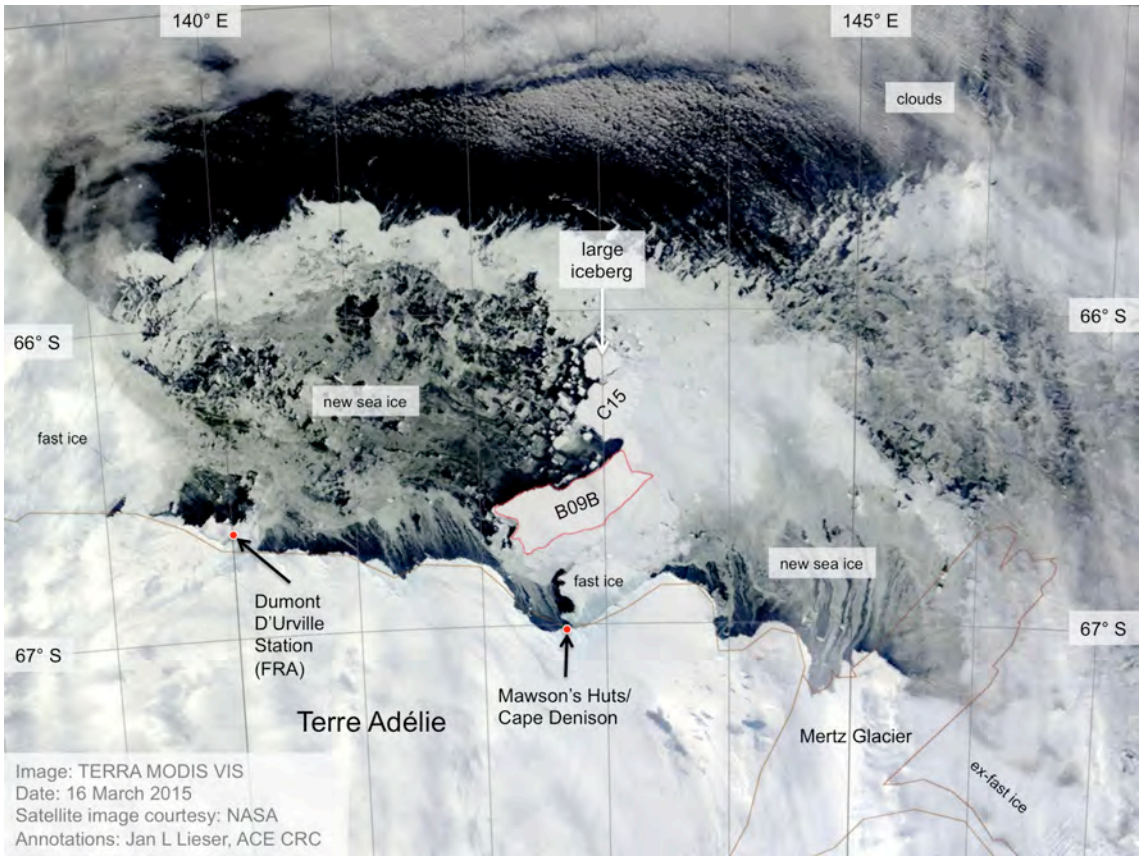

Figure 1: MODIS image, acquired 16/03/2015 and provided by NASA.

The smallest gap between C15 and the large northern berg is only 0.7 nautical miles. South of C15, the gap towards B09B appears to be sealed by a large piece of ex-fast ice. The open water half of Commonwealth Bay is now backfilling with newly forming sea ice, as is to be expected at this time of year.

With best regards,

Jan.

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Sea Ice Report #12.3/2015

by the AAD/ACE CRC Sea Ice Group*

19/03/2015

This report examines sea-ice conditions in Prydz Bay and Vincennes Bay.

- **Davis Station**
  Sea-ice concentration is increasing in Prydz Bay. The entire bay is steadily filling with newly forming sea ice, but off the face of the Amery Ice Shelf, a polynya is currently still maintained. North of Davis Station is a wide band of dense sea ice between 65° S and 67° S. The highest concentration sea ice (represented in purple colours in Figure 1) is largely expected to consist of sea ice that has survived the summer melt season. Through this band are some areas of lower concentration, roughly north-south oriented, for example at 75° E and meandering around 78° E.

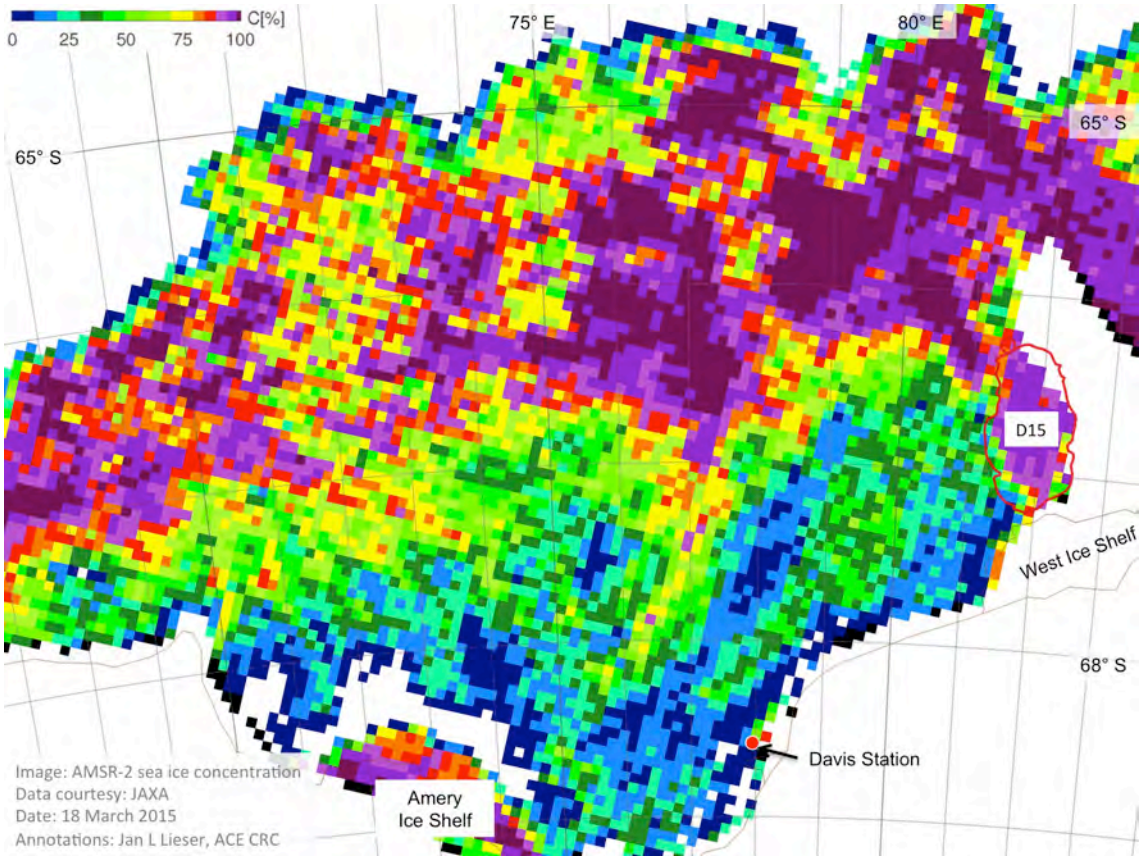

Figure 1: AMSR-2 image, acquired 18/03/2015 and provided by PolarView.

The passage of a large atmospheric low pressure system in the north is likely to spread the sea-ice cover further north, but can at the same time be assisting in easing pressure on the sea-ice cover temporarily.

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- **Casey Station**
  Off Casey Station, sea ice is also growing but most of Vincennes Bay is covered by only very light ice conditions at the moment. East of 110° E and north of 66° S, higher sea-ice concentration can be seen in Figure 2, which contains older sea ice that has been exported from ex-fast ice from the eastern side of Law Dome (outside the figure).

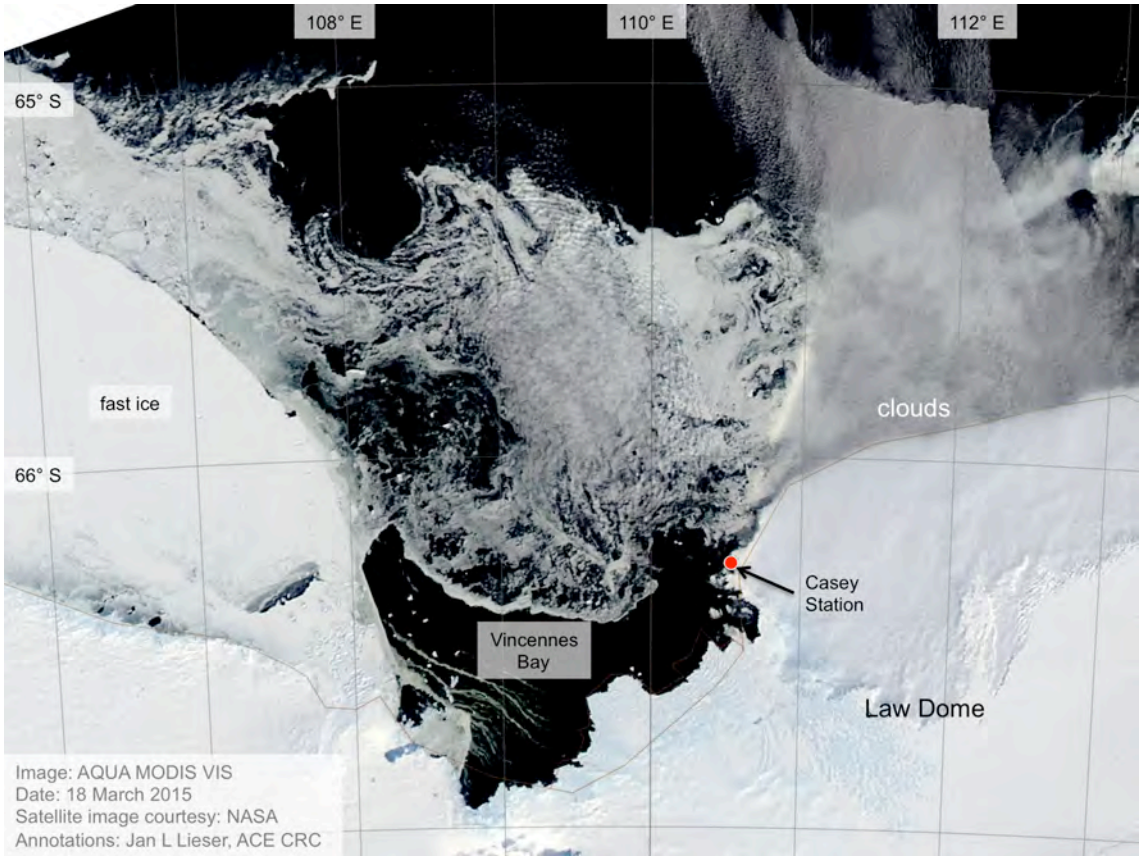

Figure 2: MODIS image, acquired 18/03/2015 and provided by NASA.

With best regards,

Jan.

Sea Ice Report #12.4/2015

by the AAD/ACE CRC Sea Ice Group*

20/03/2015

This report examines sea-ice conditions in Prydz Bay.

- **Davis Station**
  Figure 1 presents a combination of three different data sets, showing the Prydz Bay region. The background is visible MODIS imagery, overlain by a colour-coded sea-ice concentration product and Synthetic Aperture RADAR (SAR) data, of the Cape Darnley region, in the lower left (southwestern) corner. The cruise track of RSV *Aurora Australis* is shown as an orange line (up until 20/03/2015 00:00 UT). The MODIS image with SAR overlay is also shown in Figure 2 for reference.

  All data sets correspond well, except for large tabular icebergs and shelf ice misclassified in the sea-ice concentration data. The low concentration sea ice in southern Prydz Bay (mainly south of 67° S) consists largely of newly formed sea ice/pancake ice, as can be seen in the SAR scene.

  A temporary easing of sea-ice concentration is noted in the central part of Prydz Bay, particularly west of 75° E.

With best regards,

Jan.

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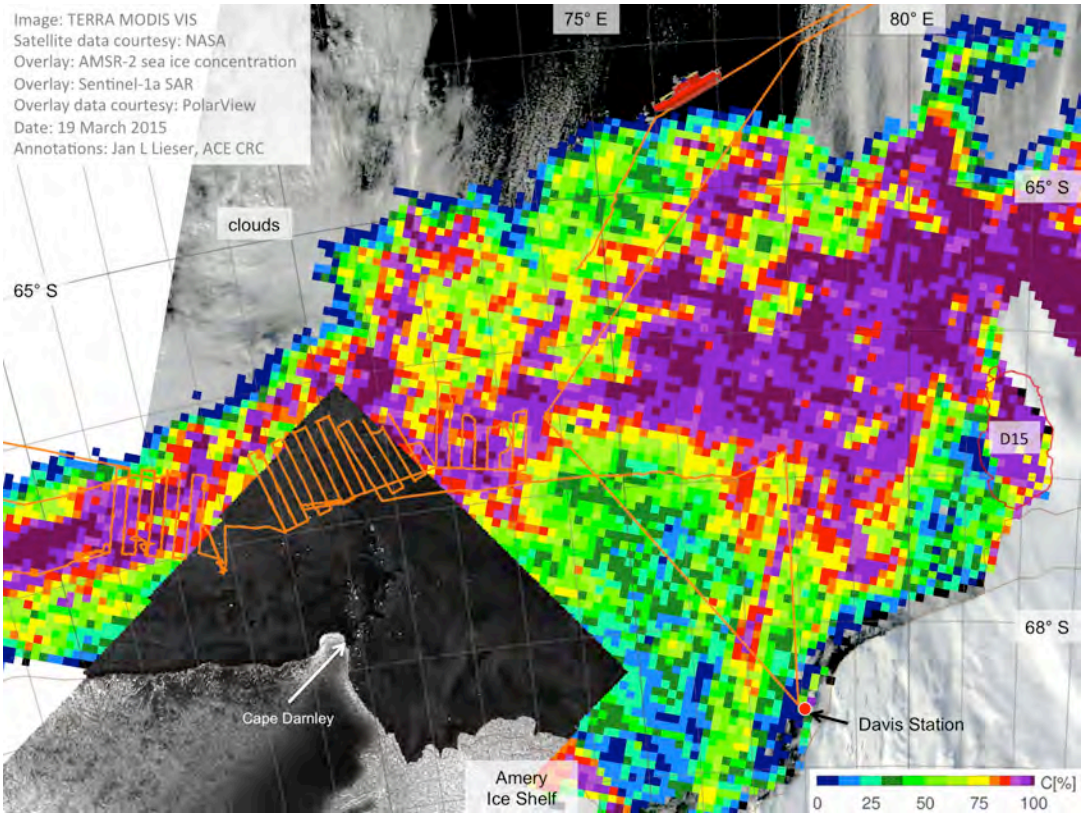

Figure 1: Three data types combined (see figure key), acquired 19/03/2015 and provided by NASA and PolarView.

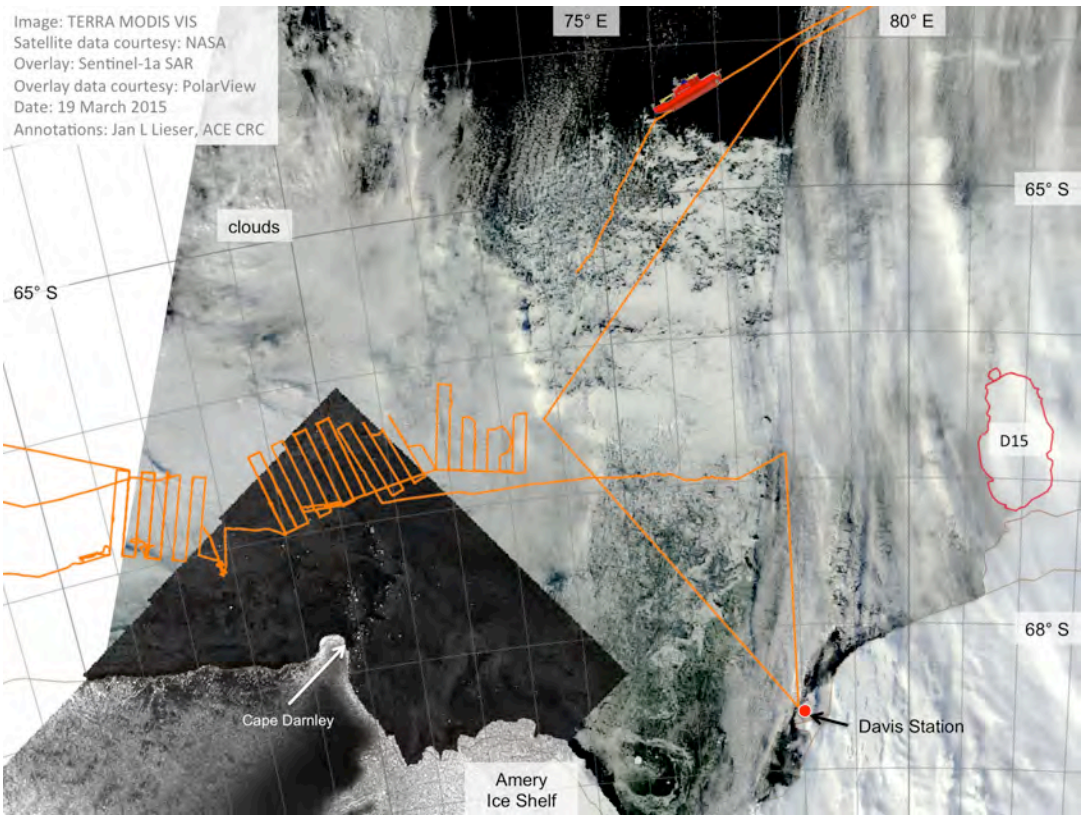

Figure 2: MODIS image with SAR overlay, acquired 19/03/2015 and provided by NASA and PolarView.

Sea Ice Report #12.5/2015

by the AAD/ACE CRC Sea Ice Group*

20/03/2015

This report examines sea-ice conditions between Dumont d'Urville Station and the Mertz Glacier.

- **Commonwealth Bay**
  Further to our Sea Ice Report #12.2/2015, Figure 1 shows a Synthetic Aperture RADAR (SAR) scene of Commonwealth Bay.

  From this it becomes clear that the previously mentioned troika of icebergs is now in fact a quadriga, as a fourth piece of ice joined in between iceberg B09B and C15. This fourth piece displays the same surface signature as other icebergs around, but bits breaking off from the fast ice east of the remaining Mertz Glacier Tongue, which accumulated during many years, show similar surface signatures.

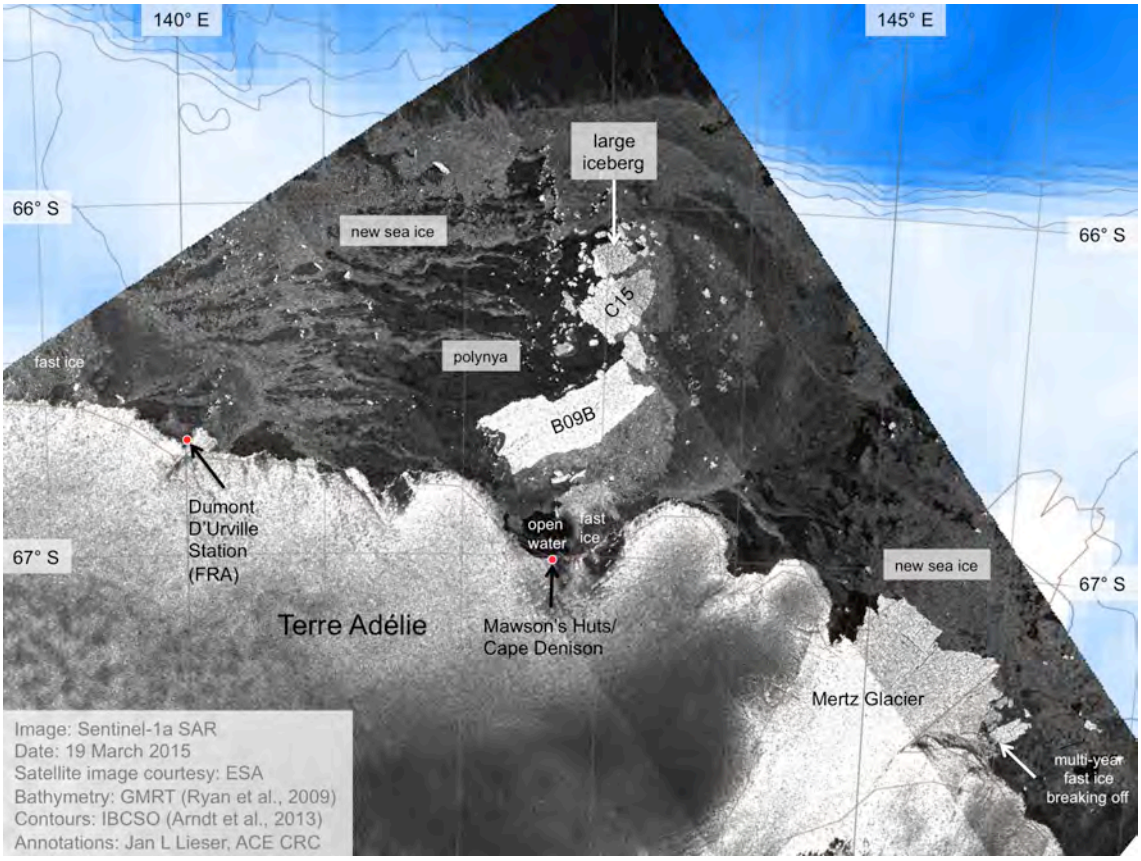

Figure 1: Sentinel-1a SAR scene, acquired 19/03/2015 and provided by PolarView.

This iceberg quadriga mimics the effect that the Mertz Glacier Tongue

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had on the sea-ice drift, pre the 2010 calving event, just a few degrees further to the west now. The polynya that is now located around 142° E appears quite active, whereas sea ice is accumulating east of the line of icebergs and in front of the Mertz Glacier.

Commonwealth Bay, off Cape Denison, appears still to be only half covered by sea ice/fast ice, but steadily backfilling with newly forming sea ice, in the western part of the bay.

With best regards,

Jan.

Sea Ice Report #12.6/2015

by the AAD/ACE CRC Sea Ice Group*

22/03/2015

This report examines sea-ice conditions of Prydz Bay.

- **Davis Station**
  Figure 1 provides a map of sea-ice concentration in Prydz Bay with an overlay of a SAR scene of the southwestern part of Prydz Bay. The orange line denotes the cruise track of RSV *Aurora Australis* (up until 22/03/2015 02:00 UT).

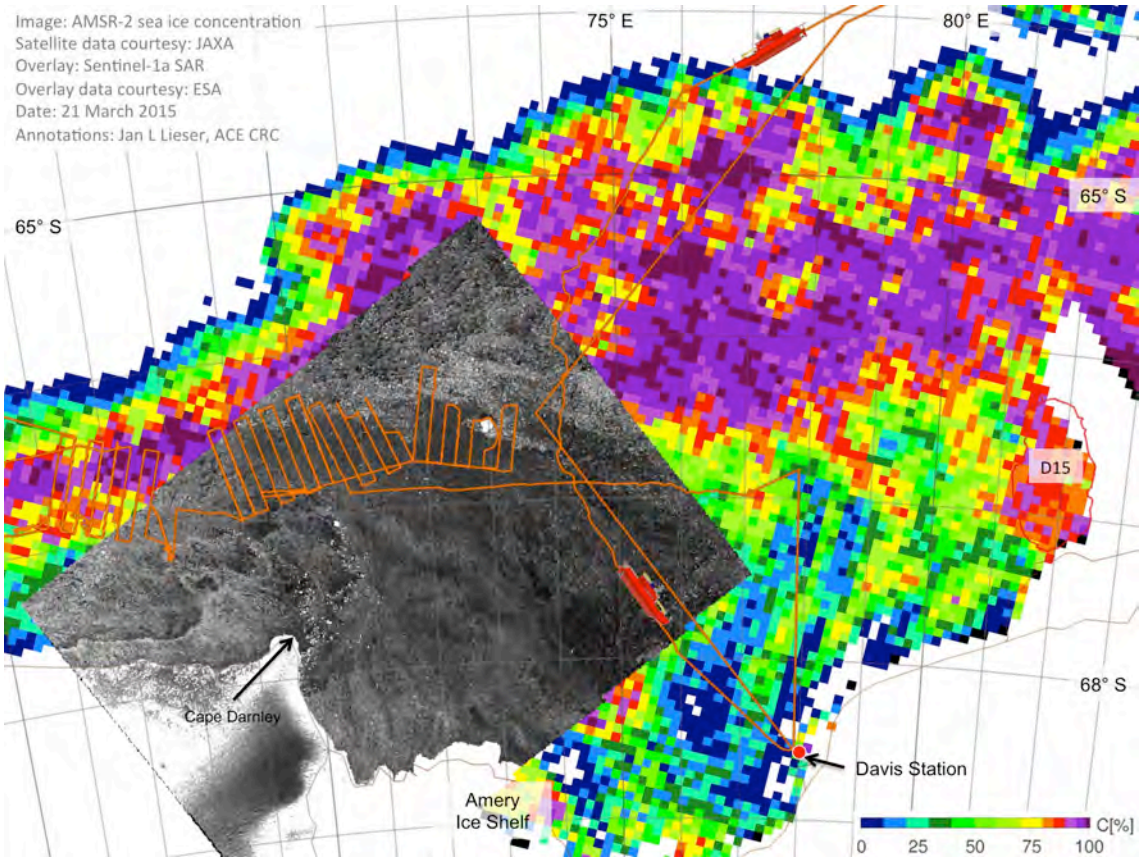

Figure 1: AMSR-2 sea-ice concentration; overlay: Sentinel-1a SAR scene, both data sets acquired 21/03/2015 and provided by PolarView.

The marginal sea-ice zone is expanding northward and the central part of the sea-ice pack is showing signs of increasing concentration. The region of comparatively lower concentration appears to be still meandering between 74° E and 75° E (see Figure 2). East of 75° E where the clouds do not obscure the view on the sea ice in Figure 2, some large cracks/leads can be seen criss-crossing throughout the

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second year sea ice. Between 74° E and 75° E, some major cracks appear to be more north-south oriented.

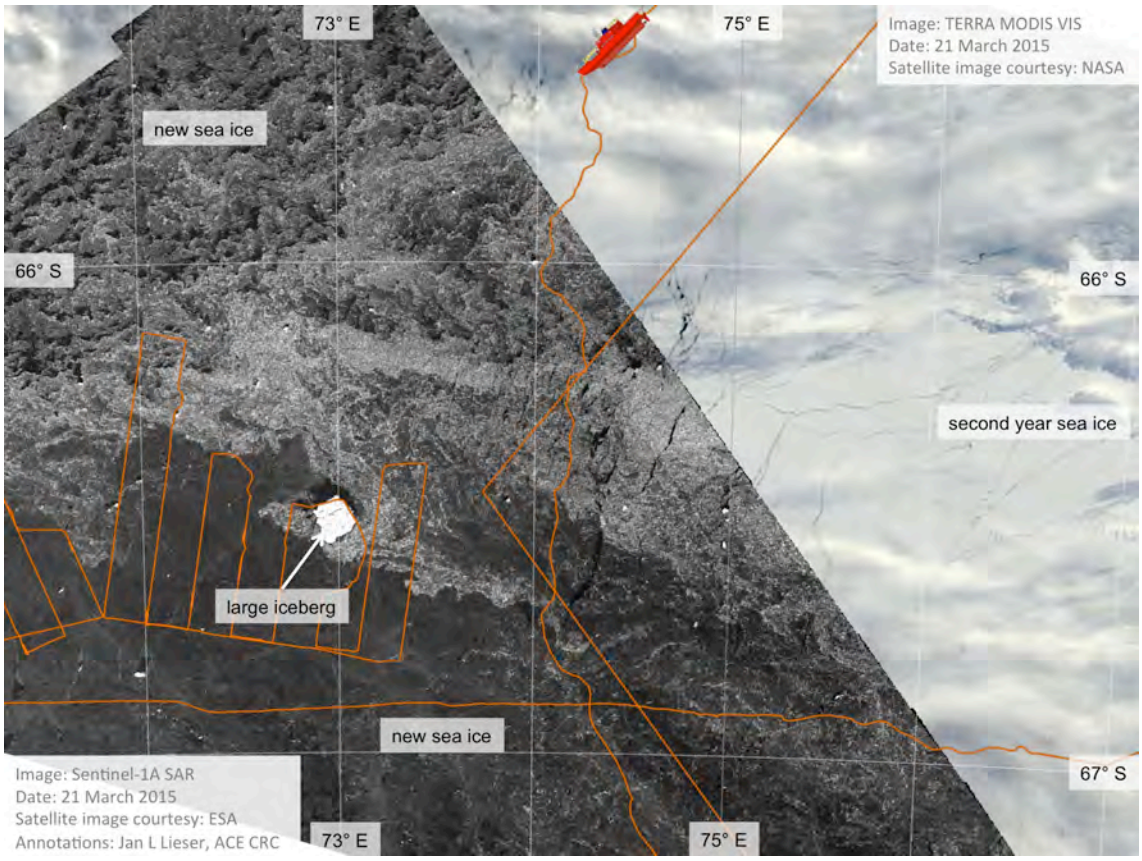

Figure 2: MODIS image (northeast part of the figure) acquired 21/03/2015 and provided by NASA; Sentinel-1a SAR scene (southwest part of the figure), acquired 21/03/2015 and provided by PolarView.

With best regards,

Jan.

Sea Ice Report #13.1/2015

by the AAD/ACE CRC Sea Ice Group*

23/03/2015

This report examines sea-ice conditions of the central part of Prydz Bay.

- **Davis Station**
  Figure 1 shows a visible MODIS image of the central part of the pack ice of Prydz Bay The orange line denotes the cruise track of RSV *Aurora Australis* (up until 23/03/2015 00:00 UT).

  Some cracks and leads are indicated by the yellow lines ahead of the ship's location. North of 66° S begins the transition from second year sea ice to newly formed sea ice. North of 65° 30' S, only a loose sea-ice cover is identified.

  The sea-ice concentration map of Figure 2 is provided for reference. From this map, it appears that the slightly more western (southbound) track still has probably a little less sea-ice concentration.

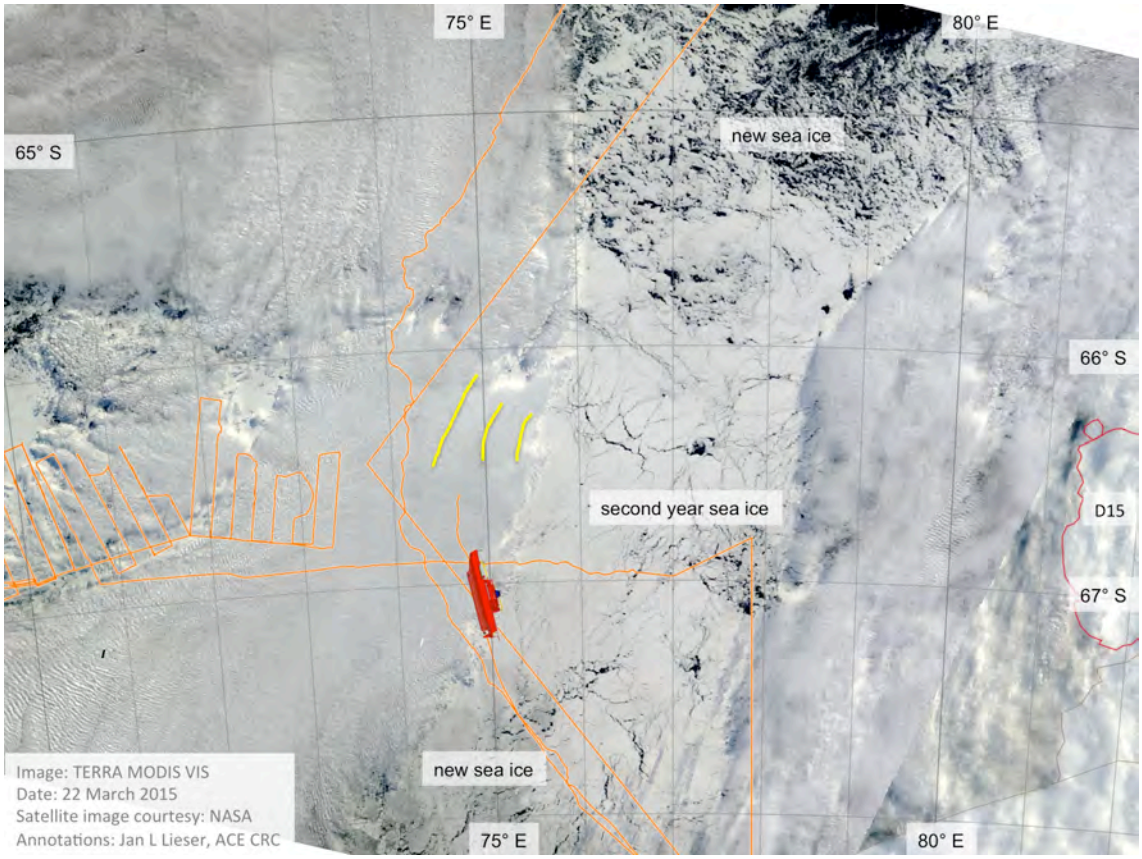

Figure 1: MODIS image acquired 22/03/2015 and provided by NASA.

*Disclaimer: *Every effort is made to ensure the data provided in this report are accurate at the date of publication; however the report is provided without warranty of any kind. The figures and charts provided in this report are intended only as a guide to ice conditions and are not suitable for navigation.*

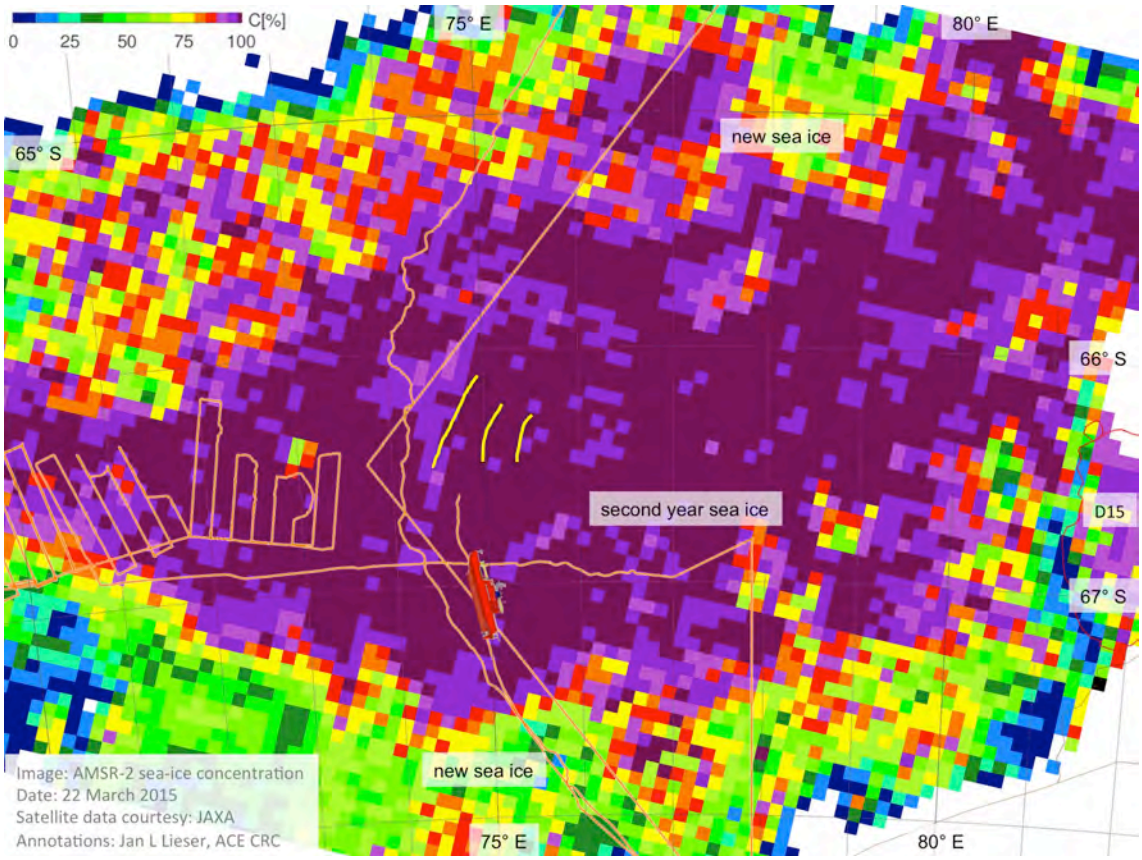

Figure 2: AMSR-2 image acquired 22/03/2015 and provided by PolarView.

With best regards,

Jan.

Sea Ice Report #14.1/2015

by the AAD/ACE CRC Sea Ice Group*

31/03/2015

This report examines sea-ice conditions off Sabrina and Banzare/Wilkes coasts.

- **Sabrina Coast**
  Figure 1 shows a Synthetic Aperture RADAR (SAR) image of the region between the Totten Glacier and the Moscow University Ice Shelf. West of the Dalton Iceberg Tongue, new sea ice is forming in the polynya, which spans between 118° 30' E and 121° E, at 66° S. The fast ice between the icebergs of the Dalton Iceberg Tongue was broken into pieces (presumably by a major swell event, see Sea Ice Report #10.3/2015), and some larger ex-fast ice floes are escaping the icebergs, and are drifting westwards across the polynya.

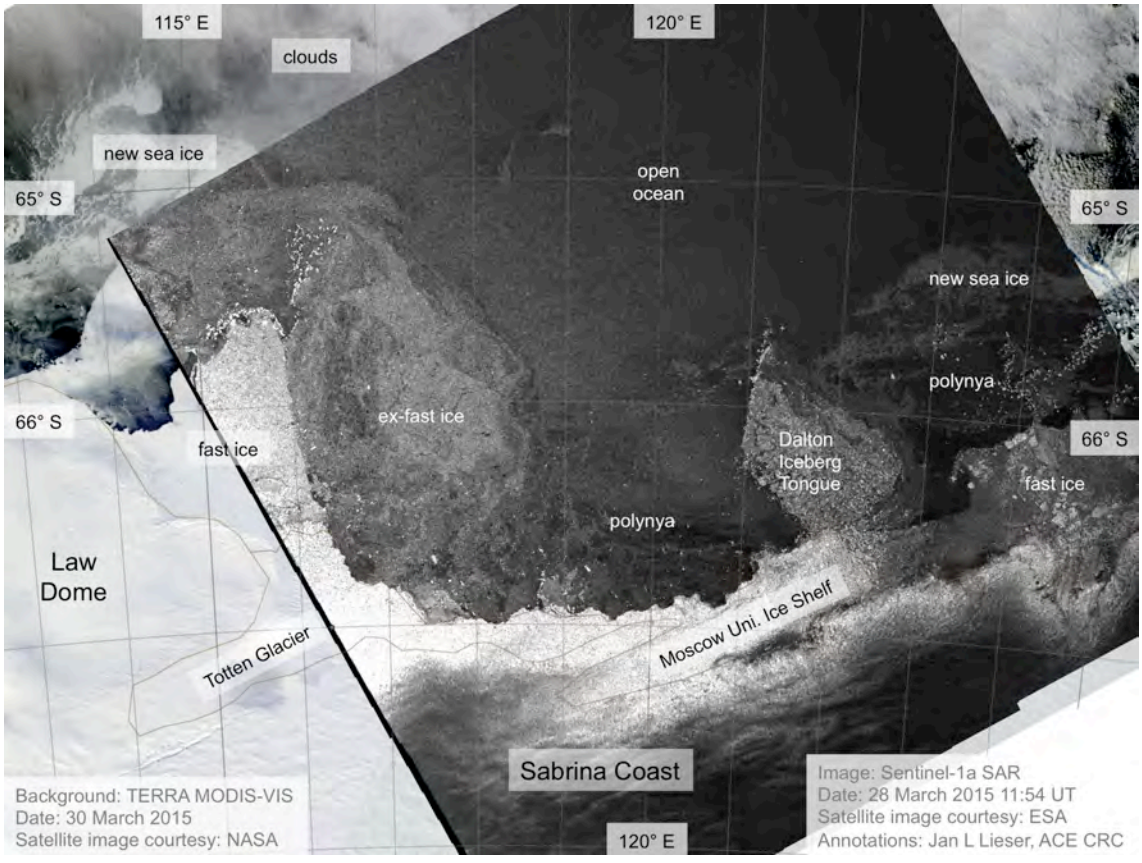

Figure 1: Sentinel-1a image acquired 28/03/2015 and provided by PolarView.

West of 119° E, newly formed sea ice accumulates against the ex-fast ice that had survived the summer season, off the face of the Totten

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Glacier. North of the Totten Glacier, old fast ice is still attached to the northeastern flank of Law Dome.

- **Banzare Coast & Wilkes Coast**
  Between 125° E and 135° E, the sea-ice edge follows roughly the 1000 m bathymetry contour. Off Banzare Coast, fast ice spans about 85 nautical miles in north-south direction, off Frost Glacier.

  West of 130° E, the pack-ice zone is only about 25 nautical miles wide (north-south extent), but as the freezing season has started in Antarctica, this zone is steadily growing.

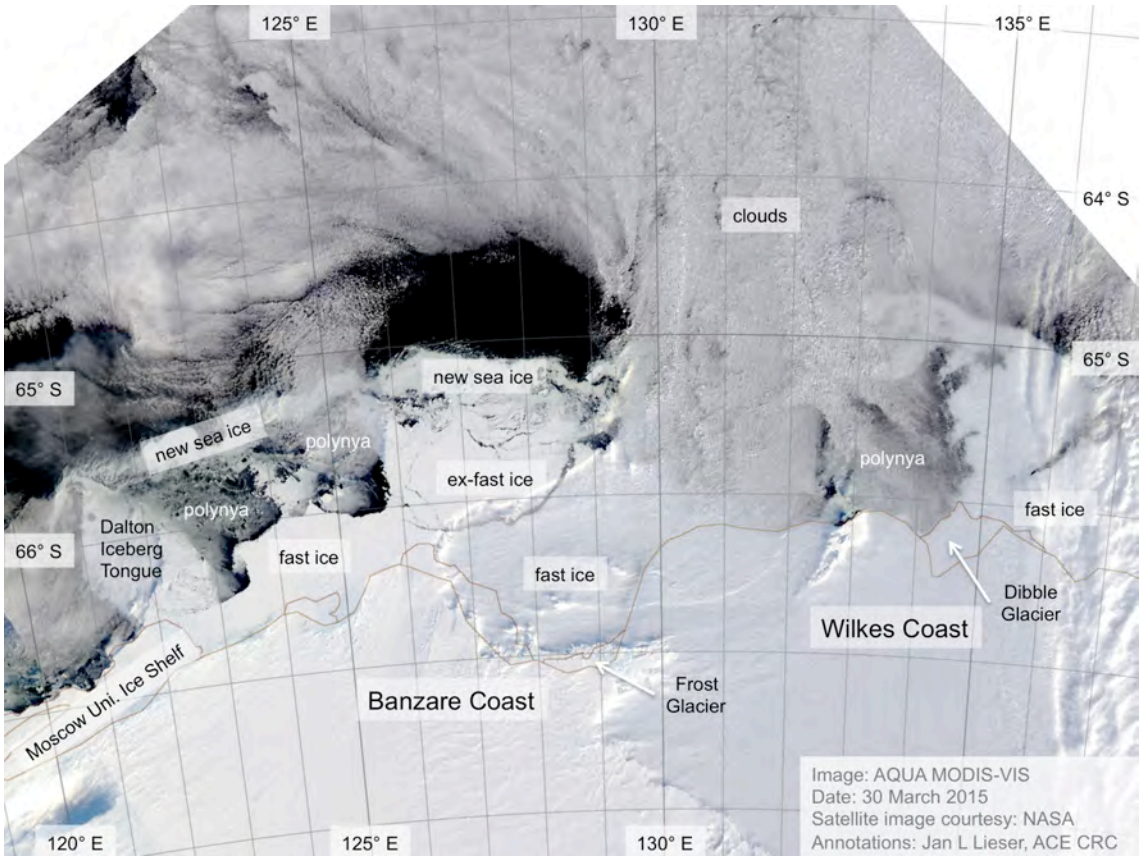

Figure 2: MODIS image acquired 30/03/2015 and provided by NASA.

East of 131° E, sea-ice conditions are lighter, including close to the coast. Off the face of Dibble Glacier, a polynya is active, which is separated from the open ocean in the north by a tongue of a mixture of old and new sea ice that is drifting westwards around a barrier of icebergs, which are grounded along 135° E.

With best regards,

Jan.

Sea Ice Report #14.2/2015

by the AAD/ACE CRC Sea Ice Group*

02/04/2015

- **Banzare Coast & Wilkes Coast**
  Figure 1 shows a visible image of Banzare Coast and Wilkes Coast. The thin orange line denotes the long-term (1980-2010) median April sea-ice extent (minimum 15% sea-ice concentration), in the region.
  Currently, the sea-ice extent is below (south of) the median for April.

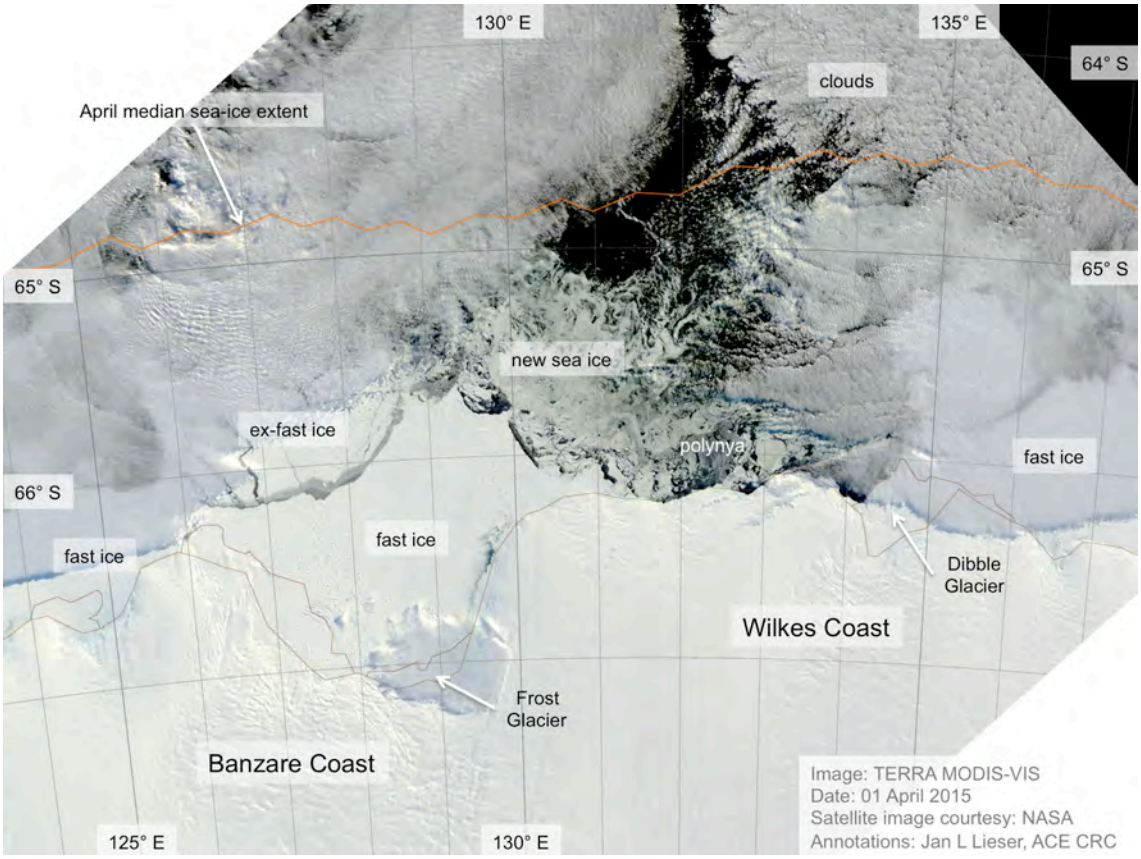

Figure 1: MODIS image acquired 01/04/2015 and provided by NASA.

The sea-ice zone is partly obscured by thin clouds, but Davis Bay, off Dibble Glacier, shows only light sea-ice conditions, medium high to high sea-ice concentration (50% to 80%) consisting mainly of new sea ice. The westward drift accumulates this newly forming sea ice against the fast ice and ex-fast ice off Banzare Coast and the Frost Glacier.

With best regards,

Jan.

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Sea Ice Report #14.3/2015

by the AAD/ACE CRC Sea Ice Group*

02/04/2015

- **Commonwealth Bay**
  Further to Sea Ice Report #12.5/2015, Figure 1 shows a visible image of the region between Dumont d'Urville Station and the Mertz Glacier.

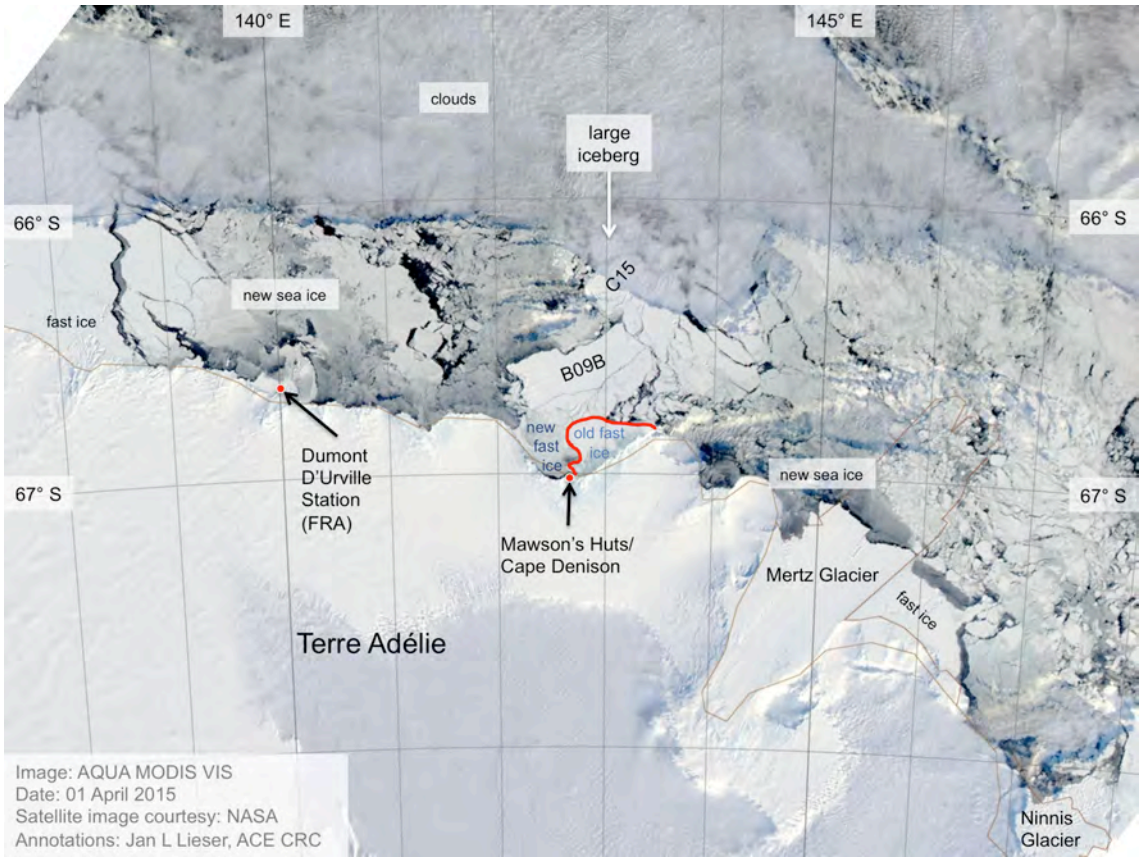

Figure 1: MODIS image acquired 01/04/2015 and provided by NASA.

Along 143° E and south of 66° S, the three icebergs (plus one large slab of ice) have established a formidable barrier in the westward drift of the pack ice, which is moving along the coast past the Ninnis and Mertz glaciers.

Off Cape Denison, inside Commonwealth Bay, fast ice is growing back in the western half of the bay. The boundary between the old (multi-year) and new fast ice is a zig-zag line in front of Mawson's Huts, as indicated by the red line.

With best regards,

Jan.

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Sea Ice Report #15.1/2015

by the AAD/ACE CRC Sea Ice Group*

08/04/2015

This report examines sea-ice conditions off Sabrina, Banzare and Wilkes coasts.

- **Sabrina Coast**
  East of 125° E, sea ice is growing steadily off Banzare and Wilkes coasts. Further west from there, the polynya west of the Dalton Iceberg Tongue is also growing over by newly forming sea ice, even though it is showing only moderate concentration in Figure 1. The thin yellow line (ending with a red dot) in the figure denotes the voyage track of RVIB *Nathaniel B Palmer* (WBP3210), until 08/04/2015 04:00 UT.

  Since 02/04/2015, the sea-ice edge has advanced up to 30 nautical miles northward and has crossed 65° S in most places.

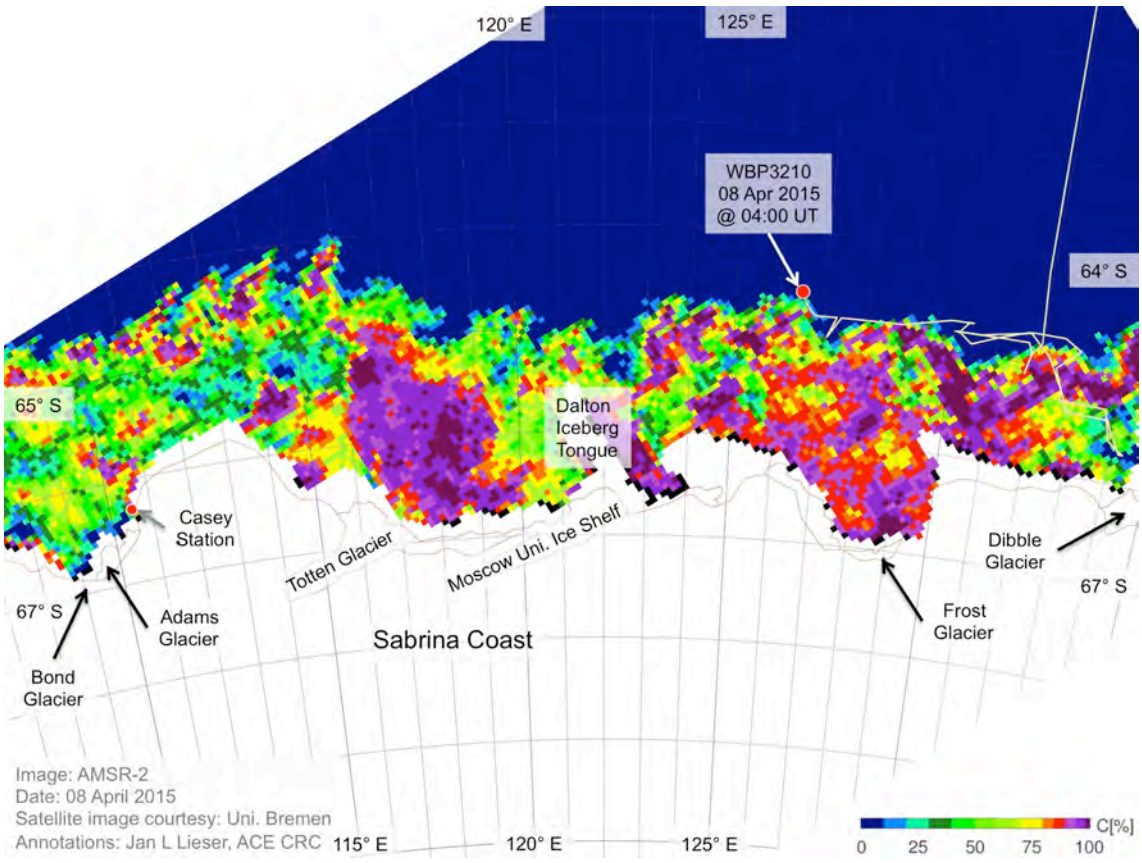

Figure 1: AMSR-2 image acquired 08/04/2015 and provided by PolarView.

Figure 2 shows a combination of a SAR scene and a largely cloud

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affected MODIS visible image. The SAR scene shows that sea ice is increasing off Casey Station, and the Bond and Adams glaciers.

Off the face of Totten Glacier appears still an area of thin ice, even though it is of high concentration, between the ex-fast ice and the glacier.

The polynya to the west of the Dalton Iceberg Tongue is obscured by clouds, but the shape of the iceberg tongue is still perceivable and the sea ice in the polynya is not expected to be of great thickness at this stage. However, as stated above, sea ice is growing quickly under autumn conditions.

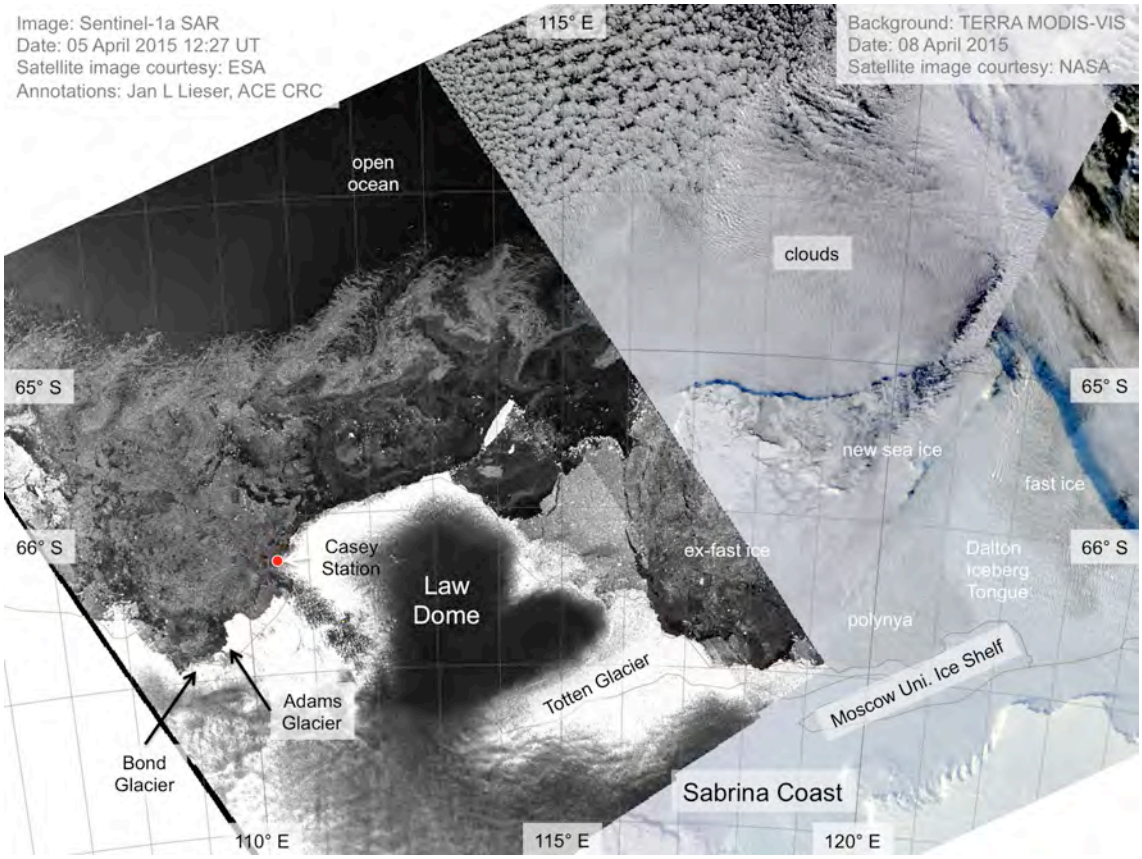

Figure 2: Sentinel-1a SAR image acquired 05/04/2015 and provided by PolarView; background: MODIS visible image acquired 08/04/2015 and provided by NASA.

With best regards,

Jan.

Sea Ice Report #15.2/2015

by the AAD/ACE CRC Sea Ice Group*

10/04/2015

This report examines sea-ice conditions off Sabrina Coast.

- **Sabrina Coast**
  Figures 1 and 2 show the same geographical frame of the region between the Totten Glacier and the Dalton Iceberg Tongue, as seen by the Synthetic Aperture RADAR (SAR) of the Sentinel-1a satellite and the AMSR-2 instrument, overlain on the SAR scene in Figure 2. The thin yellow line (ending with a red dot) in the figure denotes the voyage track of RVIB *Nathaniel B Palmer* (WBP3210), until 10/04/2015 00:00 UT.

  New sea ice has advanced northward beyond 65° S, in the entire frame of the two figures. The sea-ice edge exhibits many small-scale swirl structures, which are likely visible manifestations of eddies of the surface ocean in low wind conditions. One complete eddy can be seen centred at 119° E and 64° 55' S.

  East of the fast ice attached to the eastern flank of Law Dome, northwest of the Totten Glacier, the gaps that were visible in a SAR scene acquired 05/04/2015 (see Sea Ice Report #15.1/2015) between the fast ice and the ex-fast ice have temporarly closed again. The eastern edge of this old ex-fast ice is quite broken and some very large floes can be identified in the vicinity of 118° E (for example at 118° 09' E and 65° 30' S).

  West of the Dalton Iceberg Tongue, between 119° E and 121° E, the polynya is filling with sea ice of different roughness and thickness. The concentration of this sea ice is probably underestimated in Figure 2, where it is very thin. The SAR scene (Figure 1) suggests that the region is fully covered by various types of predominantly new sea ice, south of 65° S.

  Within the Dalton Iceberg Tongue, shattered fast ice can be identified between the icebergs, in Figure 1.

With best regards,

Jan.

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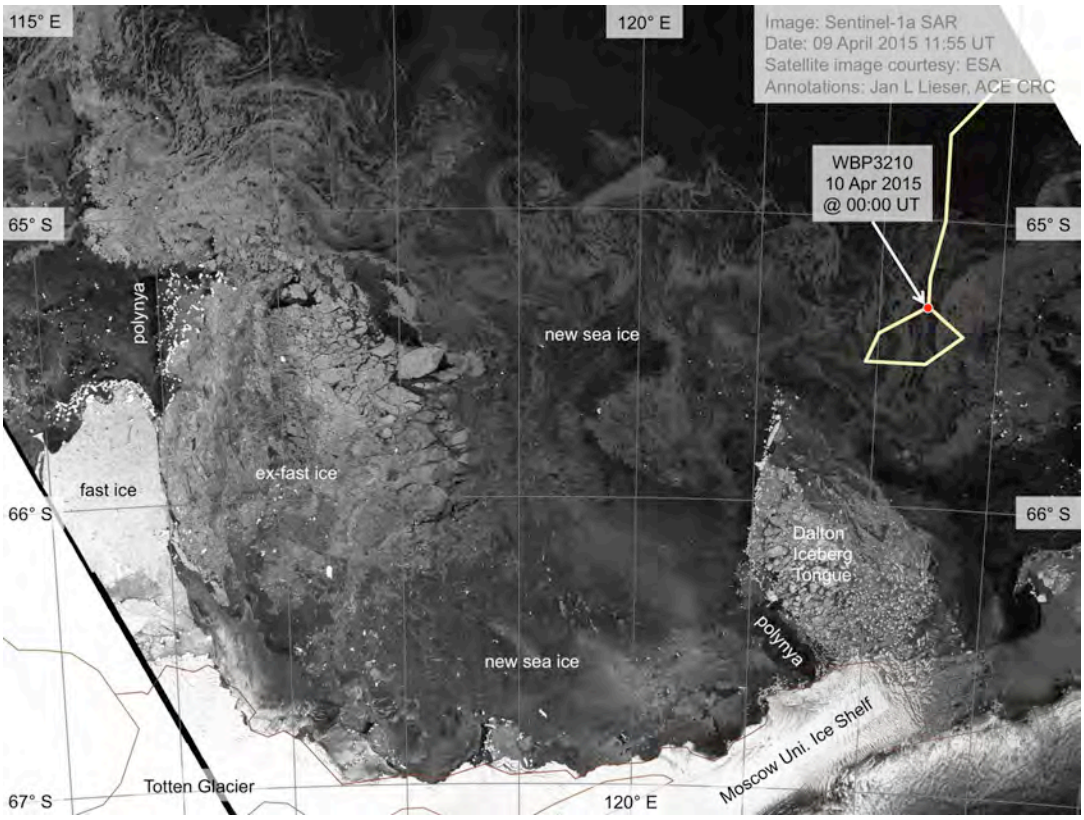

Figure 1: Sentinel-1a SAR image acquired 09/04/2015 and provided by PolarView.

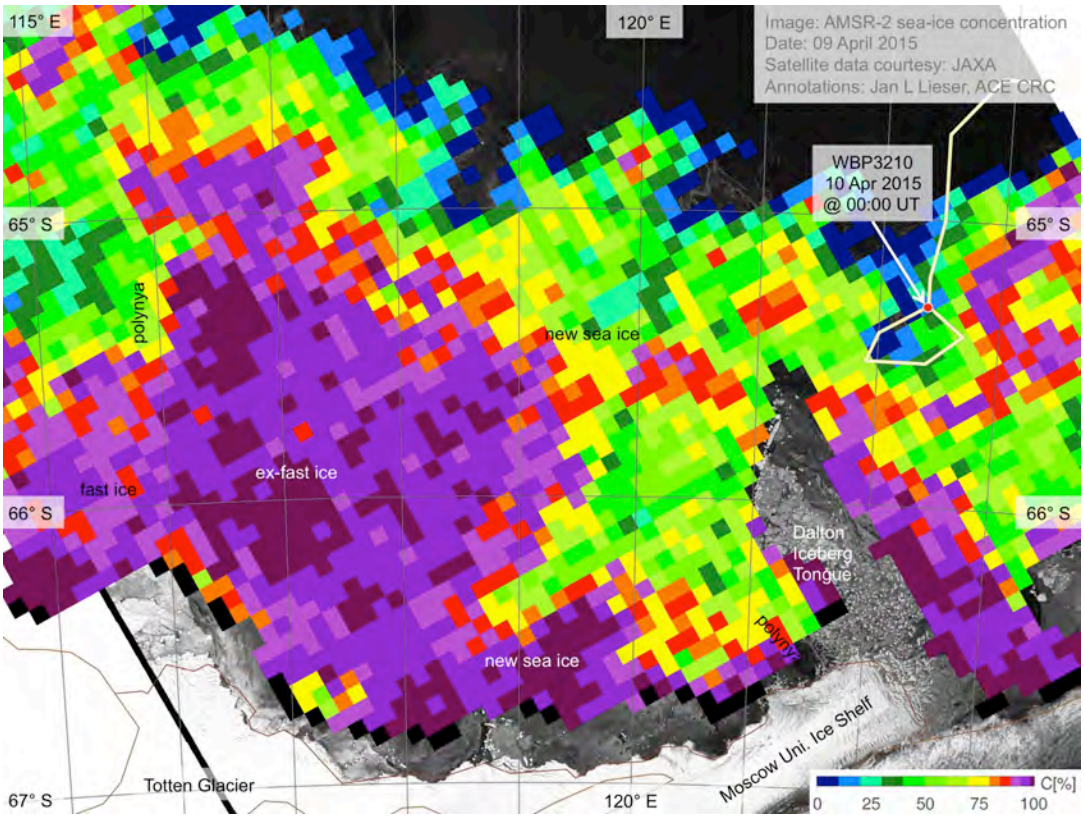

Figure 2: AMSR-2 sea-ice concentration map, acquired 09/04/2015 and provided by PolarView.

Sea Ice Report #15.3/2015

by the AAD/ACE CRC Sea Ice Group*

10/04/2015

This report examines sea-ice conditions off Commonwealth Bay.

- **Commonwealth Bay**
  Figures 1 and 2 show the same geographical frame of the coastline between Dumont d'Urville Station and the Mertz Glacier. Figure 1 shows a very high resolution (100 m horizontal resolution) Thermal Infrared (TIR) image acquired by the Landsat-8 satellite, overlain on a MODIS visible image. The surface TIR values are represented as relative greyscale, ranging from white (warm) to black (cold). The background MODIS image is provided for reference as Figure 2.

  Many cracks between the sea-ice floes expose the relatively warm ocean and can be therefore identified as white lines criss-crossing the pack ice, in the TIR image (Figure 1). Large bright (warm) patches of very thin sea ice and/or open ocean can be seen in the polynya off Cape de la Motte and to the northeast of the formation of large icebergs, which are lined up along 143° E.

  Inside Commonwealth Bay, off Cape Denison, the old and new fast ice can be distinguished by the different infrared signatures.

  Over the southern part of Mertz Glacier, clouds appear brighter (warmer) than the surface of the glacier further north. Another very thin cloud band can be seen in the visible image (Figure 2), spanning between 143° E and 145° 30' E, along approximately 66° 50' S. This cloud band is sufficiently translucent in the TIR spectrum, which leads to only minimal attenuation of the TIR signal of the sea ice locally.

With best regards,

Jan.

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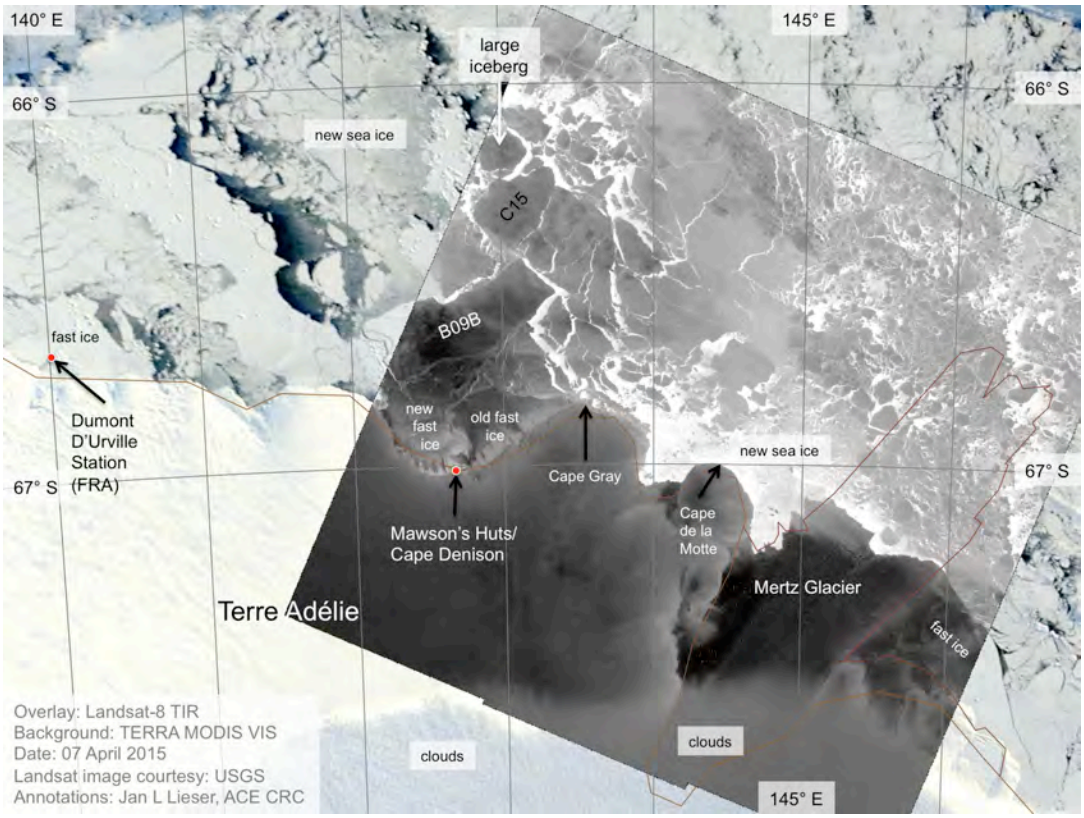

Figure 1: Landsat-8 TIR image acquired 07/04/2015 and provided by USGS.

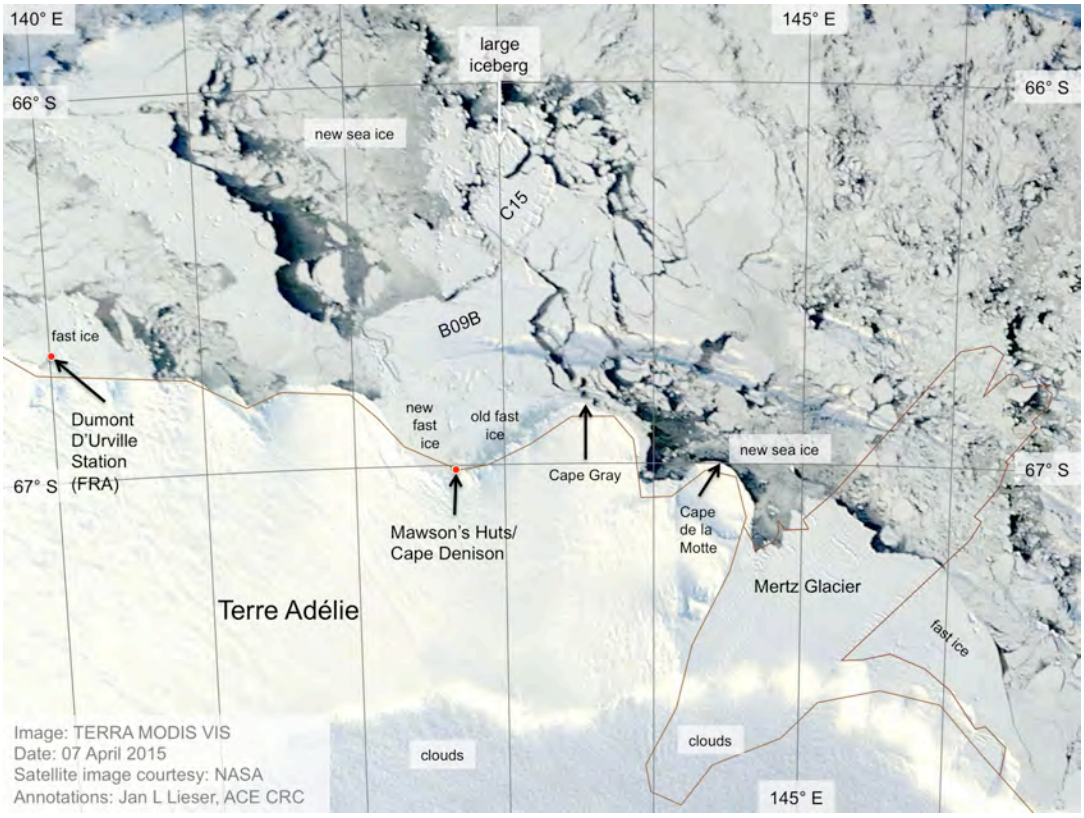

Figure 2: MODIS image acquired 07/04/2015 and provided by NASA.

Sea Ice Report #16.1/2015

by the AAD/ACE CRC Sea Ice Group*

16/04/2015

- **Commonwealth Bay**
  Along 143° E, the row of large tabular icebergs is now firmly surrounded by growing sea ice. A large number of smaller icebergs can also be identified in the region of Figure 1, particularly north of B09B and west of C15 and encircling the large northern berg. South of B09B, three larger icebergs can be seen, two of which are about 3.5 nautical miles long.

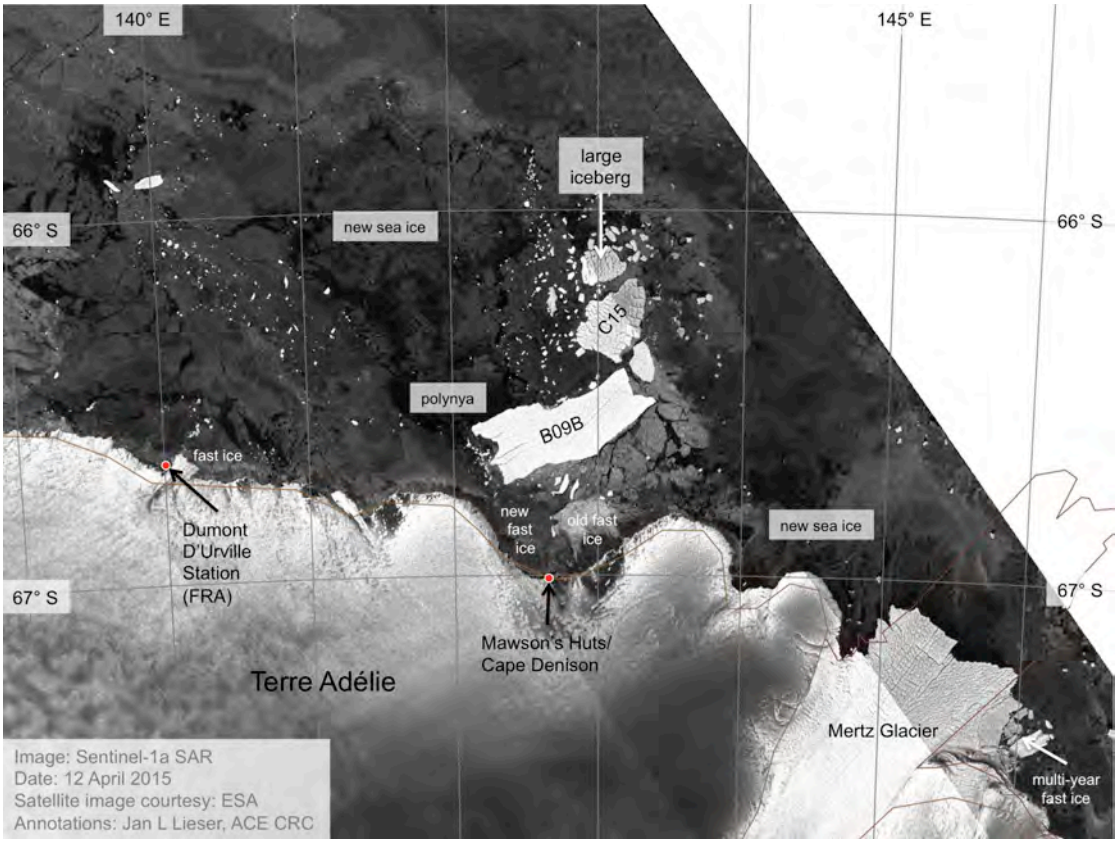

Figure 1: Sentinel-1a SAR scene acquired 12/04/2015 and provided by PolarView.

Inside Commonwealth Bay, a difference in fast-ice surface signature between old and new fast-ice can be detected in the SAR scene (see Sea Ice Report #15.3/2015 for reference relating to differences in the Thermal Infrared spectrum).

With best regards,

Jan.

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Sea Ice Report #16.2/2015

by the AAD/ACE CRC Sea Ice Group*

16/04/2015

This report examines sea-ice conditions in front of Denman, Scott, Bond, Adam and Totten glaciers.

- **Mill Island**
  Figure 1 shows a high resolution Synthetic Aperture RADAR (SAR) scene of the region northeast of the Shackleton Ice Shelf, at a resolution of 50 m × 100 m. The magenta line denotes the long-term (1981-2010) median sea-ice extent for April.

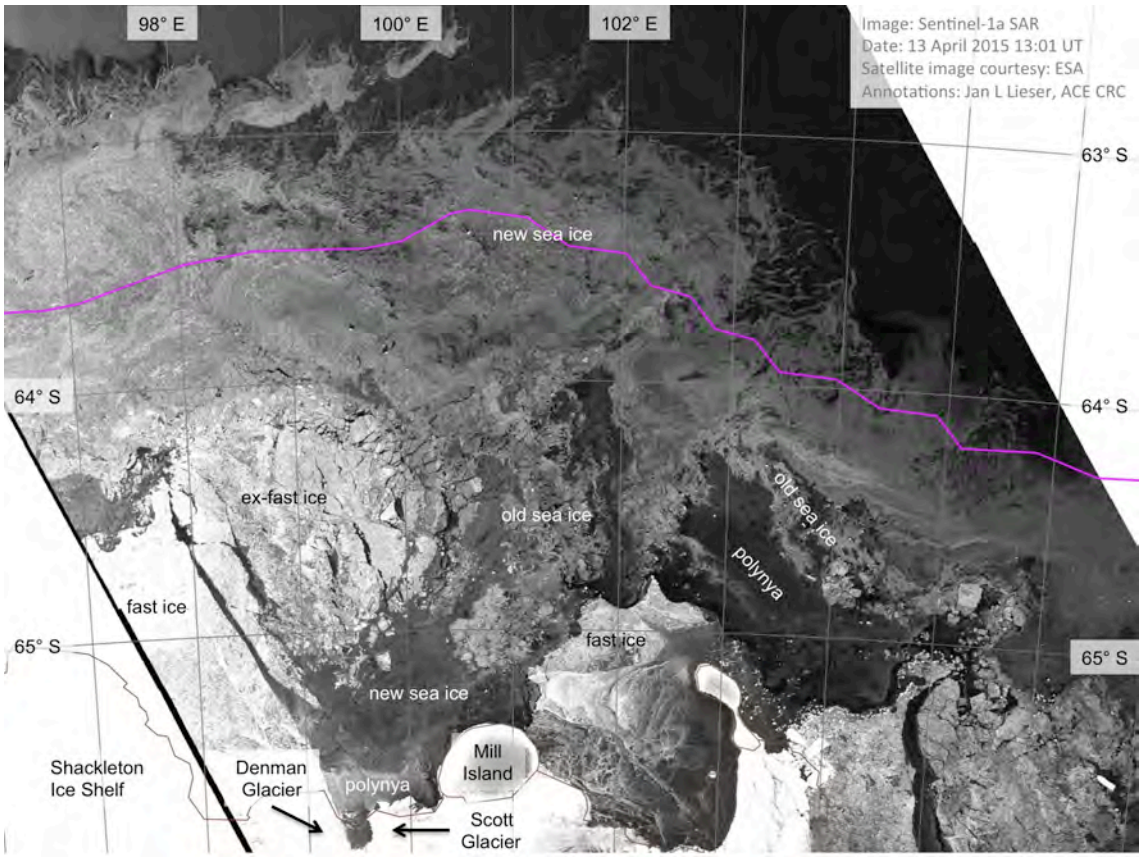

Figure 1: Sentinel-1a SAR scene, acquired 13/04/2015 and provided by PolarView.

The front of Denman Glacier is covered by fast ice, the front of Scott Glacier shows a small polynya, between the fast ice attached to the northeastern side of the Shackleton Ice Shelf and Mill Island. The entire area shown in Figure 1 shows a large variety of different sea ice types, and an overall sea-ice extent well north of the long-term April median.

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- **Casey Station**
  Figure 2 shows a sea-ice concentration map derived from AMSR-2 data, at a resolution of 3.125 km. As with Figure 1, the magenta line denotes the long-term (1981-2010) median sea-ice extent for April.

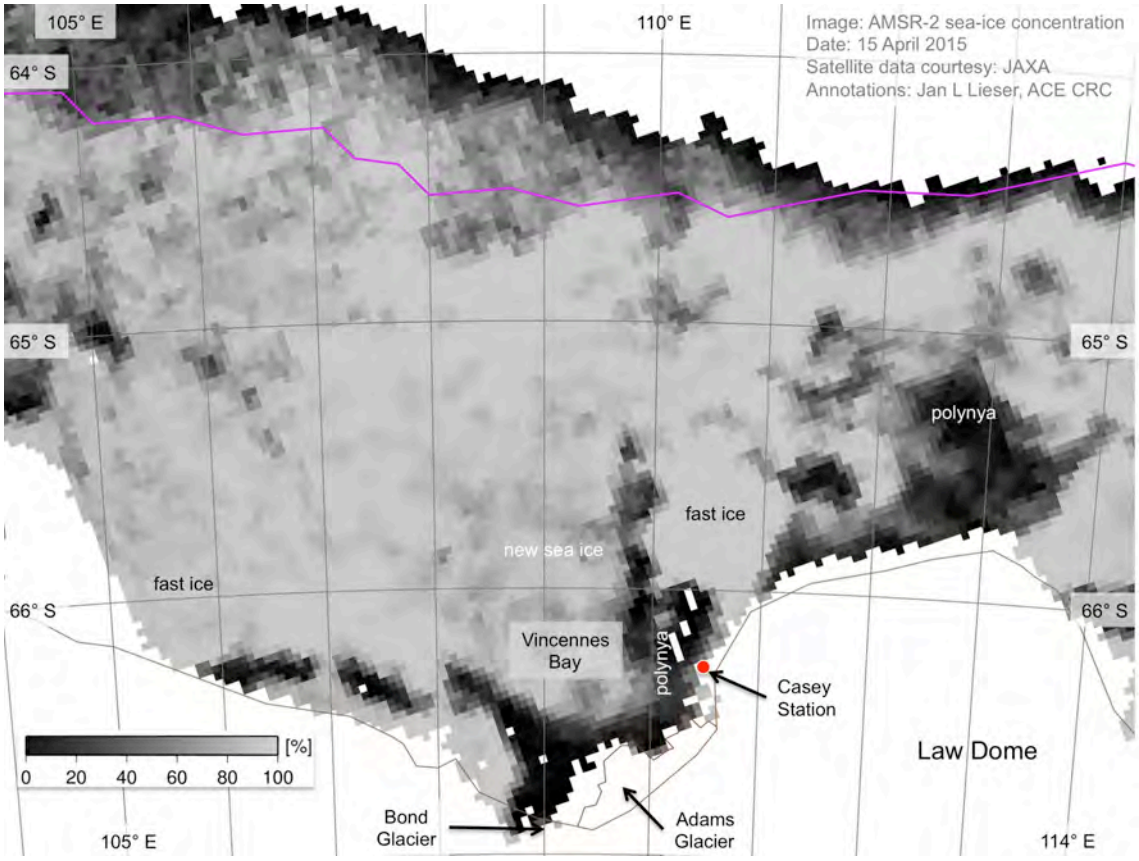

Figure 2: AMSR-2 sea-ice concentration, acquired 15/04/2015 and provided by Univerität Hamburg.

Between 105° E and 115° E, sea ice has grown beyond (further north than) the April median extent. North of Law Dome, the polynya appears as a persistent feature, but north of Casey Station, between 110° E and 111° E and between 65° 30' S and 66° S, fast ice is consolidating locally between grounded icebergs.

Sea ice in Vincennes Bay is still quite mobile, with an active polynya off Casey Station, and in front of Bond Glacier and Adam Glacier. Low sea-ice concentration values are also seen close to the coast, between 106° E and 108° E, even though it is expected that the region is largely covered by sea ice, but it might be thin.

- **Sabrina Coast**
  In addition to the features of Figure 2, Figure 3 shows a thin yellow line that denotes the cruise track of RVIB *Nathaniel B. Palmer* (WBP3210) in the region, up until 16/04/2015 00:00UT.

  East of Law Dome, the sea-ice extent is close to the median extent, with only a few excursions to the north and south, most likely in

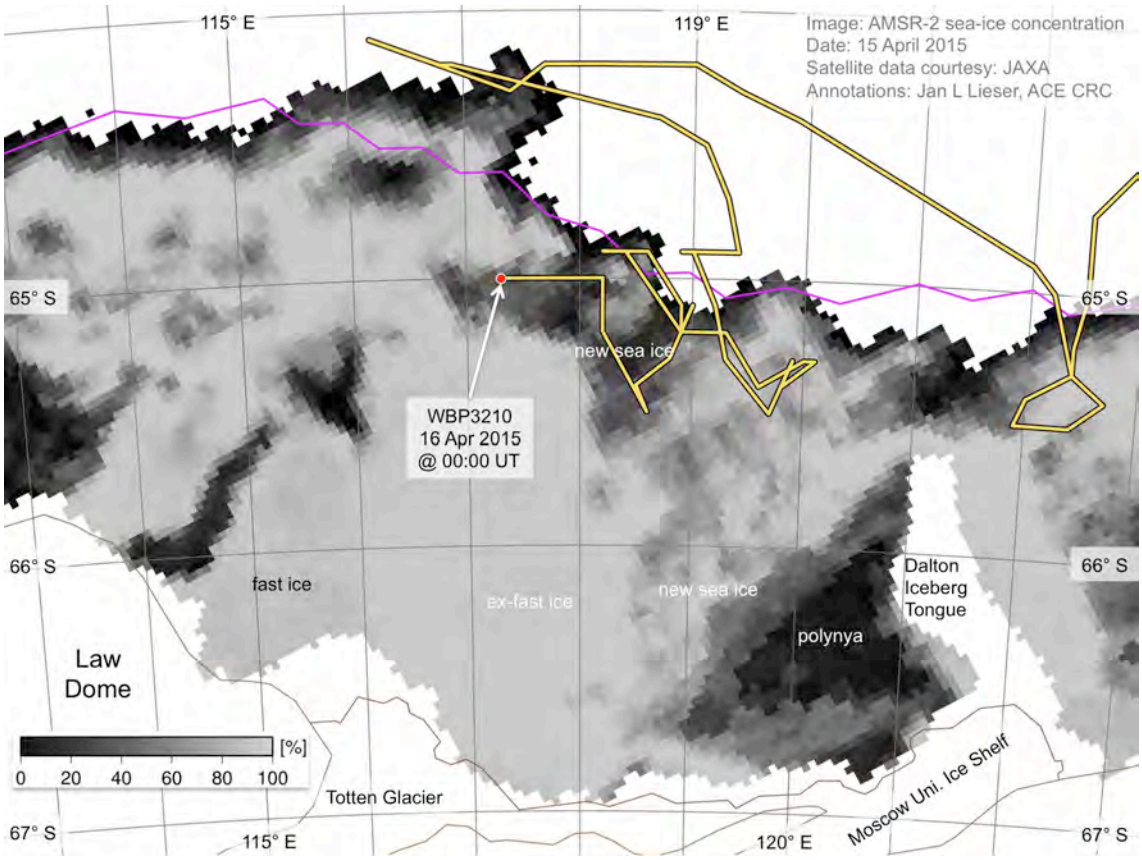

Figure 3: AMSR-2 sea-ice concentration, acquired 15/04/2015 and provided by Univerität Hamburg.

consequence of local weather. North of the Totten Glacier, the ex-fast ice appears to be consolidating and new sea ice accumulates at its eastern edge, steadily filling the polynya west of the Dalton Iceberg Tongue.

With best regards,

Jan.

Sea Ice Report #16.3/2015

by the AAD/ACE CRC Sea Ice Group*

17/04/2015

This report examines sea-ice conditions in front of Denman Glacier and Scott Glacier.

- **Mill Island**
  Figures 1 to 4 are showing the same geographical frame of the sea-ice zone off the Shackleton Ice Shelf. All data were collected on 16/04/2015. Figure 1 is a composite of MODIS visible images, where the sea-ice zone is only partly obscured by clouds. For Figure 2, a high resolution SAR scene is overlain on to the MODIS image. The sea-ice concentration maps of Figures 3 and 4 are based on the same AMSR-2 data set, but processed using different algorithms, which result in slightly higher resolution (3.125 km) of Figure 3 and a slightly coarser resolution (6.25 km) of Figure 4. The bathymetry data of Figures 3 and 4 (blueish background) is courtesy of Global Multi-Resolution Topography synthesis [*Ryan et al.*, 2009].

  The entire region shown in the figures is subject to generally high sea-ice cover of various types of sea ice. The marginal ice zone and the sea-ice edge appear fuzzy in all data sets. As stated in Sea Ice Report #16.2/2015, the sea-ice edge has advanced quite far northward compared to the median extent, for this time of year.

  The detection of fast ice (100% sea-ice coverage) northeast of the Shackleton Ice Shelf and between Mill Island and Bowman Island appears incorrect in both AMSR-2 data sets (Figures 3 and 4). However, the polynya region between the fast ice and the ex-fast ice is much better resolved in the higher resolution data (Figure 3). The same applies for the polynyas directly west of Mill Island and north of Bowman Island.

With best regards,

Jan.

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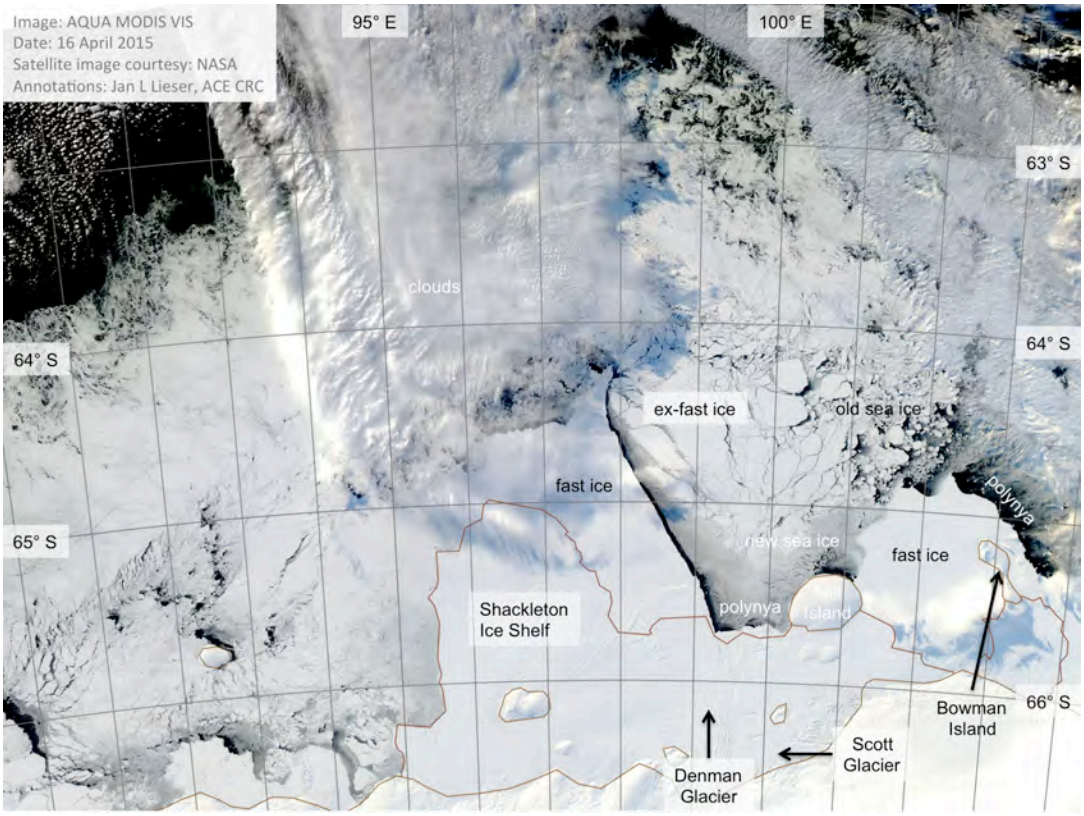

Figure 1: MODIS image, acquired 16/04/2015 and provided by NASA.

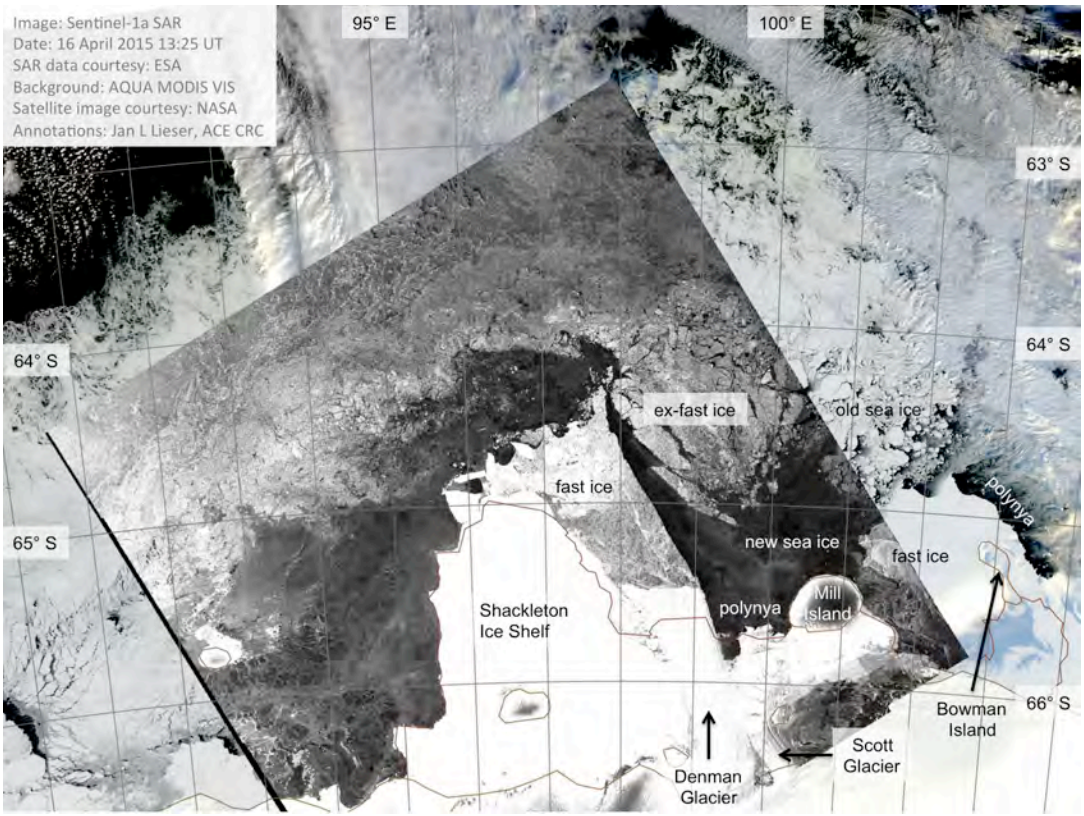

Figure 2: Sentinel-1a SAR scene, acquired 16/04/2015 and provided by PolarView.

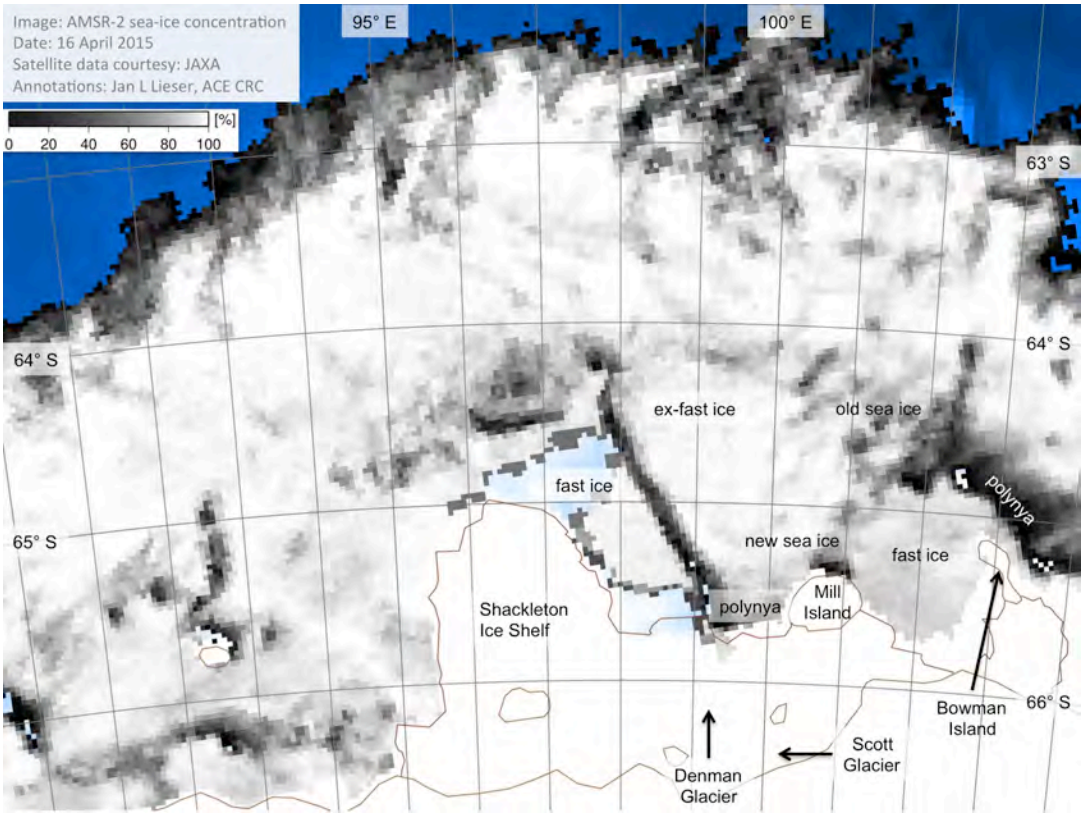

Figure 3: AMSR-2 sea-ice concentration, acquired 16/04/2015 and provided by Universität Hamburg.

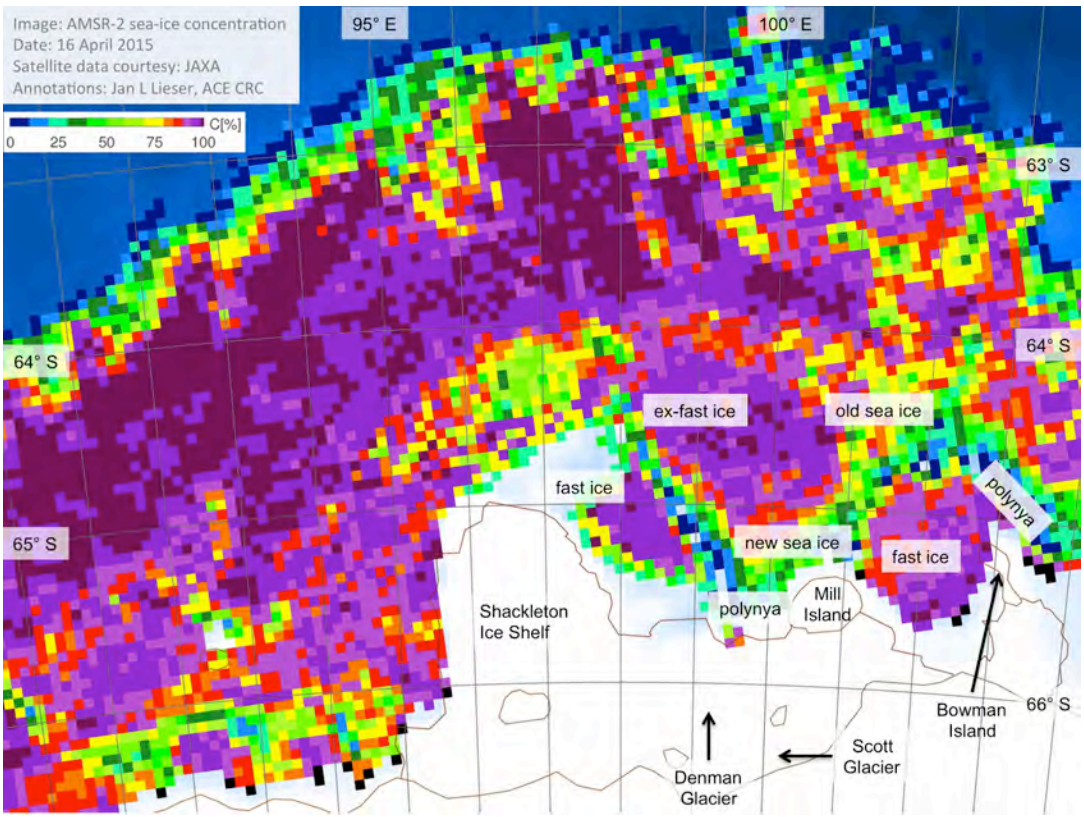

Figure 4: AMSR-2 sea-ice concentration, acquired 16/04/2015 and provided by PolarView.

Sea Ice Report #17.1/2015

by the AAD/ACE CRC Sea Ice Group*

21/04/2015

This report examines sea-ice conditions in between Sabrina Coast and Wilkes Coast.

- **Banzare Coast**
  Figure 1 shows a high resolution (3.125 km^2) sea-ice concentration map of the area between Sabrina Coast and Wilkes Coast. Near-shore regions of no sea-ice values (blueish background) have been masked during the computation of sea-ice concentration. The yellow line denotes the cruise track of RVIB *Nathaniel B. Palmer* up until 21/04/2015 00:00 UT. The thin red line gives the long-term median sea-ice extent for April.

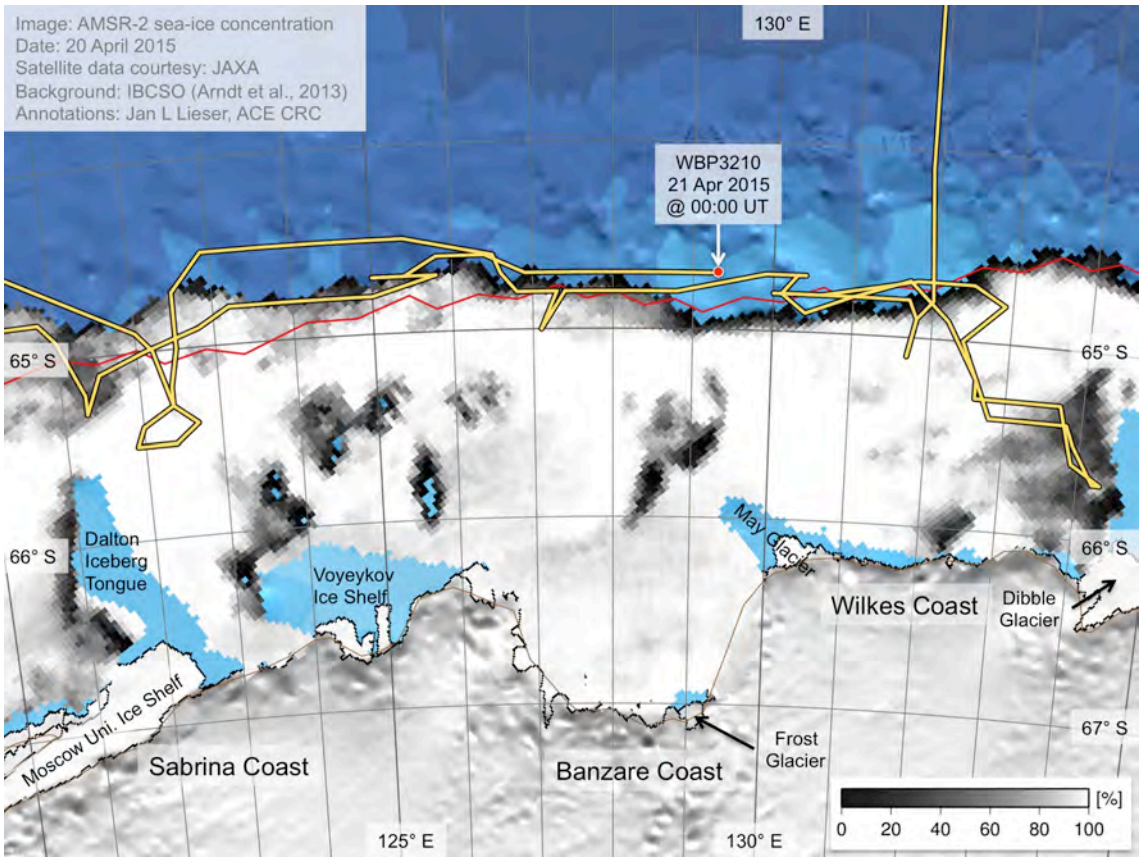

Figure 1: AMSR-2 sea-ice concentration, acquired 20/04/2015 and provided by Universität Hamburg.

The sea ice in the area has consolidated and only minor openings can be seen within the pack ice. The sea-ice edge appears

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compacted and is for large parts of the map, north of the median extent. During the past four days, the sea-ice edge has advanced between 5 nautical miles and 15 nautical miles northward, off Banzare Coast.

With best regards,

Jan.

Sea Ice Report #17.2/2015

by the AAD/ACE CRC Sea Ice Group*

22/04/2015

This report examines sea-ice conditions off Sabrina Coast.

- **Sabrina Coast**
  A high resolution SAR scene of the region between Law Dome and the Voyeykov Ice Shelf is provided in Figure 1. White contours denote known isobaths and the thin red line indicates the long-term median sea-ice extent for April.

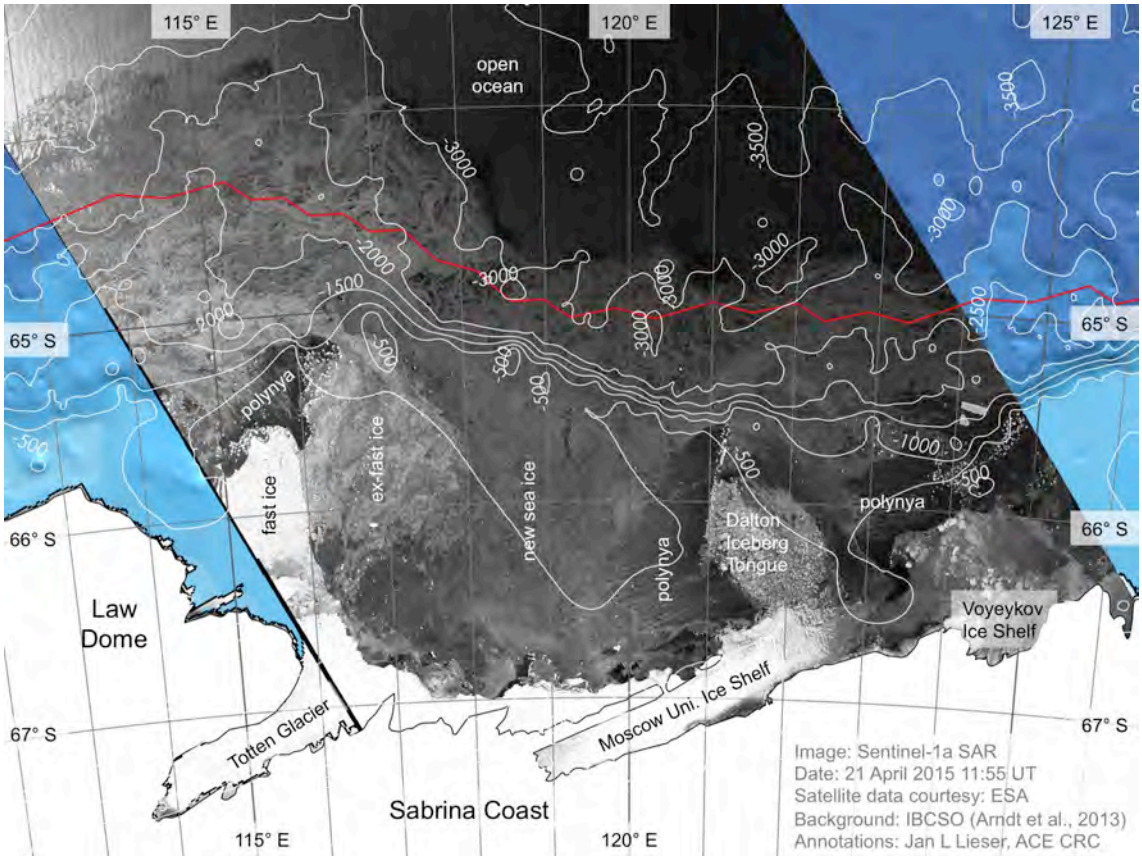


Figure 1: Sentinel -1a SAR scene, acquired 21/04/2015 and provided by PolarView.

The sea-ice edge follows roughly the 3000 m isobath in the region and is between 5 nautical miles (at about 121° E) and 50 nautical miles (at about 117° E) north of the respective (longitudinal) median extent.

Circum-Antarctic, sea-ice extent has in fact reached a new (since reliable satellite observations began, in 1979) record daily maximum on 20/04/2015, after it was following closely last year's daily records.

*Disclaimer: *Every effort is made to ensure the data provided in this report are accurate at the date of publication; however the report is provided without warranty of any kind. The figures and charts provided in this report are intended only as a guide to ice conditions and are not suitable for navigation.*

The polynya west of the Dalton Iceberg Tongue appears active and new sea ice forming in this polynya is accumulating east of the ex-fast ice, which is east of the fast ice that is attached to the eastern flank of Law Dome.

Northwest of the Voyeykov Ice Shelf, another polynya is active and new sea ice formed here is accumulating east of the Dalton Iceberg Tongue.

With best regards,

Jan.

The Sea Ice Group:

Jan L Lieser

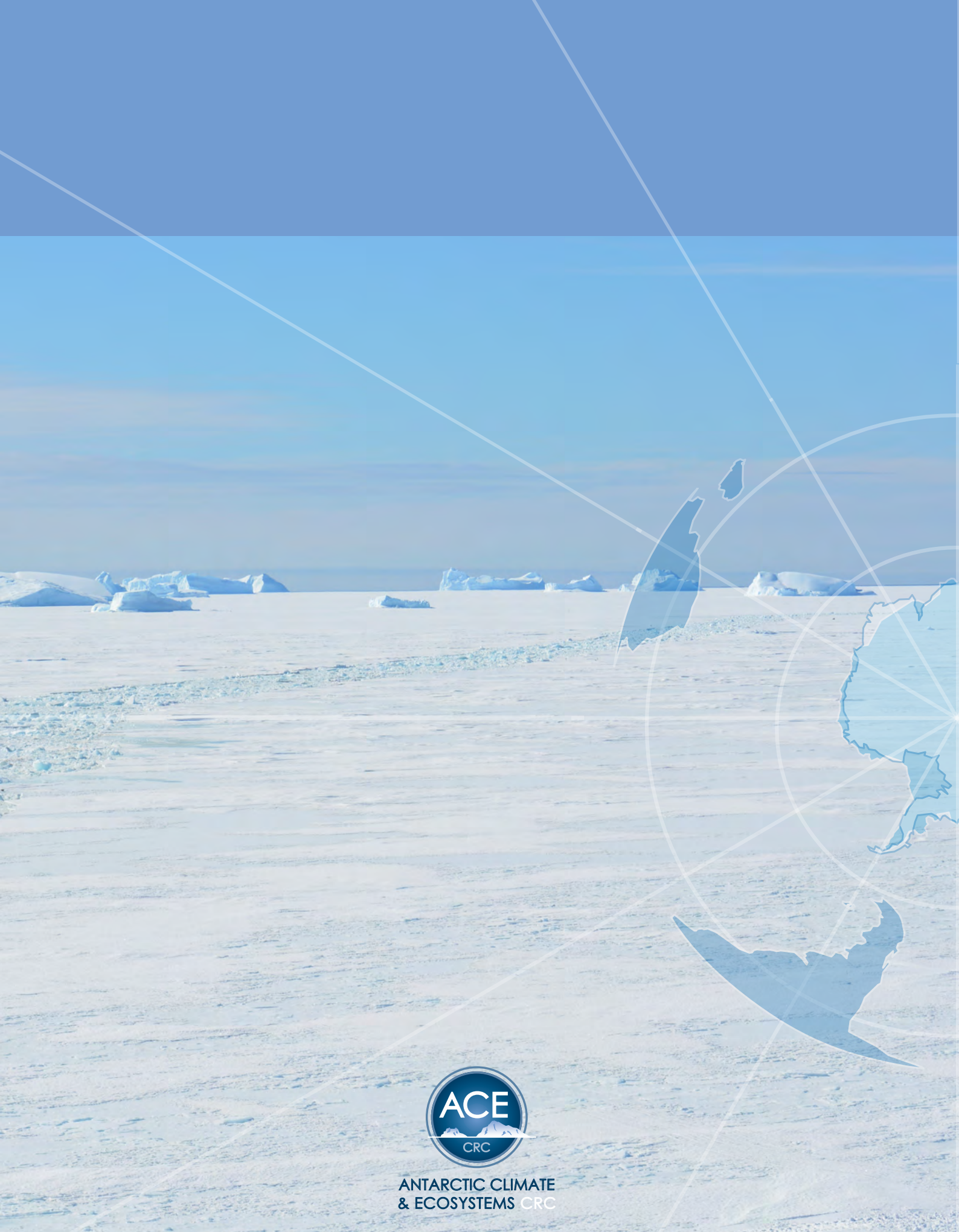
Dr Jan Lieser is a meteorologist and marine glaciologist in the Cryosphere Program of the Antarctic Climate & Ecosystems CRC. Jan's research interest is airborne imaging techniques using digital aerial photography and scanning LiDAR to estimate sea ice thickness. This information is used to check remote sensing data collected by satellites like ICESat and CryoSat–2, which are used by other Antarctic research programs. Jan has researched in–situ polar meteorological observations and sea ice geophysical properties, as well as numerical modelling of Arctic sea ice and Antarctic sub–glacial Lake Vostok, and the interpretation of remote sensing data. He was a wintering scientist at the German Neumayer Station and participated in several field research programs in both the Arctic Ocean and Antarctica.

Robert A Massom

With more than 30 years experience in a broad spectrum of polar–related research, Dr Rob Massom has worked extensively both in Arctic (1980–1992) and Antarctic (1986–present) research. His current research interests include changes in Antarctic sea ice and polar oceans and their physical and ecological significance, and bipolar comparisons; the impact of modes of large–scale anomalous atmospheric circulation and extreme events on sea ice properties and ecology; remote sensing of sea ice and its validation; snow cover on sea ice (characteristics and impacts); sea ice as a habitat; and interactions between the Antarctic Ice Sheet and sea ice (including ice–shelf breakup processes). Rob has participated on three Arctic and ten Antarctic major international multi–disciplinary sea–ice research field studies.

Petra Heil

Dr Petra Heil works as a senior research scientist within the Climate Processes and Change Program of the Australian Antarctic Division, and the Cryosphere Program of the Antarctic Climate & Ecosystems CRC. Her research concerns physical sea–ice processes, which she investigates using in–situ or remotely sensed information and numerical modelling. Her current research interests include the investigation of sea–ice drift and deformation; sea–ice modelling (stand–alone and coupled codes, decadal modelling and short–term forecasting); fast–ice studies, including mixed–layer processes; spatio–temporal variability in Antarctic and Arctic sea ice, and their interaction with polar oceans and atmosphere; and polar atmospheric processes. She has participated on several Antarctic and Arctic major multi–disciplinary sea–ice and marine–science research field campaigns, and wintered at Davis Station working on a multi–disciplinary fastice study.



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