TECHNICAL REPORT

Sea ice reports for the season 2013-2014

Prepared by Dr Jan L Lieser, Dr Robert A Massom, Dr Petra Heil
Antarctic Climate and Ecosystems Cooperative Research Centre 2014

ANTARCTIC CLIMATE & ECOSYSTEMS CRC

Sea ice reports for the season 2013-2014

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Australian Antarctic Division

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Executive summary:

This document is a compilation of weekly sea ice reports for East Antarctica, including sub-weekly updates. The reports were prepared to support ship operations in the region during the 2013/2014 shipping season. They were primarily used as guidance for the Australian Antarctic program, but were partly provided to other Antarctic operators. In particular, the assistance operation for *Akademik Shokalskiy*, coordinated by the Australian Maritime Safety Authority (AMSA) after Christmas 2013, and *Nathaniel B Palmer*'s Mertz Polynya and Totten Glacier voyage 2014 (29/01/2014 to 16/03/2014).

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 the 2013/2014 season were:

No.	Leave port	Main Purpose	Return
V1	15/10/2013	Davis resupply, refuel, summer deployment and changeover	07/12/2013
V2/3	11/12/2013	Macquarie Island summer deployment; Casey Station resupply and refuel; Assist trapped tourist vessel from heavy ice	22/01/2014
V4	29/01/2014	Casey and Davis essential cargo and summer personnel retrieval	01/03/2014
V6	09/03/2014	Mawson resupply, refuel, and changeover	19/04/2014

Note: Voyage 2 and Voyage 3 were combined for operational reasons, and Voyage 5 was conducted with *l'Astrolabe* instead of RSV *Aurora Australis*.

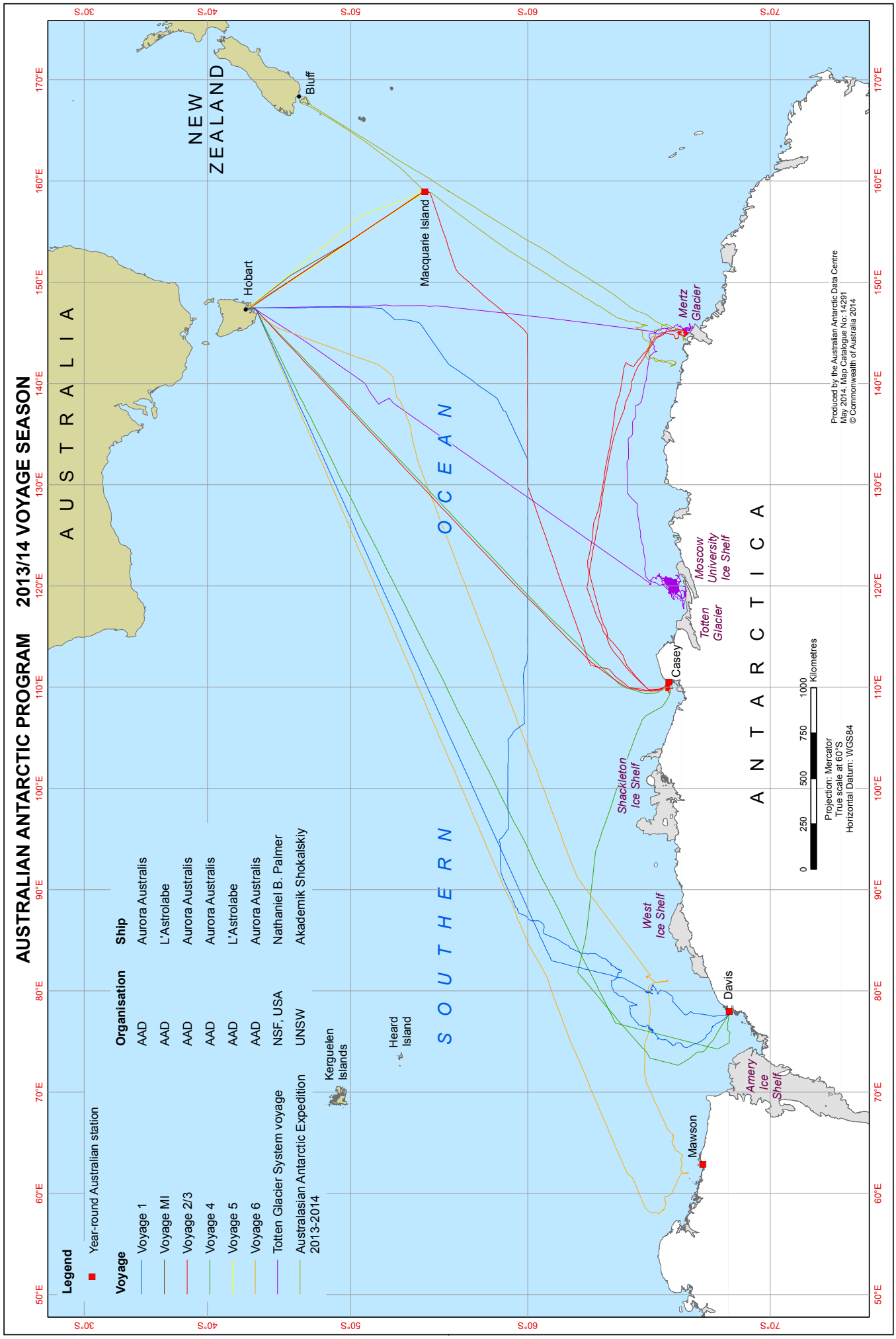
In 2013/14, the Australian Antarctic shipping season was affected by heavy sea ice persisting throughout the summer in East Antarctica, following a winter season with maximum sea ice extent since satellite records began. Off Mawson Station, fast ice surviving the summer melt season precluded the ship reaching Horseshoe Harbour, which resulted in an additional voyage (V6) necessary to supply the station by helicopter.

About this report

This report is the third 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 report of this volume is the 11th report for the year 2013. 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.


AUSTRALIAN ANTARCTIC PROGRAM 2013/14 VOYAGE SEASON
Legend
Year-round Australian station
Voyage
Organisation
Ship
Voyage 1 AAD Aurora Australis
Voyage MI AAD L'Astrolabe
Voyage 2/3 AAD Aurora Australis
Voyage 4 AAD Aurora Australis
Voyage 5 AAD L'Astrolabe
Voyage 6 AAD Aurora Australis
Totten Glacier System voyage NSF, USA Nathaniel B. Palmer
Australasian Antarctic Expedition 2013-2014 UNSW Akademik Shokalskiy
AUSTRALIA
NEW ZEALAND
SOUTHERN OCEAN
ANTARCTICA
Hobart
Bluff
Macquarie Island
Heard Island
Kerguelen Islands
Casey
Davis
Mawson
Mertz Glacier
Moscow University Ice Shelf
Totten Glacier
Shackleton Ice Shelf
West Ice Shelf
Amery Ice Shelf
0 250 500 750 1000 Kilometres
Projection: Mercator
True scale at 60°S
Horizontal Datum: WGS84
Produced by the Australian Antarctic Data Centre
May 2014. Map Catalogue No: 14291
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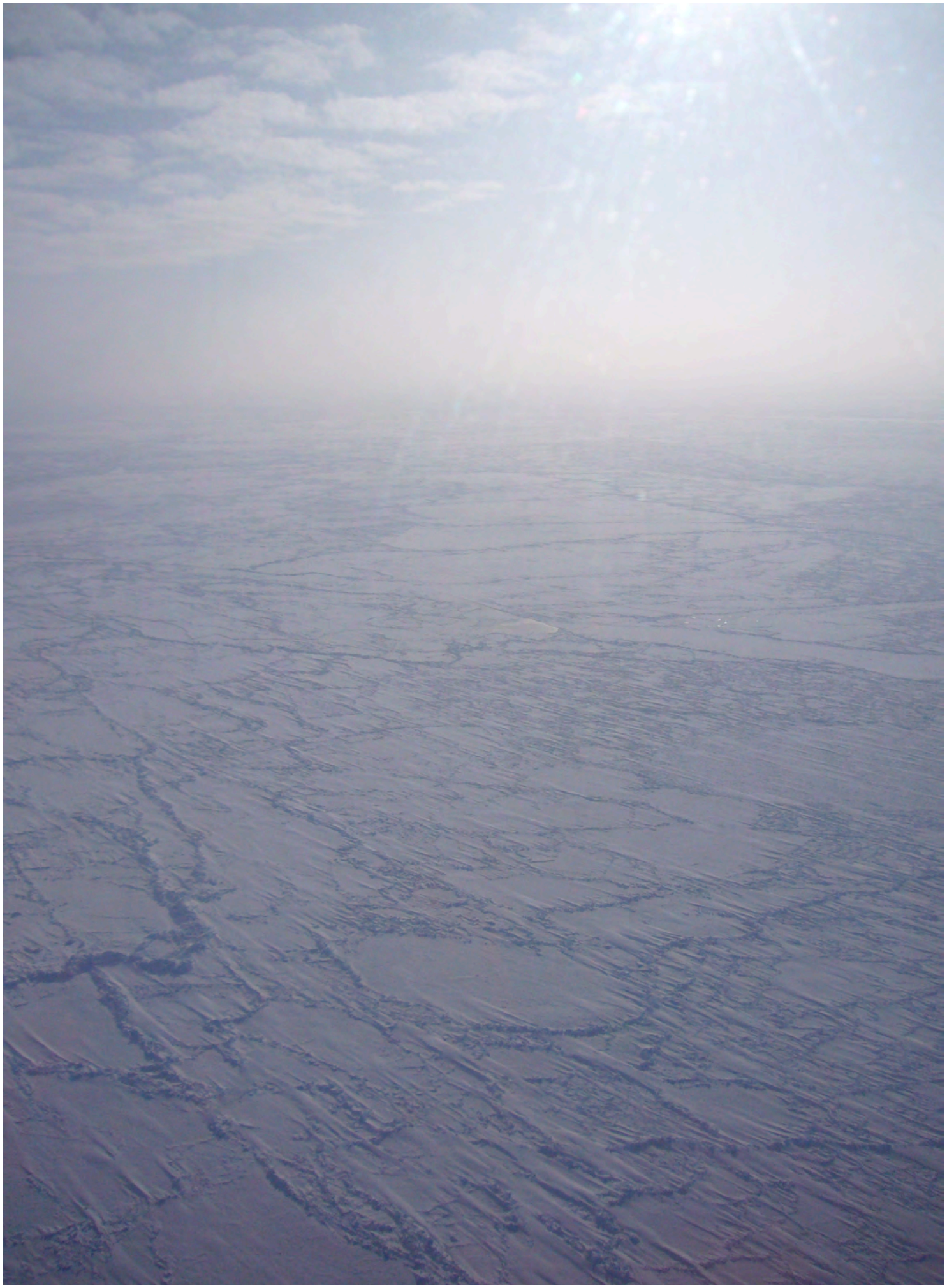
Contents

Frequently used acronyms

AAD	Australian Antarctic Division
ABOS	Australian Bluewater Observing System
ACE CRC	Antarctic Climate & Ecosystems Cooperative Research Centre
AMPS	Antarctic Mesoscale Prediction System
AMSA	Australian Maritime Safety Authority
AMSR-2 [1]	Advanced Microwave Scanning Radiometer 2
BNSK	Call sign: Research/Survey Vessel *Xue Long*
EADS	European Aeronautic Defence and Space Company - Airbus Group
FHZI	Call sign: Anchor Handling Vessel *l'Astrolabe*
MODIS [2]	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration (USA)
NSF	National Science Foundation (USA)
SSMIS	Special Sensor Microwave Imager/Sounder
TSX	TerraSAR-X satellite, operated by German Aerospace Center (DLR)
UBNF	Call sign: Passenger Ship *Akademik Shokalskyi*
UCAR	University Corporation for Atmospheric Research (USA)
VNAA	Call sign: Research & Supply Vessel *Aurora Australis*
WBP3210	Call sign: Research/Survey Vessel *Nathaniel B Palmer*

[1] The AMSR-2 instrument is onboard the GCOM-W1 satellite, which is operated by Japan Aerospace Exploration Agency.

[2] The MODIS instrument is operational on two satellites: AQUA and TERRA, both operated by NASA.



Sea Ice Report #11/2013

by the AAD/ACE CRC Sea Ice Group

09/10/2013

Welcome to the new season.

This first report (the 11th for the year) provides a rough overview of the sea ice conditions in East Antarctica.

Between 50° E and 150° E, sea ice extent during the last winter was close to the 30-year (1981-2010) average. Regionally, the extent varied only slightly with little excursions to the north and south of the average.

- **Davis Station**
  Over the past week, the sea ice edge is showing increasing signs of undulation, indicating a highly dynamic zone, especially in the region on approach toward Davis Station. Directly north of Davis Station, the sea ice edge is currently beyond (north of) 55° S, but retreats further east from there to about 61° S at 90° E.

  The pack ice zone shows typical seasonal signs of variation (between 60% and 100%) in ice concentration. A large polynya stretching from about 76° E to 82° E at 67.5° S can be seen through the thin cloud cover in Figure 1 (clouds are affecting almost the whole scene).

- **Casey Station**
  Figure 2 gives an overview of the sea ice region north of Casey Station. Even though this scene is affected by a thin cloud layer as well, some small scale structures of the pack ice can be seen, and some coastal polynyas.

- **Commonwealth Bay**
  Commonwealth Bay remains full of fast ice, with iceberg B09B still resting north of the bay (see Figure 3). Large polynyas can be seen north of Mertz Glacier and north of Commonwealth Bay. Those are separated from the open ocean by a band of pack ice, currently extending to about 62.5° S.

With best regards,

Jan, for the sea ice group.

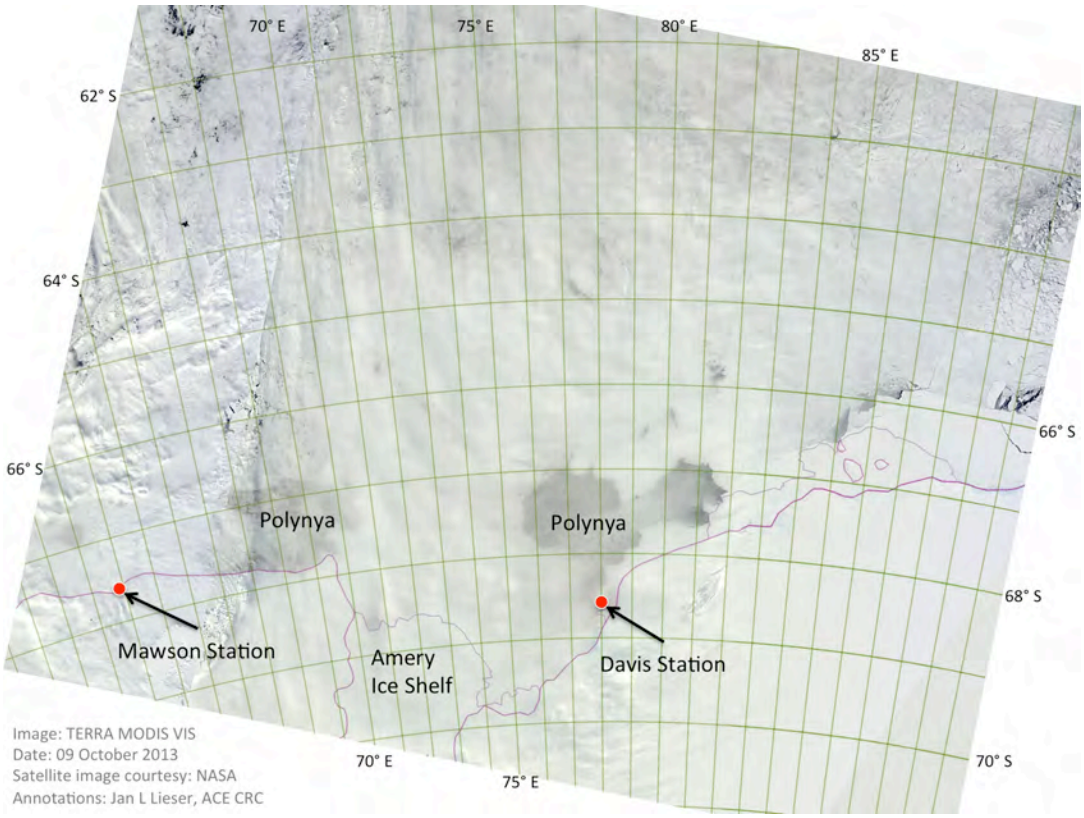


Figure 1: MODIS image, acquired 09/10/2013 and provided by NASA.

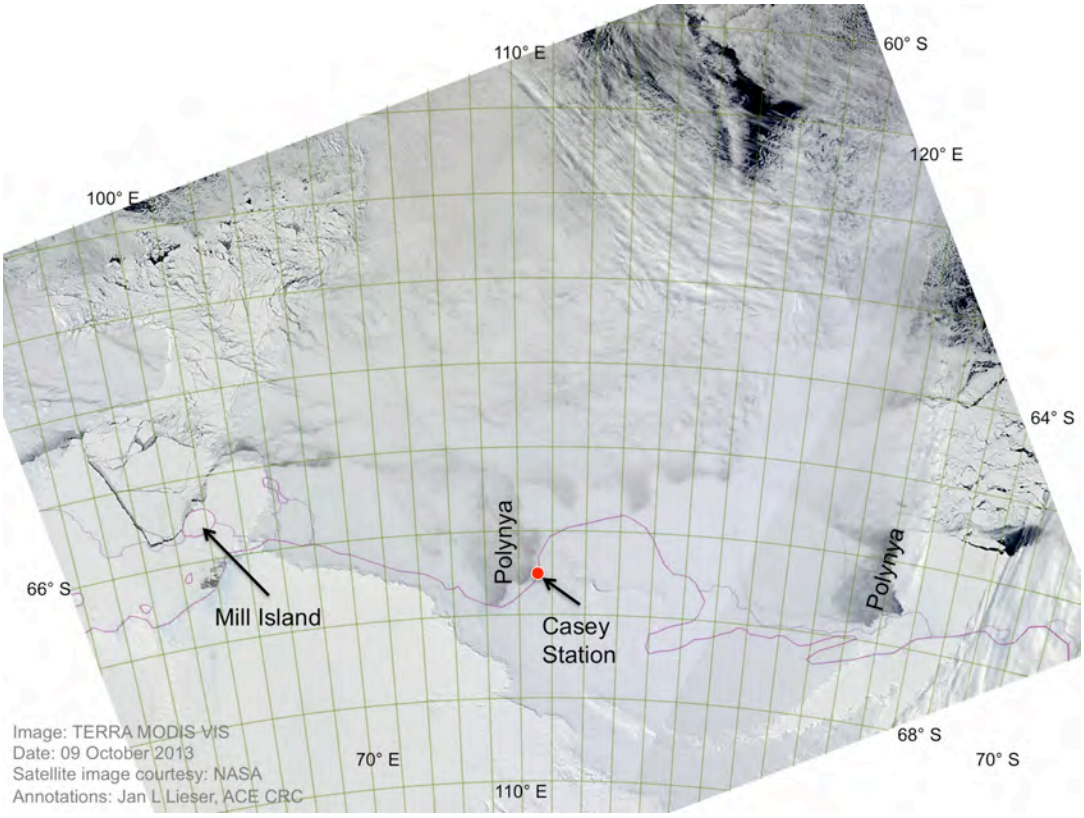


Figure 2: MODIS image, acquired 09/10/2013 and provided by NASA.

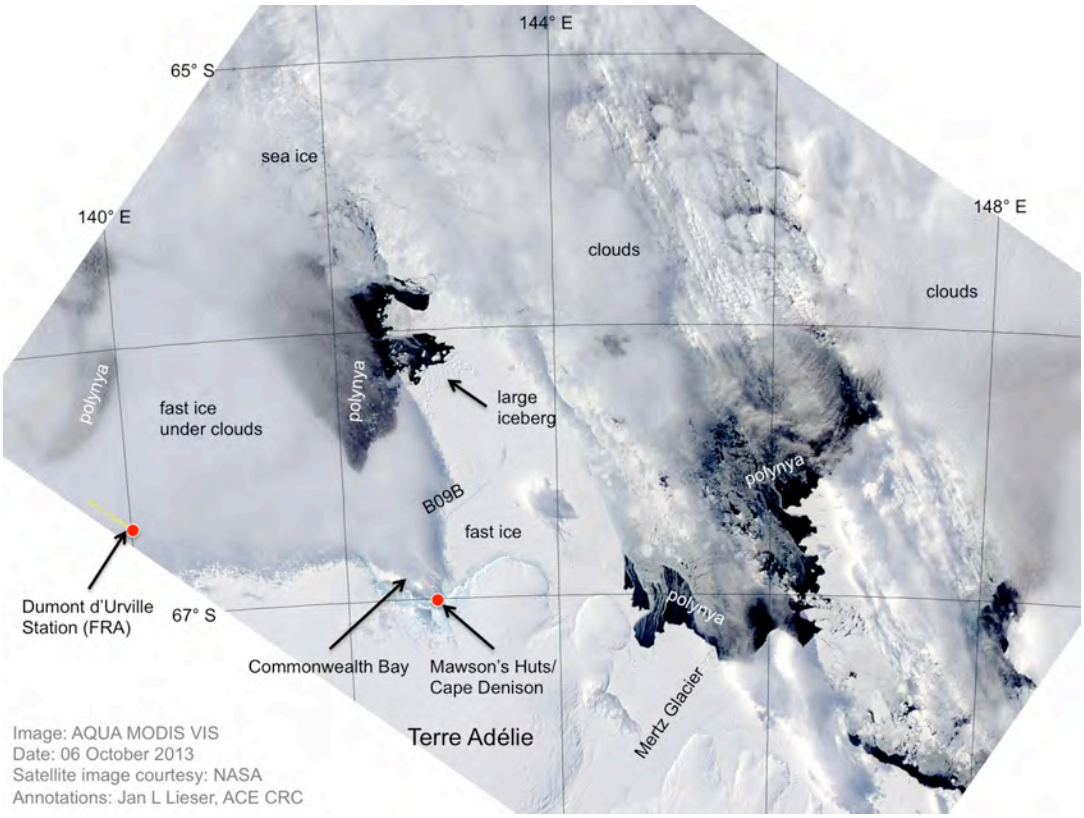


Figure 3: MODIS image, acquired 06/10/2013 and provided by NASA.

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Sea Ice Report #11a/2013

by the AAD/ACE CRC Sea Ice Group

28/10/2013

This report provides an update on the sea ice conditions north of Davis Station.

- **Davis Station**
  In the immediate vicinity of Davis Station, the fast ice appears to remain still intact, but a large area of open water has cleared at about 67° 30' S between the West Ice Shelf and iceberg D15 in the east at about 81° 30' E and a currently sharply defined sea ice edge at about 75° 30' E in the west (see Figure 1). Further to the north, a band of high concentration rough sea ice separates this polynya from a more open pack and the marginal ice zone. In Figure 2, the yellow line indicates the northern transition line between two different ice regimes: the aforementioned rougher and high concentration sea ice regime to the south of the line, and a less rough and slightly less concentration (80% - 90%) regime to the north of the line. The southern transition between very rough and less rough sea ice is indicated by the orange line (see Figure 2). *Aurora Australis*' cruise track (up until about midday today) is shown as a thin red line in the figure as well.

  There weren't many cloud free visible images available during the last week or two, but the few scenes showing the pack ice conditions in the area indicate smaller floes and less concentration further to the west of *Aurora Australis*' current location. There also appears a preferred lead orientation between massive floes. North of the West Ice Shelf and iceberg D15 (*Aurora Australis*' current location), this orientation shifts from northwest-southeast to more or less straight west-east further to the west. Those leads seem connected in a zig-zag pattern, leading south towards the polynya north of Davis Station (see for example Terra MODIS imagery acquired 17/10/13).

With best regards,

Jan, for the sea ice group.

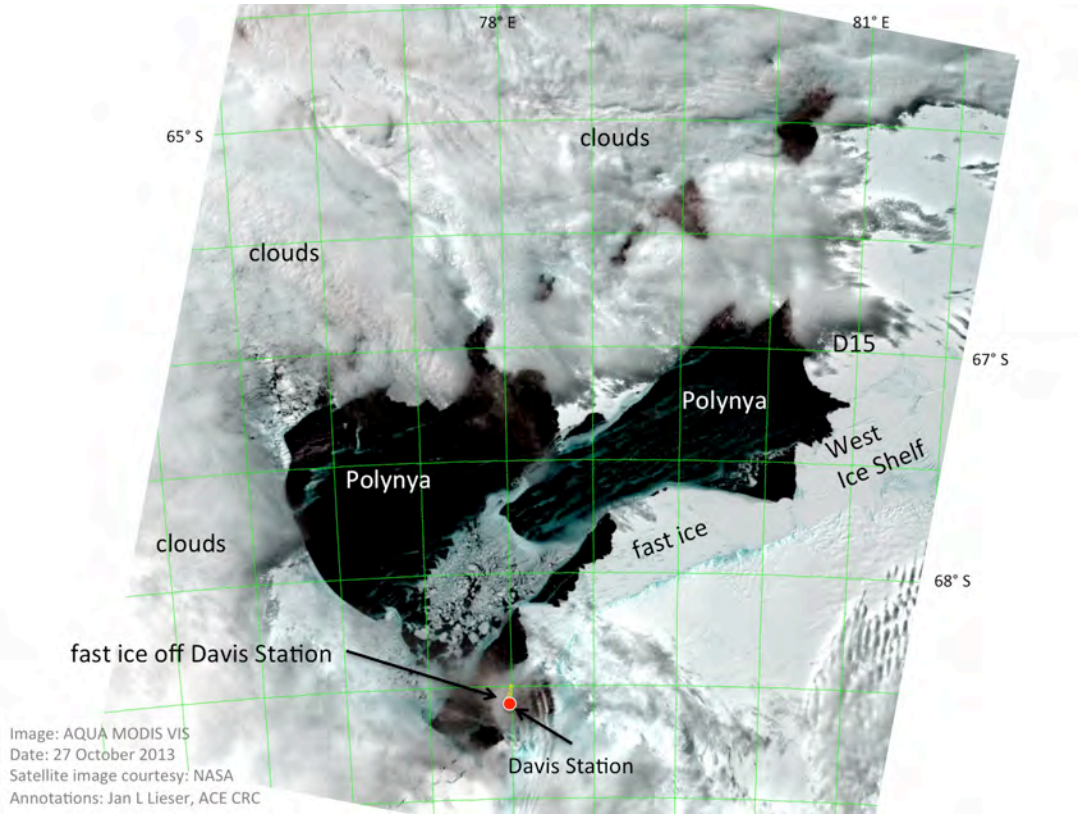

Figure 1: MODIS image, acquired 27/10/2013 and provided by NASA.

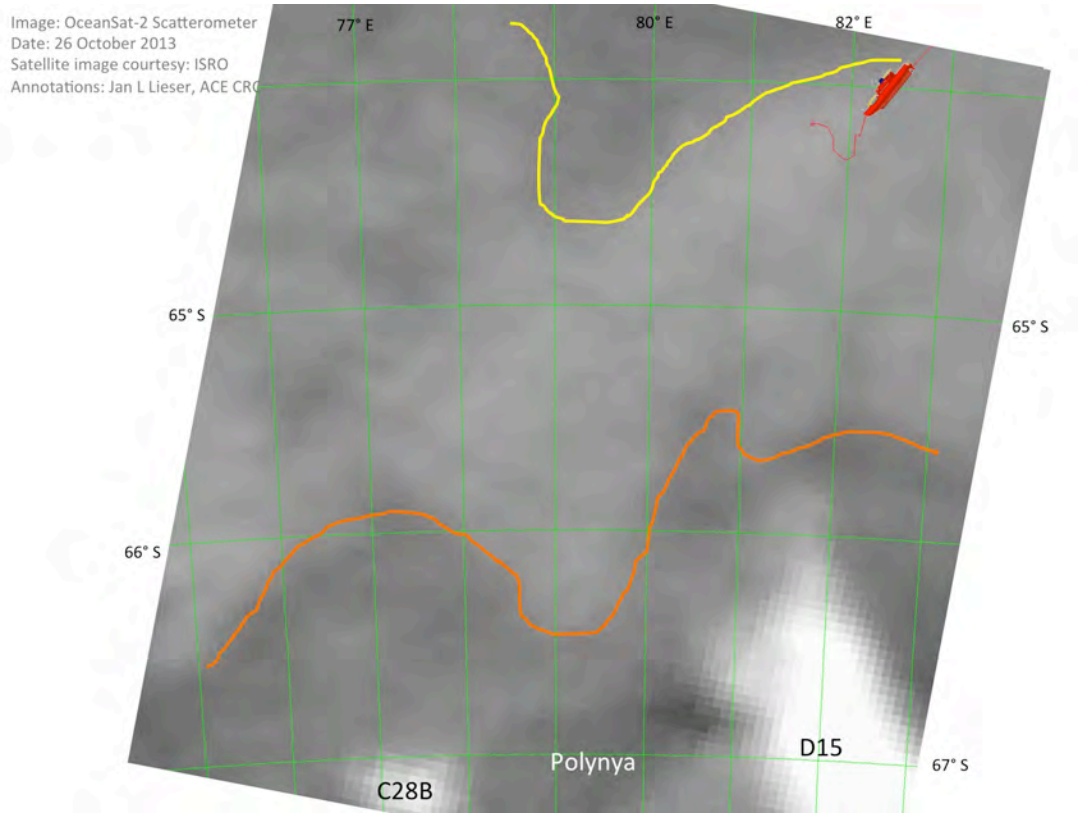

Figure 2: OceanSat-2 Scatterometer image, acquired 26/10/2013 and provided by Indian Space Research Organisation (ISRO).

Sea Ice Report #12/2013

by the AAD/ACE CRC Sea Ice Group

31/10/2013

This report provides information on the sea ice conditions north of Davis Station and the Commonwealth Bay region.

- **Davis Station**
  To the north of Davis Station between 74° E and 80° E, and 65° S and 68° S (Figure 1), sea ice conditions show an easing trend over the last two days. The general drift rate of the pack ice is about 5-6 nautical miles per day in westerly directions, with cracks and leads widening, notably around 76° E. But large floes appear still to be touching at pinch points. The polynya, as marked in Figure 1, is currently back-filling with new ice under calm conditions. Iceberg C28B, a former piece of the Mertz Glacier Tongue, is at the northern edge of the polynya almost due north of Davis Station, at the moment.

  The thin red line in Figure 1 represents the cruise track of RSV *Aurora Australis* up until the morning of 31/10/2013.

- **Commonwealth Bay**
  Figure 2 shows a synthetic aperture radar image of the Commonwealth Bay/Mertz Glacier region. This detailed, high resolution image provides an excellent impression of the sea ice surface conditions in the area. The bay is clearly filled with multi-year fast ice, where the near-coastal part is polished by offshore winds in preferential south to north direction, and the outer part exhibits more roughness with a medium-sized iceberg trapped in the central part of the bay.

  Iceberg B09B is surrounded by fast ice, consisting of trapped pack ice between the bay and the berg and further north between B09B and the large iceberg (uk316, a former piece of Ninnis Glacier), revealed in lighter grey with a rougher surface. Many smaller bergs and berg fragments are visible as bright white spots inside the fast ice matrix. In the east and west, B09B is flanked by smoother fast ice, separated from the polynyas by sharp edges. The southernmost corner of the polynya to the west of B09B appears to be at about 142° E and 66° 30' S

With best regards,

Jan, for the sea ice group.

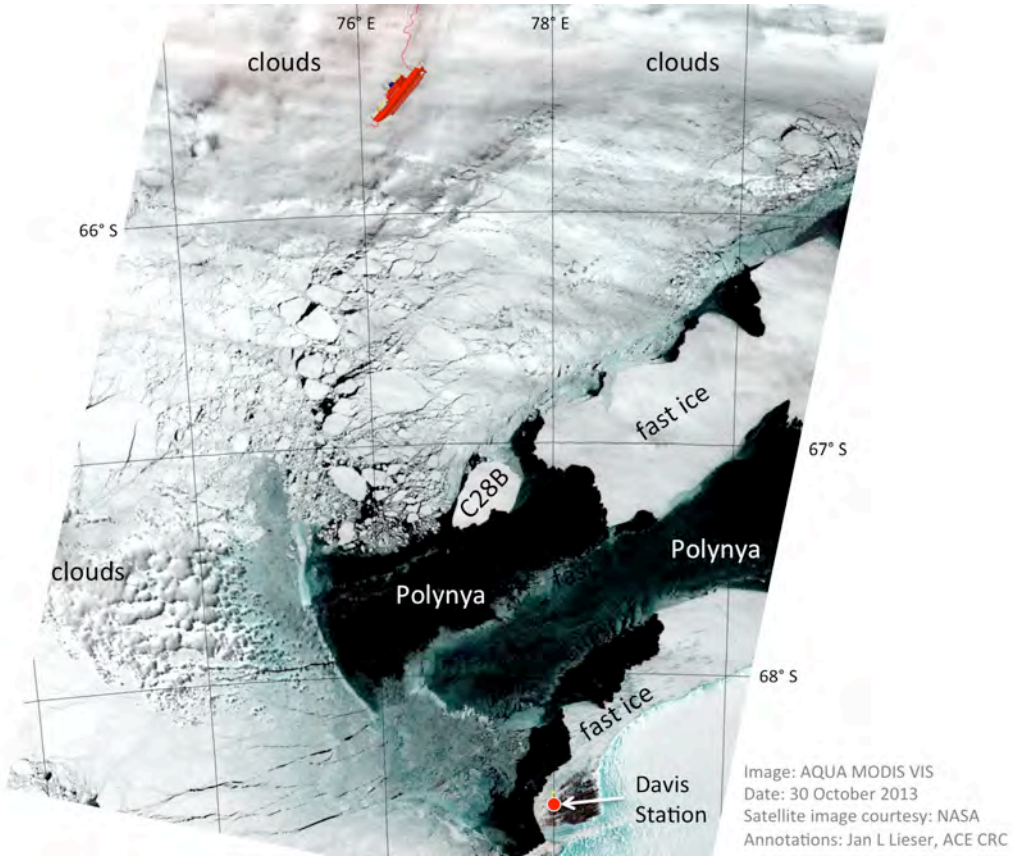

Figure 1: MODIS image, acquired 30/10/2013 and provided by NASA.

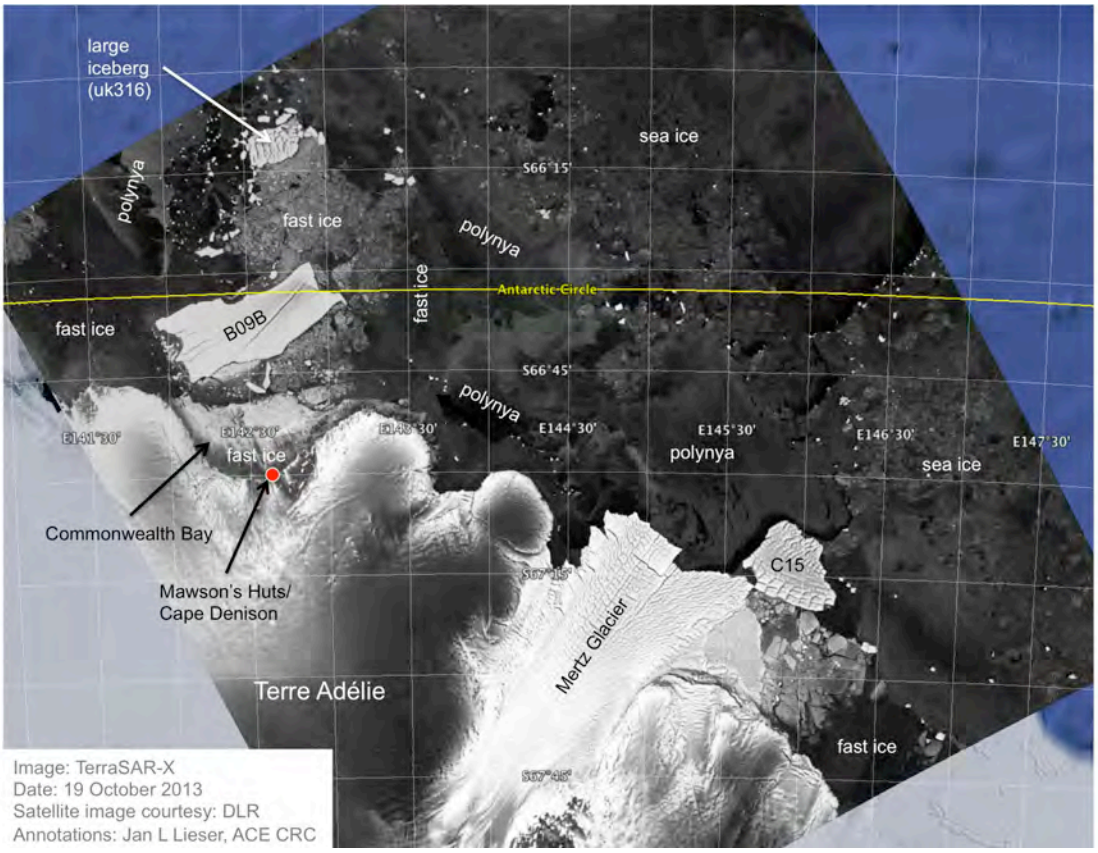

Figure 2: TerraSAR-X image, acquired 19/10/2013 and provided by DLR.

Sea Ice Report #12a/2013

by the AAD/ACE CRC Sea Ice Group

01/11/2013

This report provides a brief update on the sea ice conditions north of Davis Station.

- **Davis Station**
  Figure 1 shows a high resolution RADAR image of the region between *Aurora Australis*' current position (in the western corner of the image) and the sea ice edge of the polynya off Davis Station.

  There are three larger icebergs to the southwest of the ship's location, and an elongated shear zone (orange line) to the southeast and east of the ship's location. South of the ship and towards the shear zone is an area of heterogeneous sea ice consisting of smaller floes with different roughness and some openings between.

  South and east of the shear zone, some old and large floes can be identified, but also a number of larger leads, predominantly in east-westerly orientation.

  Further to the southeast and closer to the ice edge of the polynya, some old and very large floes appear as dark patches in the RADAR image. Some of those can potentially contain ex-land fast sea ice.

  Overall, the region is covered by high concentration sea ice of various types, but the presence of cracks and leads (dark, string-like features showing up in the RADAR scene) indicates divergent drift conditions.

With best regards,

Jan, for the sea ice group.

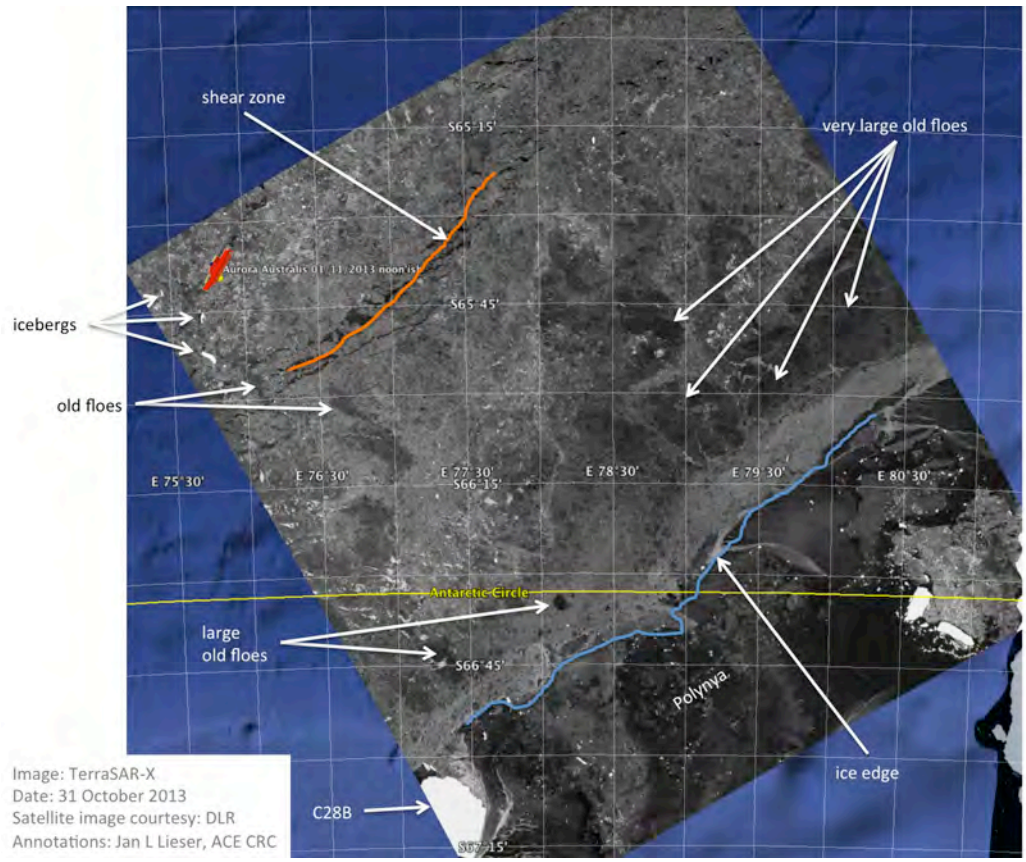

Figure 1: TerraSAR-X image, acquired 31/10/2013 and provided by DLR.

Sea Ice Report #13/2013

by the AAD/ACE CRC Sea Ice Group

07/11/2013

This report provides an overview on the sea ice conditions north of Davis Station.

- **Davis Station**
  Figure 1 shows an almost cloud free scene of sea ice north of Davis Station yesterday. The thin red line indicates the cruise track of *Aurora Australis* heading towards Davis Station.

  Three different ice regimes can be identified as wide bands skirting the Antarctic coastline.

  Closest to the coast, the polynya stretches from the West Ice Shelf and iceberg D15 in the east to the new ice accumulation region at about 76° E in the west. Further to the north from there, a band of high concentration sea ice containing some very large floes spans for about two to two-and-a-half degrees of latitude. The northern transition zone to a region with less sea ice concentration and smaller floes is indicated by the yellow line in Figure 1. This low concentration zone covers about another two degrees of latitude, before reaching the marginal sea ice zone (not shown in Figure 1).

  During the past few days, the general drift of the pack ice was in northerly directions, in the region. The current easing of conditions has opened further cracks and leads with various orientations, but some very large and potentially strong floes still survive in the band of high concentration sea ice mentioned above.

With best regards,

Jan, for the sea ice group.

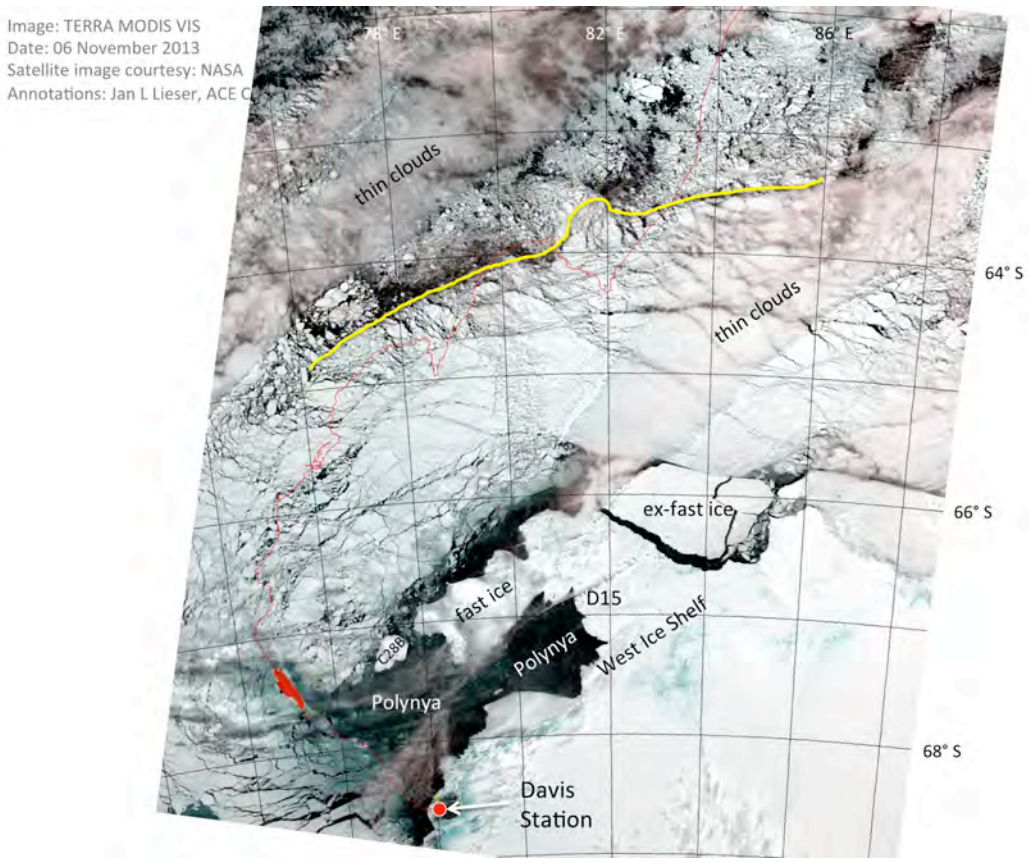

Figure 1: MODIS image, acquired 06/11/2013 and provided by NASA.

Sea Ice Report #13a/2013

by the AAD/ACE CRC Sea Ice Group

11/11/2013

This report provides an update on the sea ice conditions north of Davis Station and Commonwealth Bay.

- **Davis Station**
  Only a few thin clouds obscure the view on the sea ice in yesterday's MODIS imagery (see Figure 1). The thin red line indicates the cruise track of *Aurora Australis* into the fast ice off Davis Station.

  Between the station and iceberg C28B, the polynya is slowly back filling with new sea ice. Northwest of the berg, the sea ice appears loose with widening gaps at about 67° S and 76° 30' E. To the north and west from this location are still some very large sea ice floes with only narrow leads, even though those are widening slightly as well. The general sea ice drift in the region is about 6 nm per day in westerly directions for those very large floes. Further north beyond 66° S, leads are very wide but between some floes there appear pinch points around some edges. North of about 64° 30' S, the sea ice is quite broken up and floes are scattered.

  Beyond the northeastern corner of the polynya to the north of the fast ice as marked in Figure 1 and iceberg D15 (not marked in the figure; see Sea Ice Report #13/2013 for reference), sea ice is densely packed for about 1.5 degrees of latitude with only very narrow cracks and openings. Also, a massive piece of fast ice that has broken away from the eastern side of iceberg D15, recently, and is currently centred at about 66° S and 83° 20' E (outside of the attached figure) and moving northward.

  Overall, the route *Aurora Australis* took southbound still appears in a similar condition as a week ago.

- **Commonwealth Bay**
  Pack ice and fast ice in the wider Commonwealth Bay/Mertz Glacier region shows seasonal signs of break-up and disintegration, with the visible crack on the eastern side of the fast ice surrounding iceberg B09B only appearing in the past 36 hours, at about 144° E. But the sea ice condition directly in the bay and immediately around iceberg B09B remains unchanged over the past few weeks.

With best regards,

Jan, for the sea ice group.

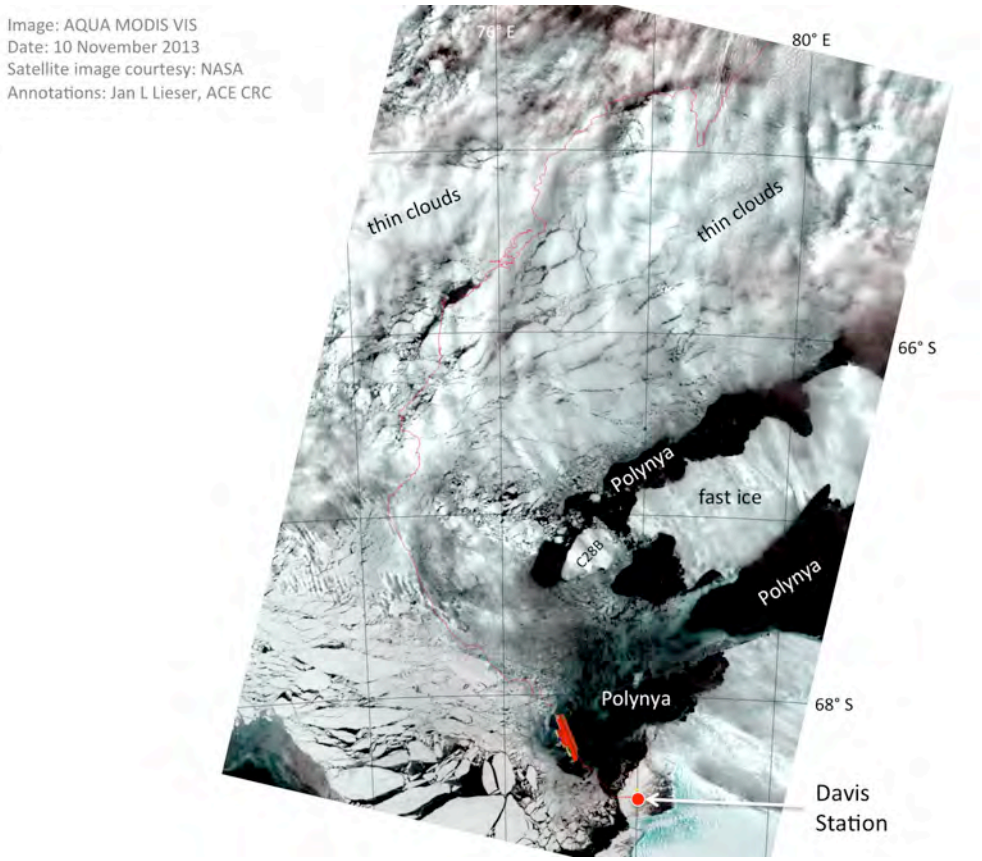

Figure 1: MODIS image, acquired 10/11/2013 and provided by NASA.

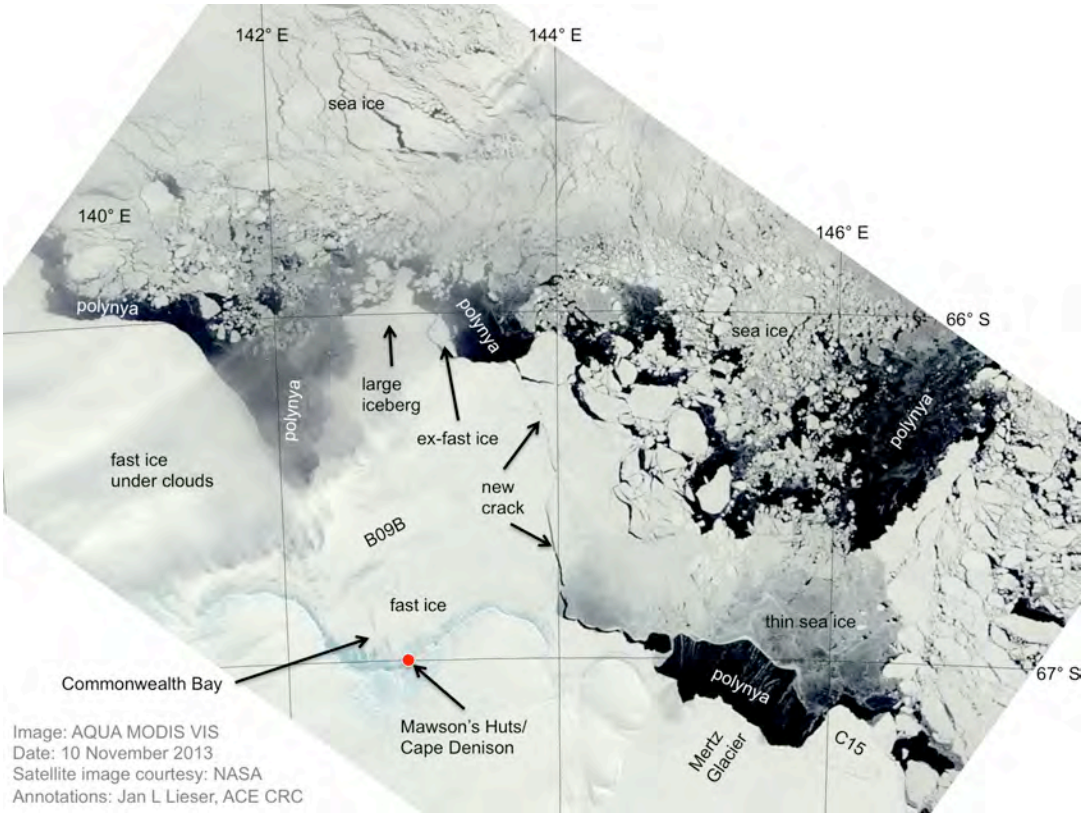

Figure 2: MODIS image, acquired 10/11/2013 and provided by NASA.

Sea Ice Report #14/2013

by the AAD/ACE CRC Sea Ice Group

14/11/2013

This report provides an overview on the sea ice conditions northeast of Davis Station.

- **Davis Station**
  The region northeast of Davis Station is currently under clouds of varying opacity, see Figure 1. The thin red line in the figure indicates the recent cruise track of *Aurora Australis*. The northern bit shows the southbound leg towards Davis Station, the southern open-ended one shows the current northbound transit.

  The yellow line gives roughly the transition zone between large and very large floes at high concentration south of the line, and smaller floes with reduced concentration north of that line. The dashed end of the yellow line is only indicative, as the clouds are obscuring the view dramatically in that region.

  The sea ice drift in the vicinity of *Aurora Australis*' current position was about 8 nm in a southwesterly direction per day over the last three days. That part of the polynya has now filled with large floes. At the same time, a few cracks and leads opened in northwest-southeast direction. Further north at about 65° S and 81° E, and further east of the ship's current position, some very large floes can be detected through the cloud cover. There are also a few cracks shining through the clouds, however pinch points likely occur at floe edges.

  The area marked as 'ex-fast ice' in Figure 1 refers to the same region as marked in Figure 1 of Sea Ice Report #13/2013. The maximum gap between this slab of ex-land fast sea ice and the West Ice Shelf was about 8 nm on 08/11/2013. Fourtyeight hours later, this gap had closed and the slab of had moved back into the place where it was land fast before. At the same time it appears to have shattered into many small floes, likely due to mechanical failure. This reflects the potential force driving this drift in the region.

With best regards,

Jan, for the sea ice group.

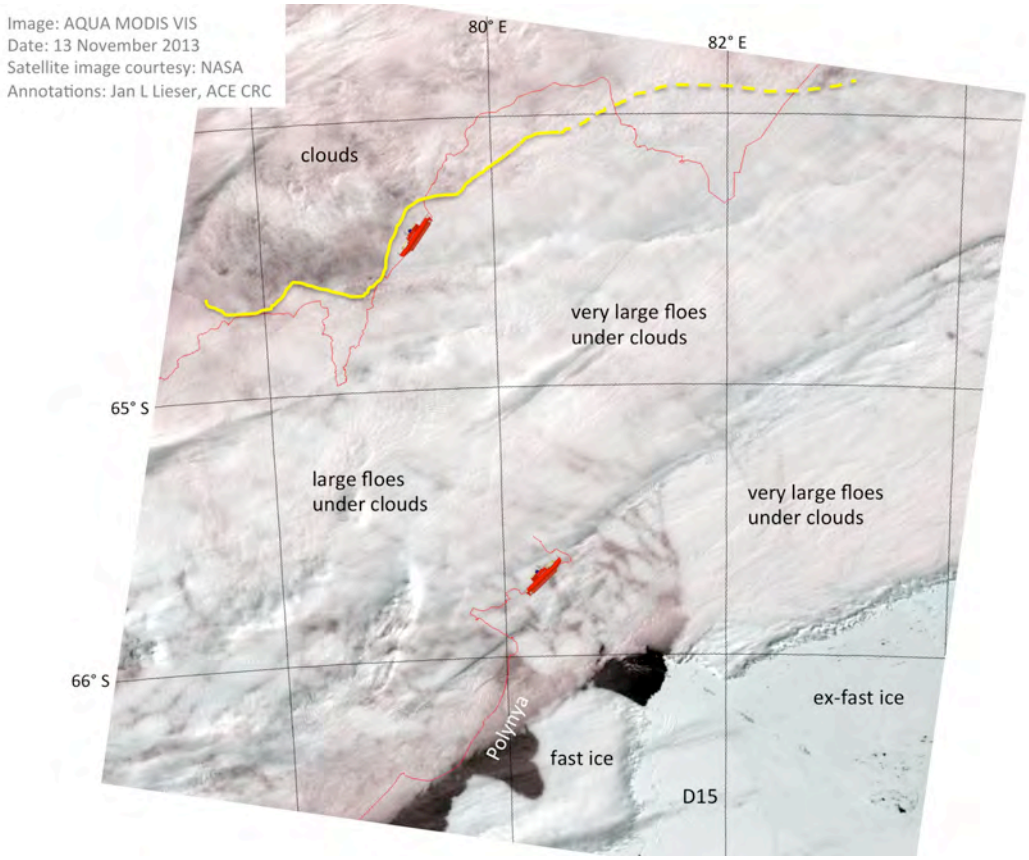

Figure 1: MODIS image, acquired 13/11/2013 and provided by NASA.

Sea Ice Report #14a/2013

by the AAD/ACE CRC Sea Ice Group

19/11/2013

This report provides a brief update on the sea ice conditions northeast of Davis Station.

- **Davis Station**
  Figure 1 shows a colour-coded sea ice concentration map for the region northeast of Davis Station. The thin red line denotes the recent cruise track of *Aurora Australis* in the area. The vessel is currently located in the middle of the high concentration patch at about 65° 36' S and 79° 45' E.

With best regards,

Jan, for the sea ice group.

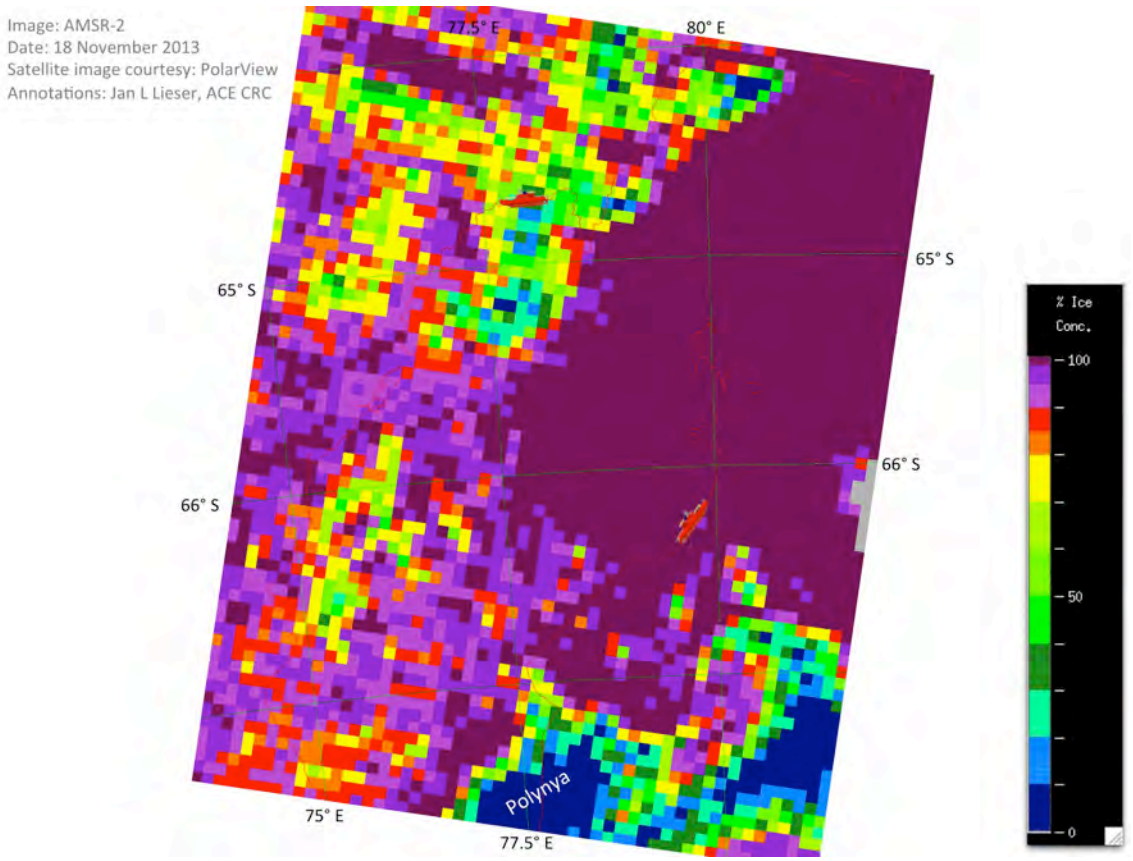

Figure 1: AMSR-2 image, acquired 18/11/2013 and provided by PolarView.

Sea Ice Report #15/2013

by the AAD/ACE CRC Sea Ice Group

21/11/2013

This report provides a review of the sea ice conditions north of Davis Station.

- **Davis Station**
  All figures included in this report show the same detail north of Davis Station, as yesterday. The synopsis of data from the three different sensors provides a very good overview of the sea ice conditions in the area. The thin red line shows the recent cruise track of *Aurora Australis*. The western track was southbound towards Davis Station, the eastern, open ended one is out of Davis Station up to her current location.

  Over the past few days, sea ice concentration maps show a growing area of 100% sea ice concentration north of Davis Station (see Figure 1 and Sea Ice Report #14a/2013). Even though winds have only been light from the north recently, it was still enough to close most of the gaps between sea ice floes on the relatively coarse scale of the microwave data. However, visual imagery from *Aurora Australis*' web-cams indicates that the pack ice is currently under low stress (horizontal pressure), with small cracks still open around the ship.

  Figures 2 and 3 are high resolution images. They are complementing each other in that the cloud free part of the MODIS image (Figure 2) was not captured by the RADAR (Figure 3), and the RADAR image provides a clear view of the cloud covered part of the MODIS image.

  To the west of about 76° E, very large individual sea ice floes can be identified, especially south of 66° S. But again, this area appears to be under very low horizontal pressure, as open water can be seen almost all around those very large floes. North of 66° S at the same longitude, sea ice floes tend to be smaller and more scattered up until about 65° S where they transition into the marginal ice zone.

  Between 76° E and 80° E (and beyond), the sea ice is much more consolidated and closed up. The polynya north of the fast ice northeast of Four Ladies Bank has closed almost completely, with only small pockets of thin ice remaining (this region is annotated 'ex-Polynya, now closed' in Figures 2 and 3). About two days ago, with the general southward drift and wind conditions, a large part of the above mentioned fast ice (which is still attached to the western side of iceberg D15) broke away and has changed the ice scape of the northeastern end of the polynya. It is annotated 'ex-fast ice' in Figures 2 and 3.

  The shortest distance between *Aurora Australis*' current position and the transition into the marginal ice zone is about 56 nautical miles at 310 degrees (northwest direction) as indicated by the orange line in

Figures 2 and 3. This direction is roughly lining up with the major lead orientation between the larger sea ice floes (which can be seen in the RADAR image, Figure 3), even though they have mostly closed up now, and tend to curve slightly towards more westerly than northwesterly directions.

In the northeastern corner of the RADAR image (Figure 3), some large old sea ice floes can be seen in dark grey. This area is the western end of a bigger tongue of those floes stretching from about 65° 20' S and 80° E to 64° S and 86° E and beyond (outside Figure 3). All this is moving with the general drift in westerly to southwesterly direction.

Not shown in the figures of this report is the region of the marginal ice zone, just north of 64° S at 80° E and further east from there along 64° S. To the west of 80° E, the transition zone follows in southwest direction roughly down to 65° S at 78° E.

With best regards,

Jan, for the sea ice group.

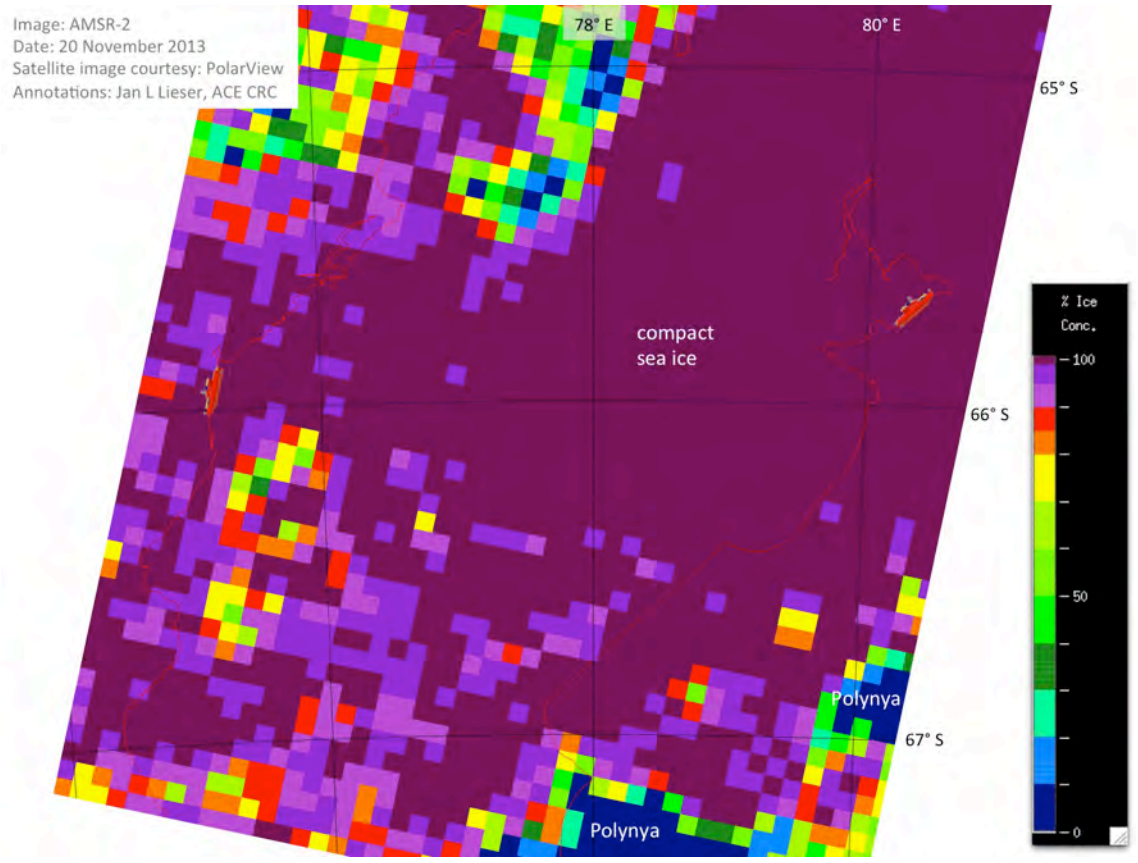

Figure 1: AMSR-2 image, acquired 20/11/2013 and provided by PolarView.

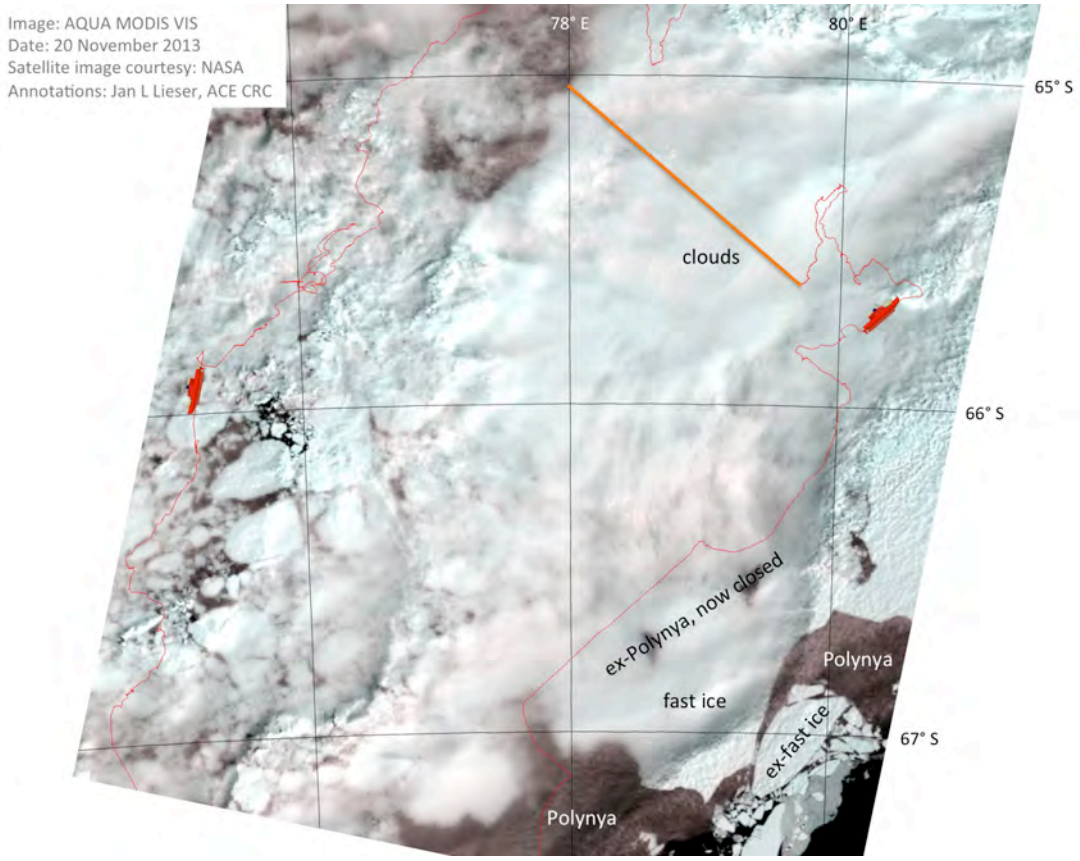

Figure 2: MODIS image, acquired 20/11/2013 and provided by NASA.

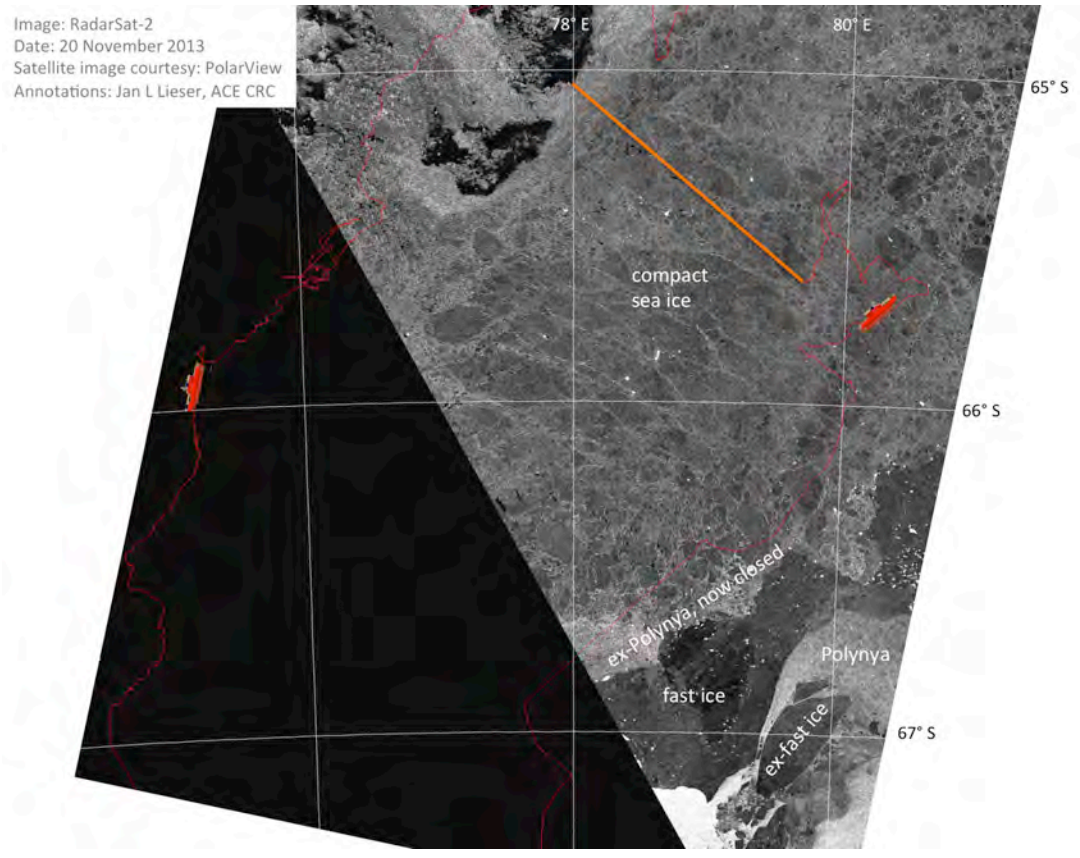

Figure 3: RadarSat-2 image, acquired 20/11/2013, provided by PolarView.

Sea Ice Report #15a/2013

by the AAD/ACE CRC Sea Ice Group

25/11/2013

This report provides an update of the sea ice conditions northeast of Davis Station.

- **Davis Station**
  During the past few days, clouds obscured MODIS' view on the sea ice in the vicinity of the current location of *Aurora Australis*. Figure 1 shows a RADAR image of the area, unaffected by cloud cover, acquired on 23/11/2013. The thin white line shows the ship's recent track in the area. The blue scribble line denotes the transition of the compact sea ice cover south of the line, and the marginal ice zone in the north. The shortest distance to the ice edge is nearly 60 nautical miles at 300 degrees. Due north, that distance is about 100 nautical miles.

  The net drift of the sea ice cover in the region was approximately three nautical miles in northerly directions between 20/11/2013 and 23/11/2013 (the two recent RadarSat data acquisitions). This is consistent with low westerly winds resulting in a net transport of the ocean's surface layer (the layer affected by wind) occurring at 90 degrees anticlockwise due to wind forcing (Ekman motion theory).

  The ship's current location is at the southwestern end of a tongue with large old ice floes, distinctively visible as darker rounded patches in the RADAR image (as marked in Figure 1). Northwest of the ship's current location, another band of such floes is also visible. Between these two ice regimes is an area of lighter grey, indicating higher surface roughness, possibly smaller floes, but more deformed. This rugged zone is roughly co-located with the slope front current, an upper ocean current following approximately the 1000 m bathymetry contour, typically manifesting in a shear zone in the sea ice.

  Old cracks appear to the west of 80° E as long features of higher reflectivity (lighter grey), and are enhanced by yellow scribble lines in Figure1.

With best regards,

Jan, for the sea ice group.

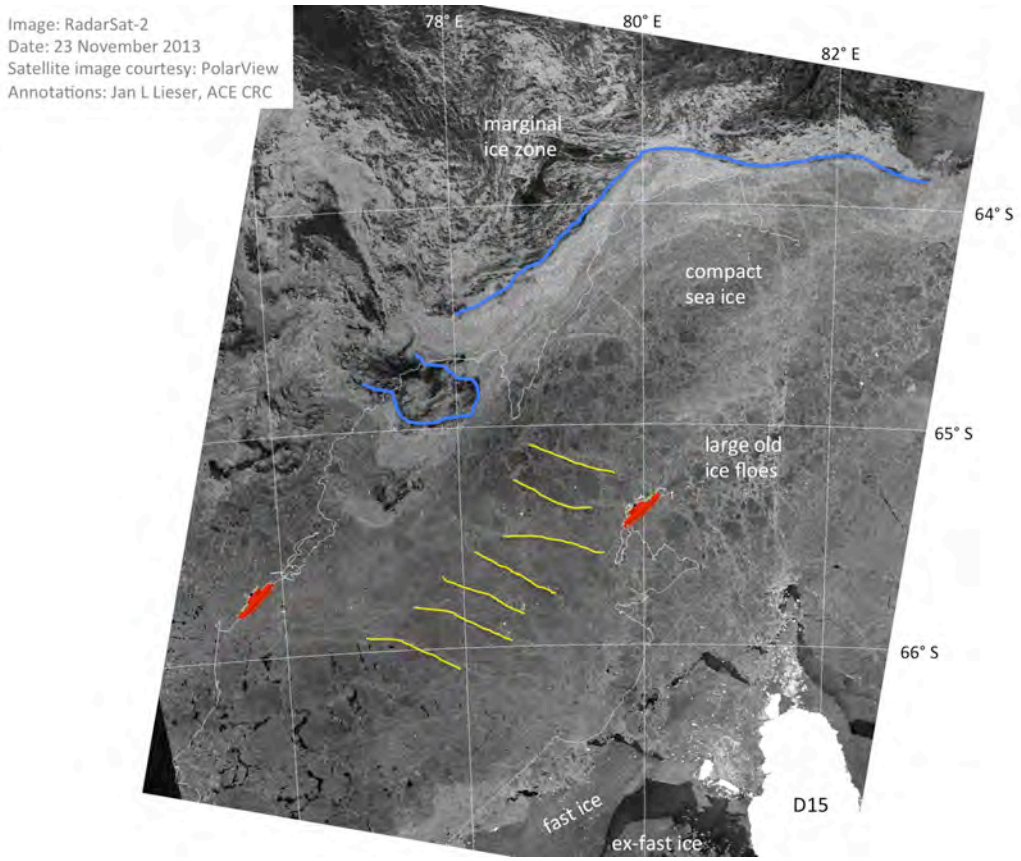

Figure 1: RadarSat-2 image, acquired 23/11/2013 and provided by PolarView.

Sea Ice Report #16/2013

by the AAD/ACE CRC Sea Ice Group

28/11/2013

Today, we report on the sea ice conditions around *Aurora Australis* north of Davis Station.

- **Davis Station**
  Figure 1 shows a high resolution RADAR image acquired yesterday. Pixel resolution is about 50 m. The thin red line denotes the recent progress of *Aurora Australis* in the region.

  In the southeastern corner of the image, large old floes can be seen as dark round patches. Ahead of the ship's heading north is an area of high reflectivity (lighter grey), indicating high roughness. Former leads and fault lines can be seen as white (very high reflectivity) linear features, slightly curved in many different directions.

  The recent low pressure system passing north of 64° S has consolidated the ice edge (the blue scribble line in Figure 1) and pushed it south by about nine nautical miles since 24/11/2013.

  The group of icebergs marked with a yellow lasso (Figure 1) have moved between four and five nautical miles in southwesterly direction in the 21 hours between the most recent RadarSat acquisitions (yesterday and the day before). Further south, some large floes have moved about eight nautical miles in the same direction during the same time.

With best regards,

Jan, for the sea ice group.

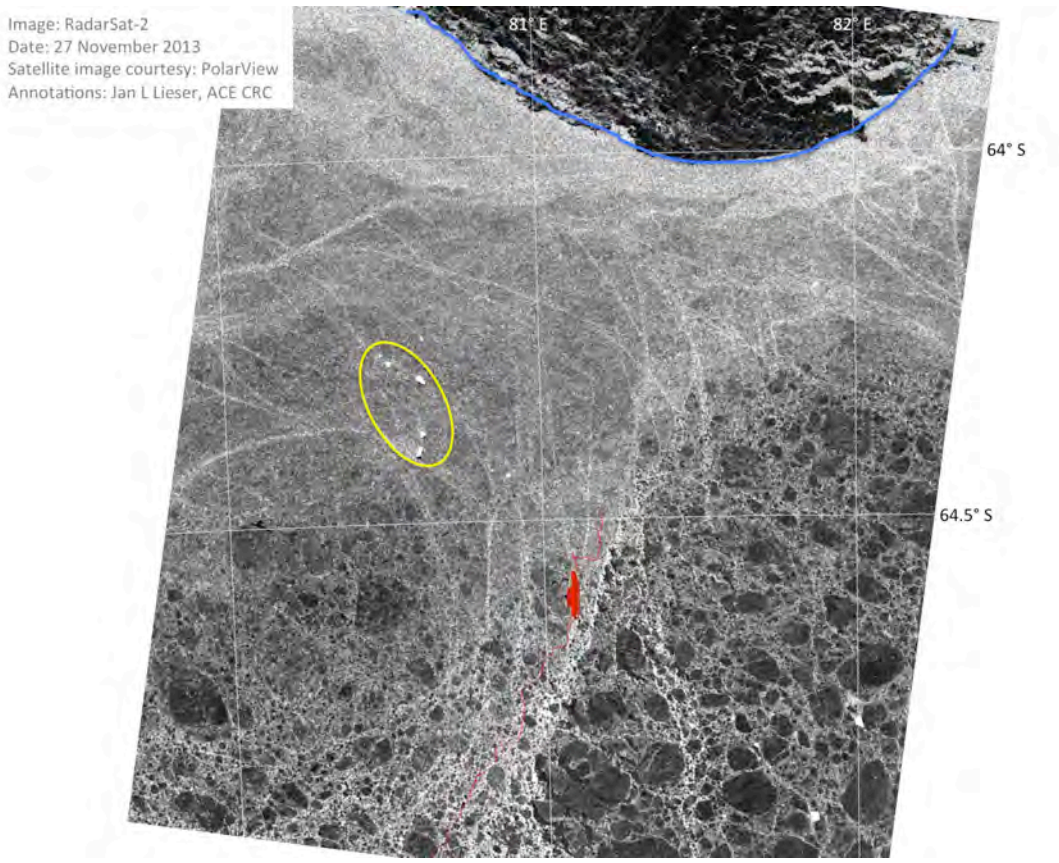

Figure 1: RadarSat-2 image, acquired 27/11/2013, provided by PolarView.

Sea Ice Report #16a/2013

by the AAD/ACE CRC Sea Ice Group

28/11/2013

This update reports briefly on the sea ice conditions around Mawson and Casey stations.

- **Mawson Station**
  Figure 1 shows a moderate resolution (1 km pixel size) visible image of the sea ice zone off Mawson Station. It is the most recent image with only thin clouds, allowing a glimpse on the sea ice conditions. Since 24/11/2013, thicker cloud cover obscures the sea ice.

  The sea ice appears still compact and with high concentration. North of the station, the southernmost location of the ice edge is at 65° S between 64° E and 65° E. A large patch of open water is located at about 66° 45' S and 62° E.

  More scattered sea ice with open water patches shining through the clouds can be seen east of 66° E up to about 71° E. The Cape Darnley polynya seems well maintained.

- **Casey Station**
  Figure 2 shows a moderate resolution (1 km pixel size) visible image of the sea ice zone off Casey Station. Almost the entire scene is under a thin cloud cover.

  The sea ice edge is roughly located at about 62° S. Between two bands of slightly thicker clouds (marked in the figure), the sea ice appears loose with large patches of open water in between.

  The polynya between 65° S and the coast and between 102° 30' E and roughly 115° E appears stable, although some large sea ice floes might still exist in the region.

With best regards,

Jan, for the sea ice group.

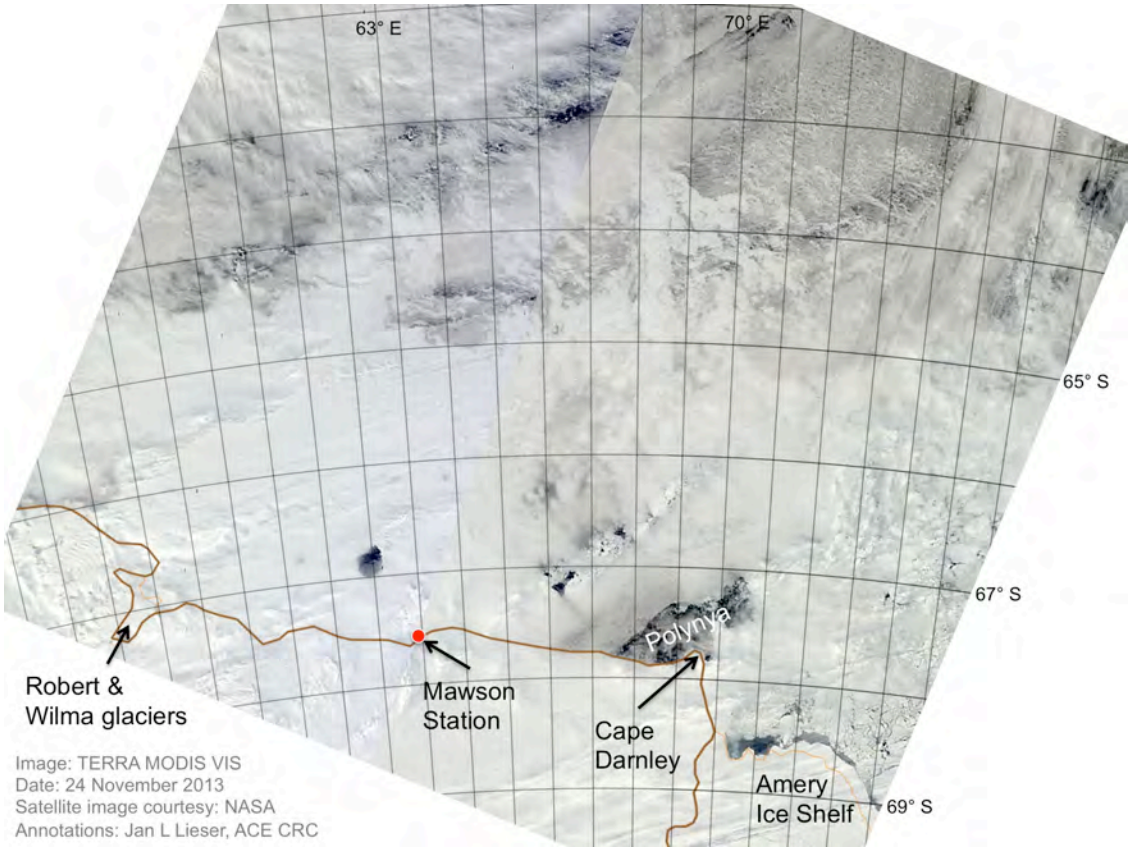

Figure 1: MODIS image, acquired 24/11/2013 and provided by NASA.

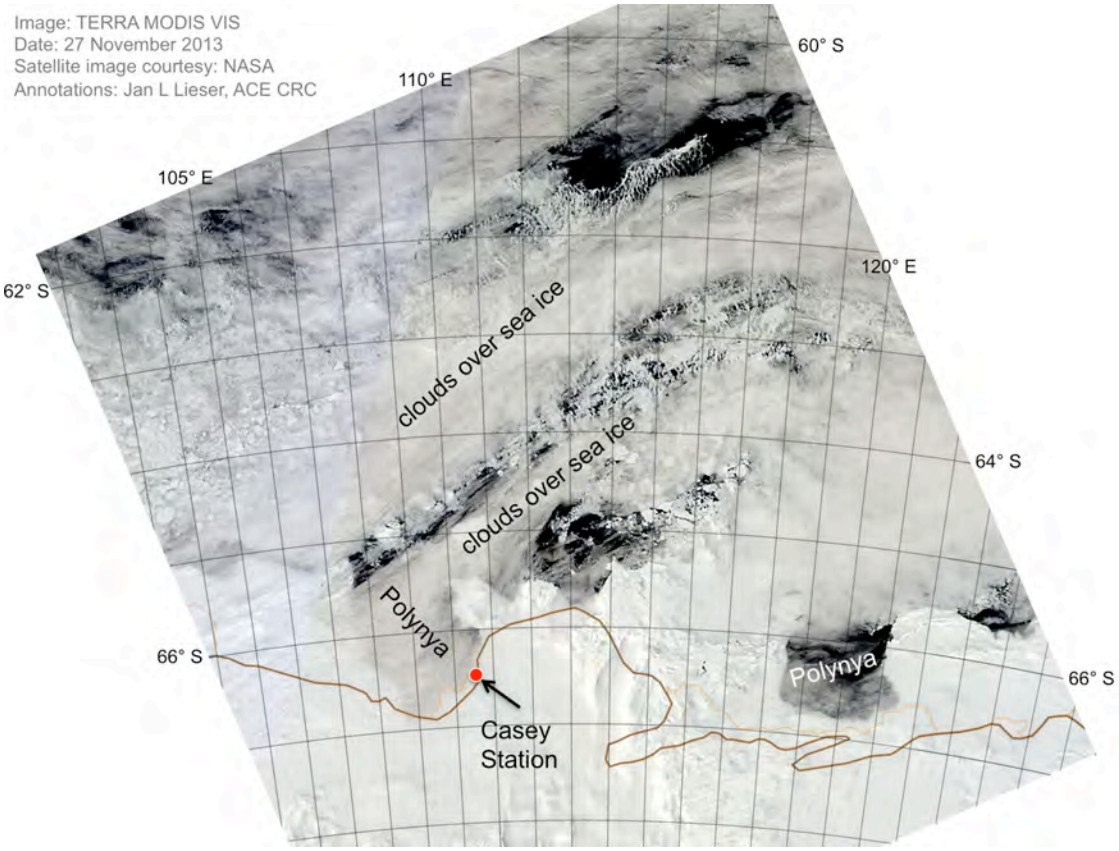

Figure 2: MODIS image, acquired 27/11/2013 and provided by NASA.

Sea Ice Report #16b/2013

by the AAD/ACE CRC Sea Ice Group

29/11/2013

This report provides an update on the sea ice conditions between Dumont D'Urville Station and Mertz Glacier.

- **Commonwealth Bay**
  Figure 1 provides an almost completely cloud free view on the sea ice in the Commonwealth Bay vicinity.

  The ice-scape is still largely dominated by the presence of iceberg B09B, grounded immediately north of Commonwealth Bay. The fast ice and its edge appears quite stable throughout November so far.

  The sea ice zone can be roughly categorised into three different regimes that are aligned more or less zonal (parallel to latitudes south). Between 66° S and the Antarctic coast, the region depicted in Figure 1, is characterised by fast ice and polynya activity. Further north, between 66° S and roughly 65° S, the sea ice zone consists of a dense sea ice pack with some very large sea ice floes in the mix. Further north again, the outer pack between 65° S and the yellow scribble line (Figure 1) appears more dynamic and some very large ice floes have recently disintegrated in that zone (since 24/11/2013).

  At the moment, the marginal ice zone extends as far north as about 63° S, but some meanders of sea ice filaments reach even beyond that, up to 62° S and further in some places.

  Two major polynyas are in the north and to the east of Commonwealth Bay. The direct (airborne) distance from the far corners of these polynyas (66° 31' S and 142° 08' E for the northern polynya; and 66° 51' S, 143° 59' E for the eastern polynya) to Cape Denison is roughly the same (approximately 32 nautical miles). On the ground (across the fast ice), however, the northern route would have to go around the westernmost corner of B09B, while the eastern route might follow the coastline around Cape Gray. Both routes add about two nautical miles to the travel distance.

With best regards,

Jan, for the sea ice group.

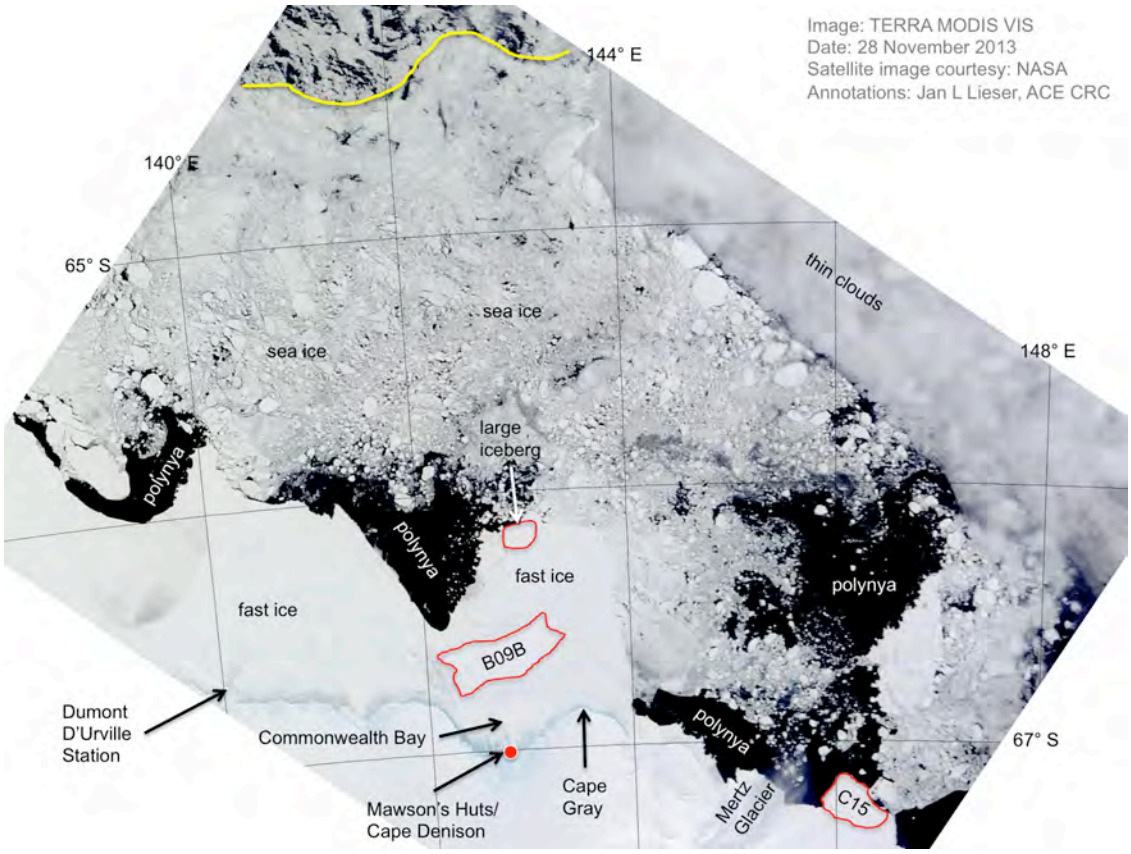

Figure 1: MODIS image, acquired 28/11/2013 and provided by NASA.

Sea Ice Report #17/2013

by the AAD/ACE CRC Sea Ice Group

05/12/2013

Today's report covers sea ice conditions off Casey Station and in Commonwealth Bay.

- **Casey Station**
  Figures 1 and 2 show the same frame of sea ice conditions between approximately 105° E and 125° E, as seen by the high-resolution MODIS and the coarser resolution AMSR-2 instruments, respectively, on 03/12/2013.

  Very open sea ice concentration (mostly between 50% and 75%; higher concentration only in isolated patches) can be seen in the region between approximately 108° E and 116° E. At the moment, the northern edge of the sea ice meanders between 62° S and 63° S. Only thin filaments of sea ice reach further north beyond 62° S, with the exception of one more compact patch centred roughly at 61° 45' S and 112° 15' E (see Figure 2). During the past few days, a low pressure system passed through the region and is expected to have spread the low ice concentration even further.

  Currently, fast ice remains largely intact between the coast and Petersen Bank (65° 47' S and 110° 47' E), and off the northeastern side of Law Dome (66° 44' S and 112° 50' E). At the face of Totten Glacier, a large area marked 'ex-fast ice' is broken into many pieces. This ex-fast ice had separated at some time between 18/10/13 and 20/10/13, and since then has been moved around inside the embayment, with only occasionally sea ice floes of various size escaping northward into the Antarctic coastal current.

- **Commonwealth Bay**
  During the past week, overall sea ice conditions have not changed significantly in Commonwealth Bay (Figure 3). The yellow squiggle line in Figure 3 denotes the approximate location of the transition zone between the marginal sea ice zone and the pack ice. Sea ice can be seen north of 62° S in places.

  The only noteworthy change since last week is the break-up of some substantial pieces of fast ice on 02/12/2013, marked with white lassos in Figure 3. However, this break-up has not shifted the location of 'nearest open water to Cape Denison', which was discussed in Sea Ice Report #16b/2013.

With best regards,

Jan, for the sea ice group.

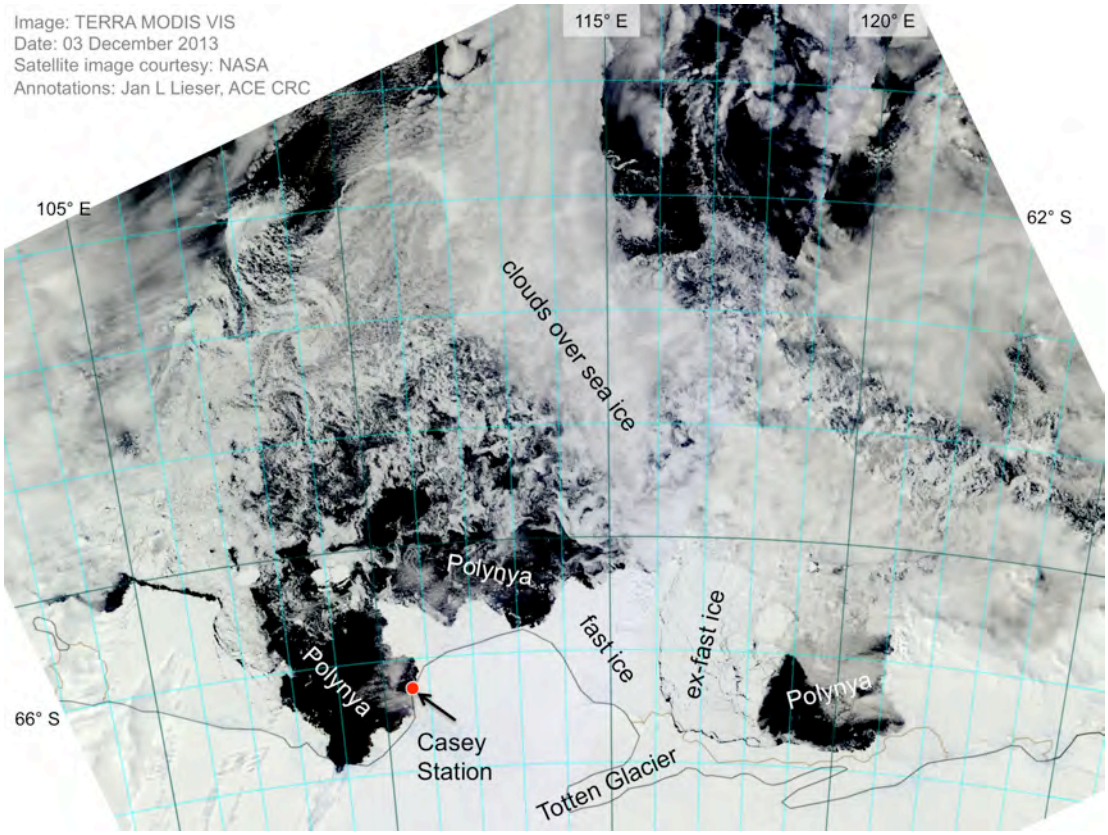

Figure 1: MODIS image, acquired 03/12/2013 and provided by NASA.

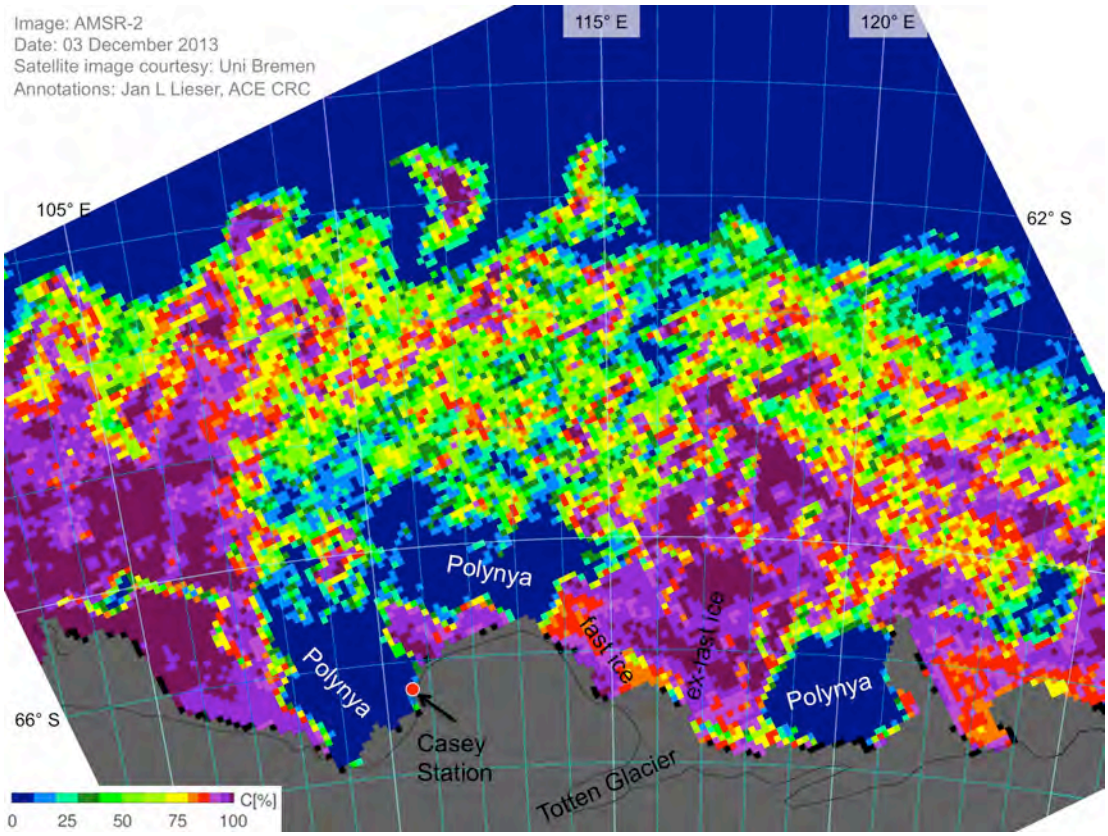

Figure 2: AMSR-2 image, acquired 03/12/2013 and provided by Universität Bremen.

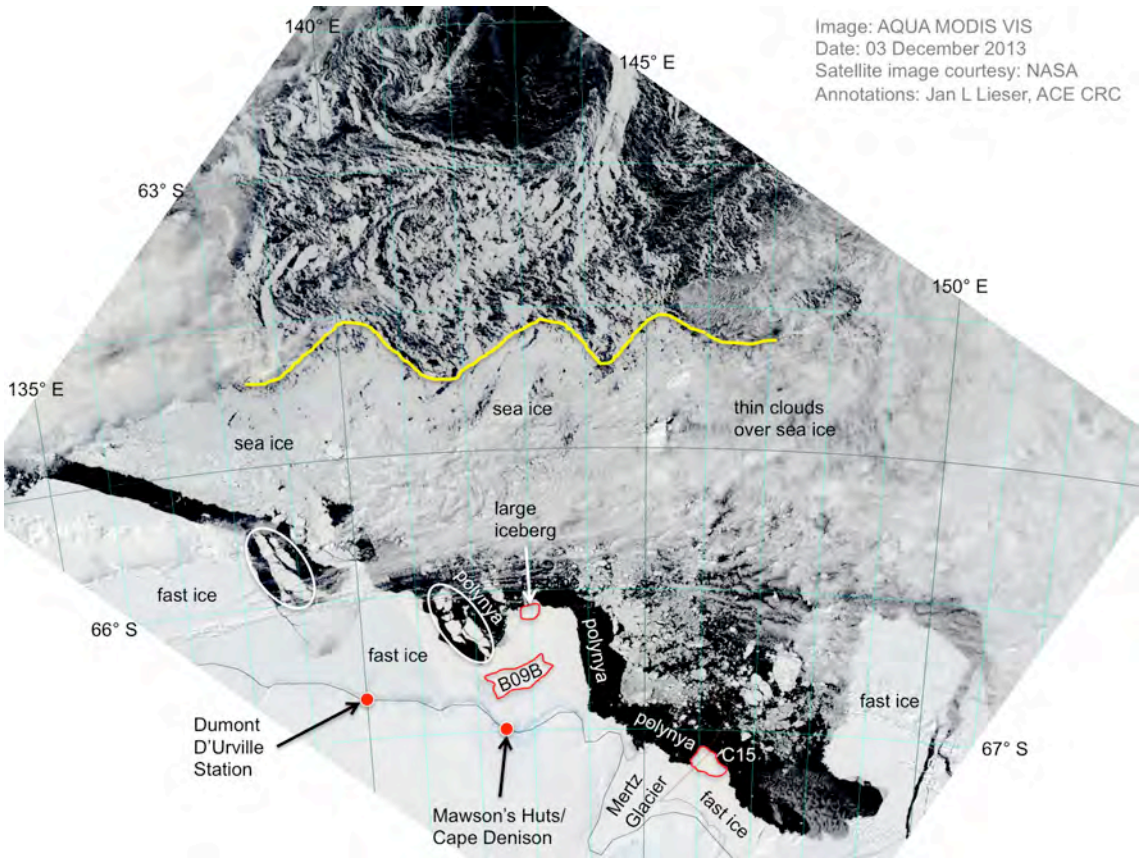

Figure 3: MODIS image, acquired 03/12/2013 and provided by NASA.

Sea Ice Report #17a/2013

by the AAD/ACE CRC Sea Ice Group

06/12/2013

Today's report updates on sea ice conditions off Mawson Station.

- **Mawson Station**
  Figures 1 and 2 show the same frame of sea ice conditions between Mawson Station and Cape Darnely, as seen by the high-resolution MODIS and the coarser resolution AMSR-2 instruments, respectively, yesterday.

  North of Mawson Station, the fast ice remains still intact and, at the moment, the shortest distance between open water in the northern polynya (at about 67° 00 S and 62° 00' E) and the station is about 41.5 nautical miles.

  Between 66° S and 67° S and 63° E and 68° E is a band of high sea ice concentration, which separates the fast ice (and polynya) north of Mawson Station in the west and the Cape Darnley polynya in the east from the more loose and patchy sea ice north of 66° S.

  Further west along the coast (outside the figures), iceberg B15T still remains at 57° 21' E and 65° 54' S.

With best regards,

Jan, for the sea ice group.

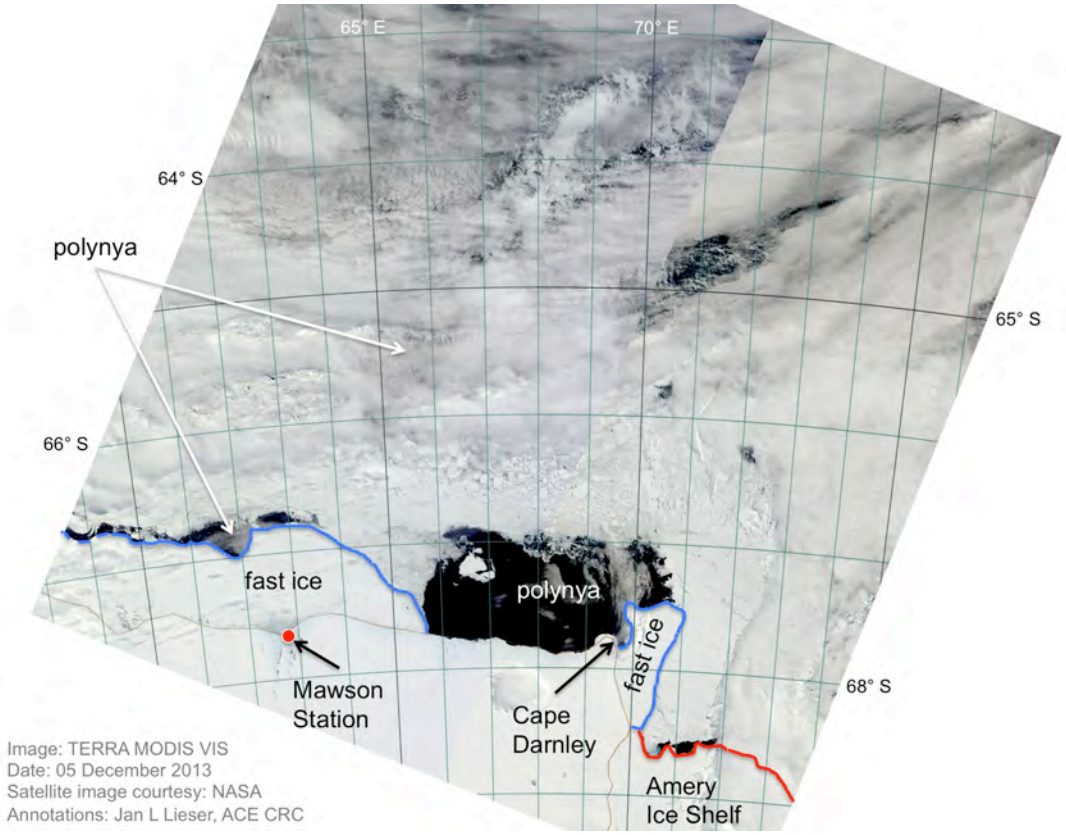

Figure 1: MODIS image, acquired 05/12/2013 and provided by NASA.

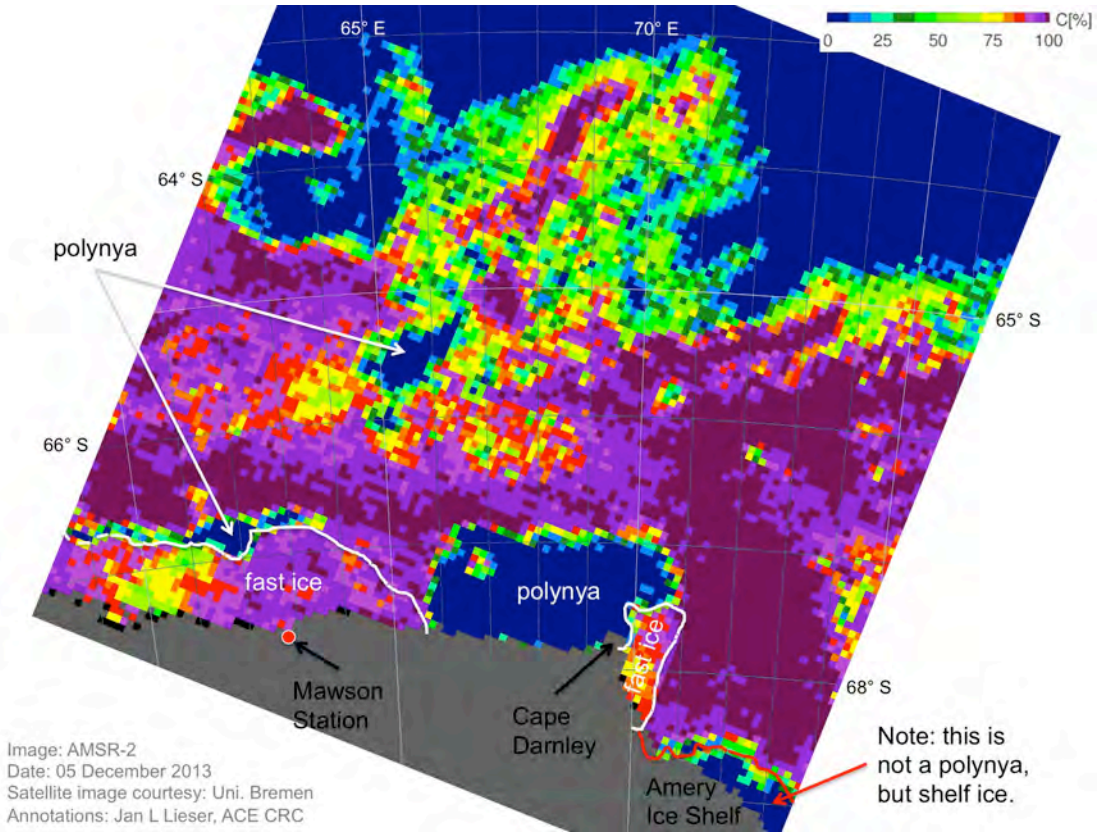

Figure 2: AMSR-2 image, acquired 05/12/2013 and provided by Universität Bremen.

Sea Ice Report #18/2013

by the AAD/ACE CRC Sea Ice Group

12/12/2013

Today's report covers sea ice conditions off Casey Station.

- **Casey Station**
  Sea ice conditions in the vicinity of Casey Station can be seen in Figures 1 and 2. Two days ago, the visible image from MODIS sensor shows a corridor of very open sea ice conditions roughly between 110° E and 116° E. This corridor was widening during the past week, and has currently further reducing sea ice concentration.

  The fast ice attached to Budd Coast off the northeastern and northwestern flanks of Law Dome (the latter covering Petersen Bank) remains intact at the moment.

  North of Totten Glacier, the fast ice edge appears to align very close with the longitude of 116° E. To the east of that longitude and south of 65° S, ex-fast ice remains local.

  The slightly coarser resolution microwave image shown in Figure 2 covers the same frame as Figure 1, plus extents a bit further east. The polynya that would lead to the face of Totten Glacier is closed off in the north, with some areas still showing between 90% and 100% ice concentration, and the face itself is still buttressed by sea ice/ex-fast ice.

With best regards,

Jan, for the sea ice group.

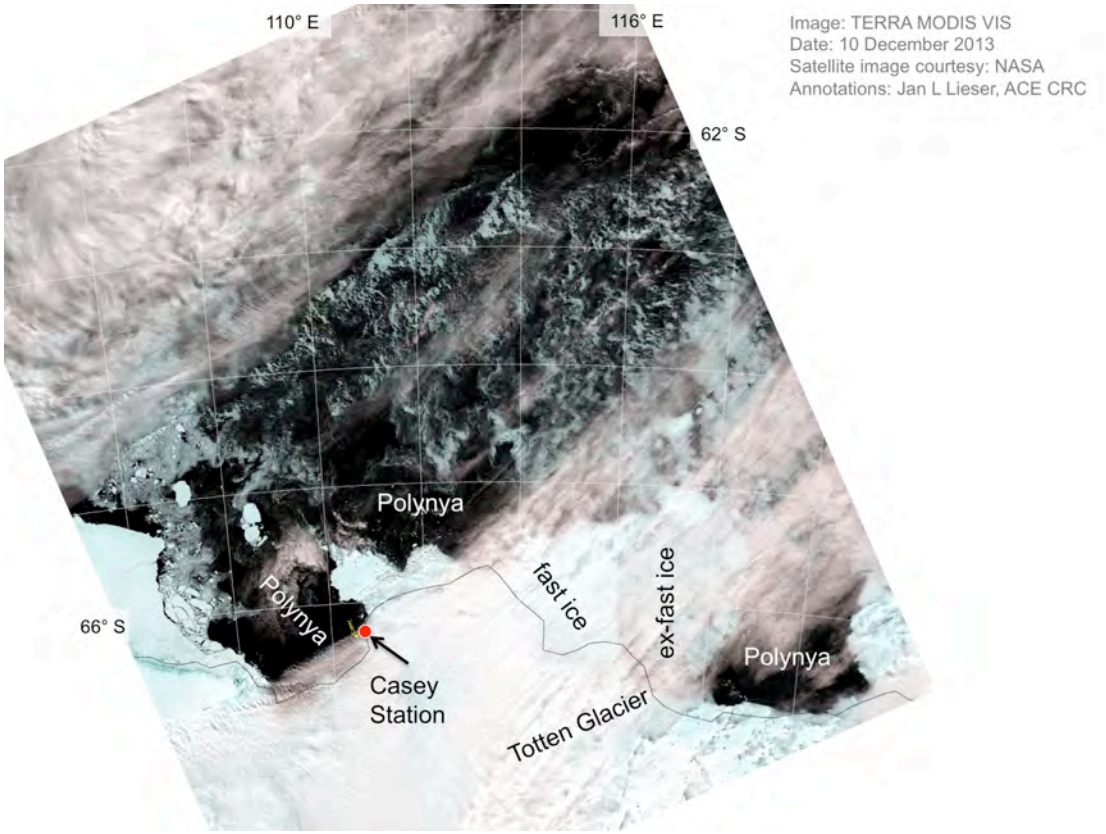

Figure 1: MODIS image, acquired 10/12/2013 and provided by NASA.

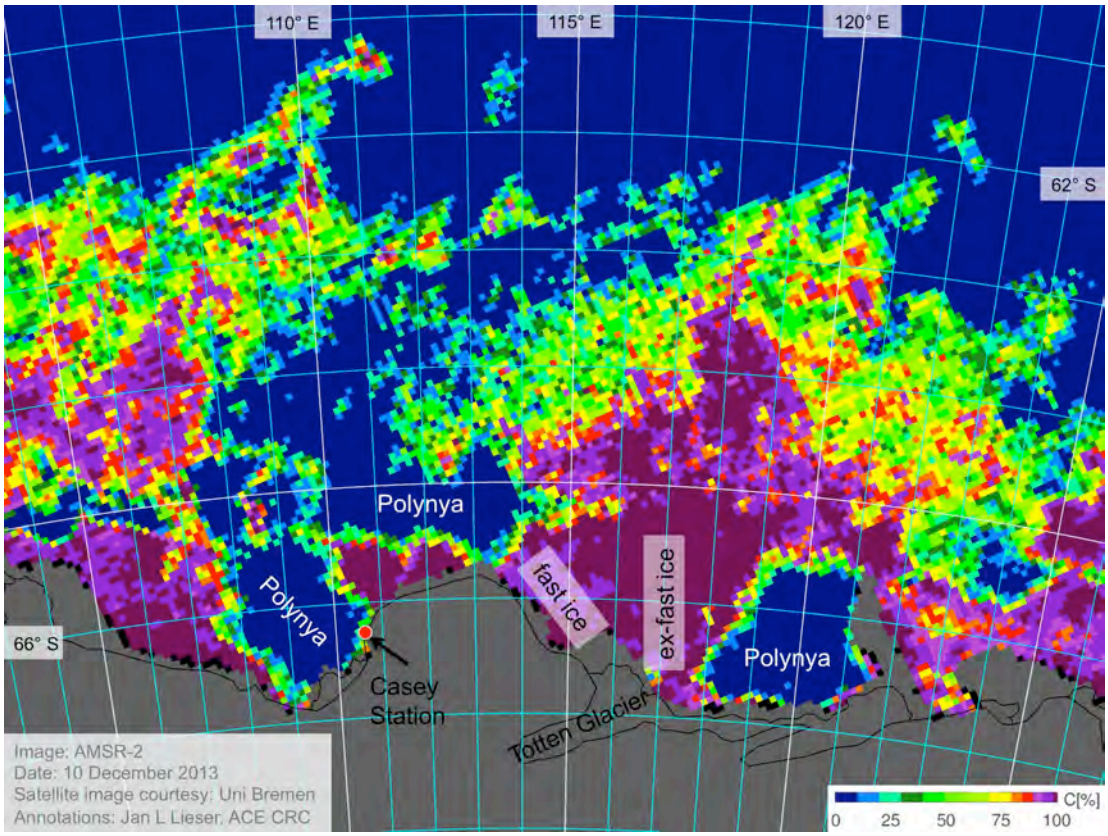

Figure 2: AMSR-2 image, acquired 10/12/2013 and provided by Universität Bremen.

Sea Ice Report #18a/2013

by the AAD/ACE CRC Sea Ice Group

16/12/2013

This report provides an update on the sea ice conditions between Dumont D'Urville Station and Mertz Glacier.

- **Commonwealth Bay**
  Figure 1 shows an almost completely cloud free view on the sea ice in the Commonwealth Bay vicinity.

  From west to east, three large polynya regions are clearly visible to the northwest of Dumont D'Urville Station, to the north of Commonwealth Bay and B09B, and off the face of Mertz Glacier. The fast ice edges have retreated very slightly in some places, but remain largely unchanged since our last report #17/2013. The sea ice has responded to wind forcing and moved within the polynyas. A recent change to westerly wind directions has opened a gap (lead) between the eastern edge of the fast ice surrounding B09B and the pack ice. Some very large floes can be identified in that pack ice matrix. The large icebergs denoted in Figure 1 remain unmoved.

  North of 66° S and east of 144° E, sea ice can be seen not only responding to winds, but also to oceanic eddies with lots of meanders spinning. Further west and between 65° S and 66° S, sea ice appears a little more compact, but the thin cloud cover obscures the view.

  Overall, the whole sea ice zone of Figure 1 seems under low horizontal pressure currently, even though pack ice concentration remains high (up to 90% to 100%) in some regions.

With best regards,

Jan, for the sea ice group.

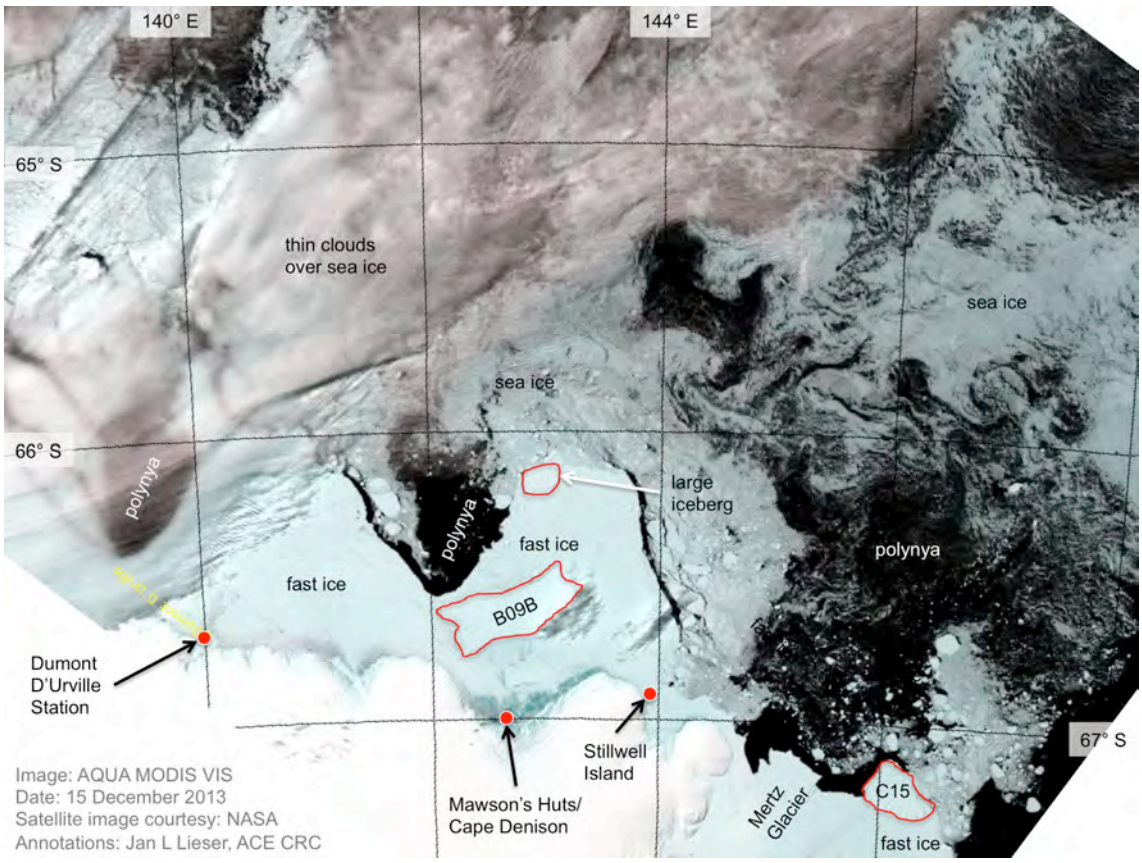

Figure 1: MODIS image, acquired 15/12/2013 and provided by NASA.

Sea Ice Report #19/2013

by the AAD/ACE CRC Sea Ice Group

19/12/2013

Today's report covers sea ice conditions off Casey Station and Commonwealth Bay.

- **Casey Station**
  Sea ice conditions north of Casey Station have eased further during the past week. The recent microwave sea ice concentration data show only little and very patchy sea ice fields, generally below 50% ice concentration.

  Even though the view is obscured by clouds in the visible spectrum during the past few days, Figure 1 shows yesterday's MODIS image of interest with respect to the front of Totten Glacier. The ex-fast ice has moved around a few times, and the polynya off the face of the glacier now shows up in the coarse microwave data as well. Between 115° E and 120° E, and below 65° S, some individual floes can be seen through the cloud cover. One very large floe (marked in Figure 1) has managed to escape the embayment and is now located off the northeastern tip of the fast ice off the eastern flank of Law Dome.

- **Commonwealth Bay**
  The sea ice zone off Commonwealth Bay and towards Mertz Glacier has been cloud covered over the past days as well. However, microwave data show generally lower sea ice concentrations north of 66° 10' S, and between about 142° E and 146° E. Only isolated patches of 90% ice concentration or more remain in the pack ice zone. Commonwealth Bay and iceberg B09B are still enclosed by fast ice.

  The face of Mertz Glacier appears sea ice free and the polynya well maintained.

With best regards,

Jan, for the sea ice group.

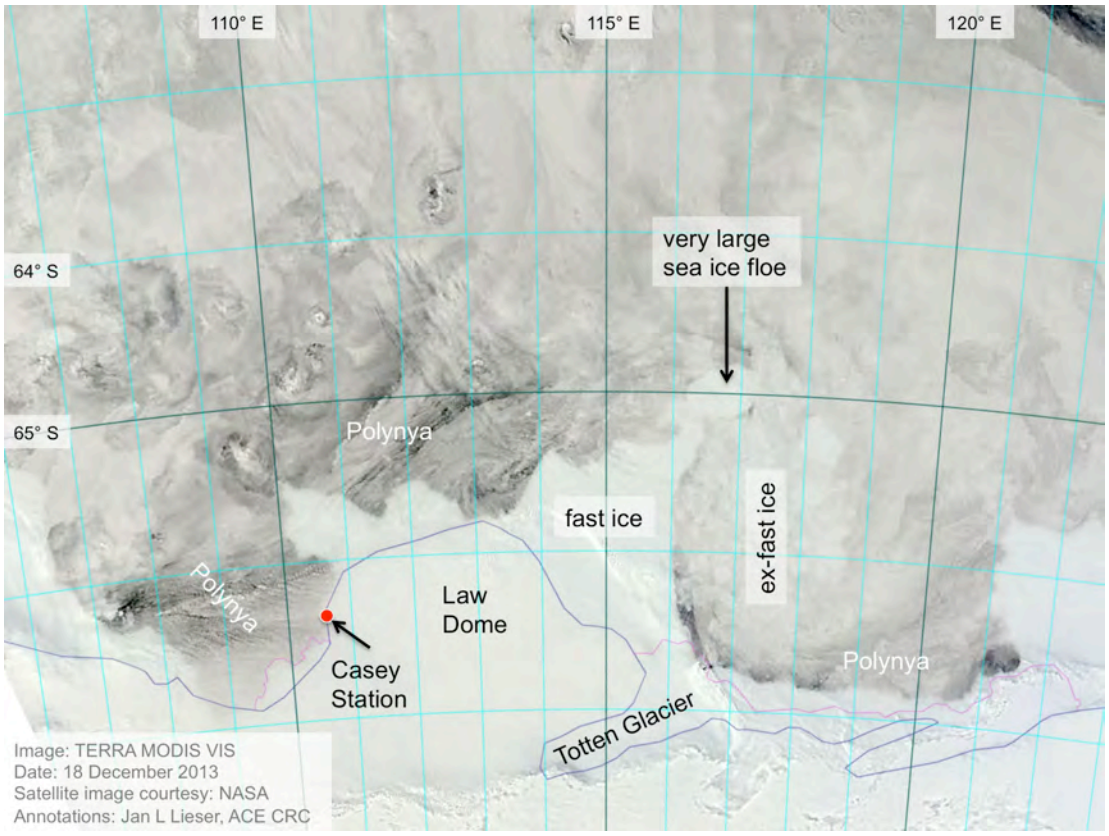

Figure 1: MODIS image, acquired 18/12/2013 and provided by NASA.

Sea Ice Report #19a/2013

by the AAD/ACE CRC Sea Ice Group

22/12/2013

Today's update covers sea ice conditions off Mawson Station.

- **Mawson Station**
  The shape of the fast ice off Mawson Station has not changed significantly, since our last report #17a/2013. The edge of the fast ice is still roughly the same distance from the station, where the closest point to water is the southernmost end of the embayment northwest of the station at about 67° S and 62° E. From that point, the distance to Mawson Station is about 41 nm.

  The polynya to the east of Mawson Station towards Cape Darnely has widened markedly, and the pack ice appears completely detached from the fast ice up to iceberg B15T in the west, with a lead/polynya showing up clearly in the visible MODIS image (FIgure 1), and in the microwave sea ice concentration data (Figure 2).

  Between 65° E and 70° E, a band of high concentration sea ice with a width of about one degree in latitude separates the Cape Darnely polynya from the marginal ice zone and the open ocean.

Merry Christmas,

Jan, for the sea ice group.

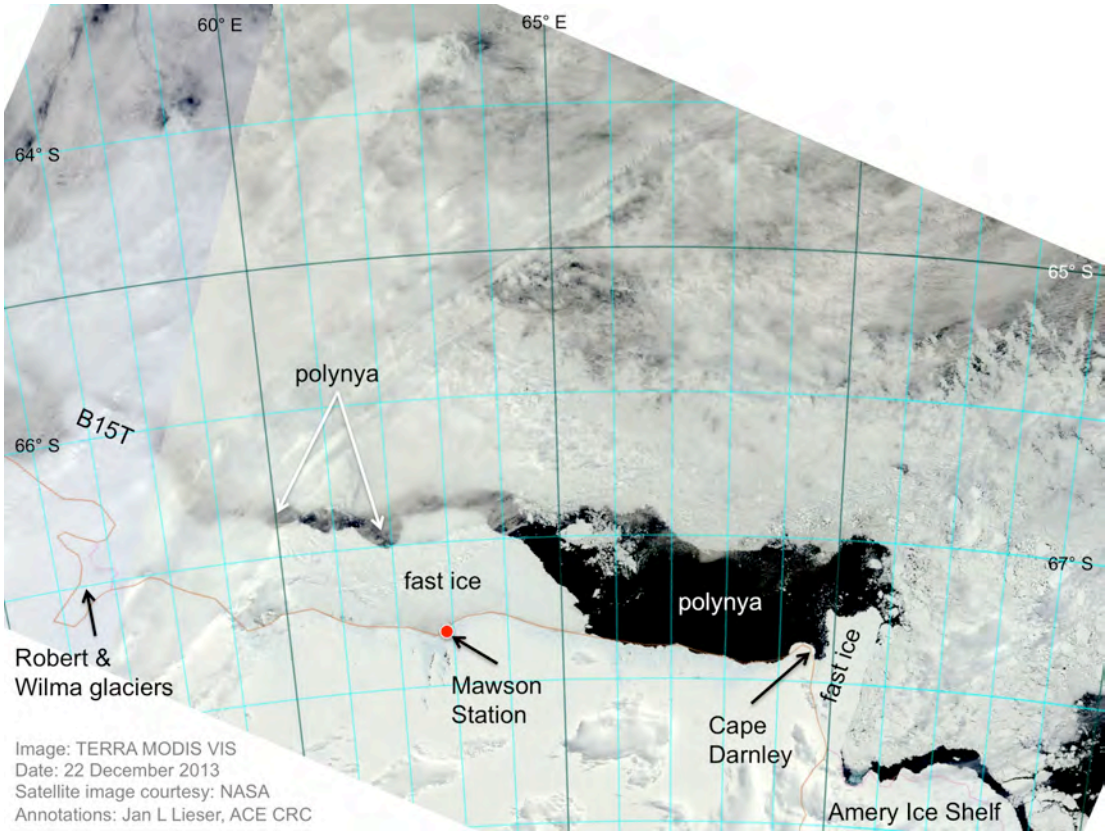

Figure 1: MODIS image, acquired 22/12/2013 and provided by NASA.

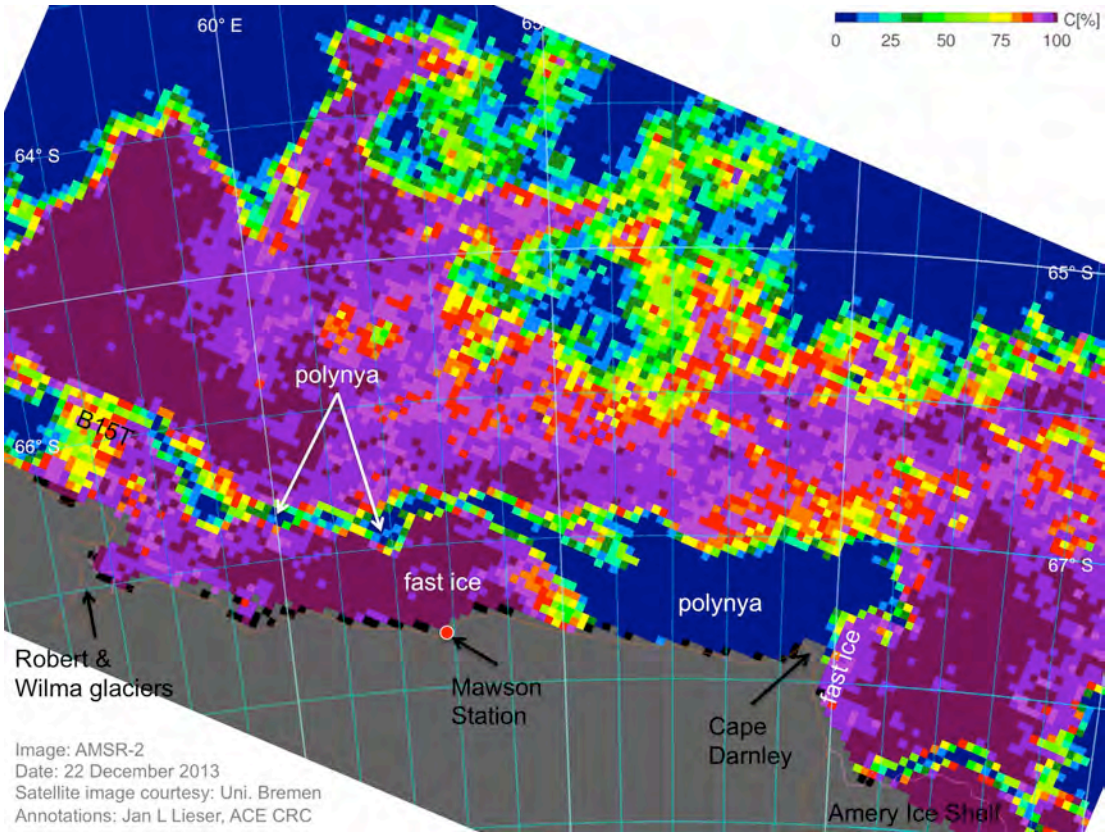

Figure 2: AMSR-2 image, acquired 22/12/2013 and provided by Universität Bremen.

Sea Ice Report #19b/2013

by the AAD/ACE CRC Sea Ice Group

24/12/2013

Today's update covers sea ice conditions off Casey Station and Totten Glacier.

- **Casey Station**
  Only very isolated and scattered sea ice floes remain in a sector between roughly 108° E and 114° E, north of Casey Station.

  While most of the scene of Figure 1 is slightly obscured by clouds, the face of Totten Glacier and all of Sabrina Coast up to the Moscow University Ice Shelf appears cloud free. Over the past five days, the ex-fast ice between 116° E and 119° E and south of 65° S has moved slightly northward. The very large sea ice floe (annotated in Figure 1) has rotated anti-clockwise by about 30 degrees and the southwestern corner has broken off. All the sea ice (ex-fast ice) immediately in front of Totten Glacier seems to be disintegrating into smaller floes, and the polynya widening.

Best regards,

Jan, for the sea ice group.

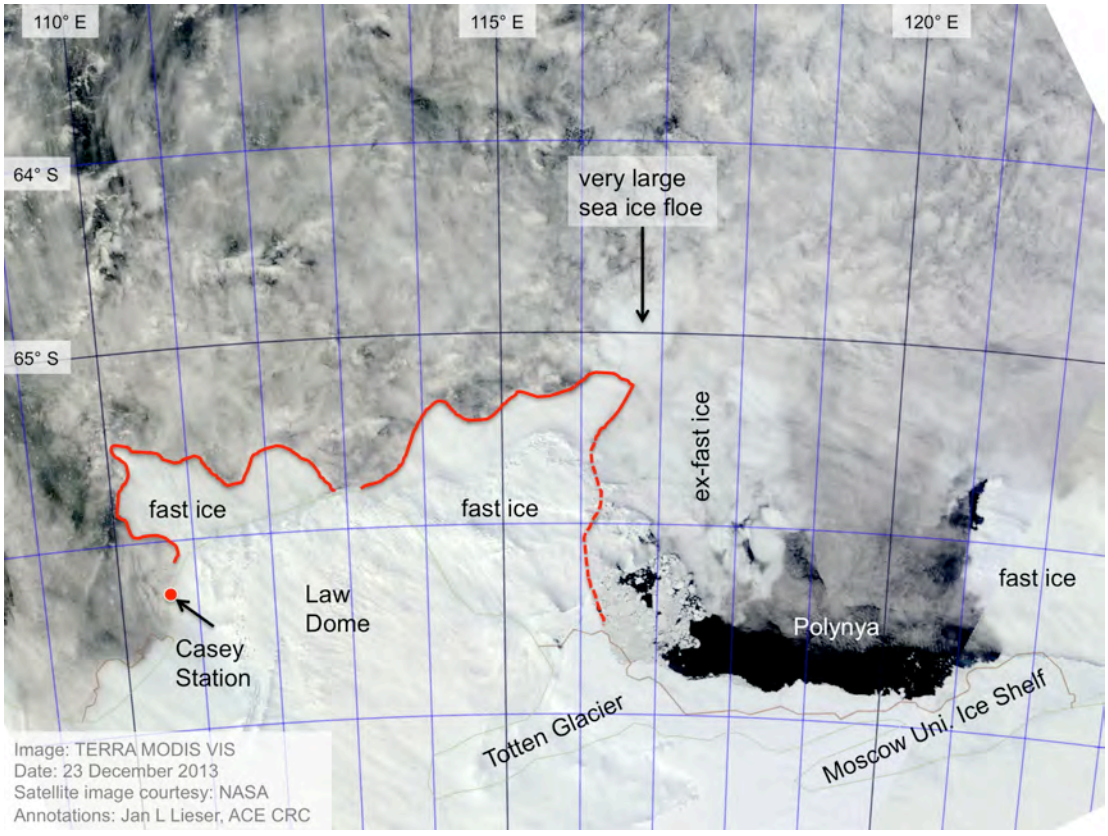

Figure 1: MODIS image, acquired 23/12/2013 and provided by NASA.

Sea Ice Report #20/2013

by the AAD/ACE CRC Sea Ice Group

26/12/2013

Today's report covers sea ice conditions between Casey Station and Mertz Glacier.

- **Casey Station**
  Sea ice conditions off Casey Station are very light and only scattered floes exist between 109° E and 113° E. Further to the east, the sea ice edge is below 64° S, with the exception of the region roughly between 116° E and 120° E, where some patches of higher sea ice concentration (up to 100%) still remain. Figure 1 provides a large scale overview of sea ice concentration between Casey Station (just outside the figure in the west) and the Mertz Glacier region in the east.

- **Mertz Glacier**
  Figure 2 gives an overview of sea ice conditions between Dumont D'Urville Station and the Mertz polynya, as seen by the high resolution MODIS instrument. The scene is largely obscured by clouds, but the ice edge can be clearly distinguished from open water/polynya. The approximate position of MV *Akademik Shokalskiy* is indicated by the star symbol. The dotted red line is the approximate location of the edge of the fast ice to the north and east of Commonwealth Bay based on imagery acquired a few days earlier. This fast ice encloses iceberg B09B and a large iceberg at its northern edge. The blue semi-circle is drawn at a distance of approximately 8.5 nm around the position of MV *Akademik Shokalskyi*.

  Sea ice conditions to the north of the Mertz polynya are generally light and only bands of sea ice with some patches of higher concentration (up to 80%) exist between 65° S and 66° S, and between 144° E and 147° E. The pack ice that is currently accumulating and consolidating at the eastern edge of the fast ice east of Commonwealth Bay contains some very large floes.

With best regards,

Jan, for the sea ice group.

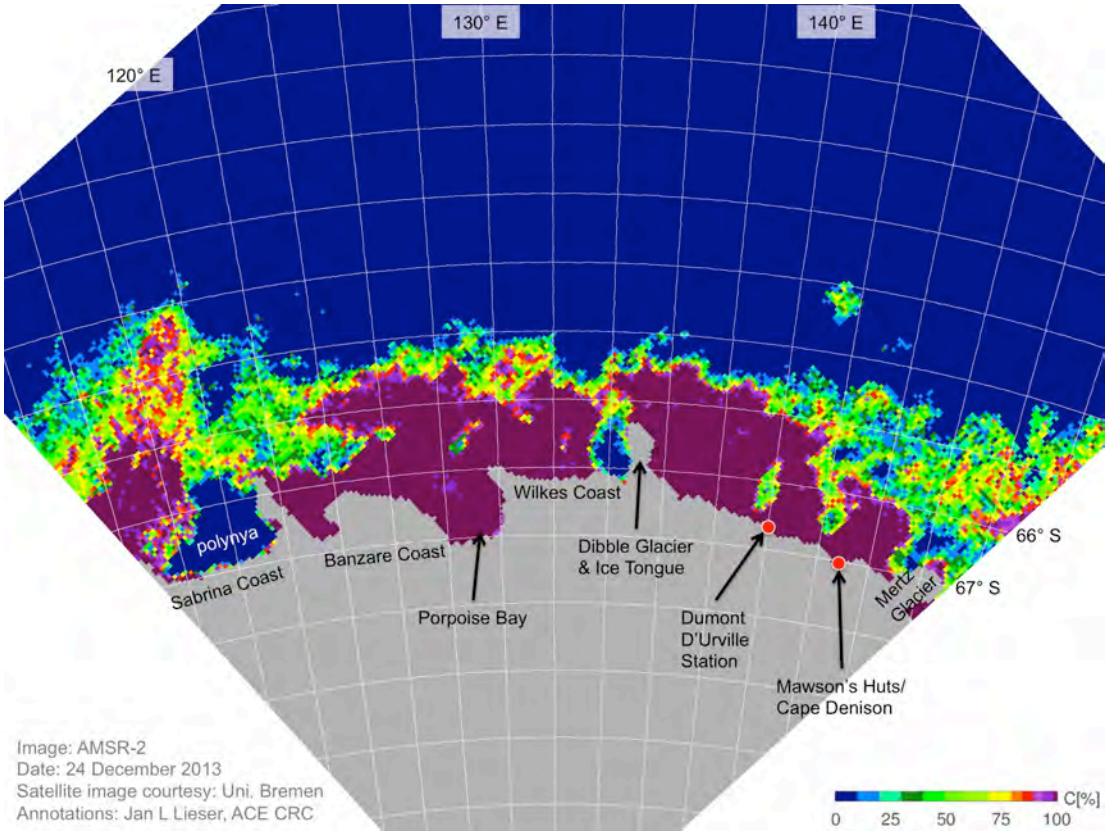

Figure 1: AMSR-2 image, acquired 24/12/2013 and provided by Universität Bremen.

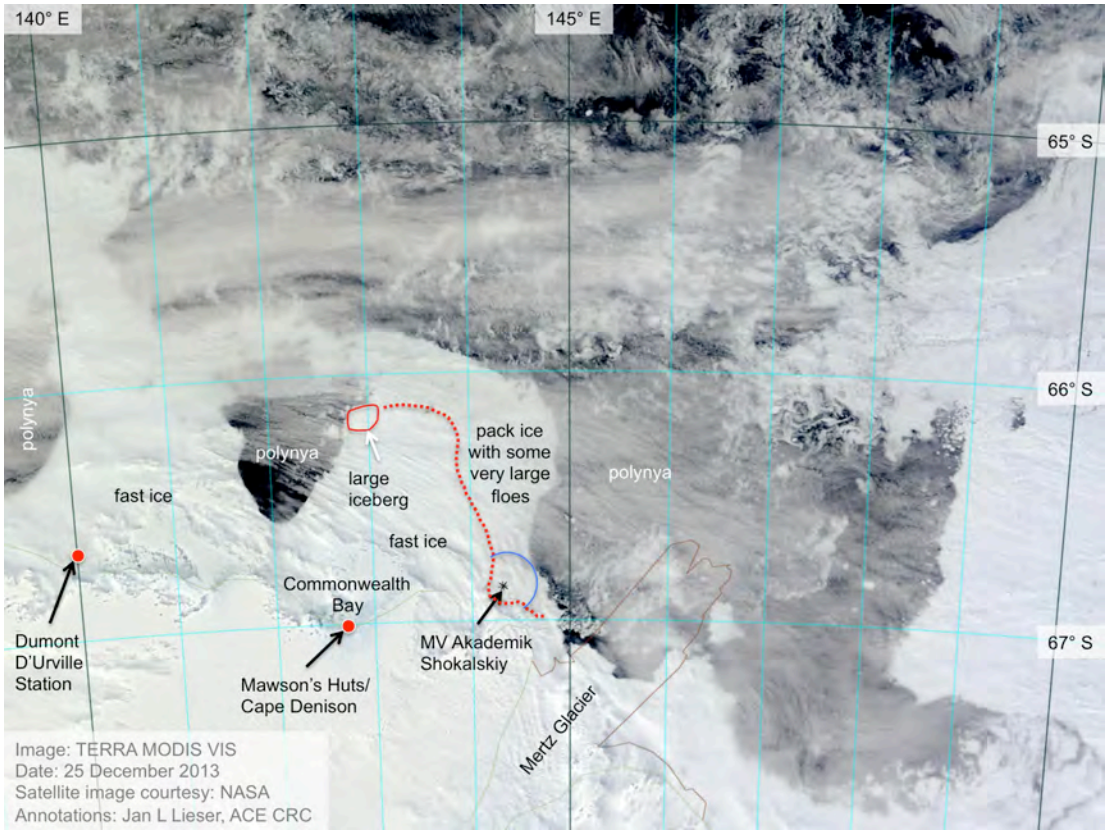

Figure 2: MODIS image, acquired 25/12/2013 and provided by NASA.

Sea Ice Report #20a/2013

by the AAD/ACE CRC Sea Ice Group

28/12/2013

This report updates on sea ice conditions in the Mertz Glacier region and to the west of the region.

- **Mertz Glacier**
  Figures 1 and 2 show the same frame of sea ice conditions off Dumont D'Urville Station and the Mertz Glacier region as seen by the microwave sensor AMSR-2 (Figure 1, yesterday) and by the MODIS instrument (Figure 2, today). Shown as red dots with a black border are locations of various vessels at different times today. RSV *Aurora Australis* (VNAA) is in transit just north of 64° S approaching 135° E, MV *l'Astrolabe* (FHZI) is located in the Mertz polynya just east of 145° E, MV *Xue Long* (BNSK) is positioned well inside the area of 100% ice concentration between Commonwealth Bay (Cape Denison) and the Mertz Glacier and MV *Akademik Shokalskyi* (UBNF) is just to the west of MV *Xue Long*. Note: the current shape of Mertz Glacier is not presented correctly by the glacier outline or the grey mask of Figure 1. The distance of MV *Xue Long*'s position to the pack ice edge in the east is in excess of 13 nm.

  Even though almost the entire scene of Figure 2 is covered by clouds the sea ice edge between the high concentration regions (including the fast ice regions) and the open water (polynya) can be seen relatively clearly. The pack ice edge to the north of Mertz Glacier (at the eastern edge of the fast ice north of Commonwealth Bay which surrounds iceberg B09B) is still steadily progressing east, indicating a growing accumulation of drifting sea ice from the polynya.

  Photographs of the sea ice edge, taken this morning by the crew of MV *l'Astrolabe* show heavily deformed sea ice floes with a high freeboard and a thick snow load.

With best regards,

Jan, for the sea ice group.

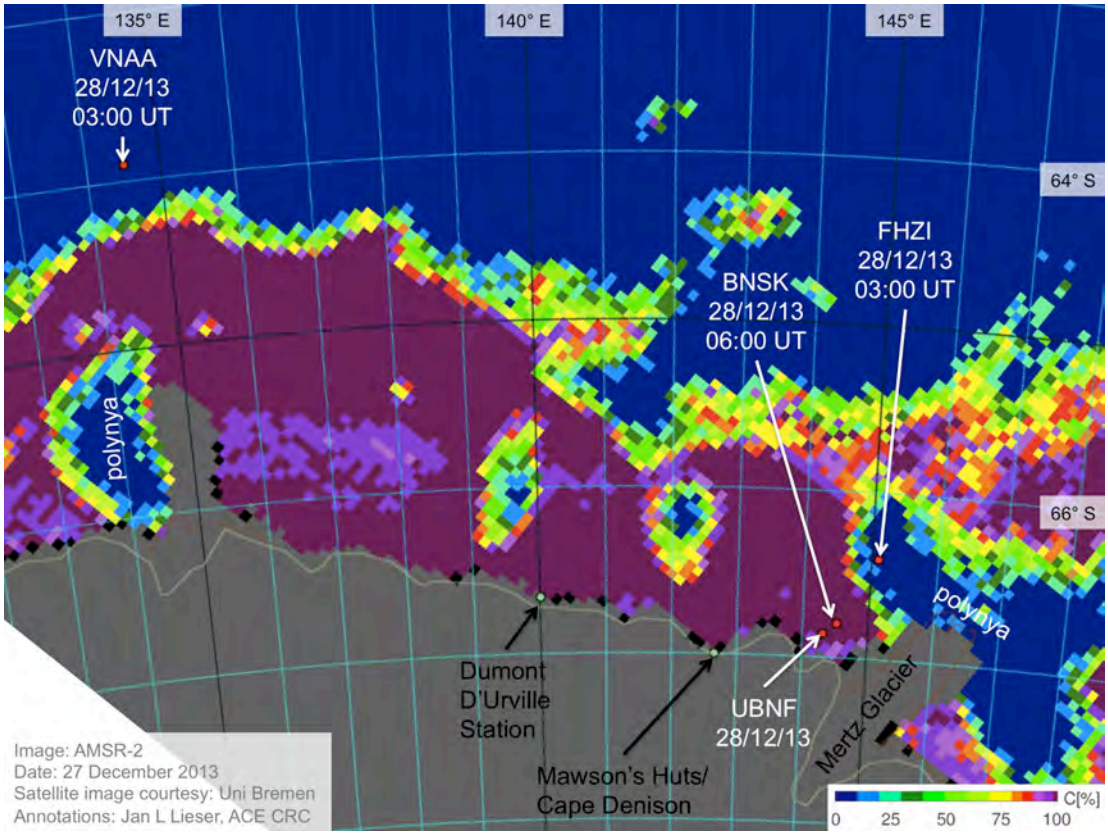

Figure 1: AMSR-2 image, acquired 27/12/2013 and provided by Universität Bremen.

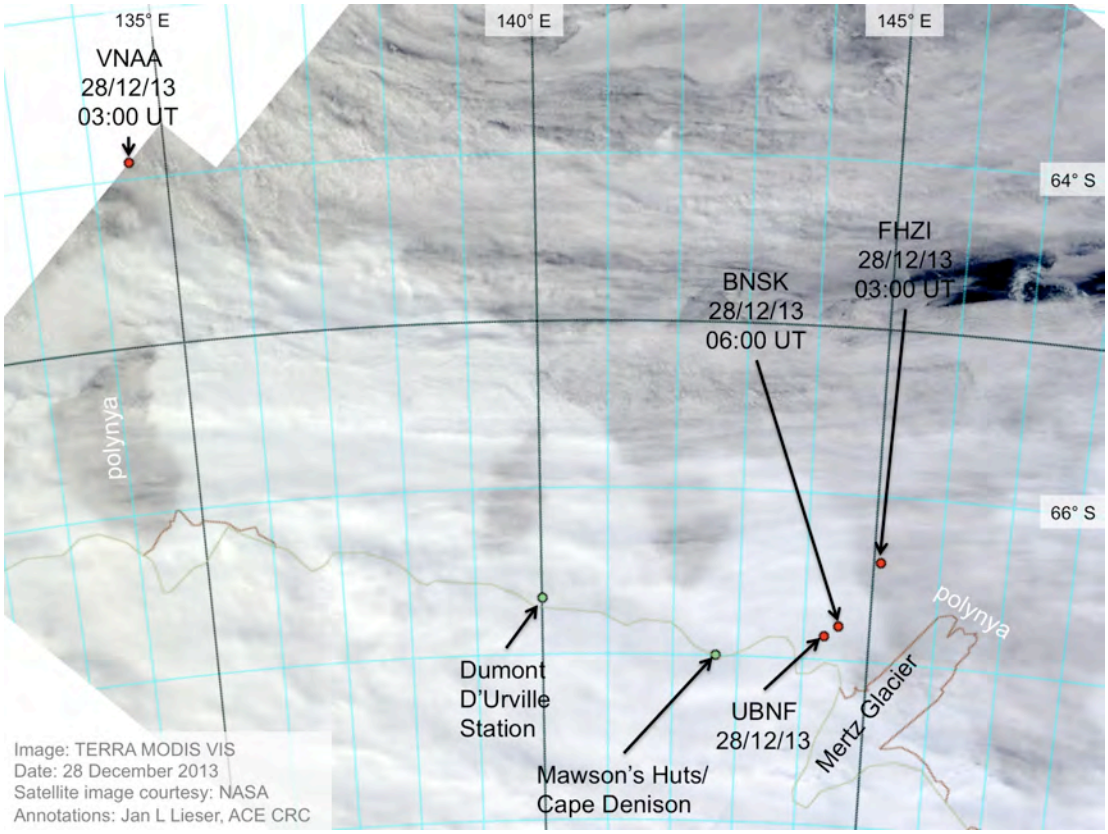

Figure 2: MODIS image, acquired 28/12/2013 and provided by NASA.

Sea Ice Report #20b/2013

by the AAD/ACE CRC Sea Ice Group

29/12/2013

This report updates on sea ice conditions in the Mertz Glacier region and to the west of the region.

- **Mertz Glacier**
  Figure 1 shows a very high resolution Radar image of the vicinity of MV *Akademik Shokalskyi* (UBNF). The current location of MV *Xue Long* (BNSK) is just outside the area covered by the Radar.

  The area can be roughly classified into three different sea ice regimes, namely the fast ice (surrounding iceberg B09B) in the west, followed by an area of old sea ice containing some very large sea ice floes (and two patches of open water) towards the east and the easternmost first year ice accumulated against the fast ice and old sea ice. The boundaries between these regimes are indicated by solid red lines in Figure 1. The easternmost region of the figure could be sub-classified into two slightly different regimes of first year sea ice, as indicated by the dashed red line. The western band of this first year sea ice comprises very small, highly compacted floes, whereas the eastern band appears to have slightly larger sea ice floes with it, and some larger areas of higher deformation (showing as slightly brighter grey).

  Even though the scene shown in Figure 2 is almost entirely obscured by clouds, the pack ice edge can be identified and is indicated by the red line, with the ice covered waters to the west of the line and open water to the east of the line. The yellow semicircle is drawn roughly at a distance of 13 nm around the position of MV *Akademik Shokalskyi* (UBNF).

With best regards,

Jan, for the sea ice group.

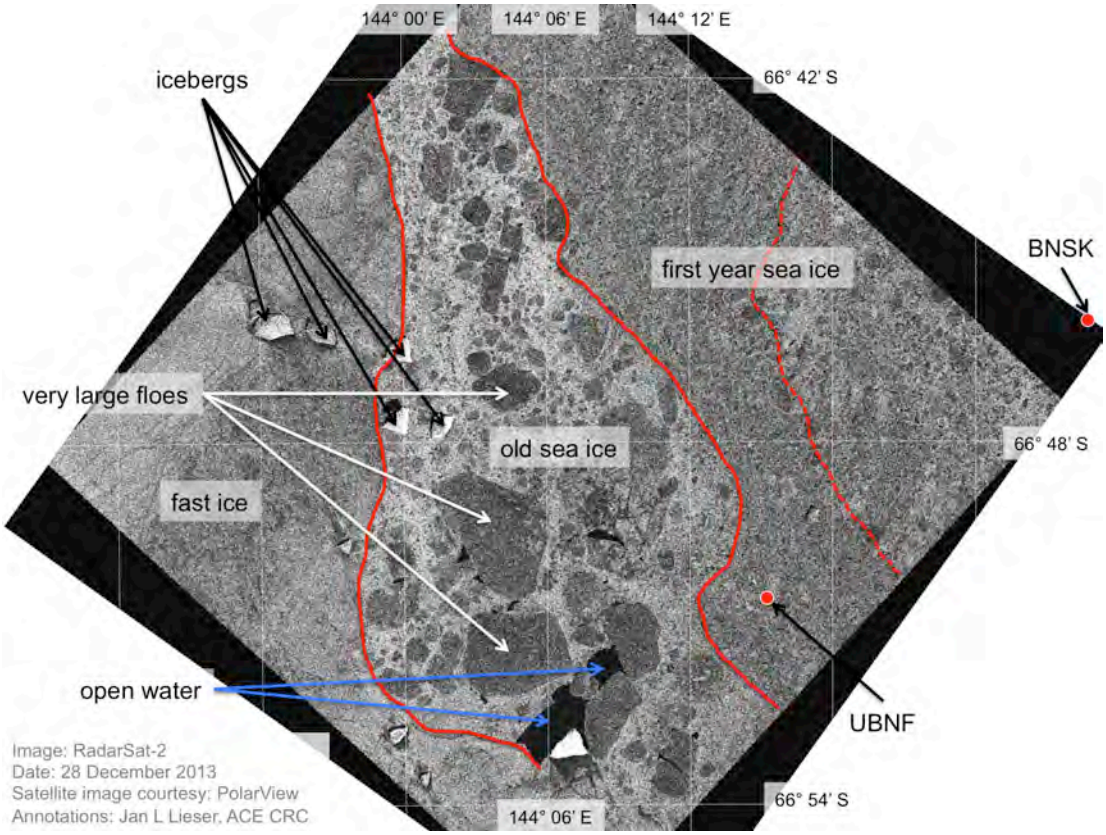

Figure 1: RADARSAT-2 image, acquired 28/12/2013 and provided by PolarView.

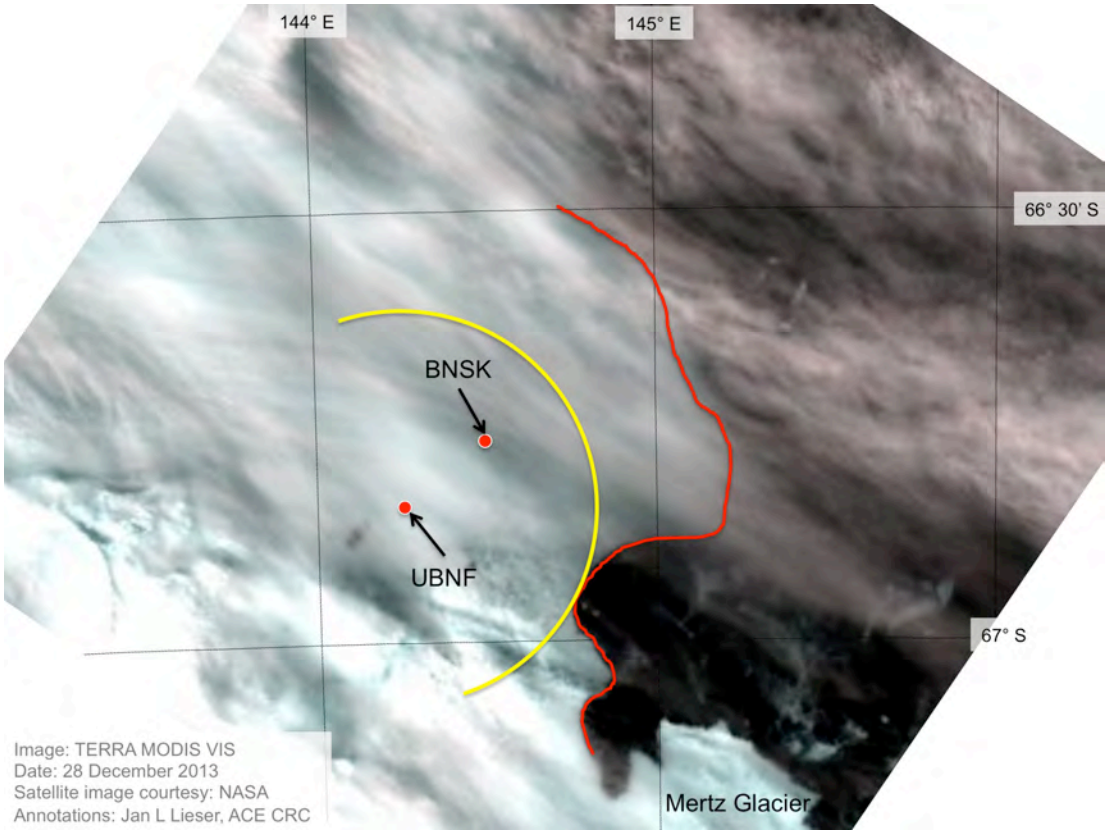

Figure 2: MODIS image, acquired 28/12/2013 and provided by NASA.

Sea Ice Report #20c/2013

by the AAD/ACE CRC Sea Ice Group

30/12/2013

This report examines a high resolution (50 m pixel size) RADAR image of the Mertz Glacier polynya.

- **Mertz Glacier**
  Figure 1 provides an overview of sea ice conditions in the Mertz Glacier polynya and to the west of it. The approximate locations of MV *Akademik Shokalskyi* (UBNF), MV *Xue Long* (BNSK) and RSV *Aurora Australis* (VNAA) are indicated as red dots. The image puts yesterday's classification of sea ice regimes (see report #20b/2013) into a broader context.

  The extent of the old sea ice adjacent to the fast ice can be seen almost all along the fast ice edge. Some shear zones within the first year sea ice regime are indicated by the blue lines. Those linear features are likely locations along which a difference in drift speed grinds sea ice, producing high deformation areas (showing as brighter grey). The general drift of the outer pack ice is mainly driven by the persistent wind towards the north-northwest, around the obstacle of the fast ice surrounding iceberg B09B. The old sea ice closer to the fast ice is likely to move slower.

  The waters off the face of Mertz Glacier appear to be covered by light sea ice (slush ice) with some larger floes still drifting across from east to west.

  Figure 2 provides a close-up of Figure 1, showing the area around the three vessels in the region. The dashed red line refers to the sub-classification of first year sea ice of yesterday's report. The distance between MV *Akademik Shokalskyi* to the sea ice edge towards RSV *Aurora Australis* is in excess of 11 nautical miles.

  Within the first year sea ice are still a few larger floes embedded. The pack ice edge to the northwest of the current position of RSV *Aurora Australis* appears in a Wineglass Bay shape, and is likely consolidated by persistent wind, as is the rest of the edge further to the north. The presence of slush ice and more sea ice floes in the polynya suggests that the pack ice edge might progress further to the east and southeast, as more sea ice accumulates in southeasterly wind.

With best regards,

Jan, for the sea ice group.

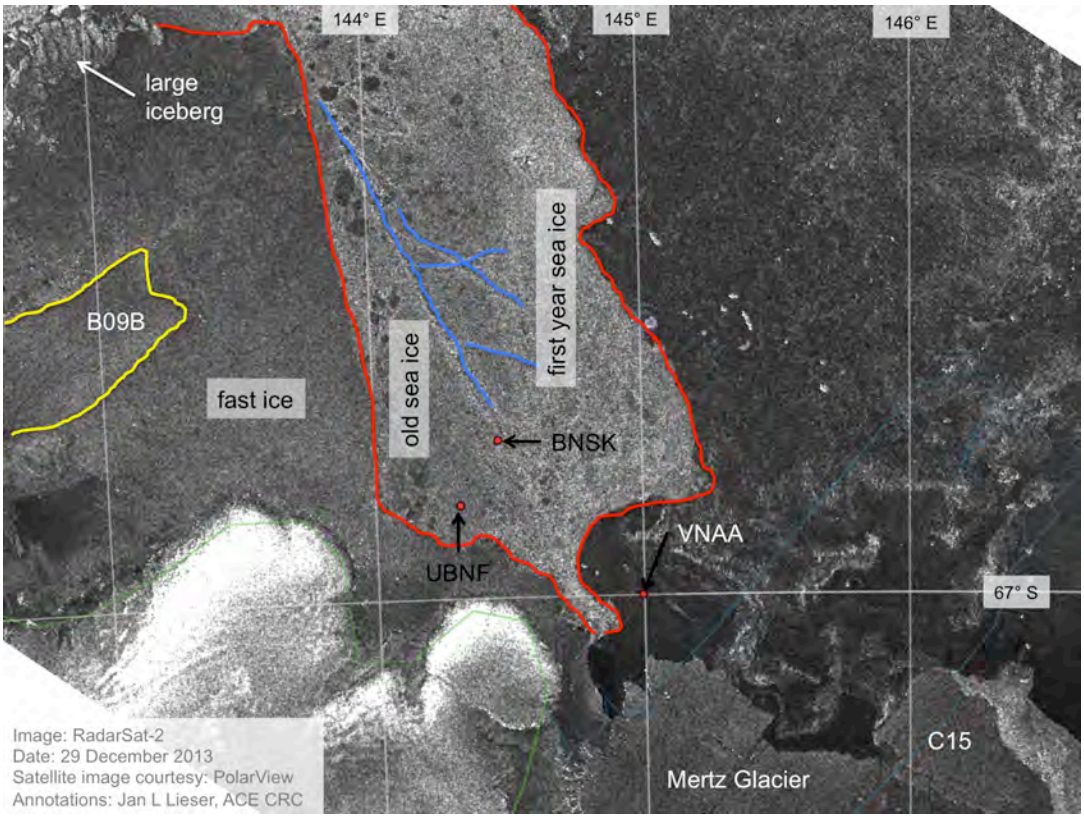

Figure 1: RADARSAT-2 image, acquired 29/12/2013 and provided by PolarView.

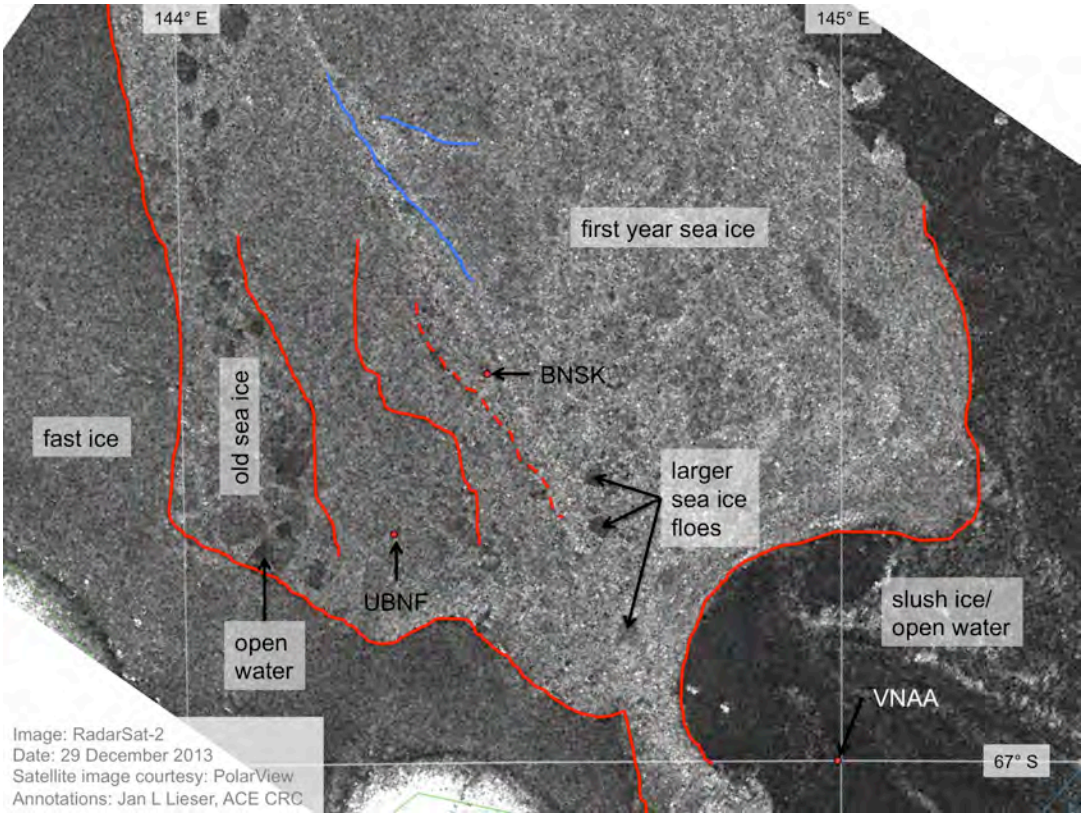

Figure 2: RADARSAT-2 image, acquired 29/12/2013 and provided by PolarView.

Sea Ice Report #20d/2013

by the AAD/ACE CRC Sea Ice Group

01/01/2014

This report examines a fine resolution Radar image of the Mertz Glacier polynya.

- **Mertz Glacier**
  Figure 1 shows a detailed view of sea ice conditions to the west of the Mertz Glacier polynya. The approximate locations (as of 31/12/13 22:30 UT) of MV *Akademik Shokalskyi* (UBNF), MV *Xue Long* (BNSK) and RSV *Aurora Australis* (VNAA) are indicated as red dots.

  Under the influence of the persistent strong southeasterly wind over the past days, the sea ice edge has compacted and retreated westward up to (and exceeding in places) five nautical miles. The 'Wineglass Bay' has been eroded, and more linear kinematic features (shear lines; indicated by the blue lines in Figure 1) can be seen within the first year sea ice. The two larger sea ice floes marked in Figure 1 have moved about six nautical miles in north-northwesterly direction, parallel to a shear line.

  Close to the fast ice edge, the patch of open water that was identified within the old sea ice in our last report (#20c/2013) is hardly detectable in Figure 1 and is certainly reduced in size.

With best regards,
and happy new year,

Jan, for the sea ice group.

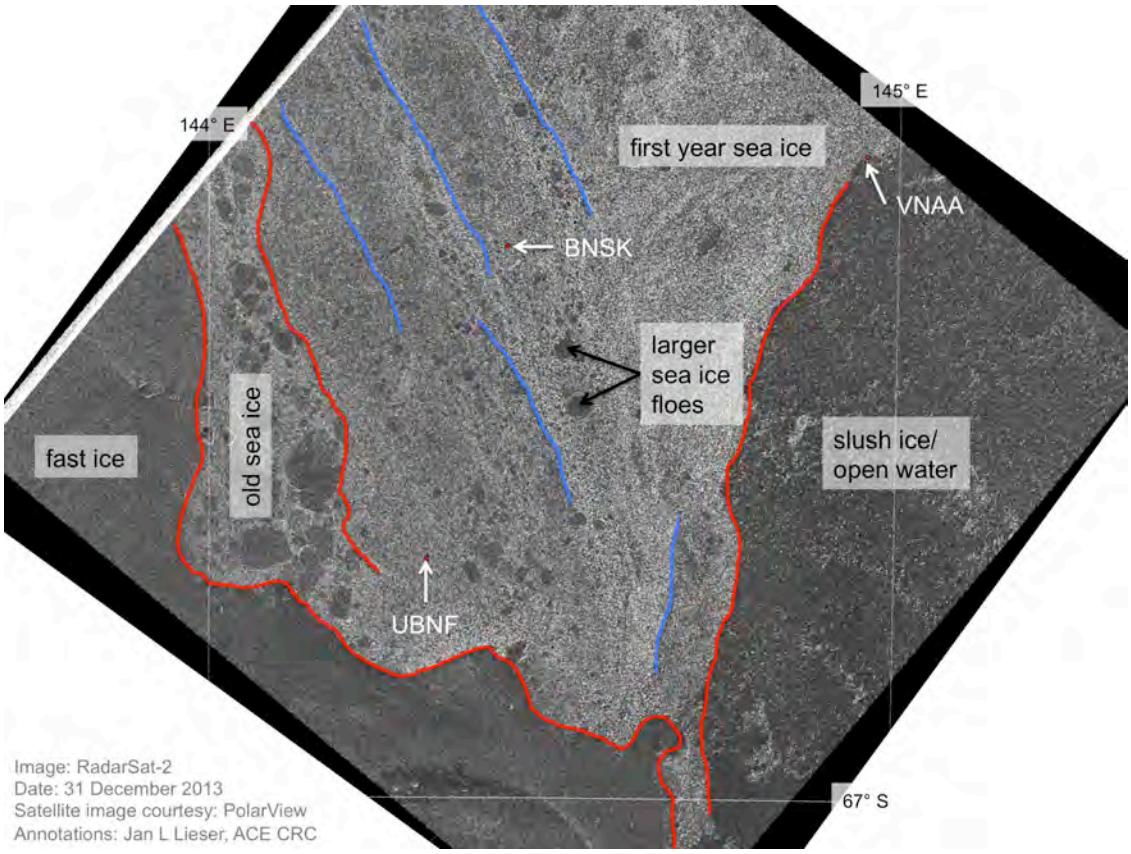

Figure 1: RADARSAT-2 image, acquired 31/12/2013 and provided by PolarView.

Sea Ice Report #01/2014

by the AAD/ACE CRC Sea Ice Group

02/01/2014

- **Mawson Station**
  North of Mawson Station remains an extensive band of fast ice. From the satellite, the nearest open water can be seen about 41 nautical miles away in the north-northwest. The distance from the station over fast ice to the Cape Darnley polynya is about 60 nautical miles. The polynya off the fast ice to the north of Mawson Station (as identified in Sea Ice Report #19a/2013) has closed and the pack ice edge has moved southward by about 20 nautical miles.

- **Casey Station**
  North of Casey Station, almost no sea ice remains in the region (see Figure 3), apart from the fast ice between Four Ladies Bank and the northern coast of Law Dome. Further east, some fast ice and accumulated pack ice remains along the eastern flank of Law Dome towards the Totten Glacier, but the polynya appears well maintained up to the face of the Totten Glacier.

- **Mertz Glacier**
  Figure 4 shows a high resolution RADAR image of the pack ice region between the Mertz Glacier polynya (slush ice/open water) and the fast ice surrounding iceberg B09B. The approximate locations (as of 01/01/14 23:00 UT) of MV *Akademik Shokalskyi* (UBNF), MV *Xue Long* (BNSK) and RSV *Aurora Australis* (VNAA) are indicated as red dots. The boundaries between fast ice, old sea ice, first year sea ice, and open water are indicated by red squiggle lines. Some shear zones (see report #20c/2013) are identified by blue lines.

  The yellow rectangle in Figure 4 denotes roughly the frame of Figure 5, which is a zoom of Figure 4 and gives an indication of the level of detail provided by this imagery. MV *Xue Long* and RSV *Aurora Australis* can be seen as highly reflective targets (bright white spots) at the time of acquisition. The track of RSV *Aurora Australis* heading towards MV *Xue Long* can also be seen as a white trail coming from the east, showing the high deformation (roughness) of the broken sea ice after the ship's passage.

  At the moment, the net movement of both vessels is with the general sea ice drift direction towards the north-northwest. Current king tides and the prevailing south-easterly wind act in concert, potentially exacerbating the effect of the shear zones.

With best regards,

Jan, for the sea ice group.

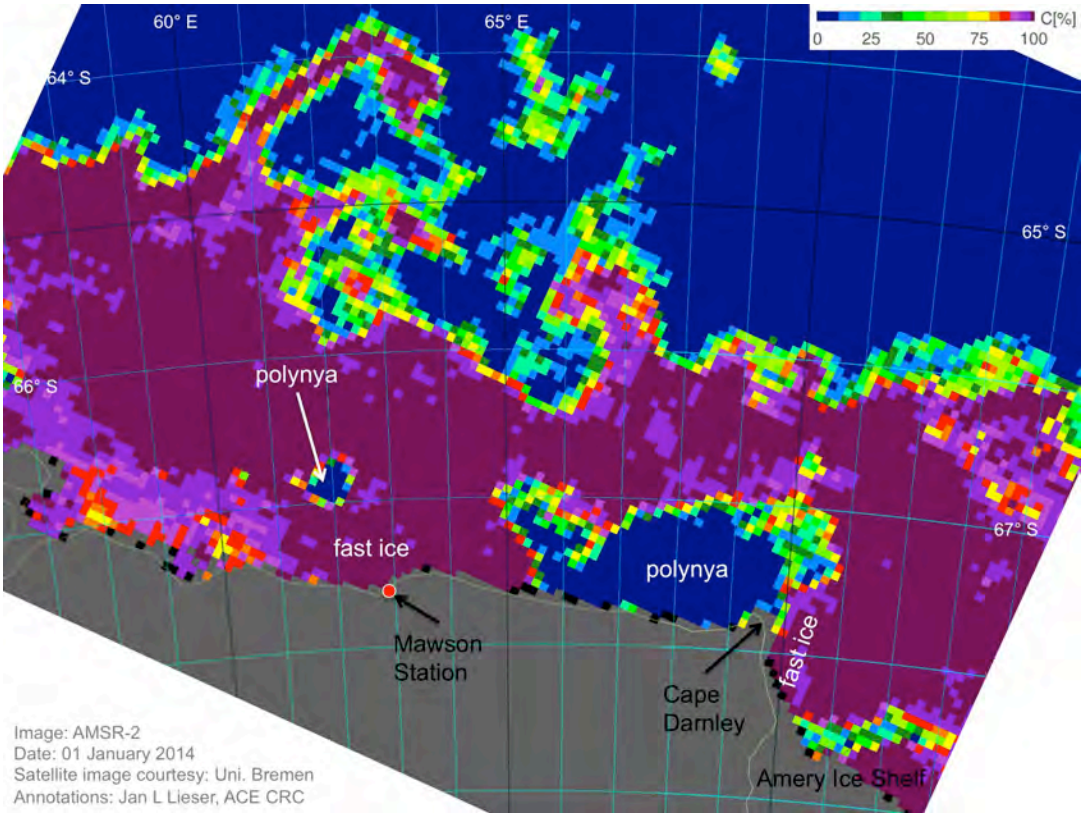

Figure 1: AMSR-2 image, acquired 01/01/2014 and provided by Universität Bremen.

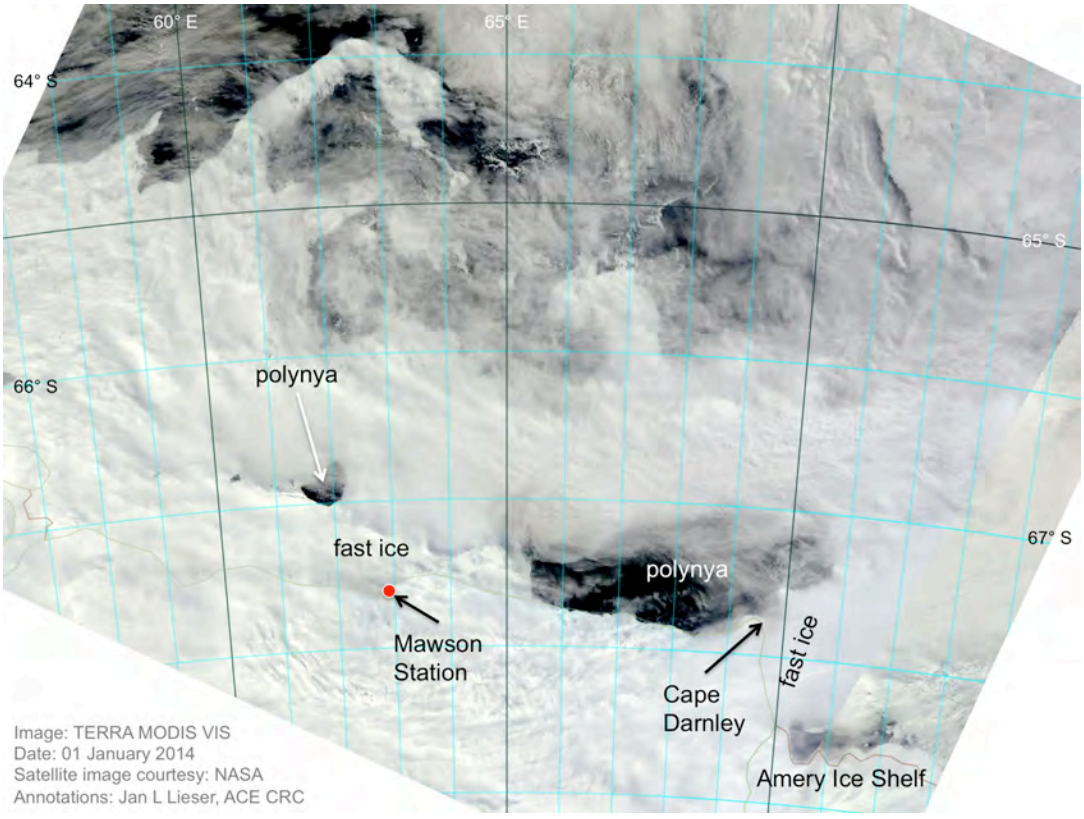

Figure 2: MODIS image, acquired 31/12/2013 and provided by NASA.

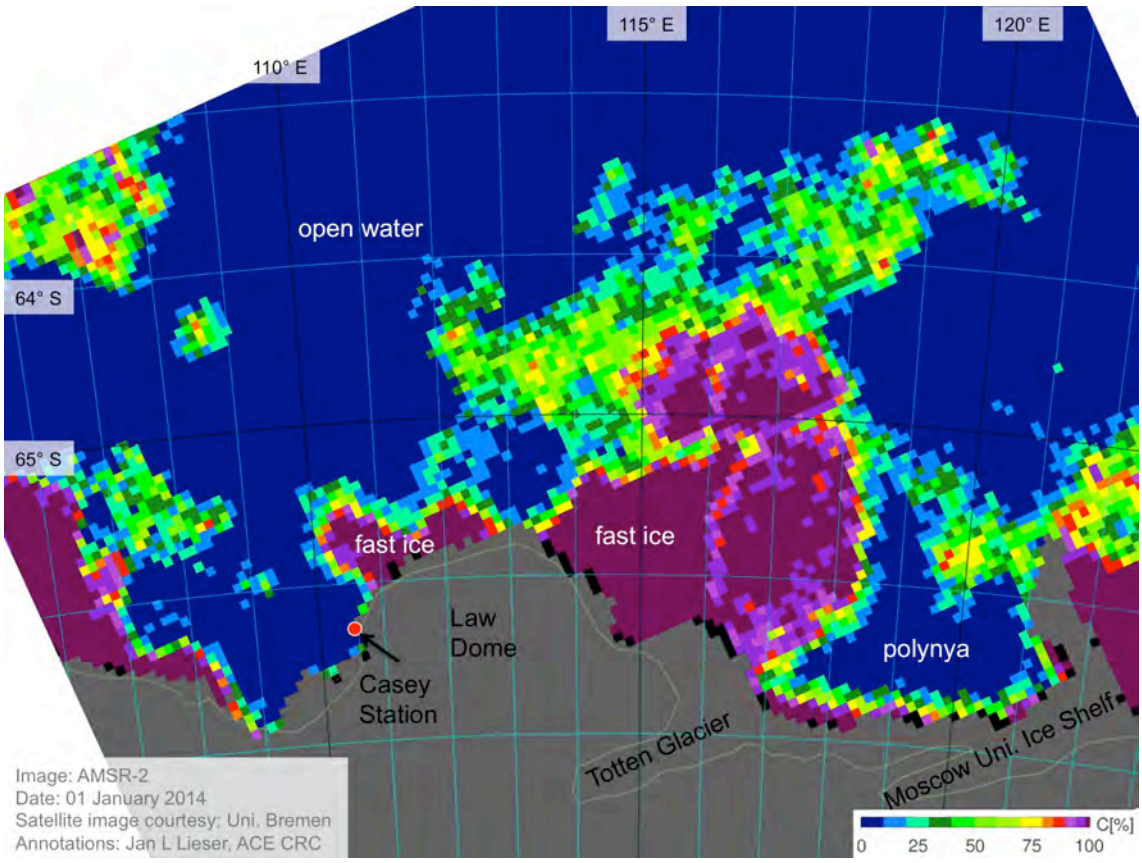

Figure 3: AMSR-2 image, acquired 01/01/2014 and provided by Universität Bremen.

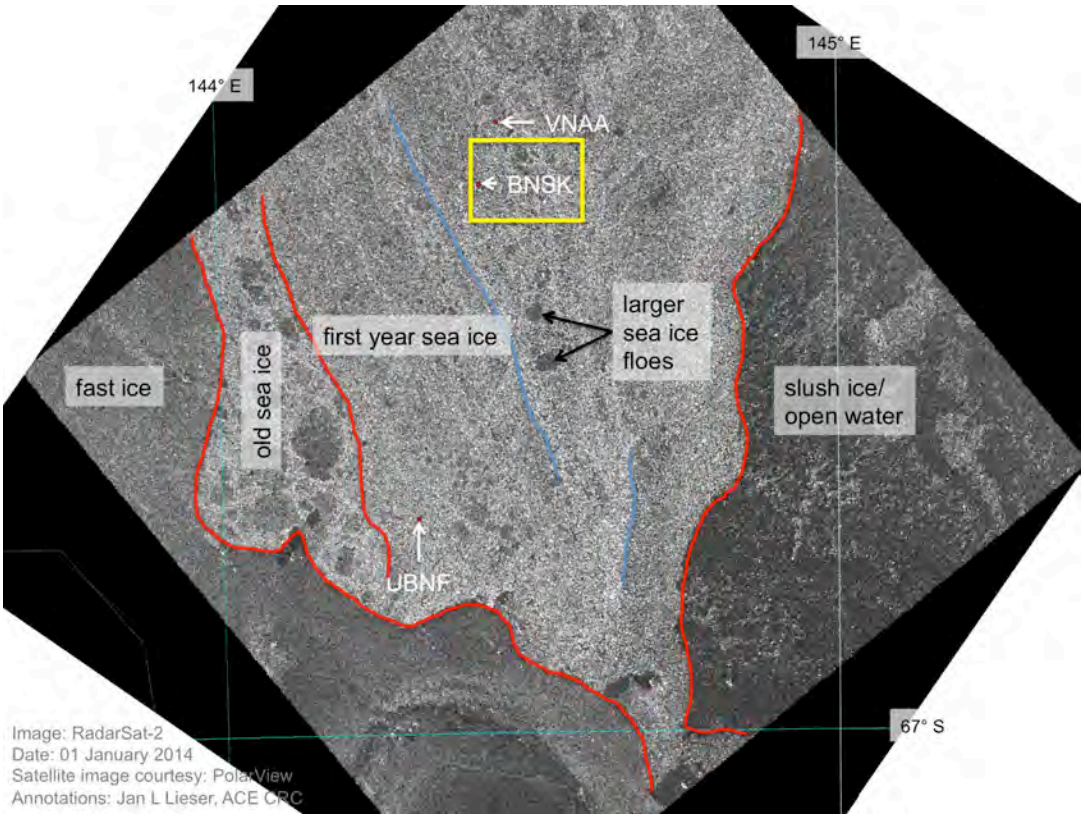

Figure 4: RADARSAT-2 image, acquired 01/01/2014 and provided by PolarView.

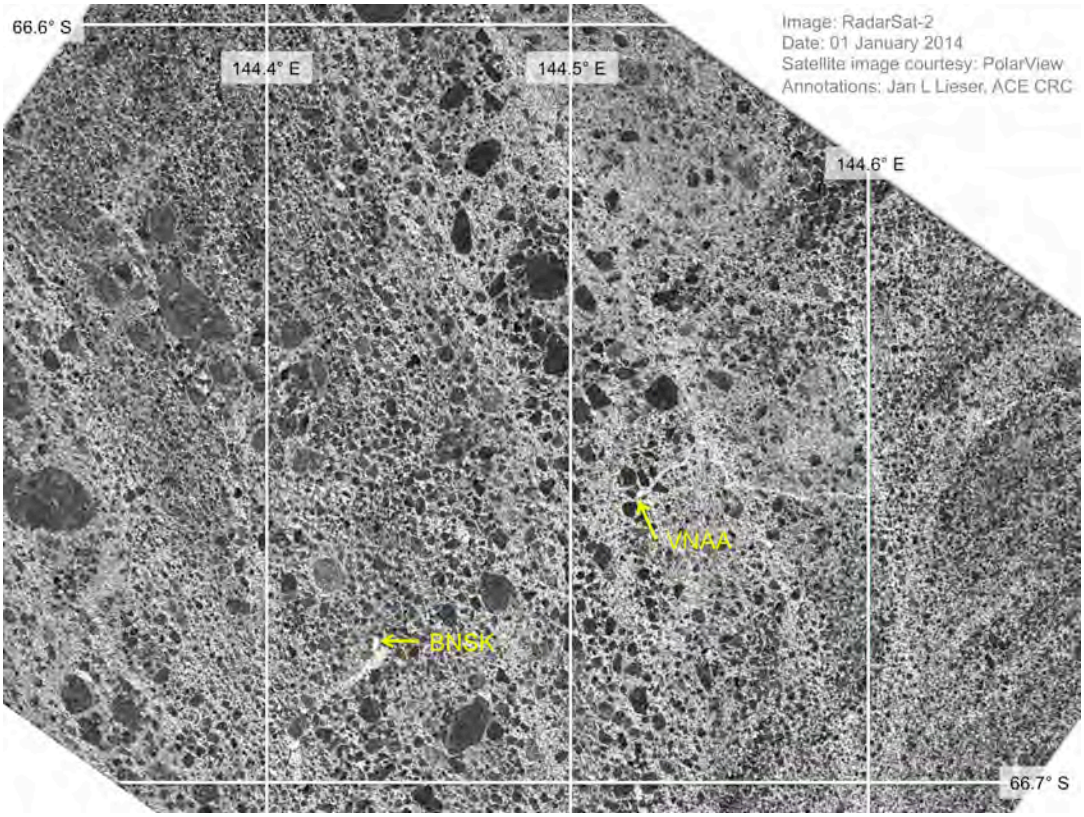

Figure 5: RADARSAT-2 image, acquired 01/01/2014 and provided by PolarView.

Sea Ice Report #01a/2014

by the AAD/ACE CRC Sea Ice Group

03/01/2014

This report updates sea ice conditions between the Mertz Glacier polynya and Commonwealth Bay.

- **Mertz Glacier**
  A partly cloud free visible image is shown in Figure 1, only the northern and eastern part of the figure is slightly obscured by clouds. The approximate locations (as of 03/01/14 at 03:00 UT) of MV *Akademik Shokalskyi* (UBNF), MV *Xue Long* (BNSK) and RSV *Aurora Australis* (VNAA) are indicated as red dots. The dashed red line indicates the location of the fast ice – old sea ice boundary.

  Under the influence of the recent persistent strong wind from the southeast some of the fast ice has broken off the western corner of iceberg B09B, exposing the iceberg cliff side to the open water of the polynya northwest of Commonwealth Bay. The broken sea ice and a very large piece of ex-fast ice can be seen drifting in the western side of this polynya now.

  The fast ice surrounding iceberg B09B and the accumulated and consolidated sea ice at its eastern flank can be seen clearly. The pack ice edge facing the Mertz Glacier polynya is identified by the (partly dashed) blue line, even though much of it is obscured by thin clouds. This edge is about 11.5 nautical miles due east of the positions of MV *Xue Long* and RSV *Aurora Australis*, and about 10.5 nautical miles due east from the position of MV *Akademik Shokalskyi*. To the east of 145° E, under cloud cover, some floating sea ice in the polynya can be seen at a concentration between 50% and 80%.

  While this report can't be treated as an ice forecast, the following observations are made based on the current weather forecast issued by the Bureau of Meteorology for the Cape De La Motte region, on 03/01/14 at 18:30 UT.

  The pack ice edge (blue squiggle line) can be expected to be diffused and retreat westward if the wind direction changes to westerlies at adequate speeds and for a sufficiently long time. At the same time, this then free drifting pack ice is expected to move east across the Mertz Glacier polynya. Some of the large floes identified in previous Sea Ice Reports are expected to be released as well, but could remain as large floes until warmer conditions weaken them and further wave action might break them.

With best regards,

Jan, for the sea ice group.

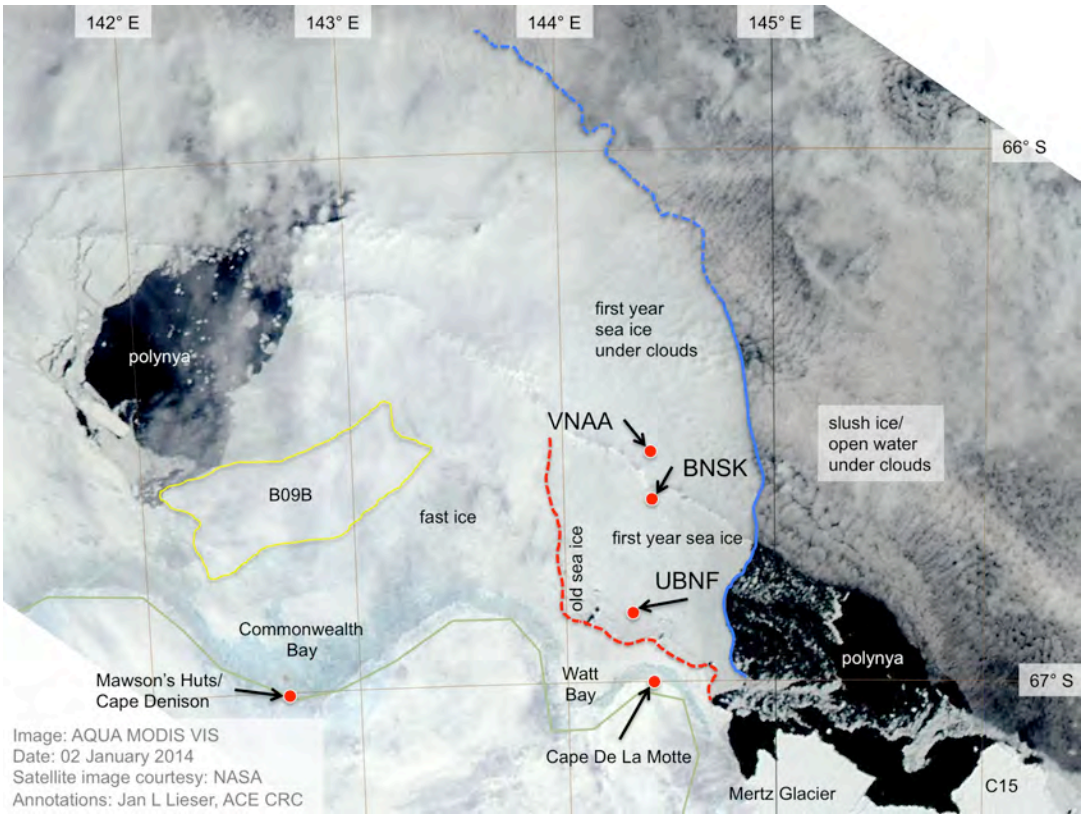

Figure 1: MODIS image, acquired 02/01/2014 and provided by NASA.

Sea Ice Report #01b/2014

by the AAD/ACE CRC Sea Ice Group

04/01/2014

This report updates sea ice conditions between the Mertz Glacier polynya and Commonwealth Bay.

- **Mertz Glacier**
  Yesterday, an almost completely cloud free scene of the region was captured by the MODIS instrument (Figure 1). The approximate positions (as of 04/01/14 at 03:00 UT) of MV *Akademik Shokalskyi* (UBNF) and MV *Xue Long* (BNSK) are indicated as red dots. RSV *Aurora Australis* has left the region.

  The red line indicates the location of the fast ice – old sea ice boundary. The dashed orange line denotes a boundary between recently advected first year pack ice that appears stationary at the moment (fastened) and an area of more mobile first year ice, which has moved north-northwest between 1 and 1.5 nautical miles in the past 24 hours. This line appears to be a shear zone between the consolidated first year pack ice to the west of it and younger sea ice to the east. MV *Xue Long* seems to be positioned just to the west of this line.

  The dark blue lines present linear features that have shifted northward by about one nautical mile yesterday, the light blue line shows the pack ice edge facing the Mertz Glacier polynya. This ice edge has moved about one nautical mile westward during the past 24 hours.

  Figure 2 shows the same geographical frame as Figure 1 and features the same annotations for reference.

  Note: Figure 2 is a coarse resolution (6.25 km by 6.25 km pixel/square size) representation of percentage sea ice covered ocean surface. The signal is contaminated close to the (green) coastline due to geographical effects (showing too low sea ice concentrations), and the mask applied for the Mertz Glacier tongue is not up to date.

  In the polynya to the north of Mertz Glacier, the sea ice has expanded a little more, covering more area, but shows still only low concentrations between 50% and 80% in the microwave (AMSR-2) data (Figure 2). Immediately east of MV *Xue Long*'s position, sea ice concentration shows values slightly below 100% (variations in purple).

With best regards,

Jan, for the sea ice group.

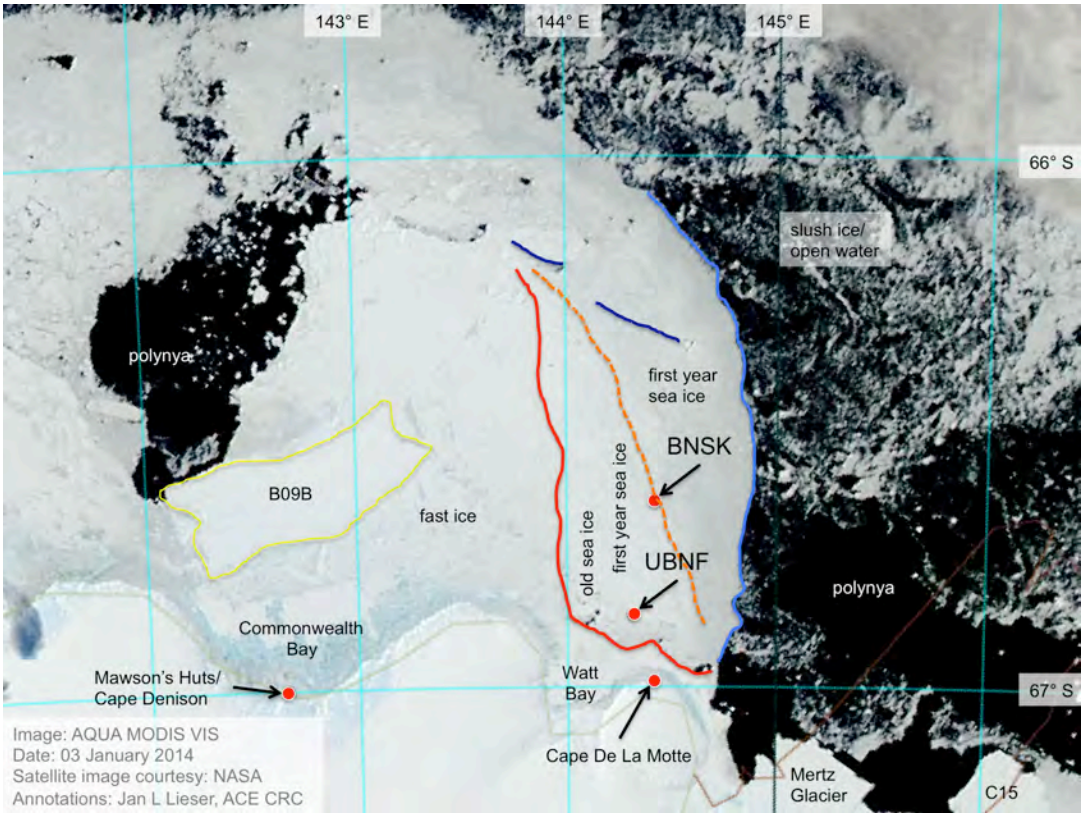

Figure 1: MODIS image, acquired 03/01/2014 and provided by NASA.

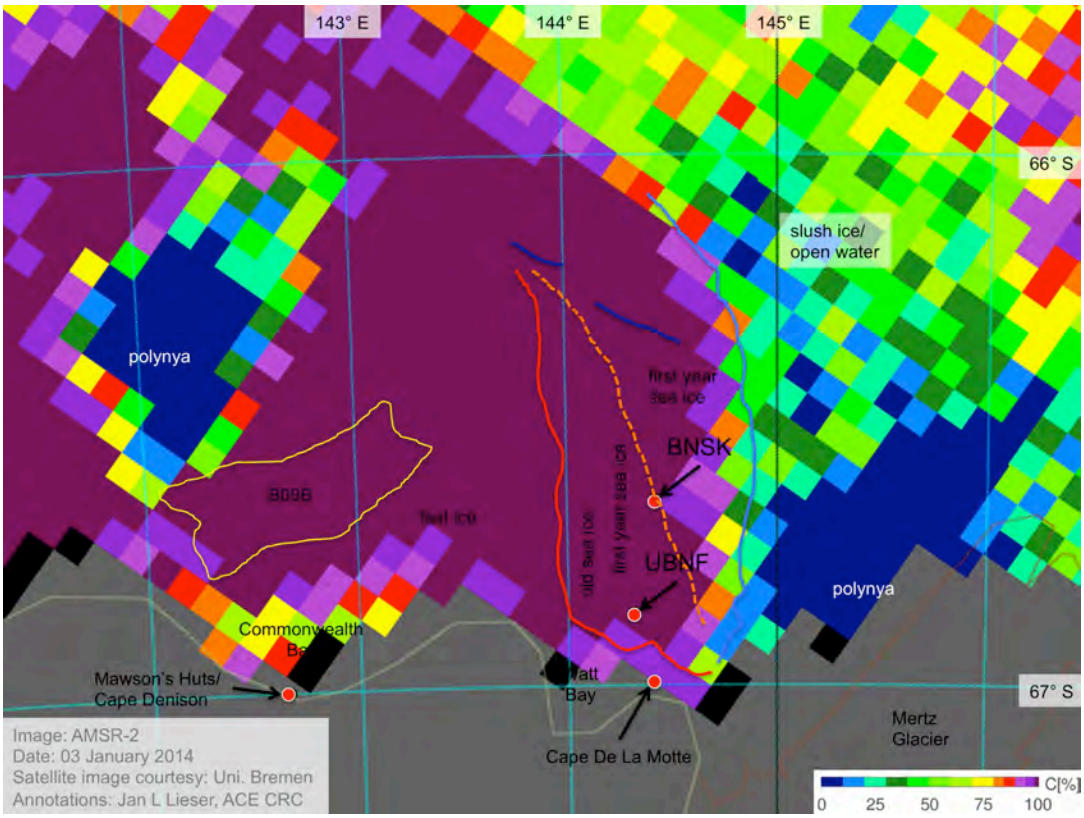

Figure 2: AMSR-2 image, acquired 03/01/2014 and provided by Universität Bremen.

Sea Ice Report #01c/2014

by the AAD/ACE CRC Sea Ice Group

07/01/2014

This report updates sea ice conditions between the Mertz Glacier polynya and Commonwealth Bay.

- **Mertz Glacier**
  About six hours ago (at 23:30 UT on 06/01/14), the MODIS instrument on-board the TERRA spacecraft captured the region with only a thin cloud cover (Figure 1). The approximate positions (as of 07/01/14 at 02:20 UT) of MV *Akademik Shokalskyi* (UBNF) and MV *Xue Long* (BNSK) are indicated as red dots.

  Over the past day or two, a substantial crack has appeared between the fast ice surrounding iceberg B09B, and the old and new sea ice that accumulated against it from the east. These break-up zones are clearly visible as dark serrated lines. At the moment, the accumulated old pack ice has separated from the fast ice as one large consolidated sheet of sea ice. The first year sea ice appears to have separated from the old sea ice along one of the (now former) major shear lines in the region.

  Figure 2 shows a zoomed cut-out of Figure 1 to examine the cracks in more detail. The main crack between the fast ice and the old pack ice (which is stretching even further north) is about one nautical mile wide at the moment. MV *Xue Long* appears to be only 1.5 or two nautical miles to the west of a former shear line (indicated as yellow dashed line in Figure 2). This estimate is subject to precise geo-referencing of the image, ship's position update, and *in-situ* circumstances.

  The eastern sea ice edge shows signs of undulations (indicated by the blue lines), which are manifestations of low horizontal force on the sea ice and almost free drift with oceanic eddies.

  If the forecast westerly winds eventuate, they may influence the future state of both the first year sea ice and the margins of the old sea ice.

With best regards,

Jan, for the sea ice group.

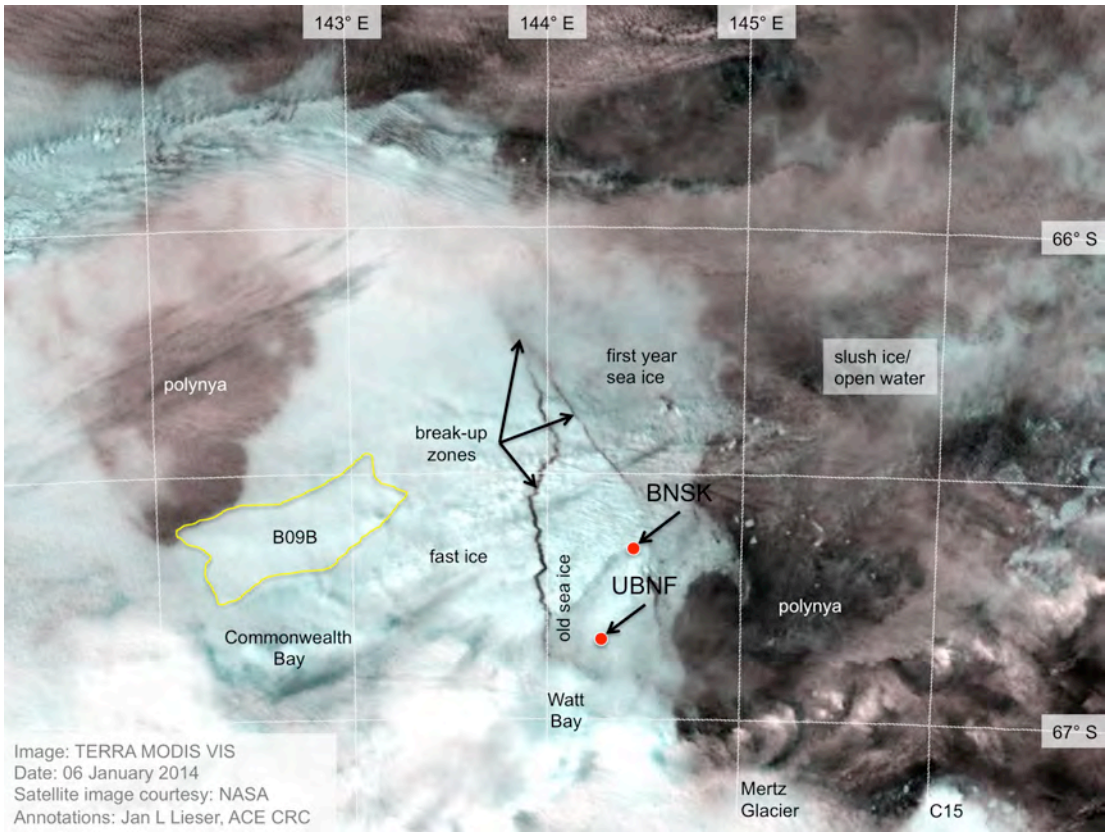

Figure 1: MODIS image, acquired 06/01/2014 and provided by NASA.

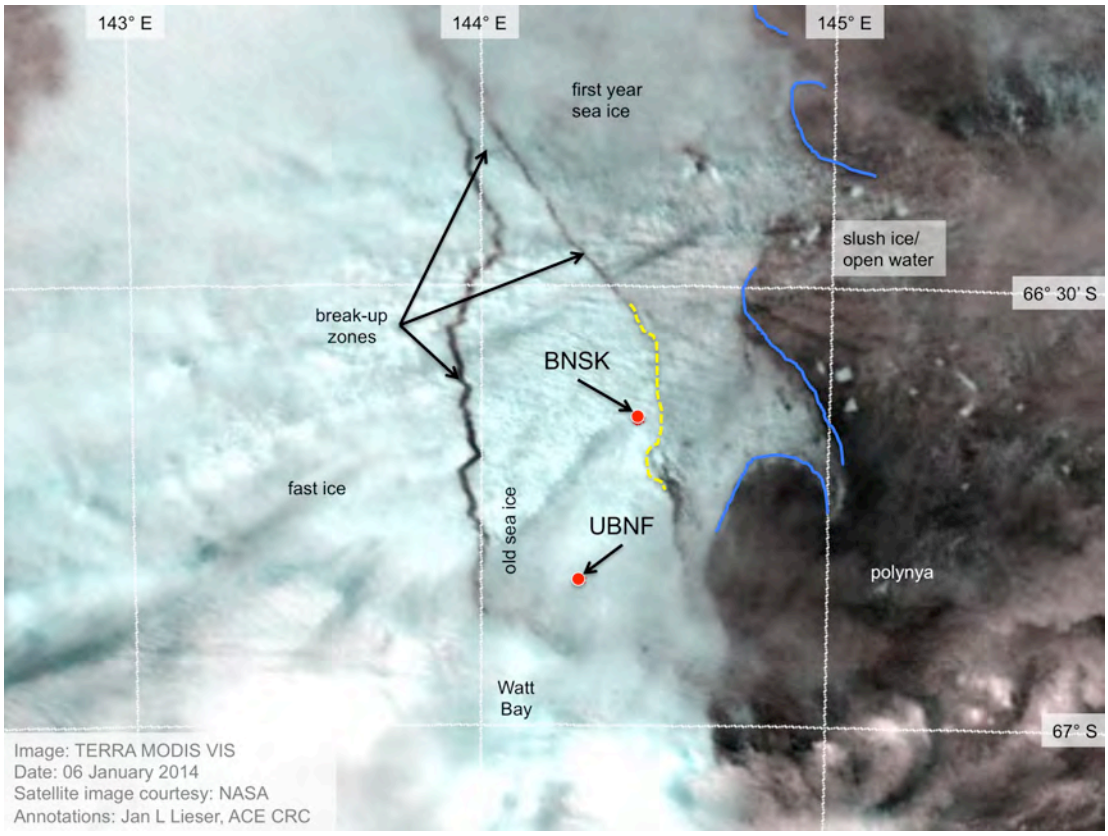

Figure 2: MODIS image, acquired 06/01/2014 and provided by NASA.

Sea Ice Report #01d/2014

by the AAD/ACE CRC Sea Ice Group

07/01/2014

This report updates Sea Ice Report #01c/2014.

- **Mertz Glacier**
  About three hours ago (at 05:05 UT on 07/01/14), the MODIS instrument on-board the AQUA spacecraft captured the region with only a thin or partly no cloud cover (Figure 1). The approximate positions of MV *Akademik Shokalskyi* (UBNF, as of 07/01/14 at 07:20 UT) and MV *Xue Long* (BNSK, as of 07/01/14 at 05:30 UT, very close to acquisition time) are indicated as red dots.

  Over the six hours between the acquisition discussed in Sea Ice Report #01c/2014 and the acquisition shown in Figure 1, the major crack between the fast ice surrounding iceberg B09B and the old sea ice has doubled in width, and is now about two nautical miles wide. The southern part of the large sheet of old and new compacted sea ice has fractured into more pieces, as can be clearly seen in the figure as dark serrated, criss-crossing lines.

With best regards,

Jan, for the sea ice group.

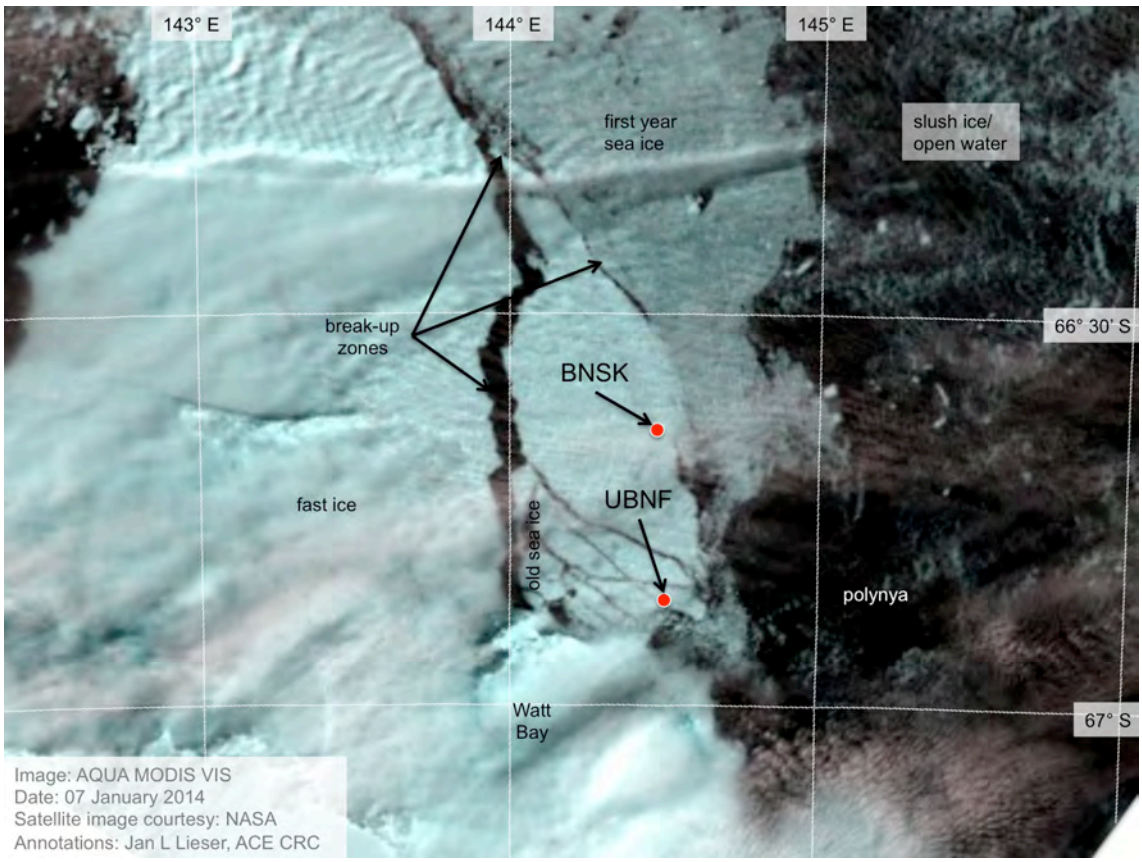

Figure 1: MODIS image, acquired 07/01/2014 and provided by NASA.

Sea Ice Report #02/2014

by the AAD/ACE CRC Sea Ice Group

09/01/2014

This report examines sea ice conditions off Mawson and Casey stations.

- **Mawson Station**
  The polynya northwest of Mawson Station and the Cape Darnley polynya appear to be well maintained and widening. To the north of these open water regions, a band of high concentration pack ice spans currently about one degree in latitude, see Figure 1. Between the pack ice and the open ocean, the marginal ice zone shows some signs of undulation and spreading (partly obscured by clouds in Figure 1).

  The fast ice between the coast and the polynyas/pack ice remains largely intact. Some areas of larger wind scouring (most likely behind icebergs stabilising the fast ice) are indicated by the yellow circle (Figure 1). The dashed red line indicates a visible boundary on the fast ice. To the southwest of this line, the surface of the fast ice appears more or less homogeneously covered by snow, whereas to the northeast of this line, facing the pack ice in the north (solid red line) and the polynya in the east, the surface of the fast ice appears more patchy. This patchiness could be interpreted in two ways; 1) as early stages of break-up (to the east of the dash-dotted red line) and 2) as shadows of thin clouds blown from the polynya over the fast ice.

  To the east of about 60° E, some ex-fast ice can be seen through the cloud cover. It has separated from the fast ice by about one to 2.5 nautical miles.

- **Casey Station**
  The sea ice conditions around Casey Station (no figure) are largely unchanged. Only the fast ice at Petersen Bank remains in place. On the other side of Law Dome, off the face of the Totten Glacier, only scattered sea ice remains close to the coast/ice shelf, but some fast ice and accumulated sea ice is still off the eastern and northeastern flank of Law Dome.

With best regards,

Jan, for the sea ice group.

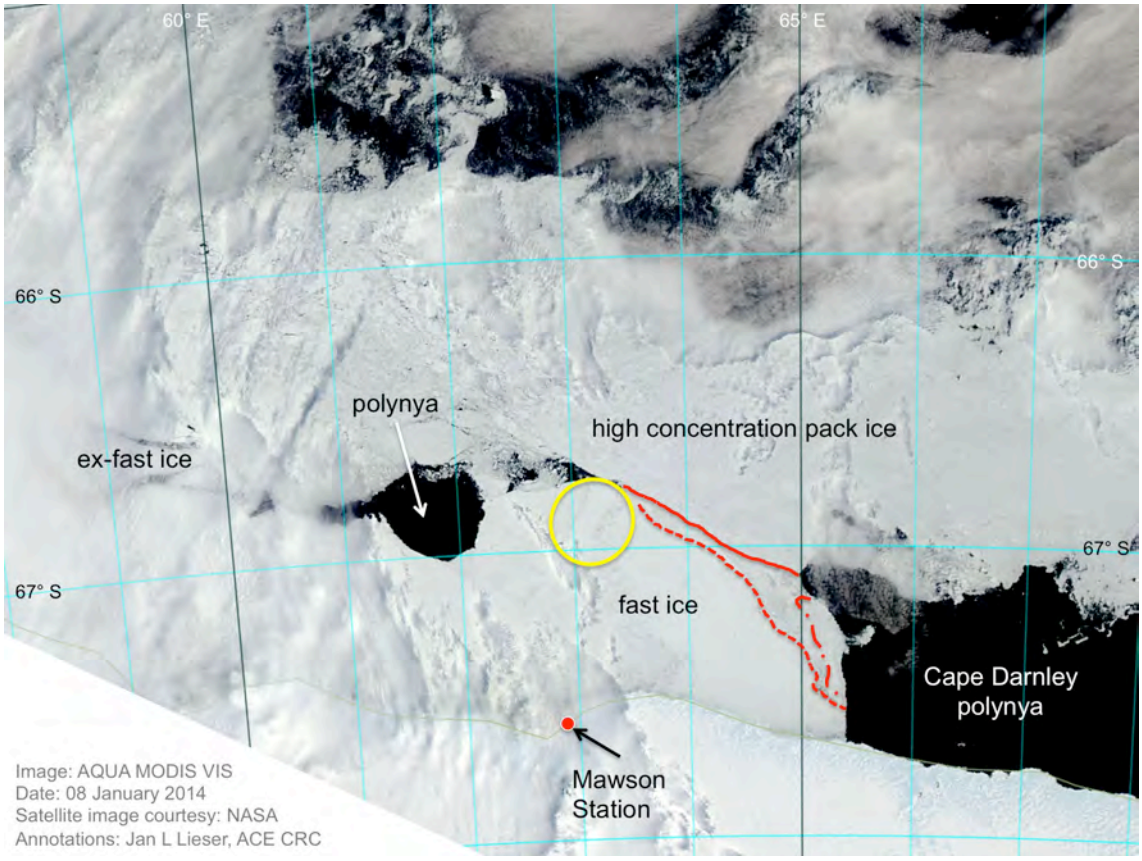

Figure 1: MODIS image, acquired 08/01/2014 and provided by NASA.

Sea Ice Report #02a/2014

by the AAD/ACE CRC Sea Ice Group

10/01/2014

This report updates on sea ice conditions off Mawson Station.

- **Mawson Station**
  The region between Cape Darnely and Mawson Station (and further west) is shown almost completely cloud free in the most recent visible image from MODIS instrument (Figure 1). Sea ice concentration data are shown in Figure 2 for exactly the same geographical frame.

  The MODIS image (Figure 1) reveals many shear lines and potential leads within the high concentration pack ice zone between 66° S and 67° S. These lines are zig-zagging and criss-crossing the pack ice. The northern marginal ice zone (and therefore the edge of the pack ice) shows a wide latitudinal spread and many undulations.

  The area of wind scour identified in yesterday's report is again marked by a yellow circle. The edge of the fast ice surrounding Mawson Station is indicated by the solid red line. The boundary between two slightly different areas of fast ice surface (see Sea Ice Report #02/2014) is shown by the dashed red line. Since there are no clouds in the area (Figure 1), we expect the reason for this difference in signature to be early stages of fast ice break up.

  Figure 2 displays a picture of varying sea ice concentration in the region. For reference, the fast ice edge identified in Figure 1 is shown as well (solid black line). It is obvious that the coarser resolution of the microwave data results in a signal uncertainty at the edges of the sea ice. It is also evident that the passive microwave signal is strongly influenced by wetness of the (snow) surface, which is common during the summer season and a typical limitation of this data product. This wetness leads to an underestimation of sea ice concentration by the data analysis algorithm.

With best regards,

Jan, for the sea ice group.

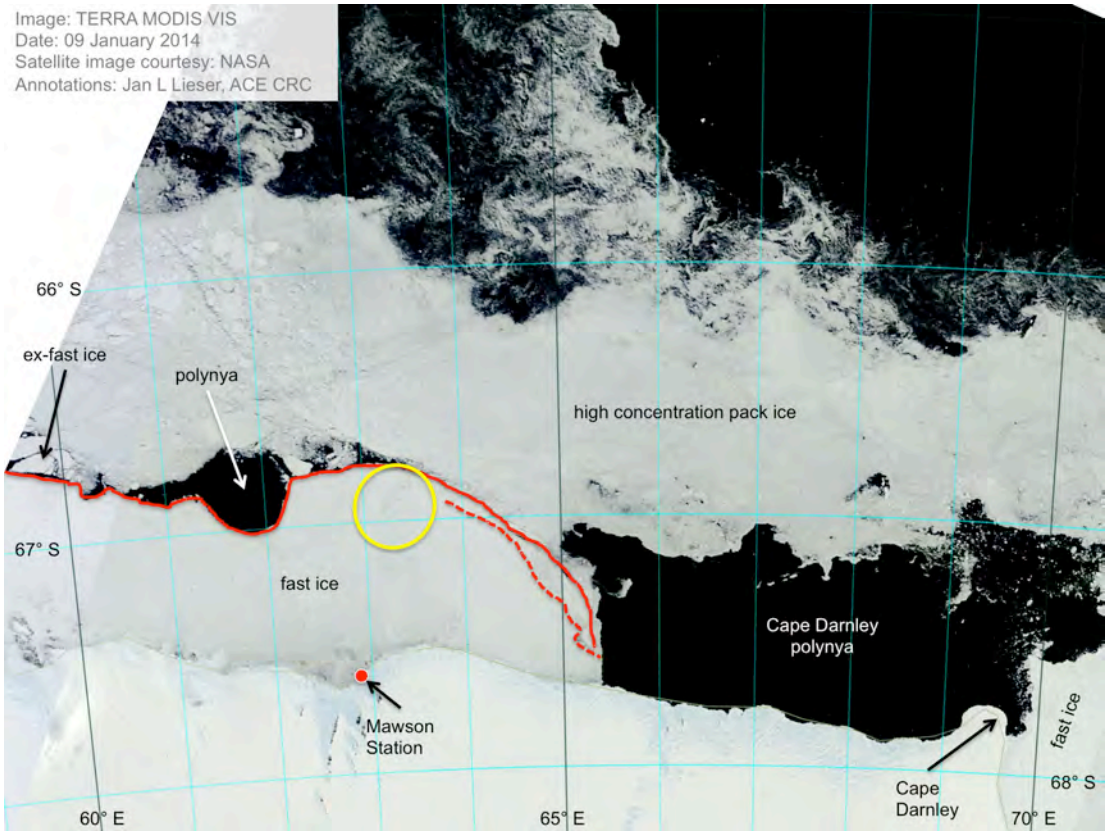

Figure 1: MODIS image, acquired 09/01/2014 and provided by NASA.

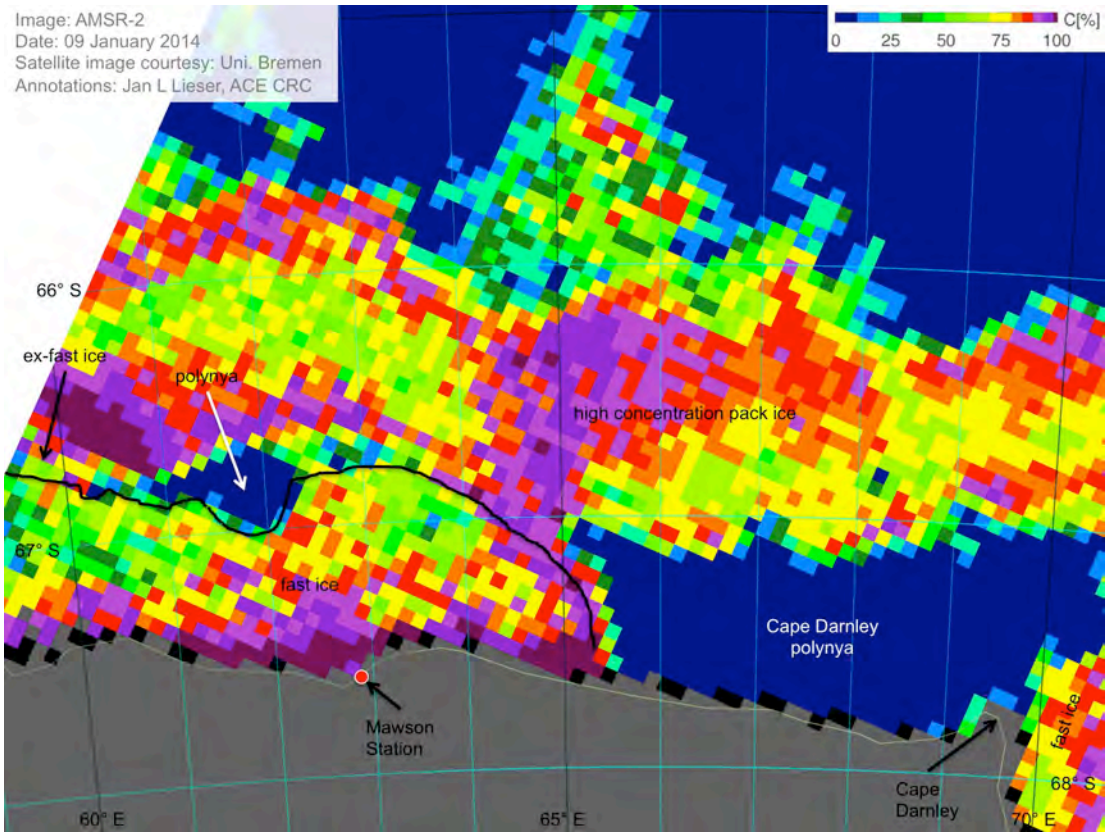

Figure 2: AMSR-2 image, acquired 09/01/2014 and provided by Universität Bremen.

Sea Ice Report #03/2014

by the AAD/ACE CRC Sea Ice Group

16/01/2014

This report examines sea ice conditions off all three Australian Antarctic stations.

- **Mawson Station**
  Sea ice conditions off Mawson Station have not changed significantly over the past week (Figure 1). The extensive fast ice to the north of the station and along the Mawson Coast remains, with only minor bits breaking off the fringe. The fast ice to the east of Cape Darnley is also still quite extensive, as well as the pack ice concentration in western Prydz Bay, north of the Amery Ice Shelf, in general. This is believed to have a stabilising effect on the fast ice off Mawson, as well as the wide, protective band of pack ice, which still stretches for about one degree in latitude between 65° E and 80° E (Figure 2, note: the grey mask applied to calculate sea ice concentration is out of date; this is most obvious at the northern end of the Amery Ice Shelf, indicated by the black line, and at the location of D15 and to the east of it).

- **Davis Station**
  Figure 2 shows that the large area of open water along Ingrid Christensen Coast (including Davis Station) is cut off from the open ocean by a wide band of high concentration sea ice stretching from the western side of the Amery Ice Shelf to iceberg D15 and beyond. Even though this band has contracted slightly in recent weeks, it is constantly fed by the large amount of sea ice still remaining to the east of D15. This sea ice is squeezed around the northern tip of D15 and then transported westward towards Cape Darnley into the western Prydz Bay.

- **Casey Station**
  There is no sea ice north of Casey Station, apart from the fast ice at Petersen Bank. At the eastern flank of Law Dome remains some fast ice (indicated by the red line in Figures 3 and 4). To the east of this fast ice, a large area of pack ice remains between the Totten Glacier and about 65° S. However, the face of Totten Glacier shows a lead between the edge of the fast ice north of the glacier and the open water west of the Dalton Iceberg Tongue. The (annotated) pack ice is moving north and south with changing wind direction. The tail of a strong low pressure system passing north of this embayment could have a flushing effect on the sea ice in the bay.

With best regards,

Jan, for the sea ice group.

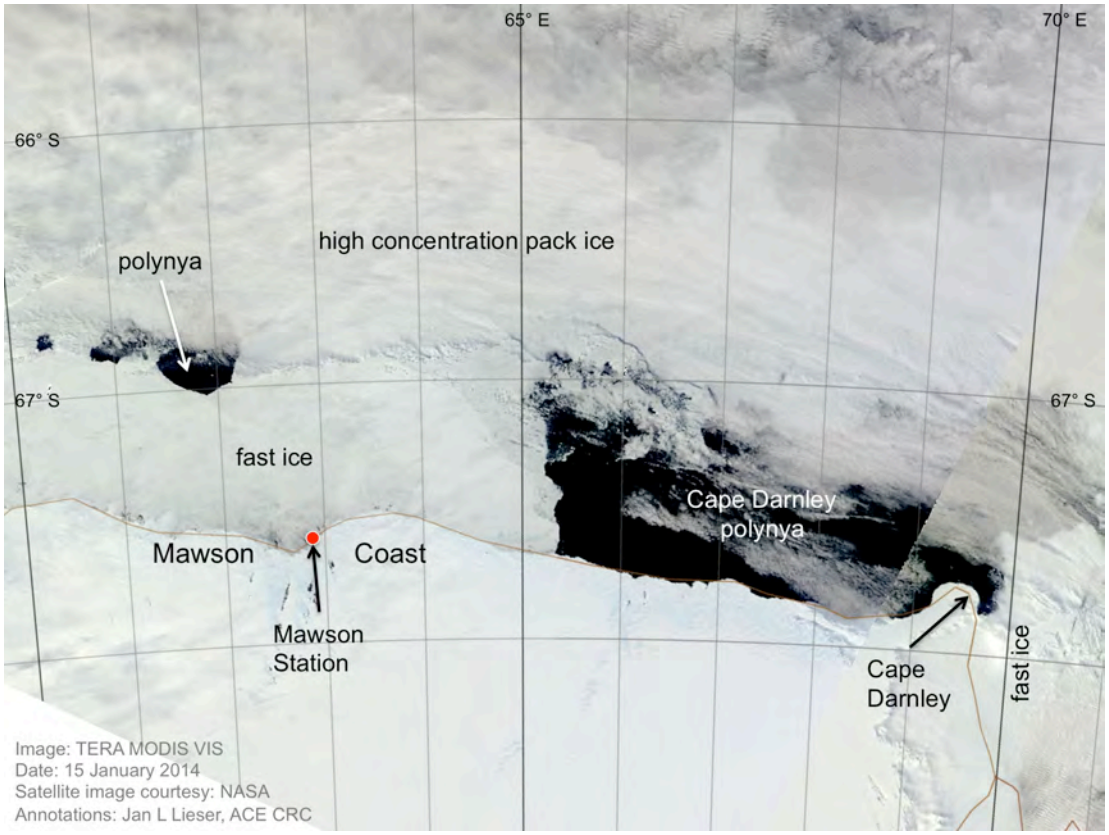

Figure 1: MODIS image, acquired 15/01/2014 and provided by NASA.

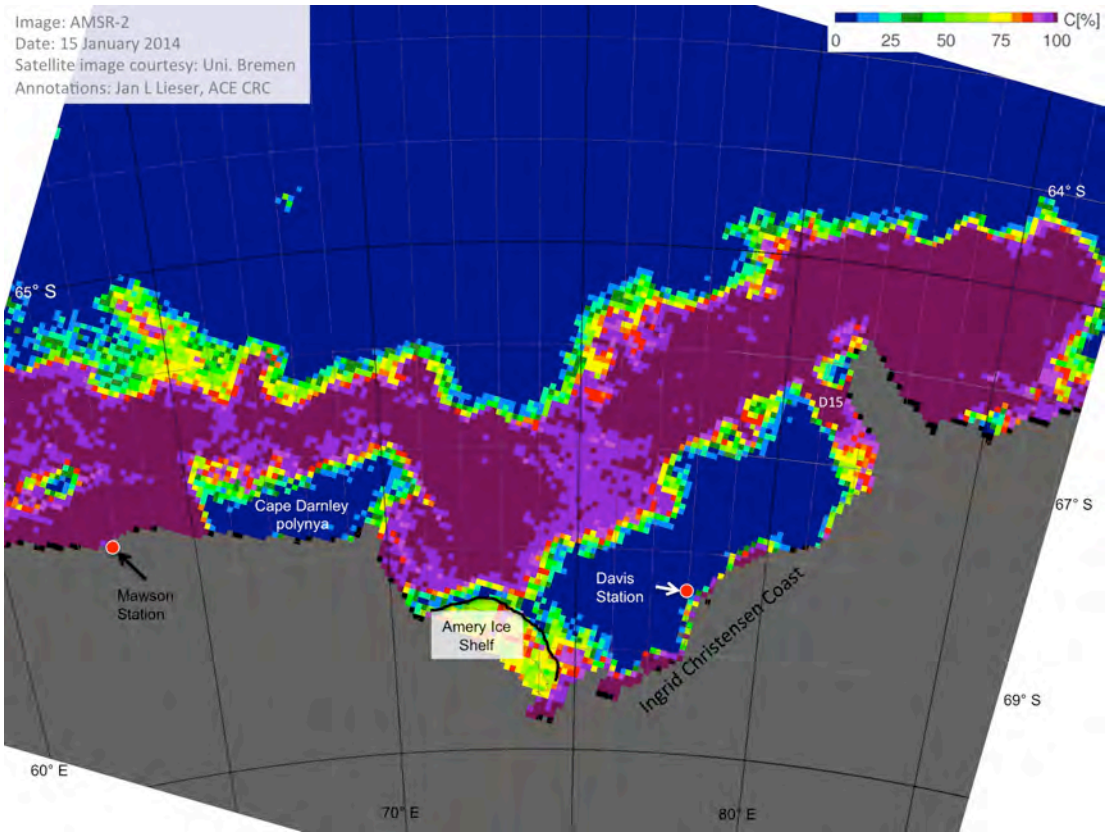

Figure 2: AMSR-2 image, acquired 15/01/2014 and provided by Universität Bremen.

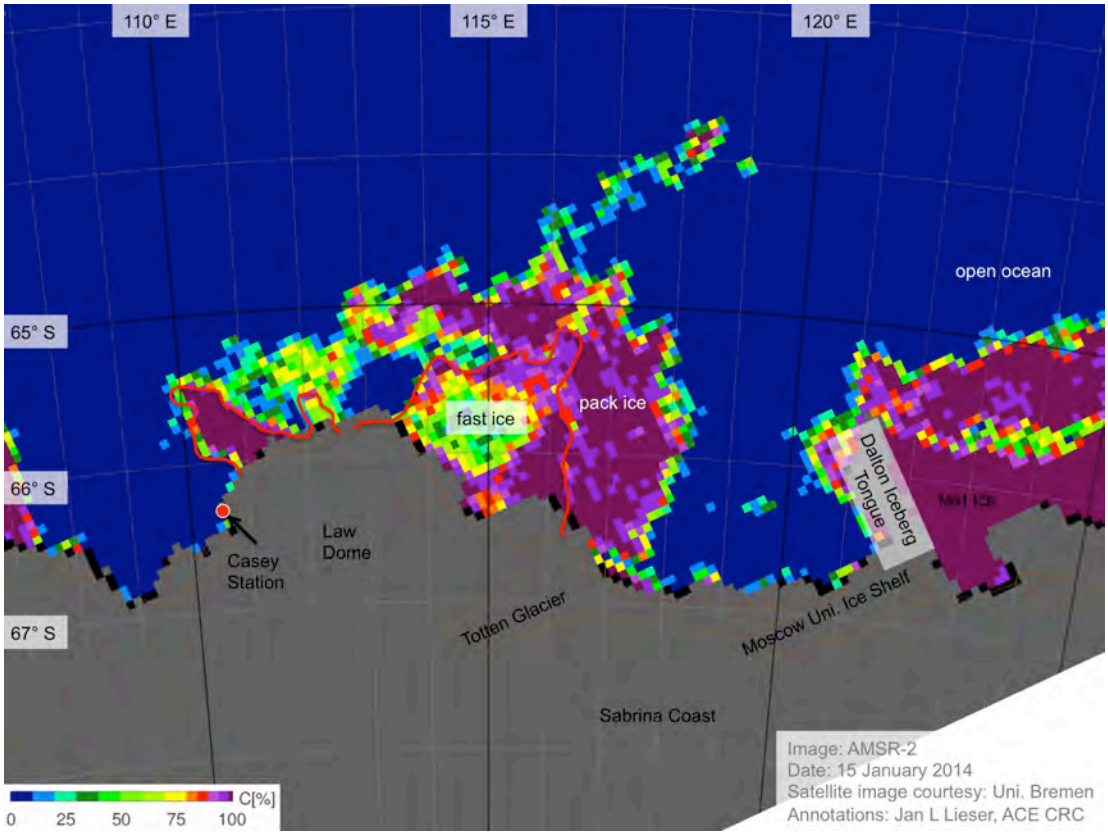

Figure 3: AMSR-2 image, acquired 15/01/2014 and provided by Universität Bremen.

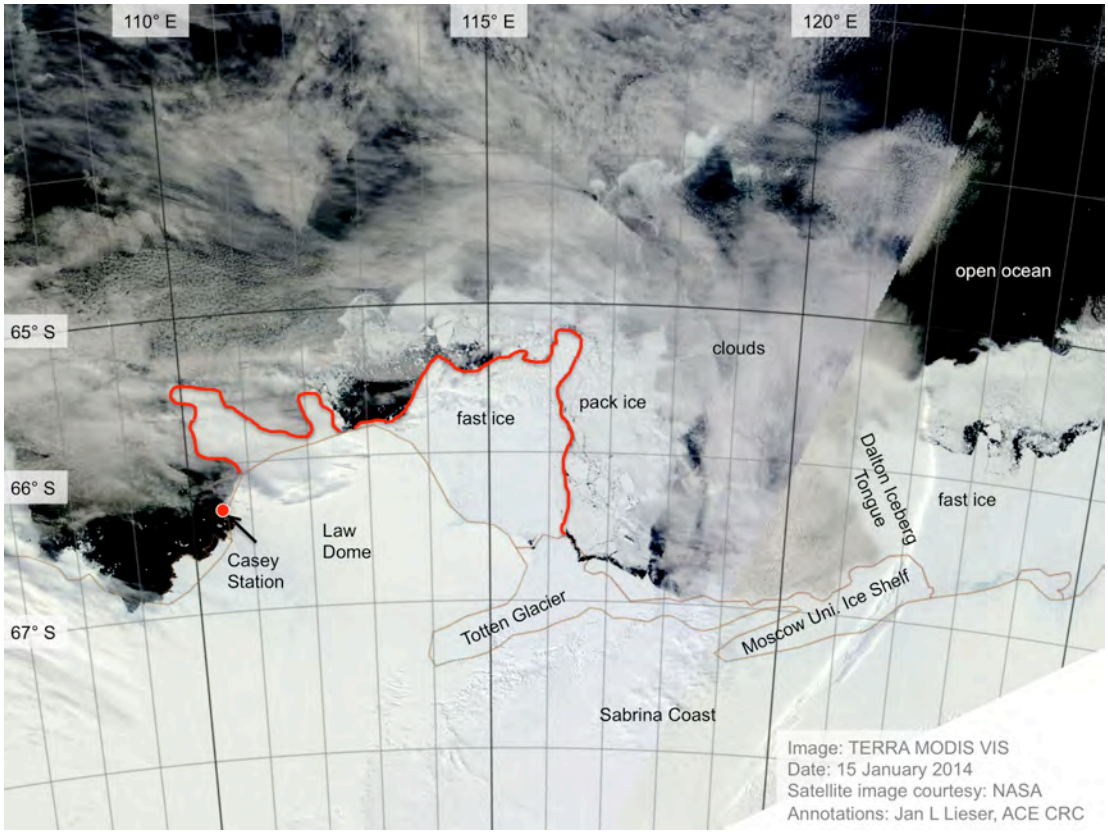

Figure 4: MODIS image, acquired 15/01/2014 and provided by NASA.

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Sea Ice Report #04/2014

by the AAD/ACE CRC Sea Ice Group

24/01/2014

This report examines sea ice conditions off all three Australian Antarctic stations. Figure 1 shows the region between Mawson and Davis stations almost completely under thin clouds, while Figure 2 shows an almost cloud free scene between Vincennes Bay and the Dalton Iceberg Tongue.

- **Mawson Station**
  During the past week, sea ice conditions off Mawson Station have not changed significantly. The persistent polynya to the northwest of the station remains about 42 nautical miles away, while the fast ice edge to the northeast of the station is currently about 48 nautical miles away, at the shortest distance. Cape Darnley polynya appears still well maintained. Between about 66° S and 67° S and east of 70° E, a persistent band of high concentration sea ice separates the polynya and fast ice from the open ocean. This band is fed with pack ice originating from an area about 350 nautical miles away, between 80° E and 85° E and between 65° S and 66° S.

- **Davis Station**
  The band of pack ice described in the previous section meanders thought the entire Prydz Bay and has a width of up to 1.5 degrees in latitude, up to about 70° E. It shows high sea ice concentration throughout its north-south extent and has still some very large floes embedded. The fast ice to the north and east of iceberg C15 shows small signs of break-up, releasing a few floes of older sea ice.

- **Casey Station**
  While the pack ice off Law Dome appears overall to be still reducing, there has recently developed a little sea ice tongue, which currently extents from the fast ice at Petersen Bank into northern Vincennes Bay. On the eastern side of Law Dome, the fast ice remains stable and the pack ice to the east of it has recently moved southward again, closing the gap in front of Totten Glacier.

With best regards,

Jan, for the sea ice group.

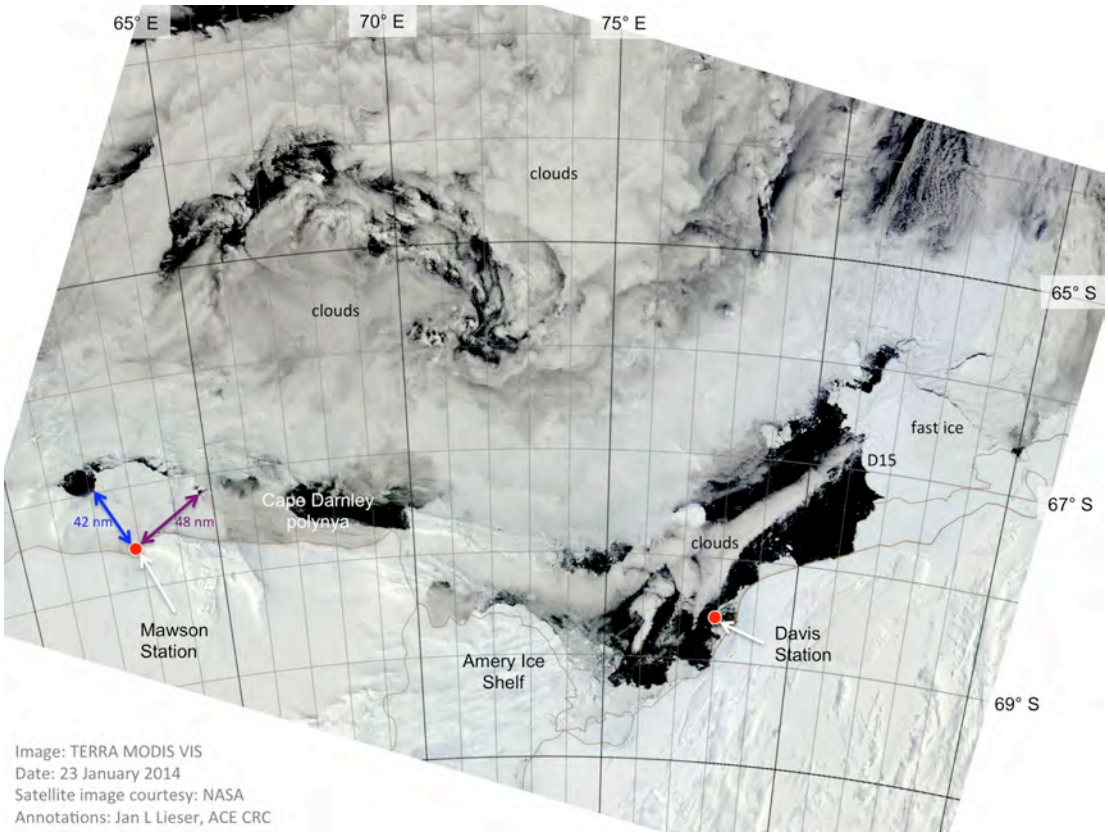

Figure 1: MODIS image, acquired 23/01/2014 and provided by NASA.

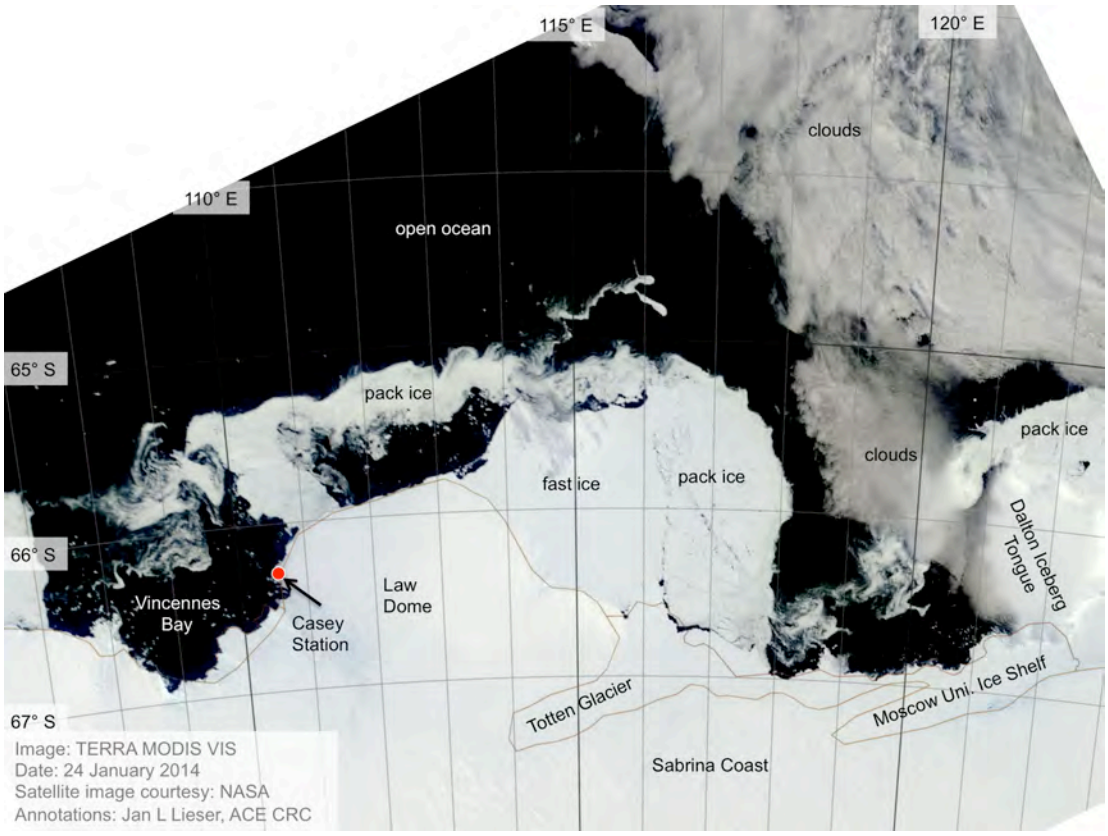

Figure 2: MODIS image, acquired 24/01/2014 and provided by NASA.

Sea Ice Report #05/2014

by the AAD/ACE CRC Sea Ice Group

30/01/2014

This report examines sea ice conditions off all Australian Antarctic bases, as well as off Totten and Mertz glaciers.

- **Mawson Station**
  While the southernmost end of the polynya to the northwest of the station is still at about 67° S, a few pieces of fast ice have broken off the eastern flank of this polynya and drifted across the open water and are currently west of 62° E. The location of the break off is marked with a little red scribble line in Figure 1. Apart from that, the overall sea ice conditions remain largely unchanged with about one degree in latitude of high concentration pack ice between the open Southern Ocean and the Cape Darnley polynya and the fast ice off Mawson Station.

- **Davis Station**
  Sea ice conditions off Davis Station have overall not changed over the past week. Between 1 and 1.5 degrees in latitude of high concentration sea ice separates the open ocean in the north from the very large polynya at the coast.

- **Casey Station**
  Sea ice off Casey Station starts slowly refilling Vincennes Bay, but between about 107° E and 108° 30' E, the entrance into the bay is largely ice free (Figure 2). The northeastern part of the fast ice at Petersen Bank has broken away, but is still local and remains as one very large floe at the moment.

- **Totten Glacier**
  East of Law Dome, the polynya between the fast ice north of Totten Glacier and the Dalton Iceberg Tongue is also slowly starting to fill again. Figure 3 shows that the face of Totten Glacier is currently free of sea ice, and over the past weeks this has been a recurring, but unstable feature. Between 116° E and 118° E, high concentration pack ice is oscillating north and south (possibly driven by tides), and with every pulse beyond the northern fast ice edge off Law Dome some pack ice escapes to the west. In the same longitude interval, a distinct difference between new sea ice accumulating at the southern end of the pack ice off the Totten Glacier and the pack ice further north can be seen in Figure 3. The sea ice crossing the polynya from the northern tip of the Dalton Iceberg Tongue appears to be connecting with this new ice accumulation.

- **Mertz Glacier**
  Figures 4 and 5 show the same geographical frame, as seen by the AMSR-2 and MODIS instruments, respectively. While the area has

been under thicker clouds recently (Figure 5), the microwave data (Figure 4) provide some insight into the apparent onset of freezing conditions in the region, as can be seen from the increased, but still low ice concentration in the polynyas north of Dumont D'Urville Station, iceberg B09B, and the Mertz Glacier polynya

With best regards,

Jan, for the sea ice group.

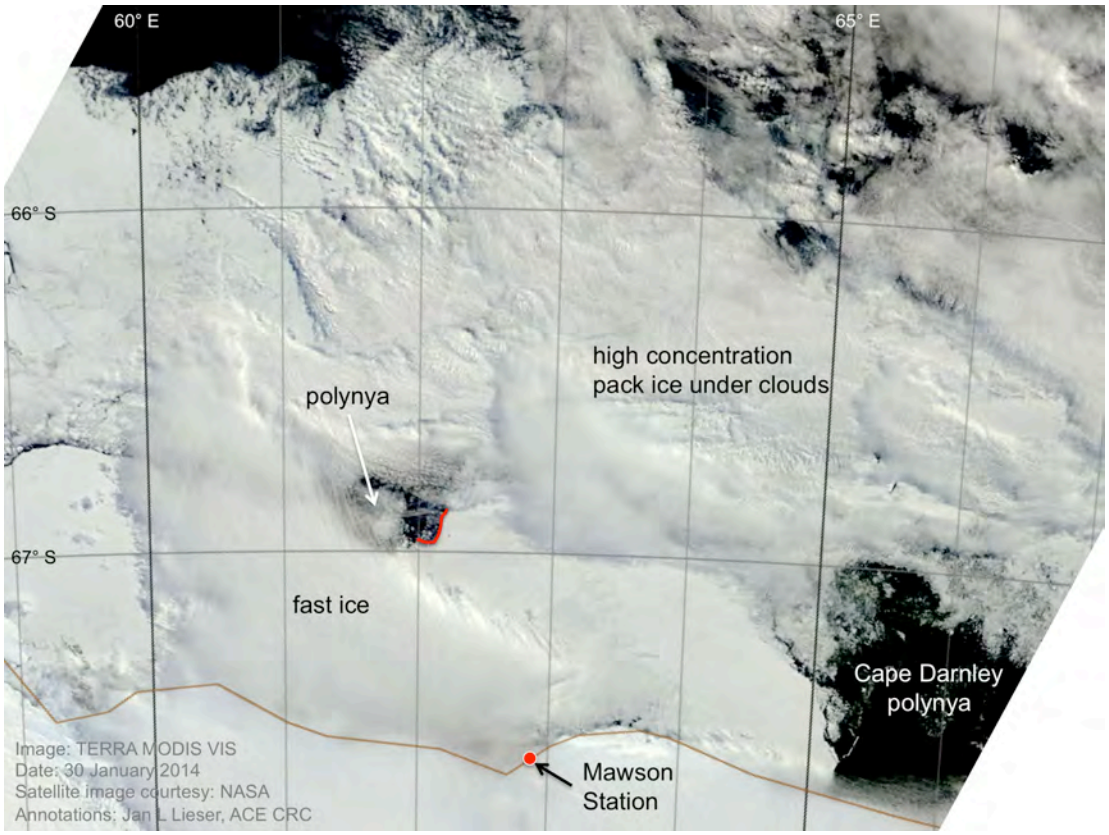

Figure 1: MODIS image, acquired 30/01/2014 and provided by NASA.

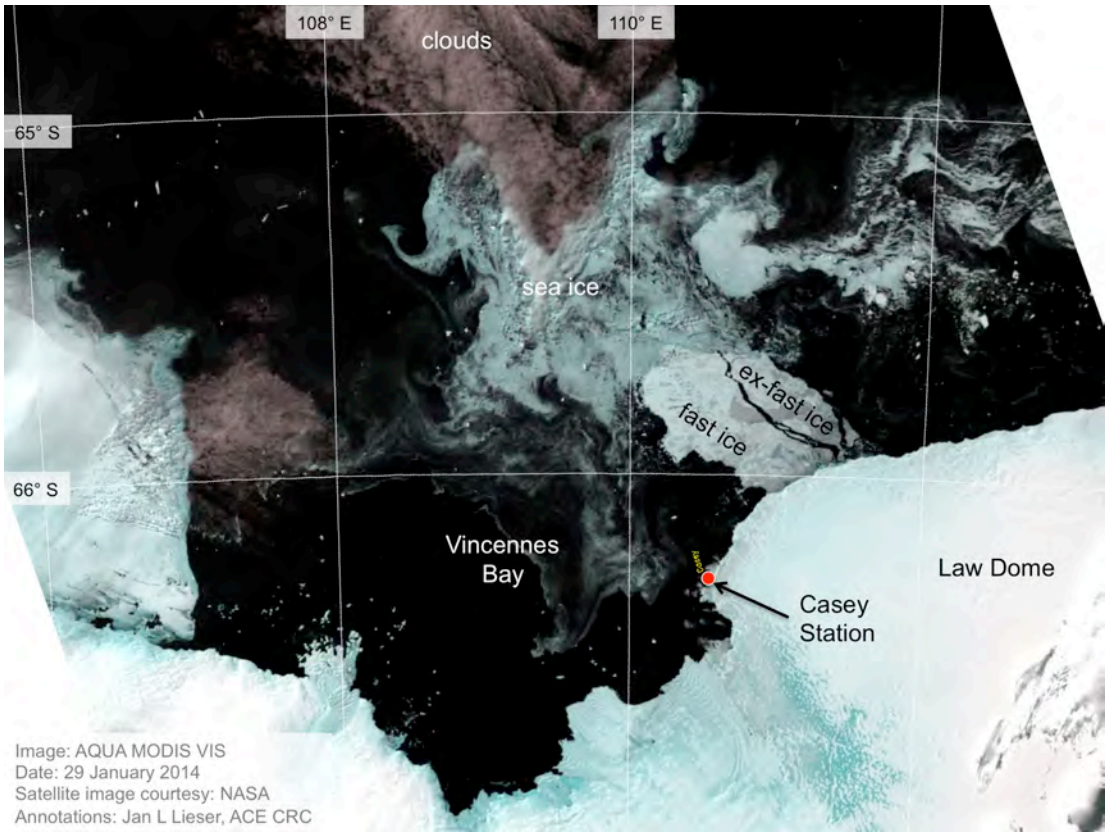

Figure 2: MODIS image, acquired 29/01/2014 and provided by NASA.

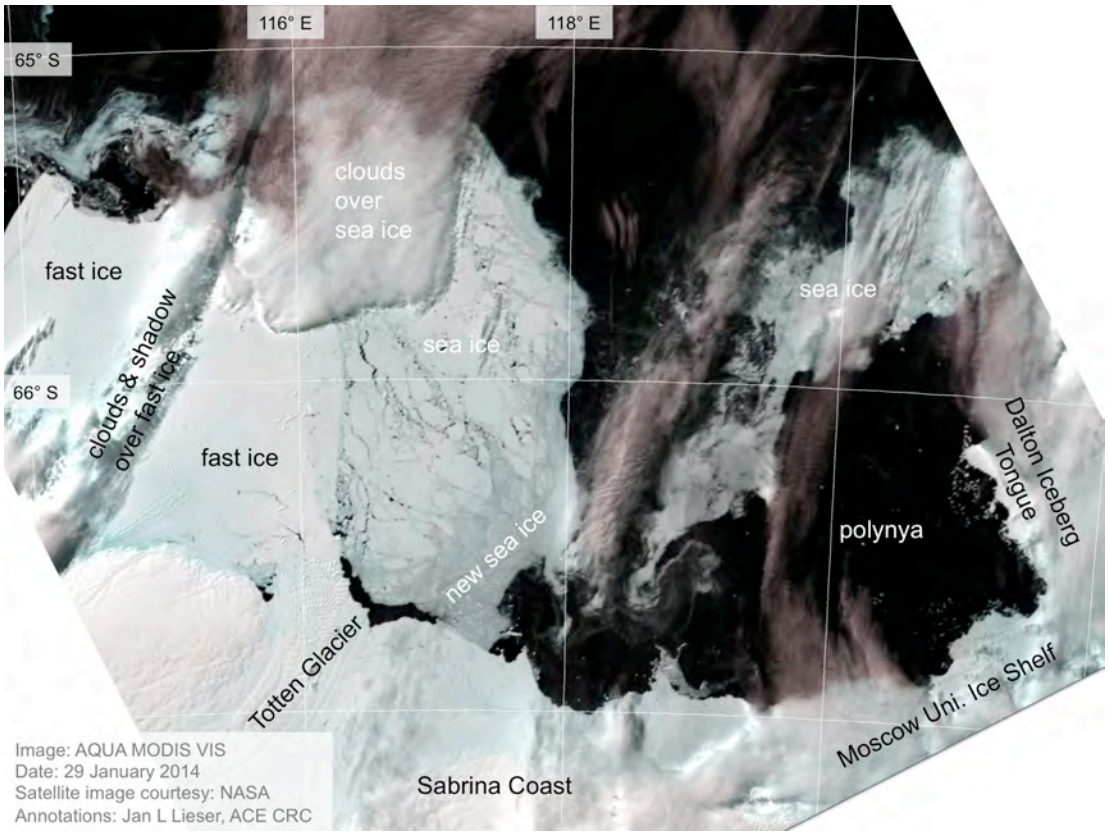

Figure 3: MODIS image, acquired 29/01/2014 and provided by NASA.

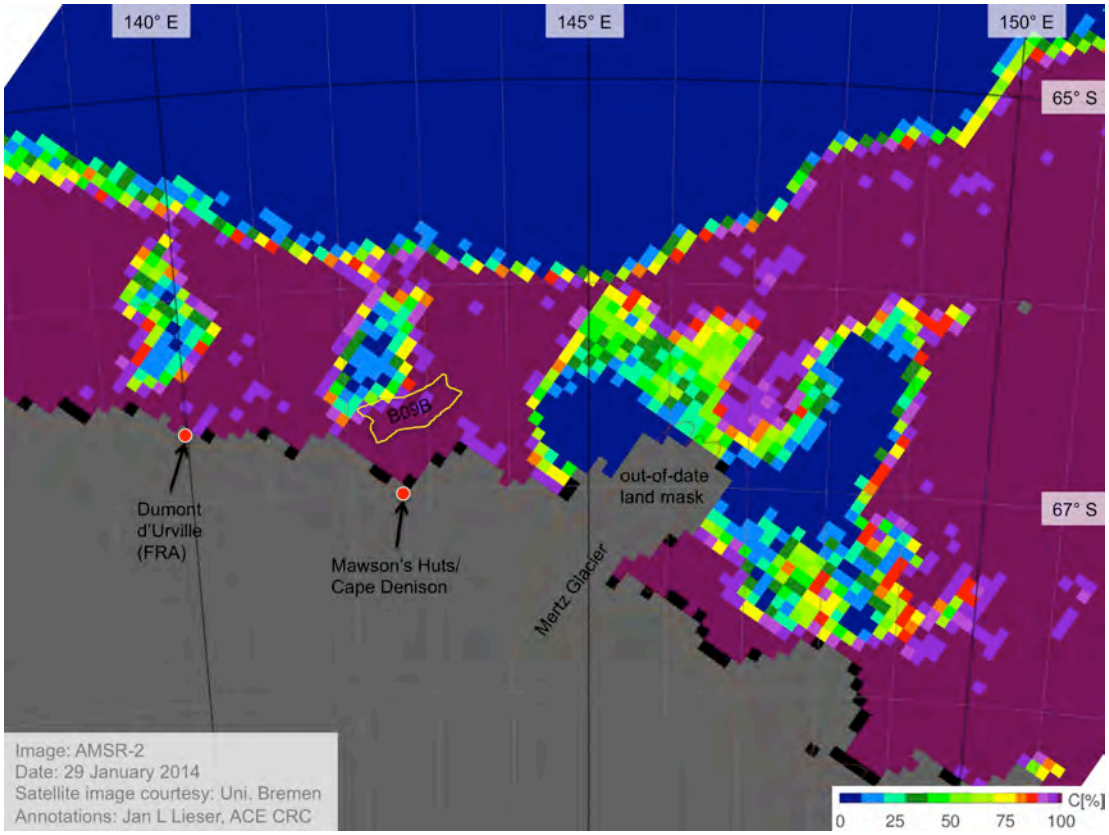

Figure 4: AMSR-2 image, acquired 29/01/2014 and provided by Universität Bremen.

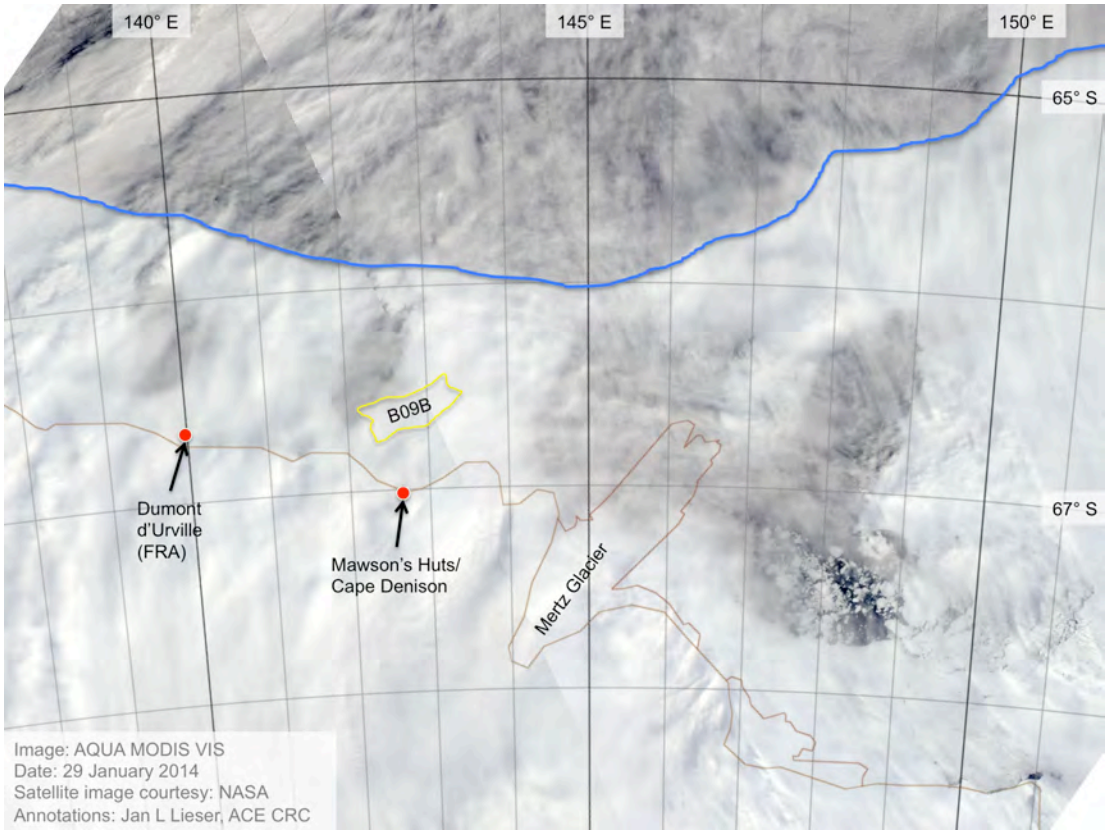

Figure 5: MODIS image, acquired 29/01/2014 and provided by NASA.

Sea Ice Report #05a/2014

by the AAD/ACE CRC Sea Ice Group

31/01/2014

This report updates on sea ice conditions off Mawson Station, and off the Totten and Mertz glaciers.

- **Mawson Station**
  Even thought the boundary of the polynya to the northwest of Mawson Station appears to be widening, the polynya itself is now filling with the sea ice that has broken off the edges. North of 66° 15' S and east of 64° E, the edge of the high concentration pack ice was under little clouds yesterday (Figure 1) and can be seen with many northward reaching sea ice filaments and as a quite diffuse sea ice edge. This indicates low horizontal pressure on the sea ice at the moment, even though the concentration remains high in the central part of the band of pack ice separating the Cape Darnley polynya and fast ice off Mawson Station from the open ocean.

- **Totten Glacier**
  The polynya off the face of Totten Glacier appears a little smaller in yesterday's MODIS image (Figure 2) compared to Figure 3 of Sea Ice Report #05/2014. North of about 66° 30' S, the scene is largely obscured by clouds, but the edge of the sea ice north of Totten Glacier is indicated by the (partly dashed) red line in Figure 2. The cloud pattern belongs to the tail end of a low pressure system, centred at about 123° 45' E and 64° 15' S, at the time of image acquisition. The tongue of sea ice reaching across the polynya from the northern tip of the Dalton Iceberg Tongue towards the Sabrina Coast appears to be thickening slightly over the past day or two.

- **Mertz Glacier**
  Figure 3 shows the region between Dumont D'Urville Station and the Mertz Glacier polynya under less clouds than Figure 5 of yesterday's Sea Ice Report. The increase in sea ice concentration reported yesterday appears to be a result of more sea ice floes floating in the various polynyas, combined with the onset of new ice formation. This newly formed sea ice can be quickly pushed to one side once wind strength is strong enough and may therefore appear as a reduction in ice concentration in future imagery. From north of 66° S and west of 150° E, the pack ice entering the polynya off the Mertz Glacier seems to be spreading in a fan-like pattern, as indicated by the purple arc in Figure 3. At 145° E and 66° S, the gap between the pack ice creeping from the east and the pack ice west of the fast ice surrounding iceberg B09B appears to be almost closed.

With best regards,

Jan, for the sea ice group.

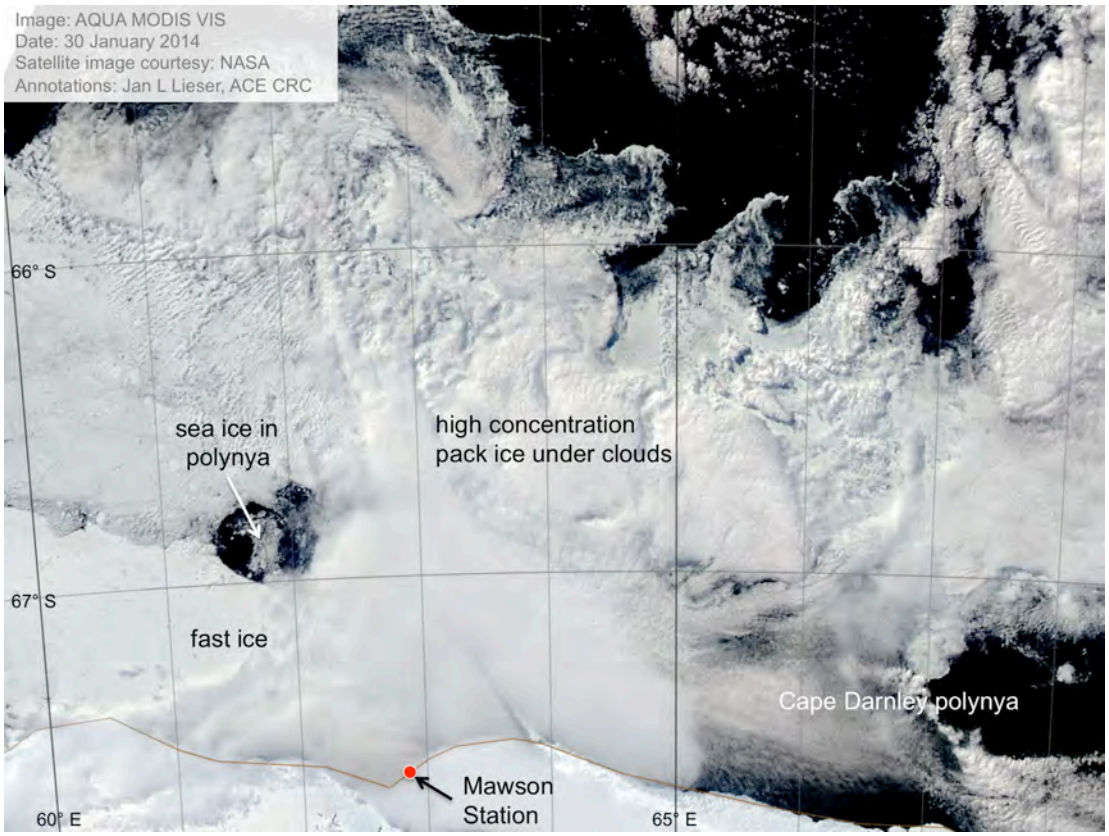

Figure 1: MODIS image, acquired 30/01/2014 and provided by NASA.

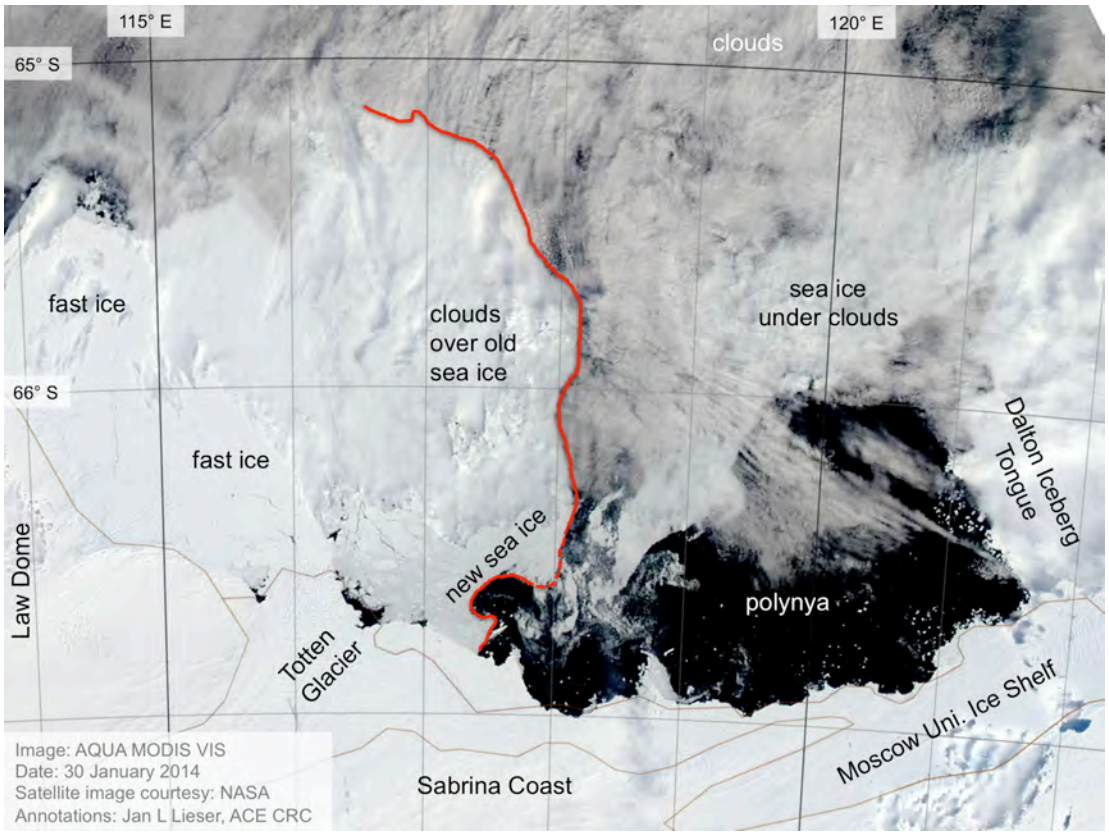

Figure 2: MODIS image, acquired 30/01/2014 and provided by NASA.

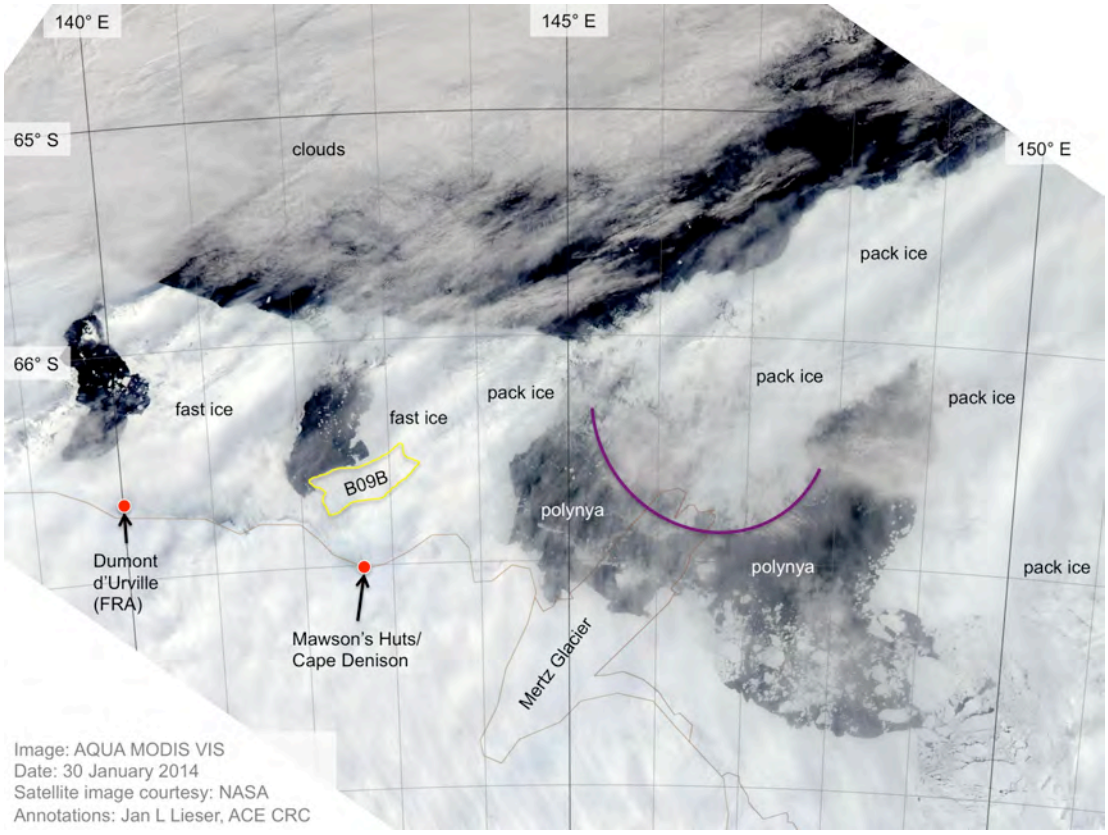

Figure 3: MODIS image, acquired 30/01/2014 and provided by NASA.

Sea Ice Report #05b/2014

by the AAD/ACE CRC Sea Ice Group

03/02/2014

This report updates on sea ice conditions off all Australian Antarctic stations, and off the Totten and Mertz glaciers.

- **Mawson Station**
  Over the past few days, the fast ice condition has not changed significantly off Mawson Station (Figure 1). The shortest distance to open water is till towards the polynya north west of the station, about 41 nautical miles. While the pack ice west of about 67° E (including the area north of the fast ice) still shows high concentration and about one degree of latitude in extent, east of 67° E the sea ice appears to be reducing and almost opening the Cape Darnley polynya to the Southern Ocean, as indicated by the yellow shape in Figure 1, north of Cape Darnley.

- **Davis Station**
  North of Davis Station, the pack ice conditions have not changed significantly, too. A wide band of high concentration sea ice extends still for about one degree in latitude in the sector between 75° E and 85° E. This is likely a result of a longer sea ice season (about two months longer, a combination of earlier sea ice advance last autumn and later sea ice retreat in the following spring), which we observed in the sector between 90° E and 180° E during the previous year.

- **Casey Station**
  Some sea ice is entering Vincennes Bay around the fast ice north of Casey Station, but overall the sea ice concentration is only light in the region. Almost the entire scene of Figure 2 is obscured by clouds, but through the thinner areas some sea ice can be identified along 110° E and north of Law Dome.

- **Totten Glacier**
  The region between Totten Glacier and the Dalton Iceberg Tongue can be seen almost entirely cloud free in Figure 3. The face of Totten Glacier appears largely free of sea ice and to east of the fast ice attached Law Dome, the difference between the old sea ice and new sea ice appears obvious. In fact, the apparent north-south movement of this combined old and new sea ice reported earlier might be a result of just northward movement of the combined pack, which is subsequently replenished at the southern end with new sea ice crossing the polynya from the northern tip of the Dalton Iceberg Tongue. The gap between the sea ice pack west of 118° E and the sea ice turning the corner around the Dalton Iceberg Tongue seems to be narrowing.

- **Mertz Glacier**
  The Mertz Glacier polynya is filling with sea ice, but the pattern is quite diffuse, which indicates that there is low atmospheric force (wind) at the moment and the sea ice is mainly moved by oceanic eddies in the region. To the east of the fast ice surrounding iceberg B09B, the accumulated pack ice appears to be retreating westwards at its southern end but extending further to the east at its northern end, where it connects to the pack ice drifting across from form the area east of 147° E.

  Caution regarding iceberg C15: over the past few days, we have noticed some movement of iceberg C15, currently located at the eastern end of the Mertz Glacier Tongue. It appears to be not connected with the glacier tongue anymore. It may not to be floating free yet, but seems to be in the process of detaching itself from the fast ice east of the Mertz Glacier. Once it may set itself free it is likely to move westward and cross the face of Mertz Glacier.

With best regards,

Jan, for the sea ice group.

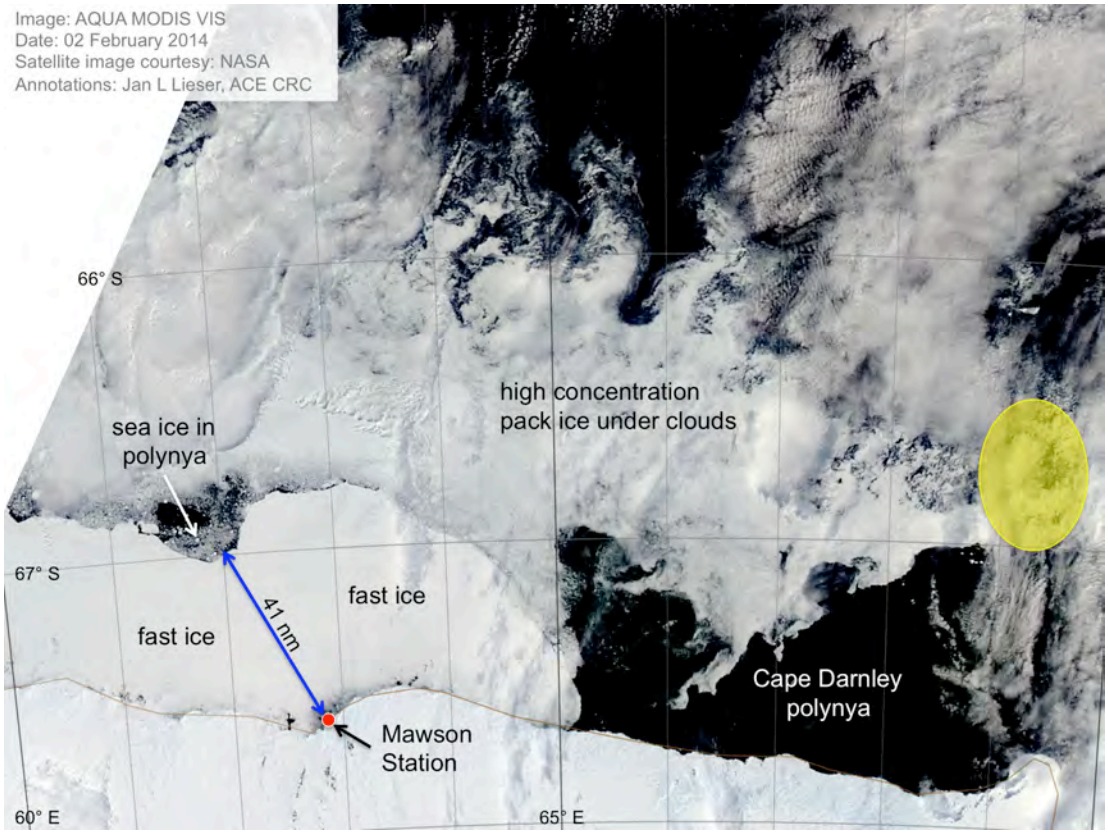

Figure 1: MODIS image, acquired 02/02/2014 and provided by NASA.

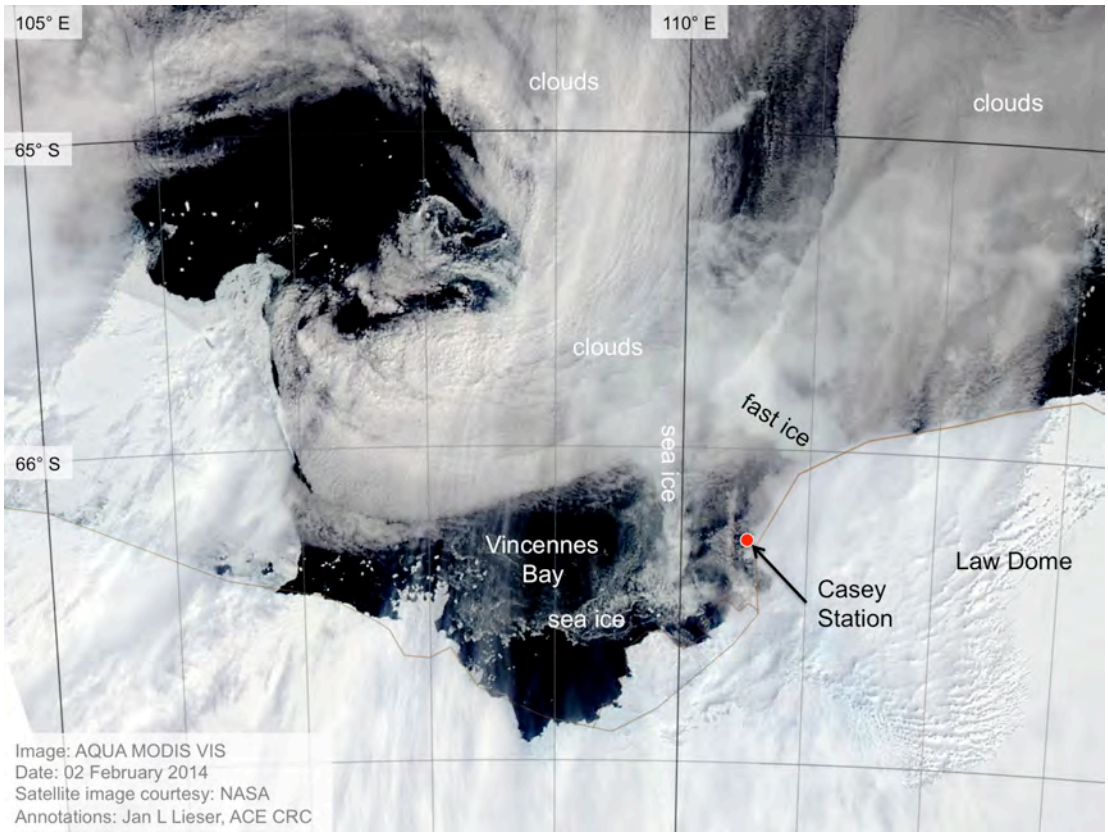

Figure 2: MODIS image, acquired 02/02/2014 and provided by NASA.

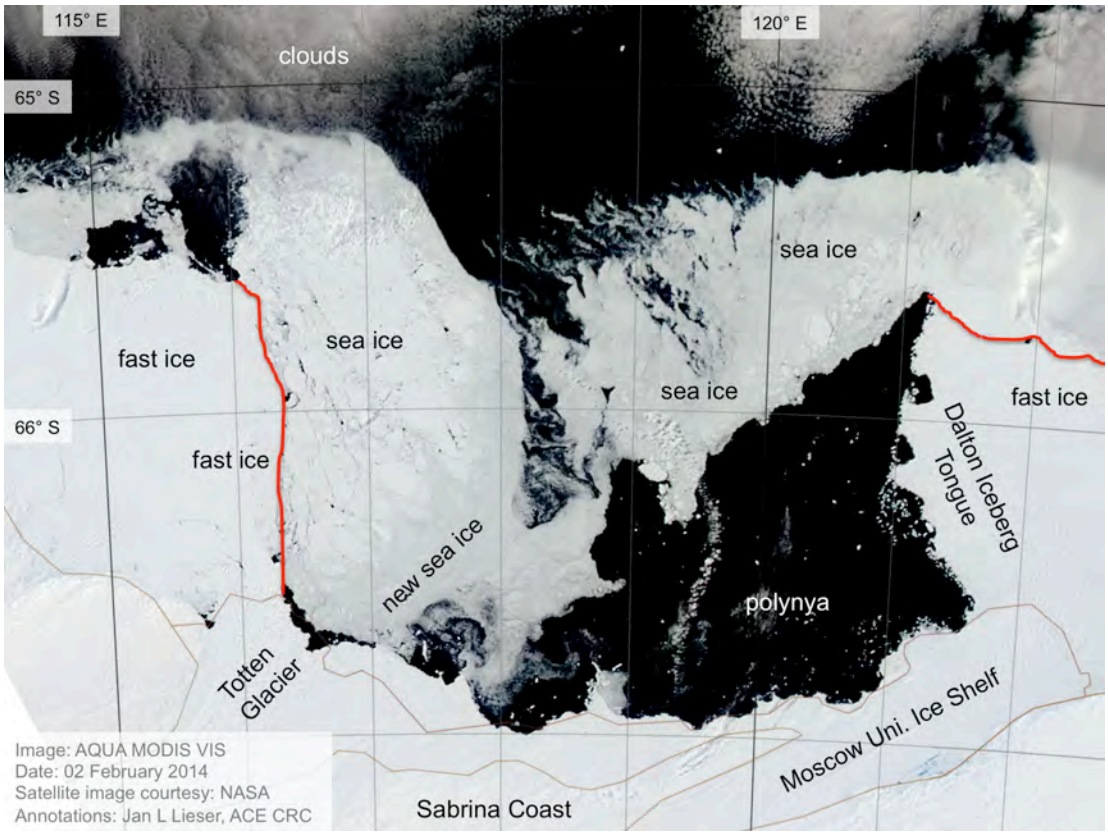

Figure 3: MODIS image, acquired 02/02/2014 and provided by NASA.

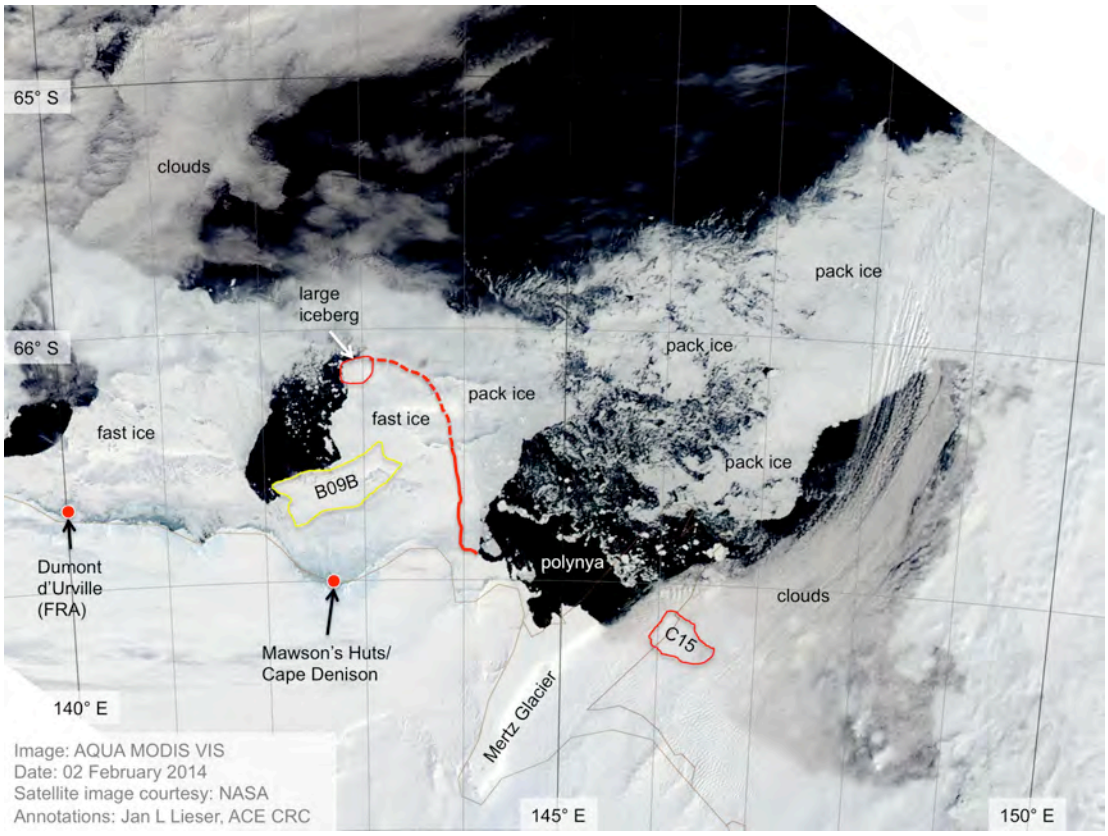

Figure 4: MODIS image, acquired 02/02/2014 and provided by NASA.

Sea Ice Report #06/2014

by the AAD/ACE CRC Sea Ice Group

06/02/2014

This report examines sea ice conditions off all Australian Antarctic bases, as well as off Totten and Mertz glaciers.

- **Mawson Station**
  Even though the sea ice condition close to shore at Mawson Station appears to be deteriorating, the larger picture (see Figure 1) seems more or less unchanged. Cape Darnley polynya is slowly filling with sea ice moving south from about 67° S, but the 'gap' in the pack ice identified in report #05b/2014 persists and is indicated by the yellow shape in Figure 1. The polynya to the northwest of Mawson Station is also slowly filling with pack ice at its western boundary, while the overall shape of the fast ice off Mawson Coast has not changed significantly.

- **Davis Station**
  Off Davis Station, a wide band (up to one degree in latitude) of high concentration pack ice still separates the coastal open water between the Amery Ice Shelf and iceberg D15 from the Southern Ocean (see Figure 2). Immediately north of Davis Station, one fragment of the ex-Mertz Glacier Tongue, iceberg C28B, is currently within the pack ice.

- **Casey Station**
  Sea ice conditions off Casey Station appear to be light, but clouds prevent a clear view of the area recently.

- **Totten Glacier**
  The face of Totten Glacier is under clouds as well, but some dark patches can be seen in Figure 3 between the glacier and the pack ice to the north of it, hinting some larger open water areas close to the coast. The eastern part of Figure 3 provides a cloud free view of the region and shows some icebergs scattered throughout the polynya and some larger gaps (lighter sea ice concentration) in the pack ice south of 65° 25' S.

- **Mertz Glacier**
  In the Mertz Glacier polynya, sea ice seems to be pushed north a little, and accumulating around 66° S, plus-minus half a degree. Iceberg C15 continues to rotate clockwise around its eastern end, while one fragment has fallen off the western side of the berg and is now drifting across the face of Mertz Glacier. The approximate position of *Nathaniel B. Palmer* (WBP3210) at 02:00 UT on 06/02/14 is marked with a red dot in Figure 4.

With best regards,

Jan, for the sea ice group.

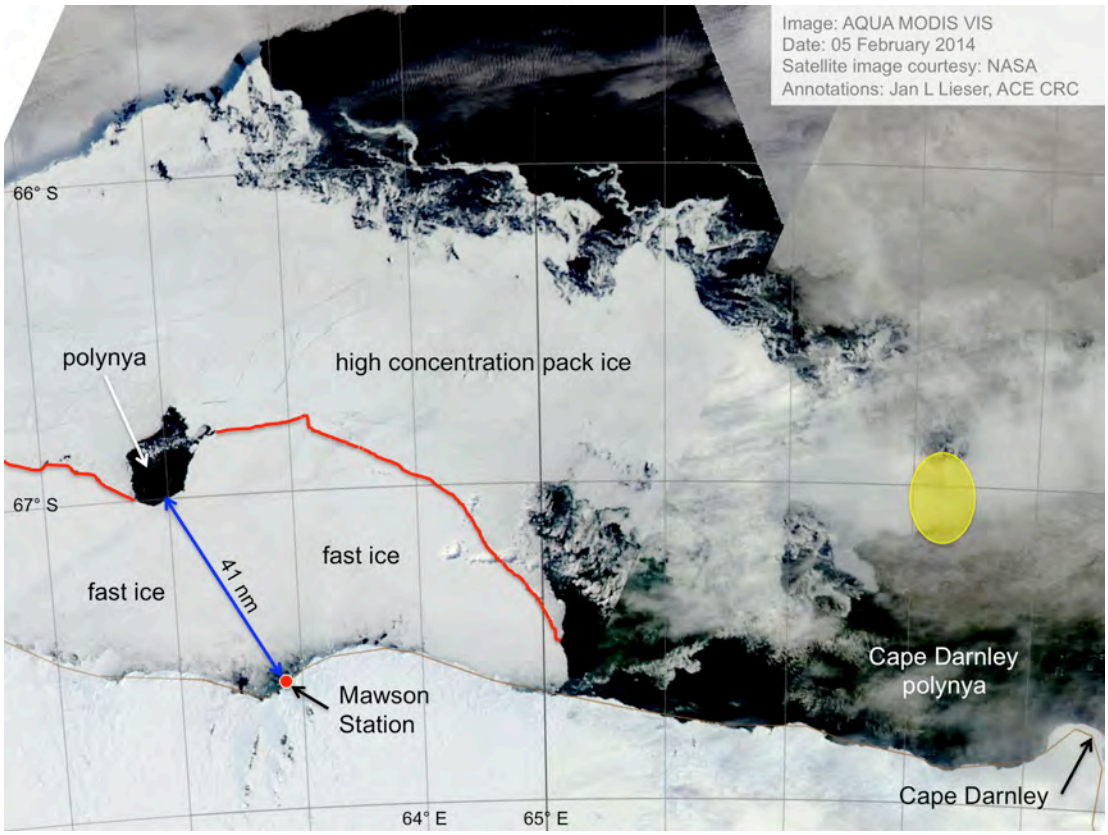

Figure 1: MODIS image, acquired 05/02/2014 and provided by NASA.

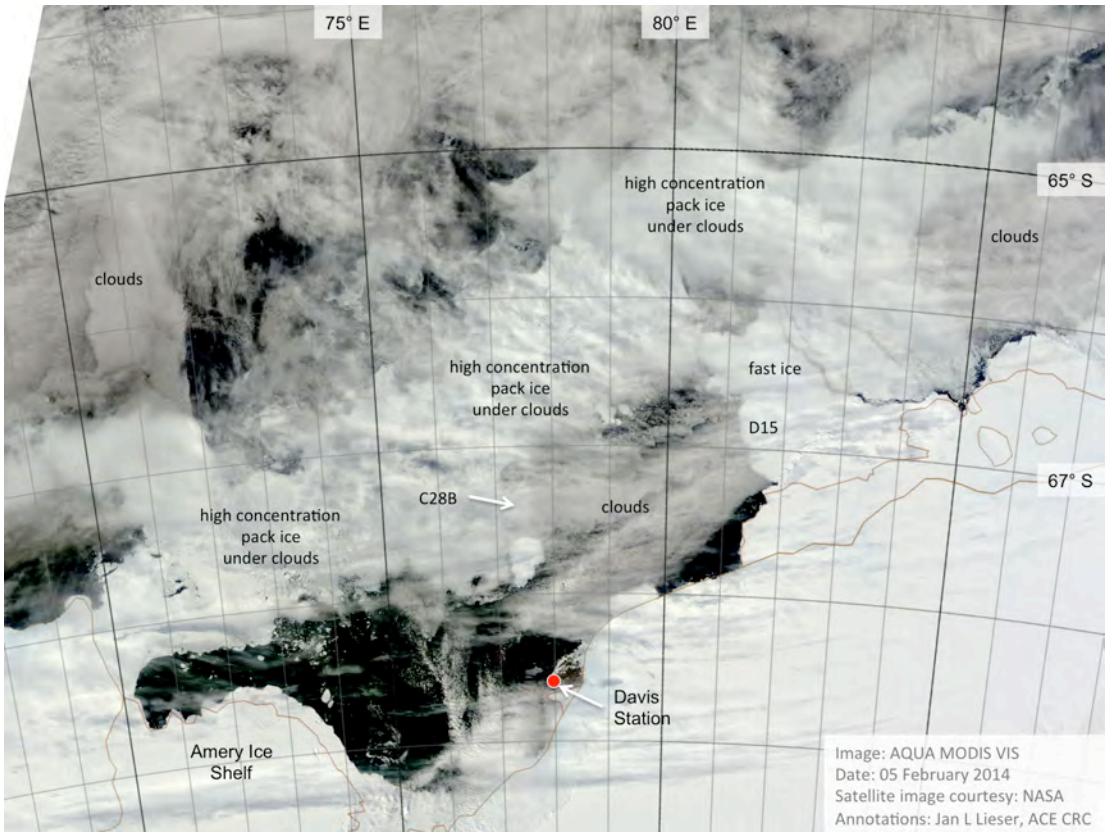

Figure 2: MODIS image, acquired 05/02/2014 and provided by NASA.

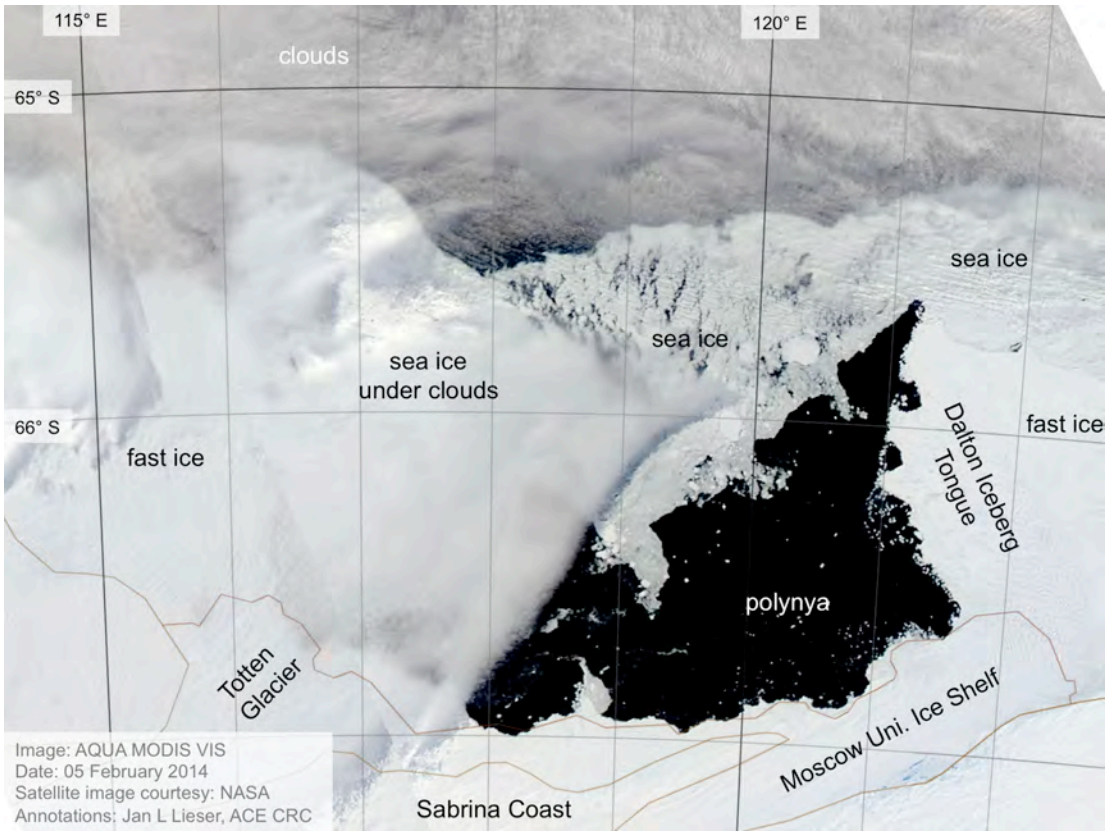

Figure 3: MODIS image, acquired 05/02/2014 and provided by NASA.

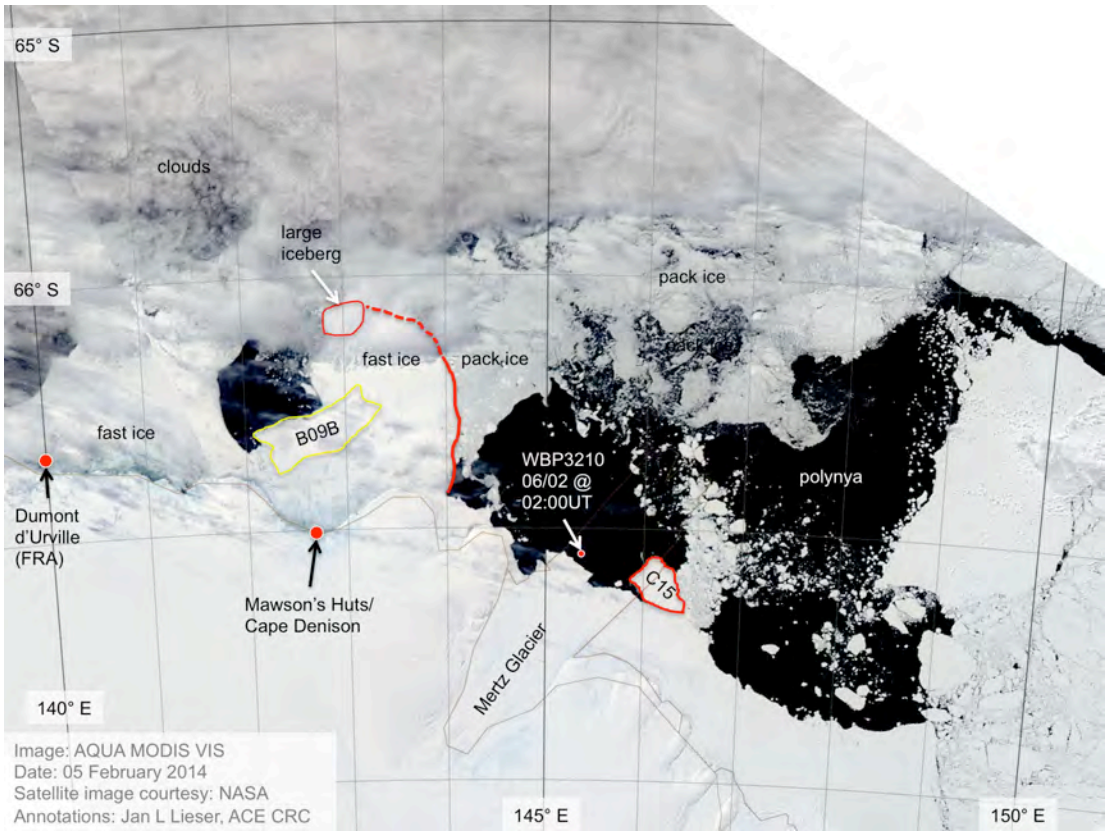

Figure 4: MODIS image, acquired 05/02/2014 and provided by NASA.

Sea Ice Report #06a/2014

by the AAD/ACE CRC Sea Ice Group

10/02/2014

This report updates on sea ice conditions off Davis Station and the Totten glacier.

- **Davis Station**
  Sea ice off Davis Station appears to have experienced a shift during the weekend, and now shows a very fuzzy northern sea ice edge and a more defined southern boundary. Figure 1 presents an almost entirely cloud free scene from the Amery Ice Shelf to the region east of iceberg D15. Only small bands of thin clouds are visible and don't obscure the view on the sea ice and ocean too much.

  Two regions of recent reduction in sea ice concentration can be identified, in the west along 74° E in Prydz Bay and to the north of iceberg D15 between 80° E and 82° E. This eastern region shows lower ice concentrations only since 08/02/2014. Two major tabular icebergs are identified in this region (namely B09F and B16), and the low (almost zero) ice concentration immediately north of theses bergs is explained by a change in sea ice drift and subsequent lee effect.

- **Totten Glacier**
  South of 65° 30' S, the region between Law Dome and the Dalton Iceberg Tongue shows a big increase in ice concentration on 08/02/2014. This increase left the open water fraction (0% - 15% ice concentration) of the polynya north of Sabrina Coast almost half in size. The entire region has been under increasing and thickening clouds since 06/02/2014, therefore no high resolution, clear view image could be acquired by the MODIS instruments.

With best regards,

Jan, for the sea ice group.

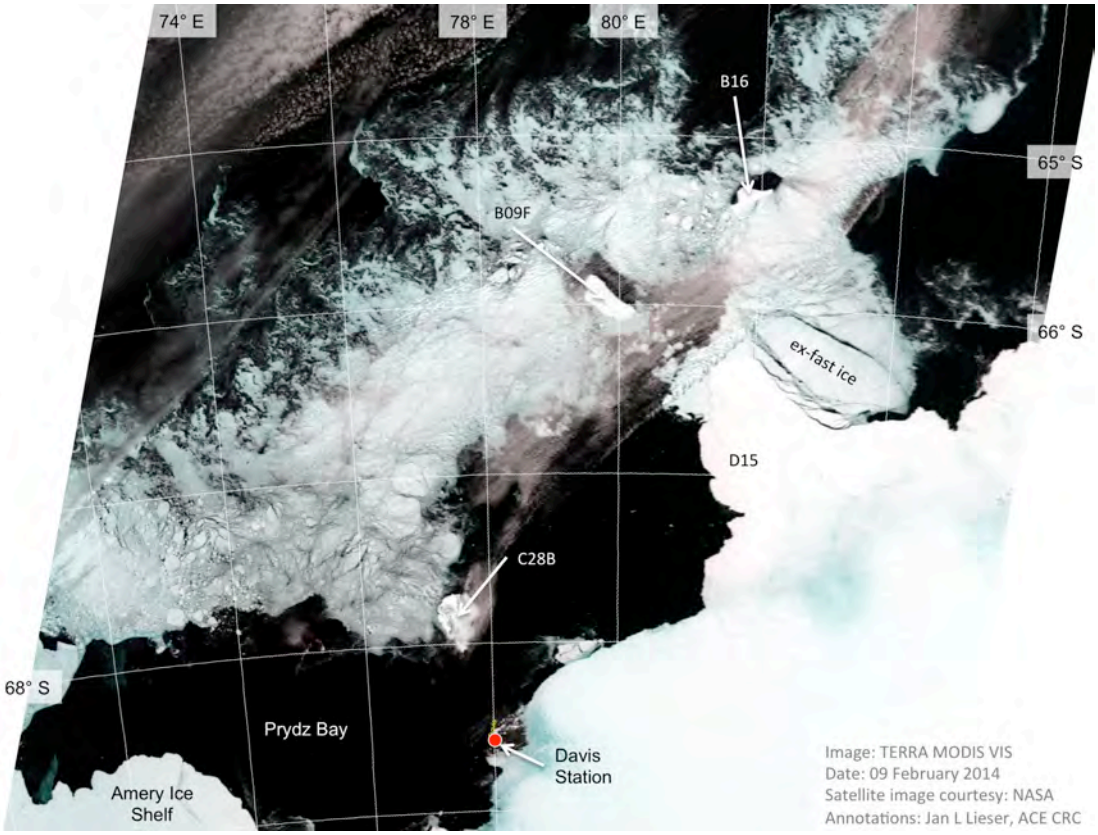

Figure 1: MODIS image, acquired 09/02/2014 and provided by NASA.

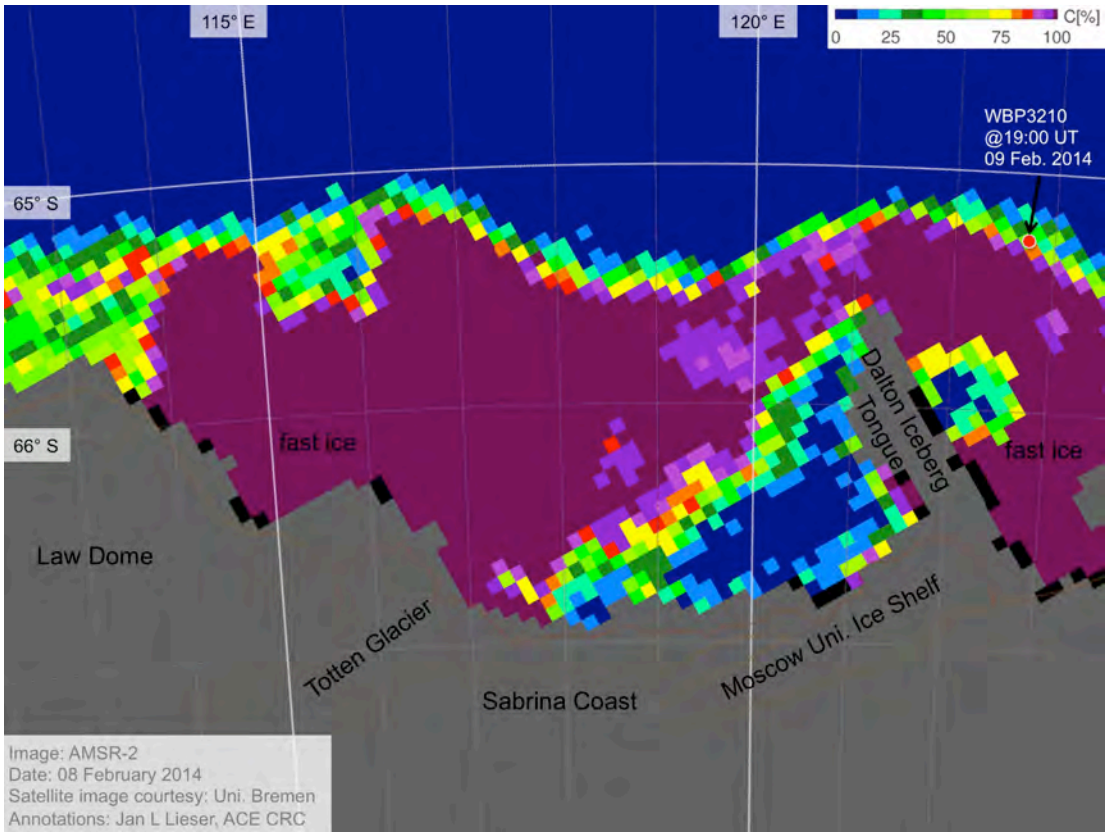

Figure 2: AMSR-2 image, acquired 08/02/2014 and provided by Universität Bremen.

Sea Ice Report #06b/2014

by the AAD/ACE CRC Sea Ice Group

11/02/2014

This report updates on sea ice conditions off Mawson and Davis stations and the Totten glacier.

- **Mawson Station**
  Figures 1 and 2 show the same geographical frame between Mawson Station and Cape Darnley, as seen by the MODIS and AMSR-2 instruments, respectively. While the north-south extent of sea ice to the north of the Cape Darnley polynya has reduced recently, the overall sea ice conditions to the west of 66° E remains largely unchanged. The shape of the fast ice off Mawson Station has not reduced significantly, but the polynya to the northwest of the station appears to be slightly smaller. The high concentration pack ice shows no signs of predominant shear or fractures, nor any gaps or openings.

- **Davis Station**
  Sea ice in Prydz Bay appears slightly more loose at the moment (Figure 3) than during the previous few weeks. North of the Amery Ice Shelf, sea ice concentration has reduced over a larger region, between 73° E and 76° E roughly. The northern boundary appears fuzzy, and the marginal ice zone has spread over about half a degree in latitude. The approximate position of RSV *Aurora Australis* (VNAA) on 11/02/14 at 03:45 UT is indicated by a red dot at the top of Figure 3. The large icebergs mentioned in report #06a/2014 remain in the area but can not be identified in the AMSR-2 data.

- **Totten Glacier**
  Figures 4 and 5 show the same geographical frame between Totten Glacier and the Dalton Iceberg Tongue, as seen by the AMSR-2 and MODIS instruments, respectively. The approximate position of RSV *Nathaniel B. Palmer* (WBP3210) on 11/02/14 at 04:30 UT is indicated by a red dot inside the polynya north of the Moscow University Ice Shelf in the figures.

  Even though the region is still under a large cloud cover, the open water and sea ice covered areas can be well distinguished through the thin clouds. With the corresponding AMSR-2 data shown in Figure 4 the edge between the pack ice off Totten Glacier and the polynya to the west of the Dalton Iceberg Tongue can be seen in Figure 5, at about 119° E close to the coast.

With best regards,

Jan, for the sea ice group.

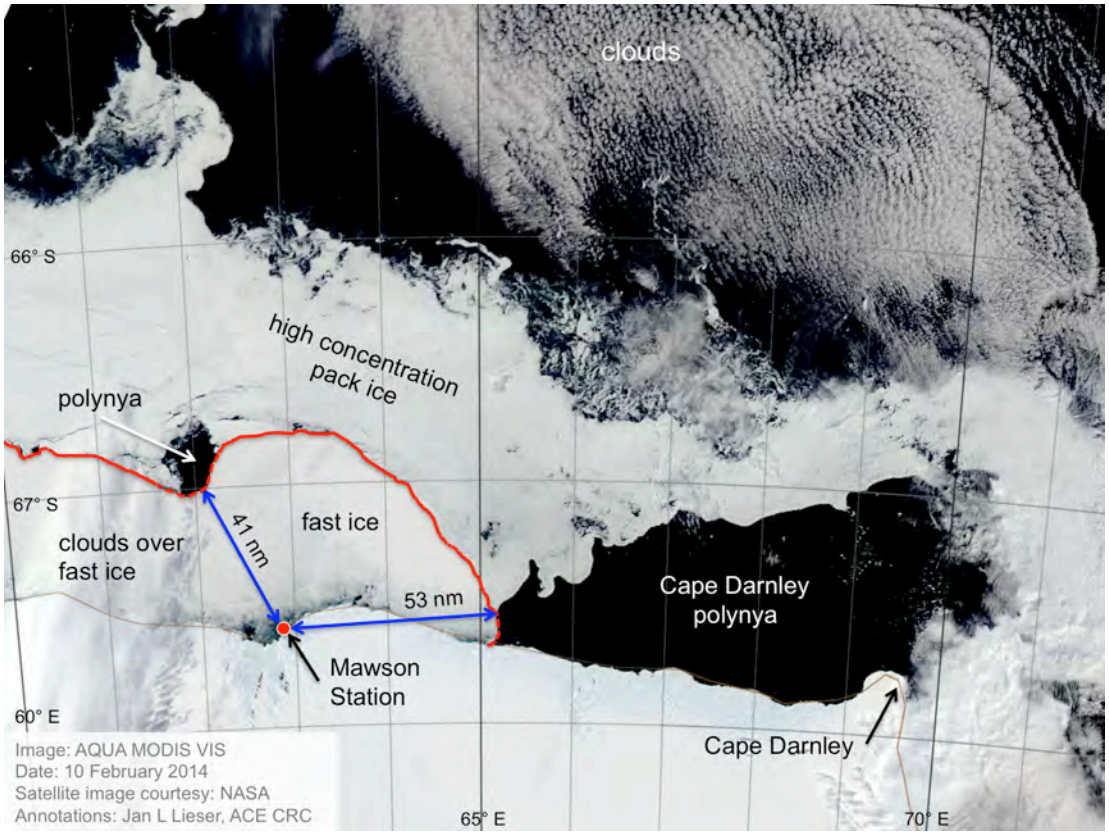

Figure 1: MODIS image, acquired 10/02/2014 and provided by NASA.

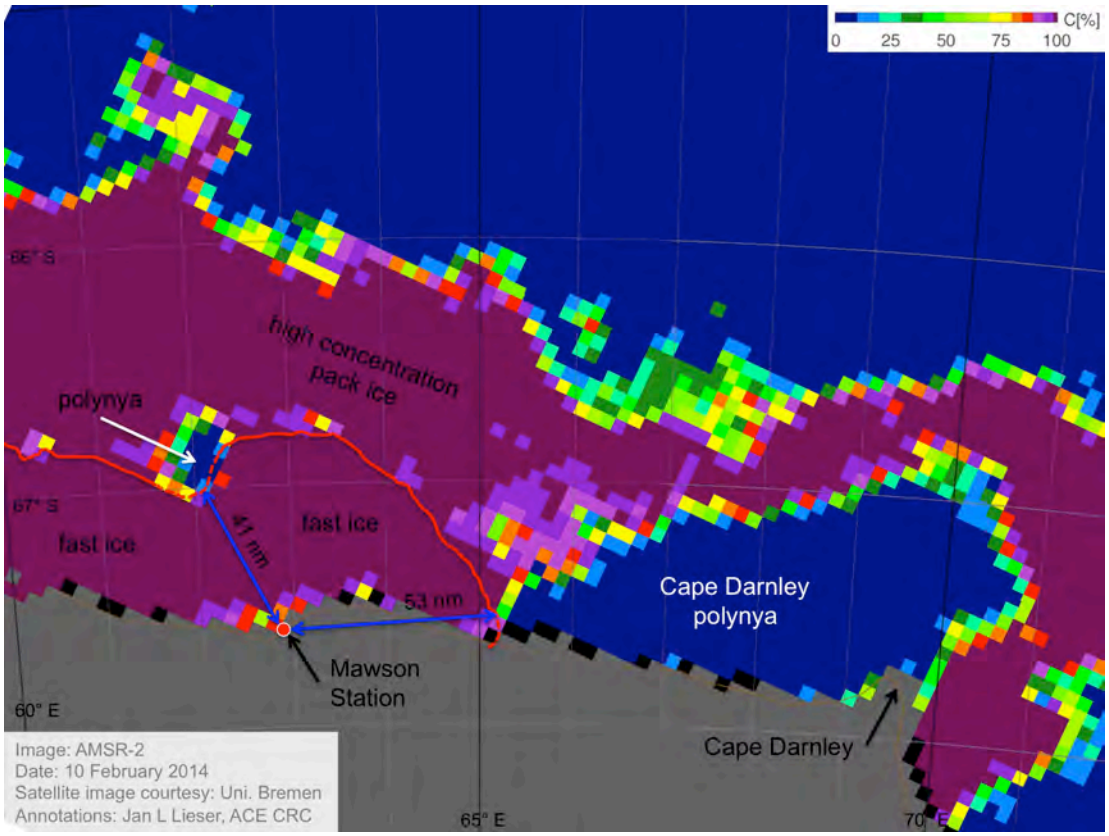

Figure 2: AMSR-2 image, acquired 10/02/2014 and provided by Universität Bremen.

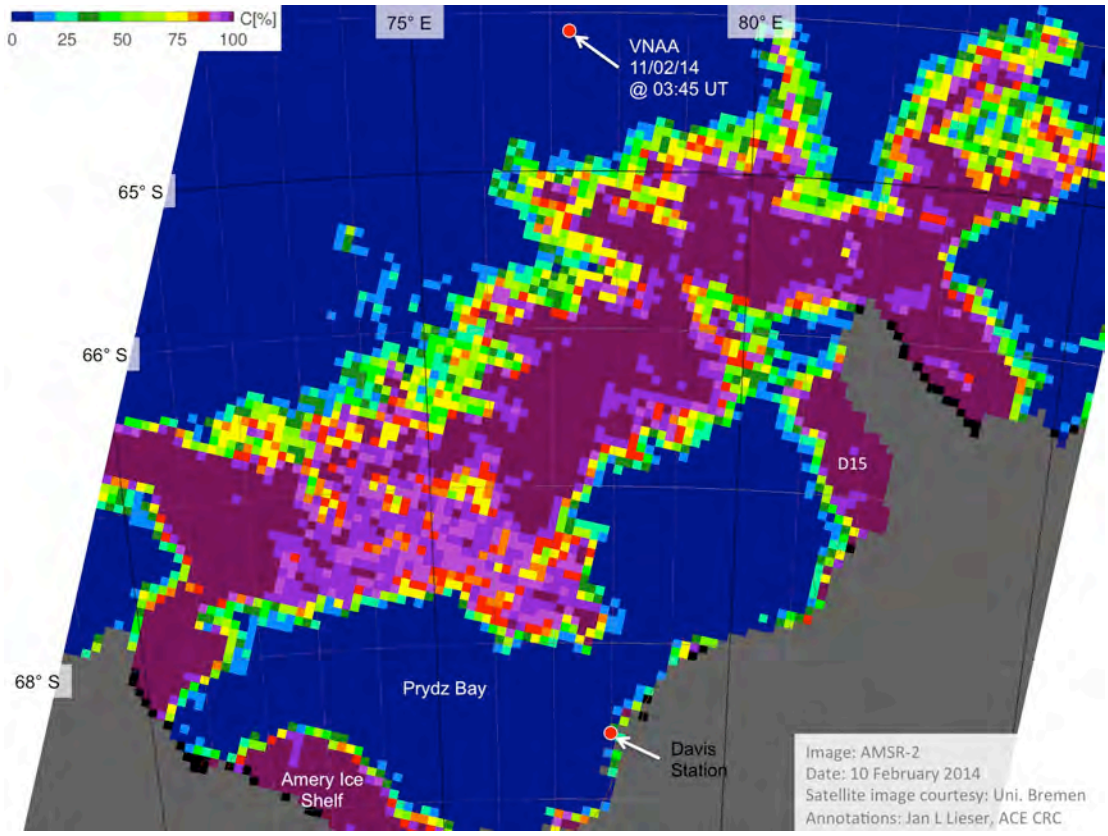

Figure 3: AMSR-2 image, acquired 10/02/2014 and provided by Universität Bremen.

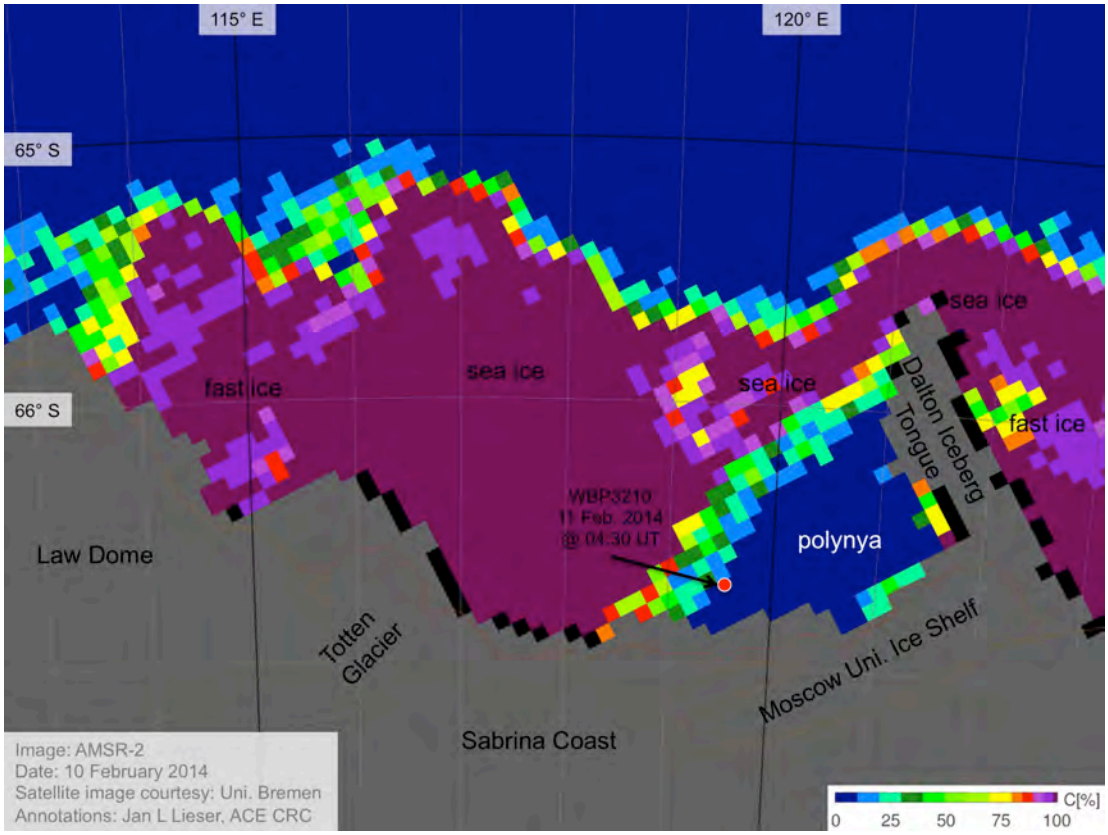

Figure 4: AMSR-2 image, acquired 10/02/2014 and provided by Universität Bremen.

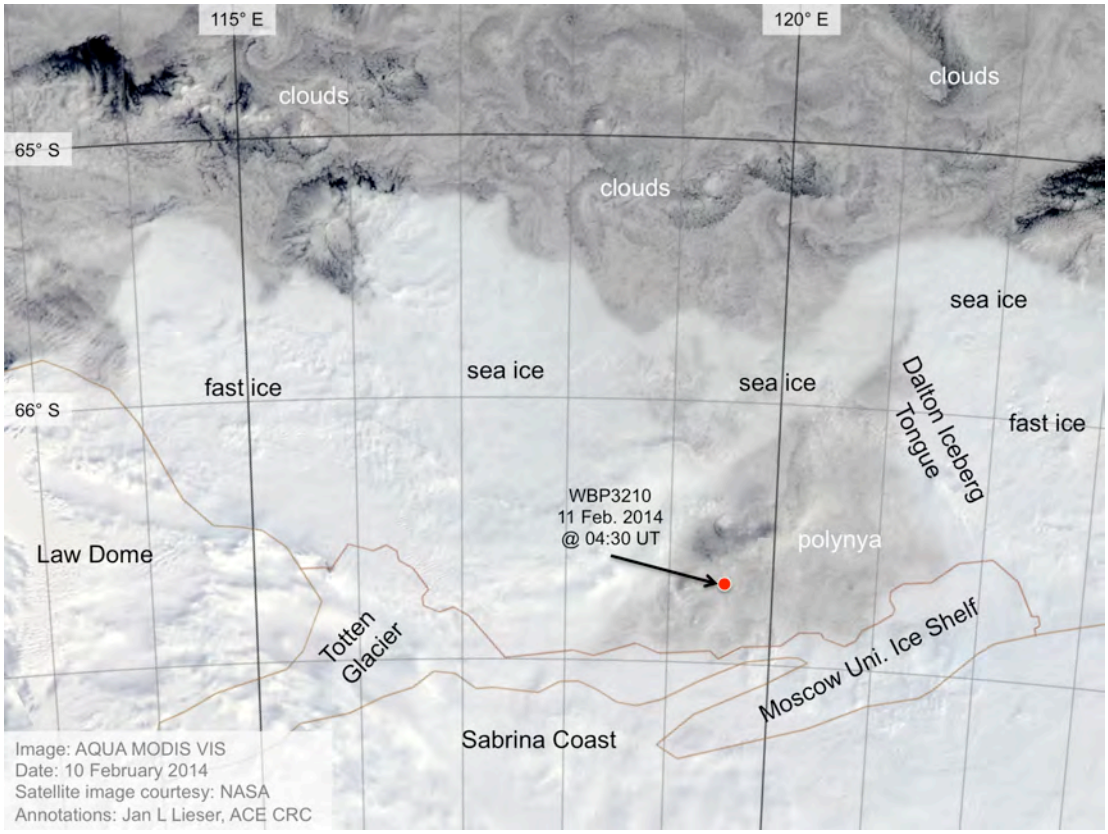

Figure 5: MODIS image, acquired 10/02/2014 and provided by NASA.

Sea Ice Report #07/2014

by the AAD/ACE CRC Sea Ice Group

12/02/2014

This report examines sea ice conditions off Davis station.

- **Davis Station**
  Figures 1, 2 and 3 show the same geographical frame as seen by RadarSat-2, the MODIS instrument and the AMSR-2 instrument, respectively.

  The high resolution RADAR image (Figure 1) shows a very homogenous sea ice cover east of 75° E. Not many large floes can be identified in this sea ice matrix. West of 75° E, the concentration of floes is a bit lower but some large floes can be seen in the mix. Smaller eddy-like sea ice drift features are clearly visible at the outer edge (the sea ice margin), but also at the coastal side of this band of sea ice, to the north and west of iceberg C28B. Some twirls can even be seen in the central pack, for example along 67° S. All this indicates that the sea ice is currently under low horizontal stress, with very little wind forcing.

  The medium resolution MODIS image (Figure 2) presents a clear view on the sea ice west of 75° E, but some moderate to thick cloud cover obscuring the scene east of 75° E. Again, some larger floes can be seen south of 67° S, at least in the cloud free part of the image.

  The coarse resolution AMSR-2 image (FIgure 3) is provided for reference. Ice concentration below 75% appears to be dominant in a sector between 73° 30' E and 75° E. Even though iceberg C28B can not be positively identified in the data, it's location is marked in the figure.

With best regards,

Jan, for the sea ice group.

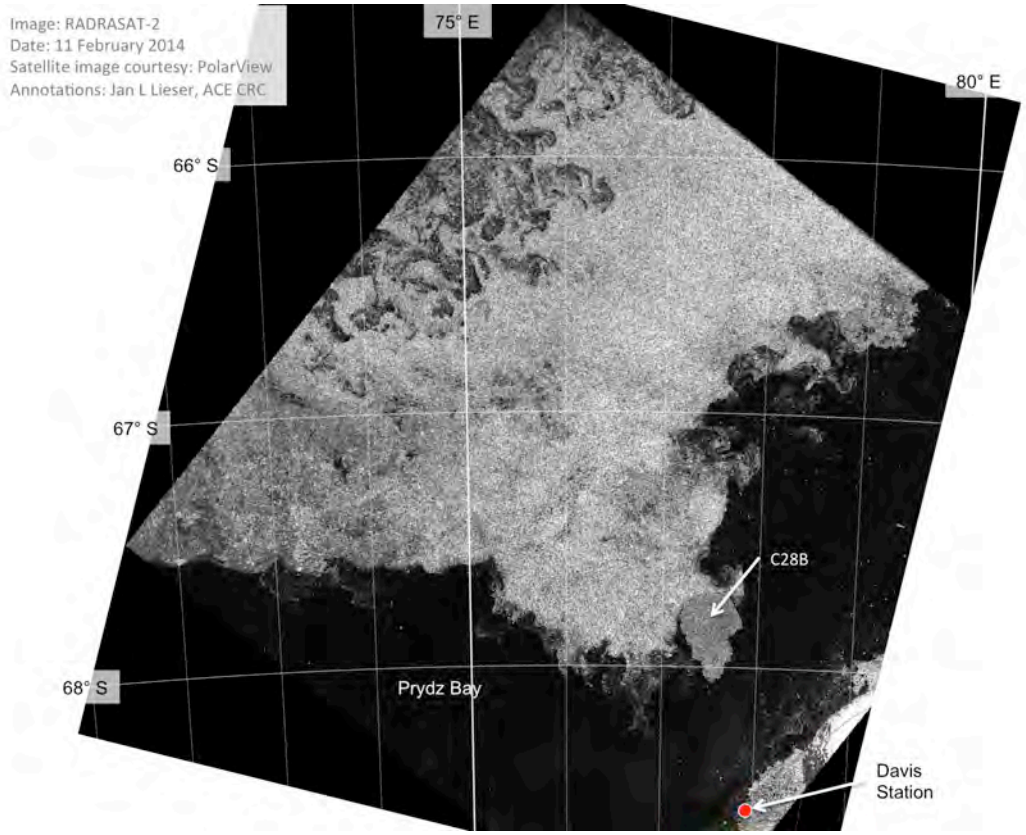

Figure 1: RADARSAR-2 image, acquired 11/02/2014 and provided by PolarView.

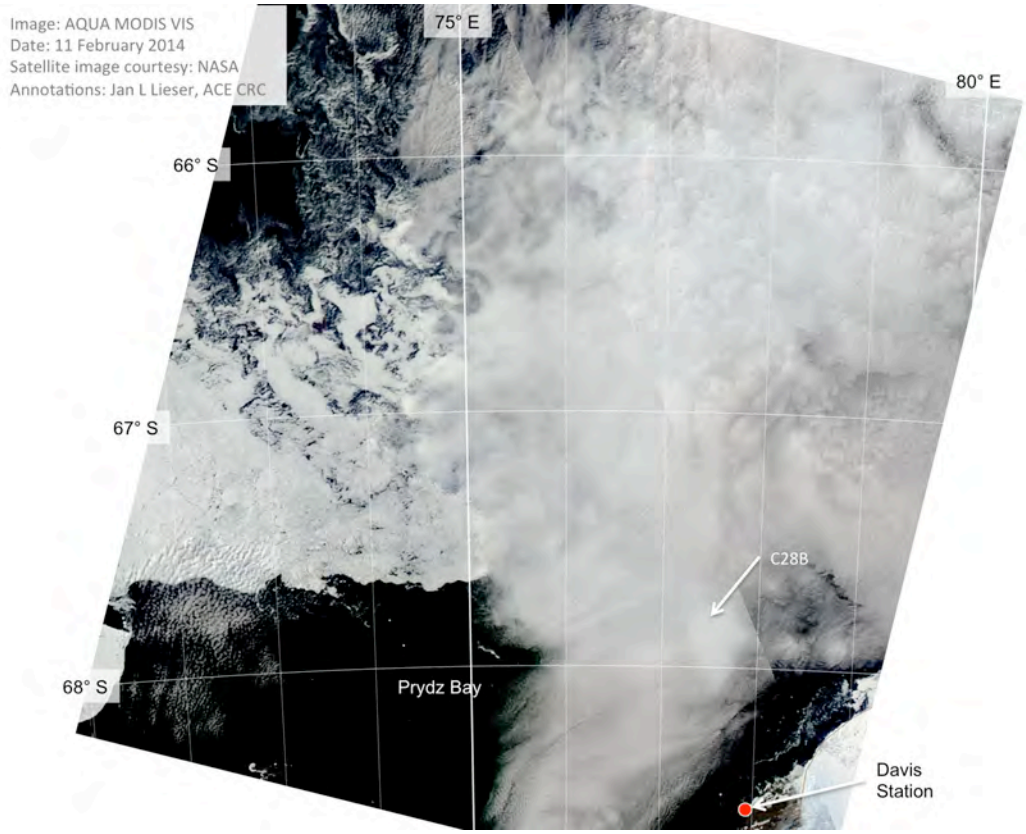

Figure 2: MODIS image, acquired 11/02/2014 and provided by NASA.

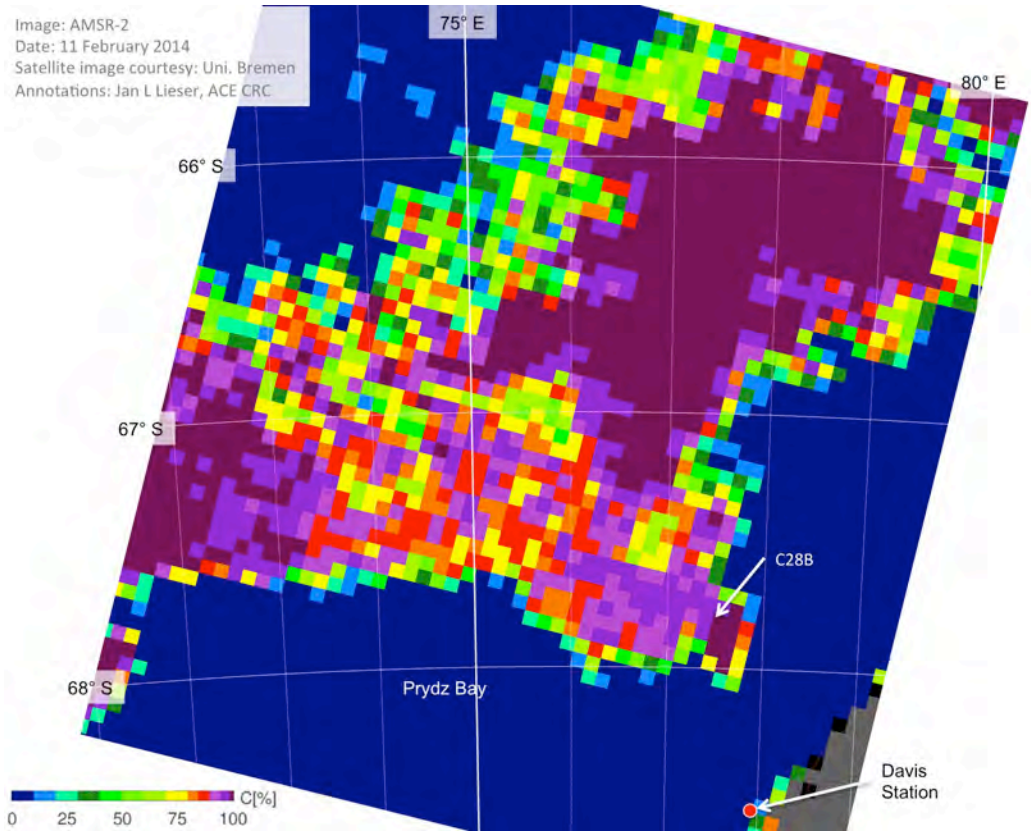

Figure 3: AMSR-2 image, acquired 11/02/2014 and provided by Universität Bremen.

Sea Ice Report #07a/2014

by the AAD/ACE CRC Sea Ice Group

14/02/2014

- **Mawson Station**
  Figures 1 and 2 show the same geographical frame between Mawson Station and Cape Darnley. The boundary between the fast ice and pack ice off Mawson Station is approximated by the dashed red line.

  The high resolution RADAR scene shows no large, consolidated floes in the pack ice matrix, however some large, darker patches can be identified in the fast ice off Mawson Station that could be interpreted as large, old floes embedded in there. Between 65° E and 70° E, the northern edge of the pack ice appears slightly frayed, whereas the southern edge of this pack ice (the northern edge of the Cape Darnley polynya) is a bit more consolidated. The pack ice entering the frame from the east has contracted into a slightly narrower band, spanning about 27 nautical miles in latitude west of 70° E currently.

  East of Cape Darnley, at the northeastern edge of the fast ice the pack ice of Prydz Bay still touches the fast ice. In the same region, a number of large icebergs (bright spots) are lined up roughly between 70° 24' E and 66° 52' S and 71° 22' E and 67° 51' S. Those bergs appear to be in the way of the pack ice drifting west, with more open water detectable in the lee of the bergs, at their western sides.

- **Davis Station**
  Figures 3 and 4 show the same geographical frame of eastern Prydz Bay, off Davis Station. While the western part of the MODIS image (Figure 4) is obscured by clouds, the RADAR scene (Figure 3) provides a highly detailed view of the sea ice, and the large icebergs in the area. The recent cruise track of RSV *Aurora Australis* is indicated by the orange dotted line. The ship is currently at Davis Station.

  The pack ice in this frame shows no major floes within the matrix and a quite fuzzy marginal ice edge both, facing the Southern Ocean and the open water body off Ingrid Christensen Coast (between the Amery Ice Shelf in the southwestern corner of the figures and the West Ice Shelf at the eastern end of the coast line). This indicates still low horizontal stress on the sea ice in the region, while a large low pressure system is passing far north of the ice edge, currently at about 75° E and 60° S.

With best regards,

Jan, for the sea ice group.

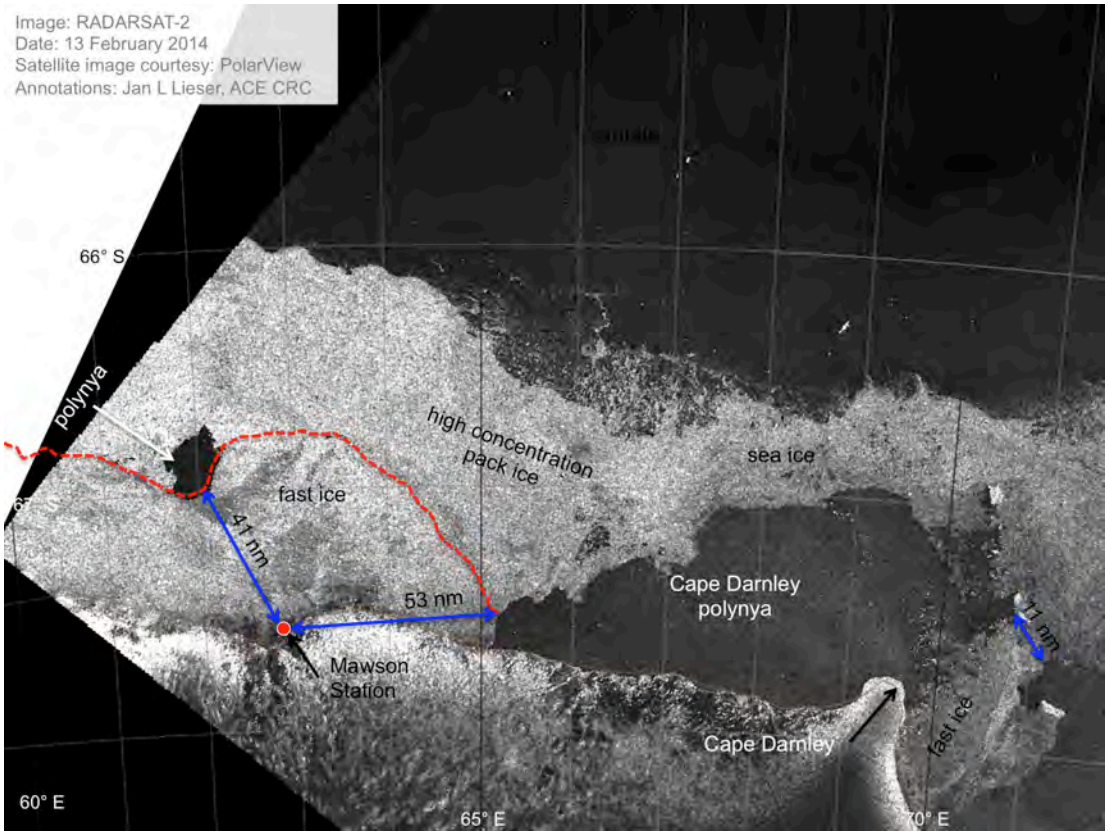

Figure 1: RADARSAR-2 image, acquired 13/02/2014 and provided by PolarView.

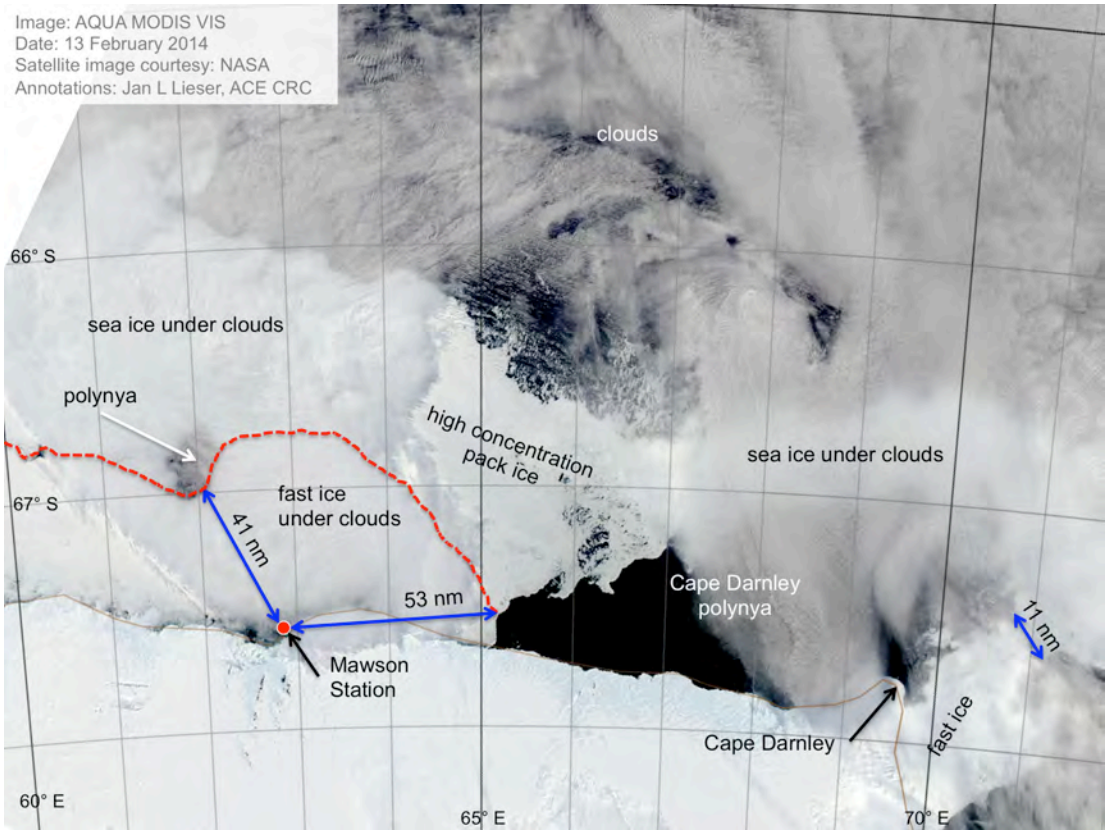

Figure 2: MODIS image, acquired 13/02/2014 and provided by NASA.

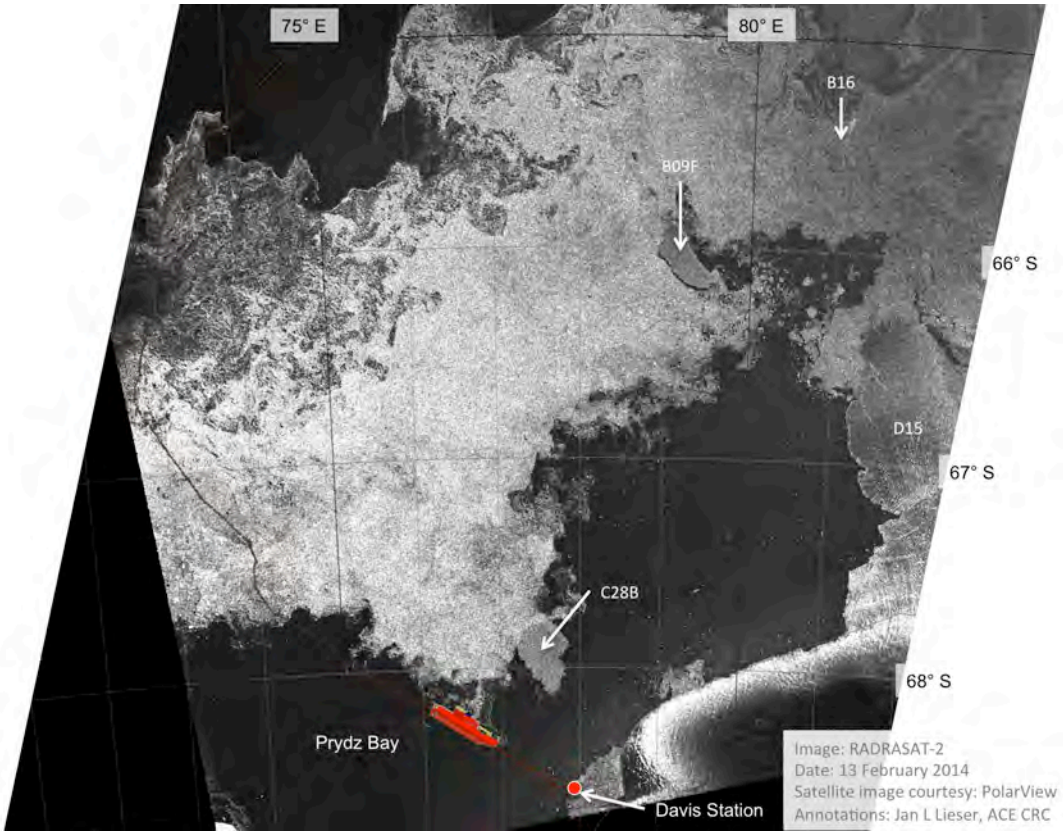

Figure 3: RADARSAR-2 image, acquired 13/02/2014 and provided by PolarView.

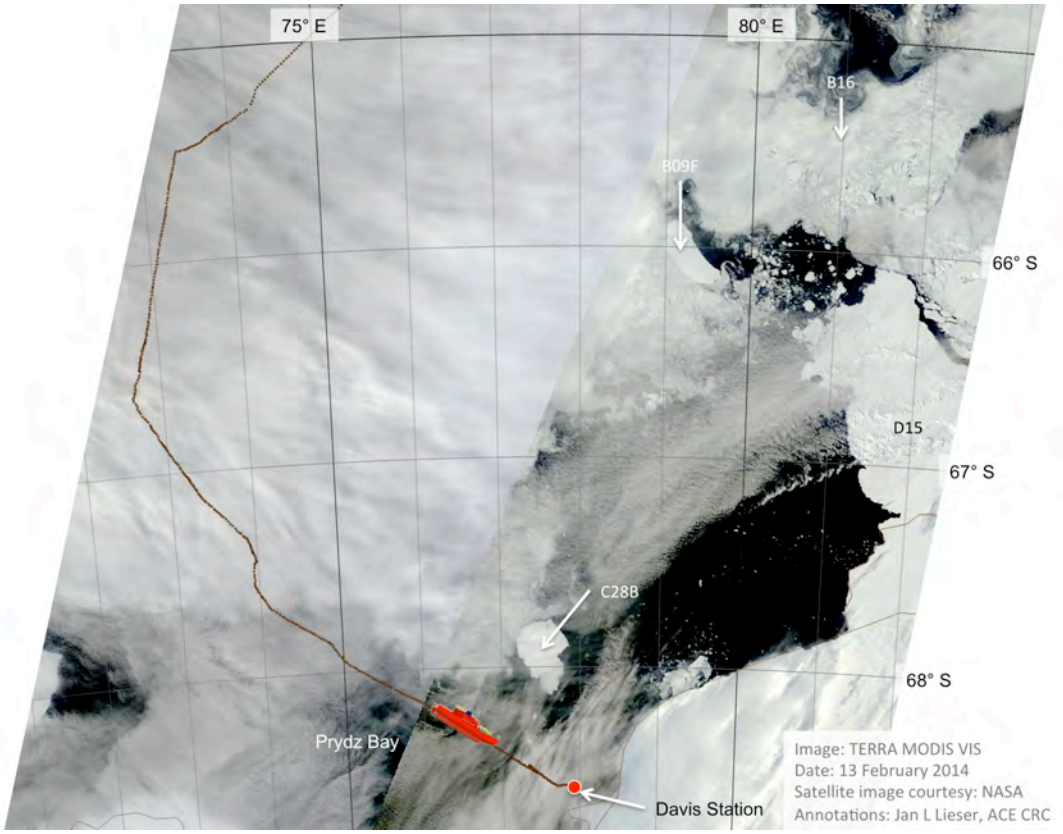

Figure 4: MODIS image, acquired 13/02/2014 and provided by NASA.

Sea Ice Report #07b/2014

by the AAD/ACE CRC Sea Ice Group

14/02/2014

This report updates on sea ice conditions off the Totten Glacier.

- **Totten Glacier**
  Figures 1 and 2 show the same geographical region between Law Dome and the Dalton Iceberg Tongue. The MODIS scene pictured in Figure 1 is still largely obscured by clouds. The approximate position of RSV *Nathaniel B Palmer* is indicated by the red dot (as of 14/02/14 04:15 UT).

  The polynya north of the Moscow University Ice Shelf appears well maintained, but the condition of the sea ice cover off the Totten Glacier can not be assessed from Figure 1. The region has been under clouds for about a week now, preventing the acquisition of visible imagery. But between 119° E and 121° E, a slight northward expansion of the sea ice cover can be noticed in both data sets (MODIS and AMSR-2), together with an increase in sea ice concentration of about 25%. At the same time, around the northern tip of the Dalton Iceberg Tongue (annotated by a red scribble line in Figure 1), a gap between the ice tongue and the pack ice appears to be shining through the clouds, about 1.5 nautical miles wide. Immediately west of 121° E, a few more openings and leads seem to be visible through the clouds as well. But those openings are likely to be below the detection limit of the AMSR-2 sea ice concentration algorithm, especially close to the margin of the land mask (shown in grey in Figure 2).

With best regards,

Jan, for the sea ice group.

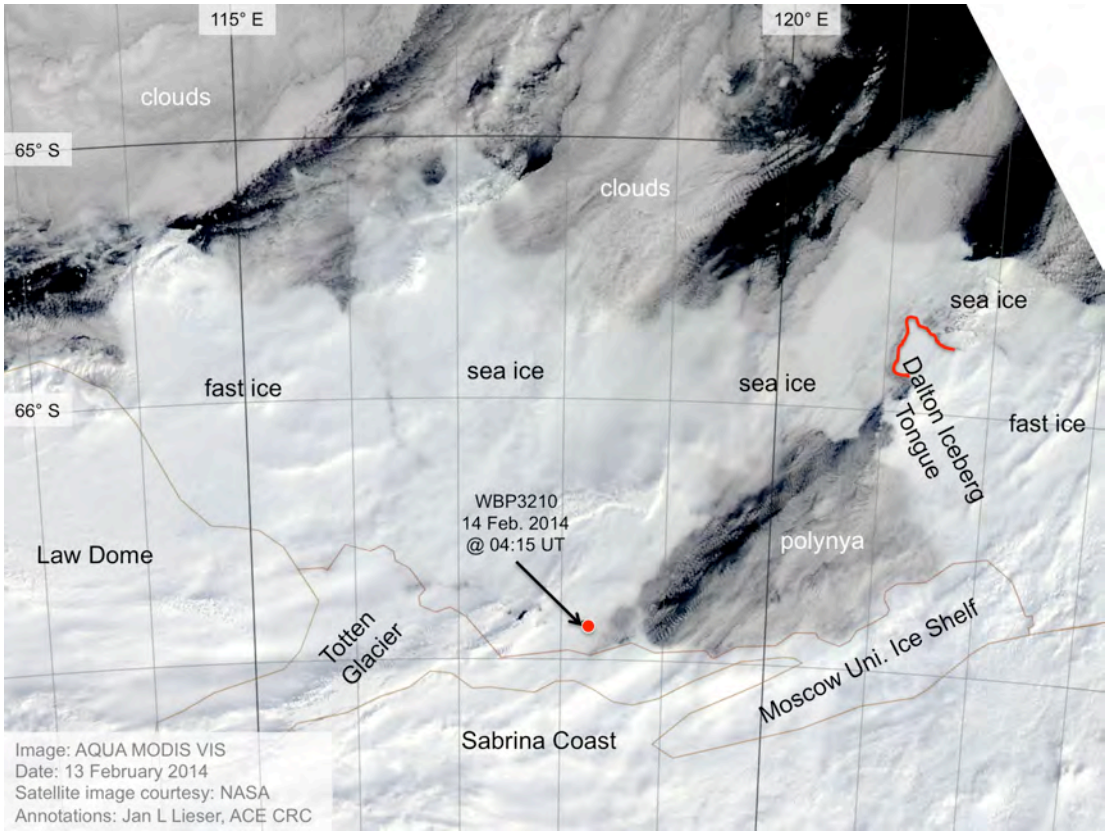

Figure 1: MODIS image, acquired 13/02/2014 and provided by NASA.

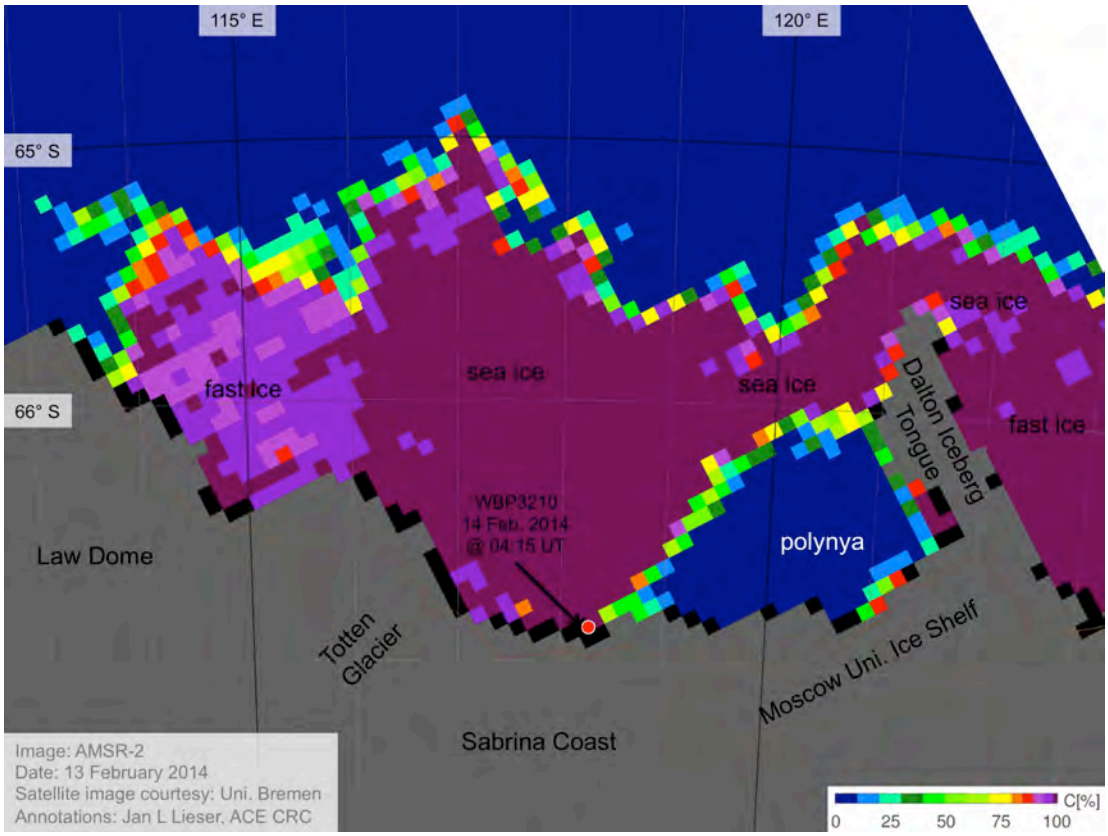

Figure 2: AMSR-2 image, acquired 13/02/2014 and provided by Universität Bremen.

Sea Ice Report #07c/2014

by the AAD/ACE CRC Sea Ice Group

17/02/2014

This report updates on sea ice conditions off Mawson Station.

- **Mawson Station**
  Fast ice off Mawson Station is obscured by clouds recently, but the pack ice can be seen clearly in Figure 1. The transition zone between the fast ice and the pack ice appears to be just under clouds as well. The northern edge of Cape Darnley polynya is visible as a clear cut, indicating an offshore compaction of sea ice northward. East of 67° E, the northern edge of the pack ice separating the polynya from the Southern Ocean appears fuzzy, possibly a continuation of the northward drag. West of 65° E, the marginal sea ice zone looks compacted towards the south, resulting in a defined northern boundary to the open ocean.

  Figure 2 shows the Cape Darnley polynya and western Prydz Bay, again with most of the sea ice cover under clouds. Between the fast ice off the eastern side of Cape Darnley and the sea ice east of 71° E, a small bridge of ice exists mostly consisting of large tabular icebergs and various types of sea ice.

  While this report can't be treated as a sea ice forecast, the following observations are made based on atmospheric conditions predicted by the Antarctic Mesoscale Prediction System (AMPS)[1].

  For the Cape Darnley region, the AMPS is expecting southerly winds exceeding 50 knots for Tuesday, 18/02/14 at noon UT, which has the potential to change the sea ice and fast ice conditions in the area quite substantially, and therefore making resulting conditions unpredictable. Further west however, lower wind speeds and more from southeasterly directions are expected off Mawson Station, which can push the pack ice against and along the fast ice edge over there.

With best regards,

Jan, for the sea ice group.

[1]The Antarctic Mesoscale Prediction System is sponsored by the National Science Foundation (NSF) Office of Polar Programs and the NSF UCAR and Lower Atmospheric Facilities Oversight Section. It is a collaboration of the National Center for Atmospheric Research and the Byrd Polar Research Center of The Ohio State University.

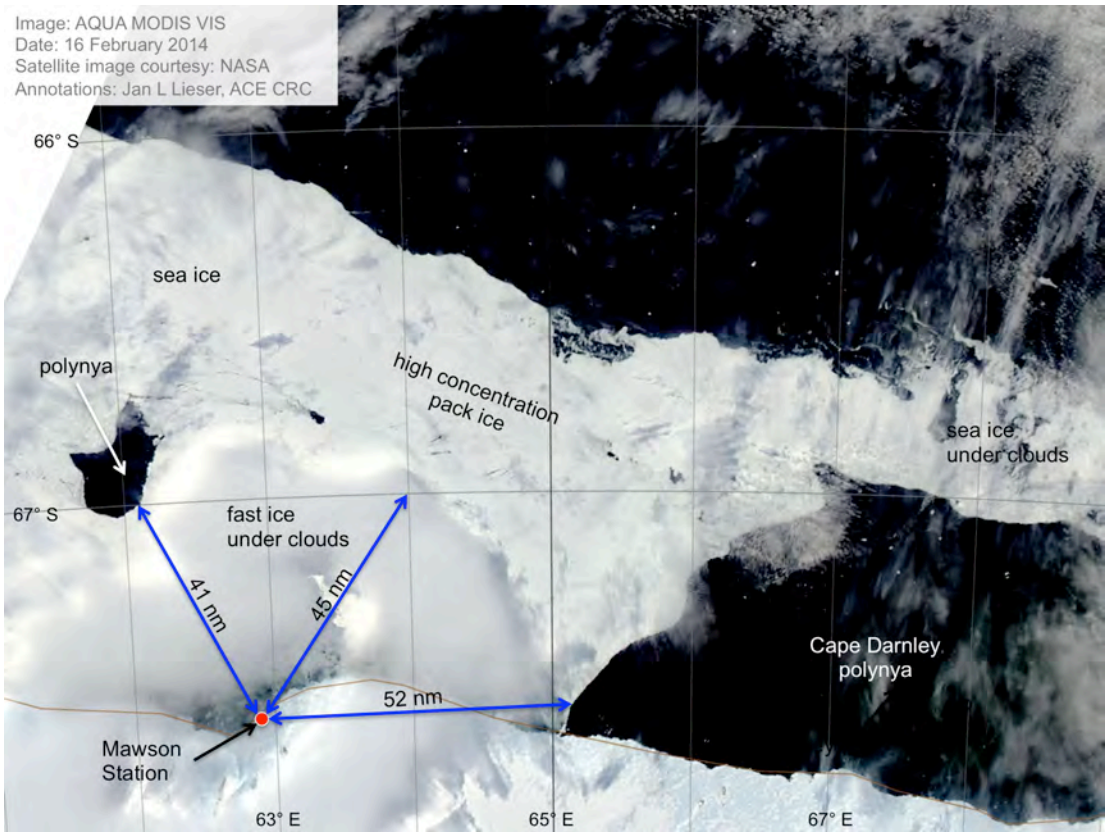

Figure 1: MODIS image, acquired 16/02/2014 and provided by NASA.

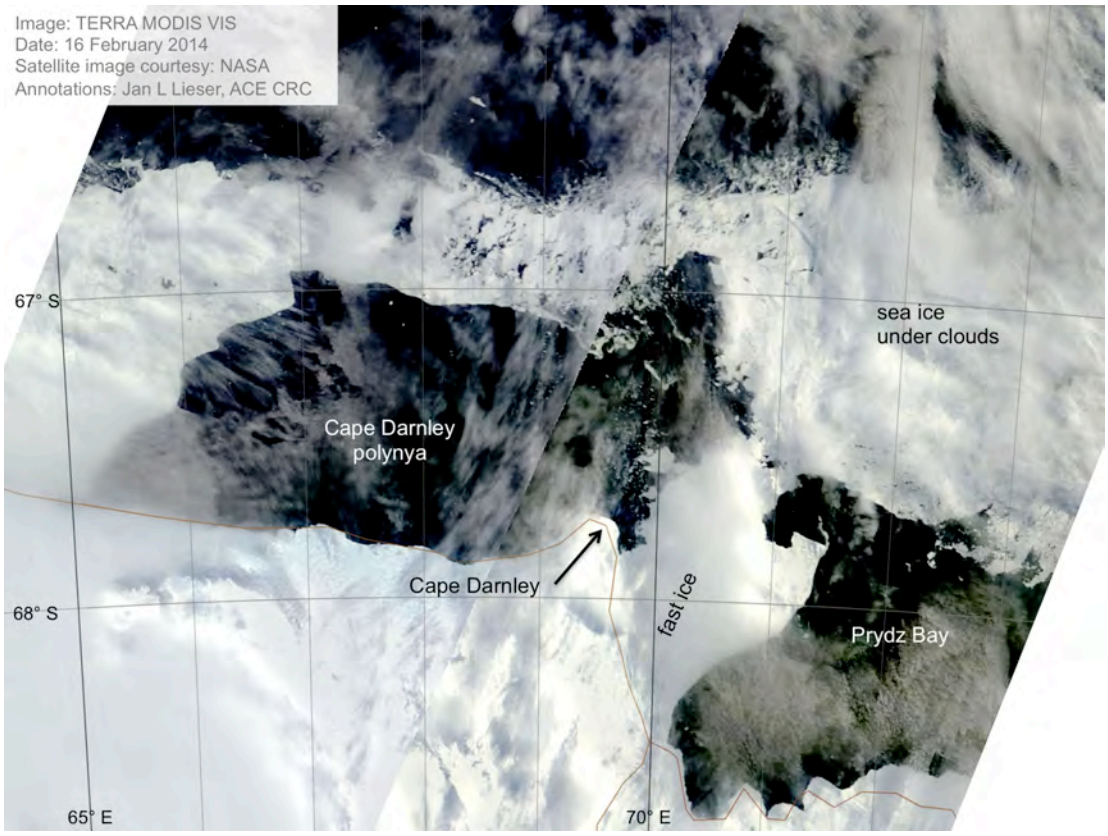

Figure 2: MODIS image, acquired 16/02/2014 and provided by NASA.

Sea Ice Report #07d/2014

by the AAD/ACE CRC Sea Ice Group

17/02/2014

This report updates on sea ice conditions off Totten Glacier.

- **Totten Glacier**
  Figure 1 provides a largely cloud free view on the ice conditions between Law Dome and the Dalton Iceberg Tongue, two days ago. The position of RSV *Nathaniel B Palmer* (WBP3210; time annotated) is marked in the figure as a red dot. In the 24 hours preceding this acquisition, the sea ice north of Sabrina Coast had moved slightly northward, loosening up a little and showing more cracks and leads in east-west direction.

  The same geographical frame as in Figure 1 is shown in Figure 2. A fuzzy sea ice edge can be seen in the AMSR-2 data, as well as the openings close to the coast, off the Totten Glacier.

  Today's image (Figure 3) is largely obscured by clouds but open water can be seen as dark patches shining through the clouds over the polynya. In Figure 4, the same geographical frame of Figure 3 is shown as seen by the AMSR-2 instrument. In both figures, the position of RSV *Nathaniel B Palmer* (WBP3210; time annotated) is marked by a red dot.

  The northern sea ice edge appears a bit more fuzzy in recent days, and east of 120° E the sea ice spreads out almost up to 65° S. Along 120° E, sea ice concentration has markedly reduced showing maximum concentration only for about 8 nautical miles.

With best regards,

Jan, for the sea ice group.

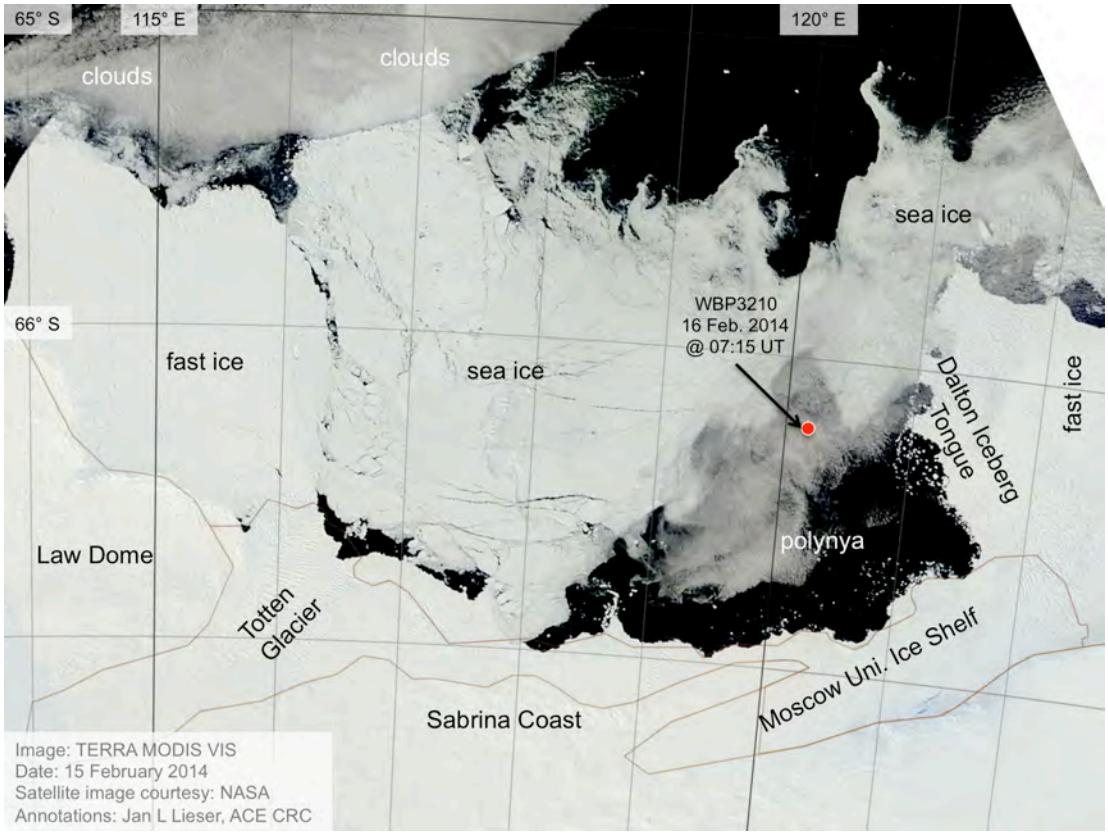

Figure 1: MODIS image, acquired 15/02/2014 and provided by NASA.

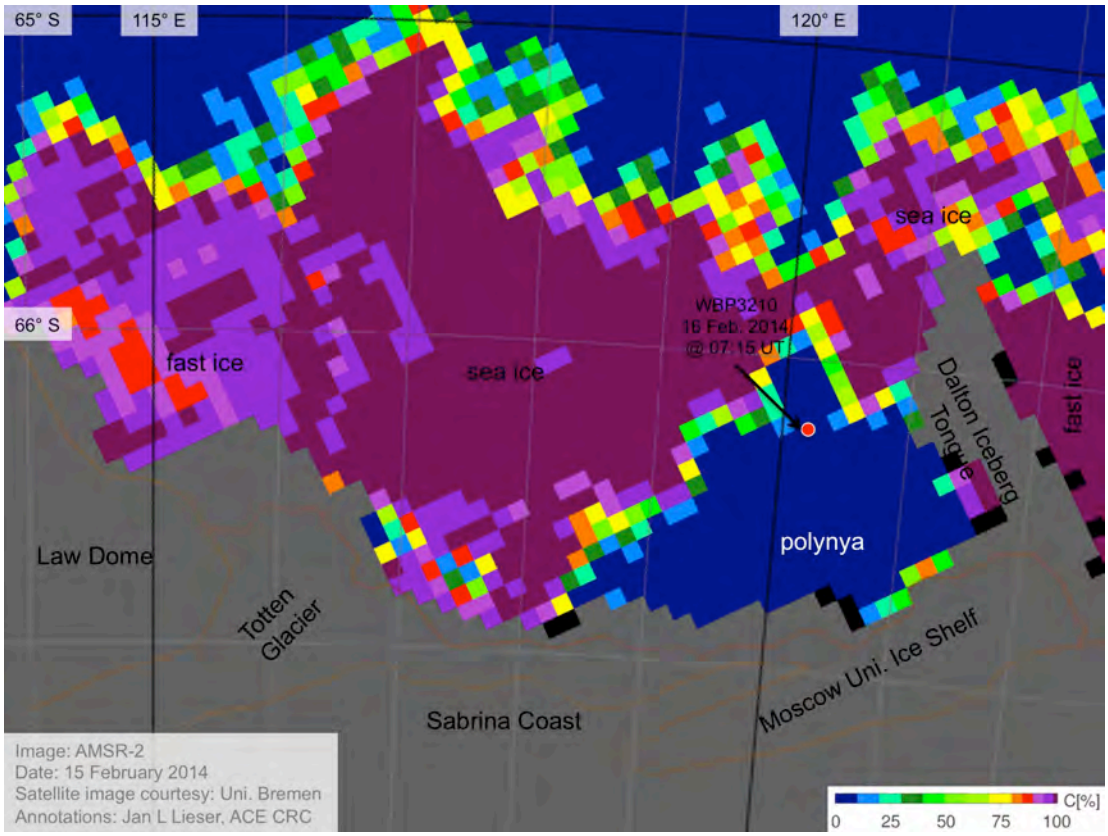

Figure 2: AMSR-2 image, acquired 15/02/2014 and provided by Universität Bremen.

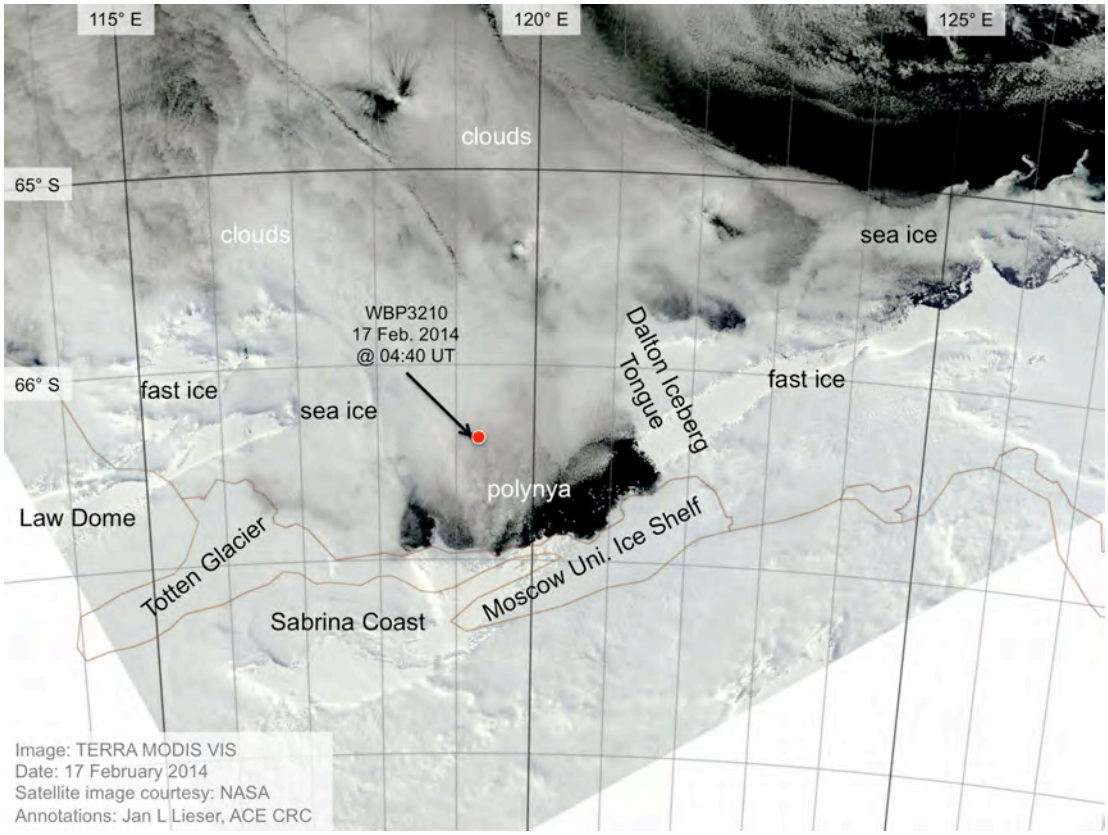

Figure 3: MODIS image, acquired 17/02/2014 and provided by NASA.

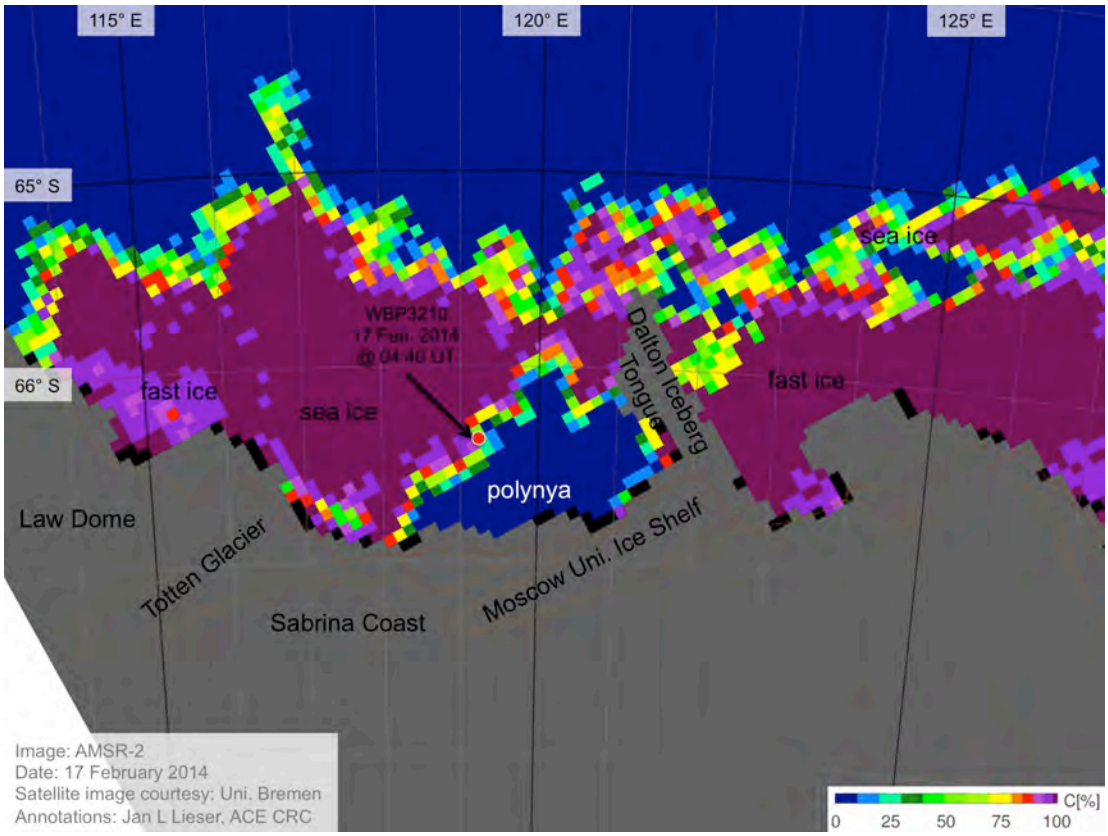

Figure 4: AMSR-2 image, acquired 17/02/2014 and provided by Universität Bremen.

Sea Ice Report #07e/2014

by the AAD/ACE CRC Sea Ice Group

19/02/2014

This report updates on sea ice conditions off the Totten and Mertz glaciers.

- **Totten Glacier**
  Figure 1 shows an essentially cloud free scene of the region between Totten Glacier and the Dalton Iceberg Tongue. The position of RSV *Nathaniel B Palmer* (WBP3210; time annotated) is marked by a red dot.

  Yesterday, between two overflights of the MODIS instrument on the AQUA and TERRA spacecraft (the later TERRA acquisition is shown in Figure 1), the lead in front of Totten Glacier has widened by about 1.5 nautical miles. Between 116° E and 120° E, the entire pack ice has moved northward by more or less the same distance.

  Immediately east of 120° E, a sea ice bridge between the polynya and the Southern Ocean has thinned further and is currently only about 7.5 nautical miles long in north-south direction.

- **Mertz Glacier**
  During the past two weeks, the overall sea ice conditions off Commonwealth Bay and the Mertz Glacier have not changed significantly (Figure 2). In front of Metz Glacier, the polynya appears still well maintained with light pack ice conditions between 145° E and 146° E. A fragment of iceberg C15, that broke away from the berg when it started to wiggle (see Sea Ice Report #05b/2014 from 03/02/2014), is now located about 40 nautical miles away from where it broke off.

  Even though the scene displayed in Figure 2 is largely obscured by clouds (except for the Mertz Glacier polynya region), the dark open ocean in the polynya north of iceberg B09B (this iceberg's exact shape can not be identified through the clouds) can be clearly distinguished from ice covered waters. It is noted that the fast ice at the western end of Commonwealth Bay has retreated further to the coast, so that only about five (5) nautical miles of fast ice remain at this location (see red double arrow in Figure 2).

With best regards,

Jan, for the sea ice group.

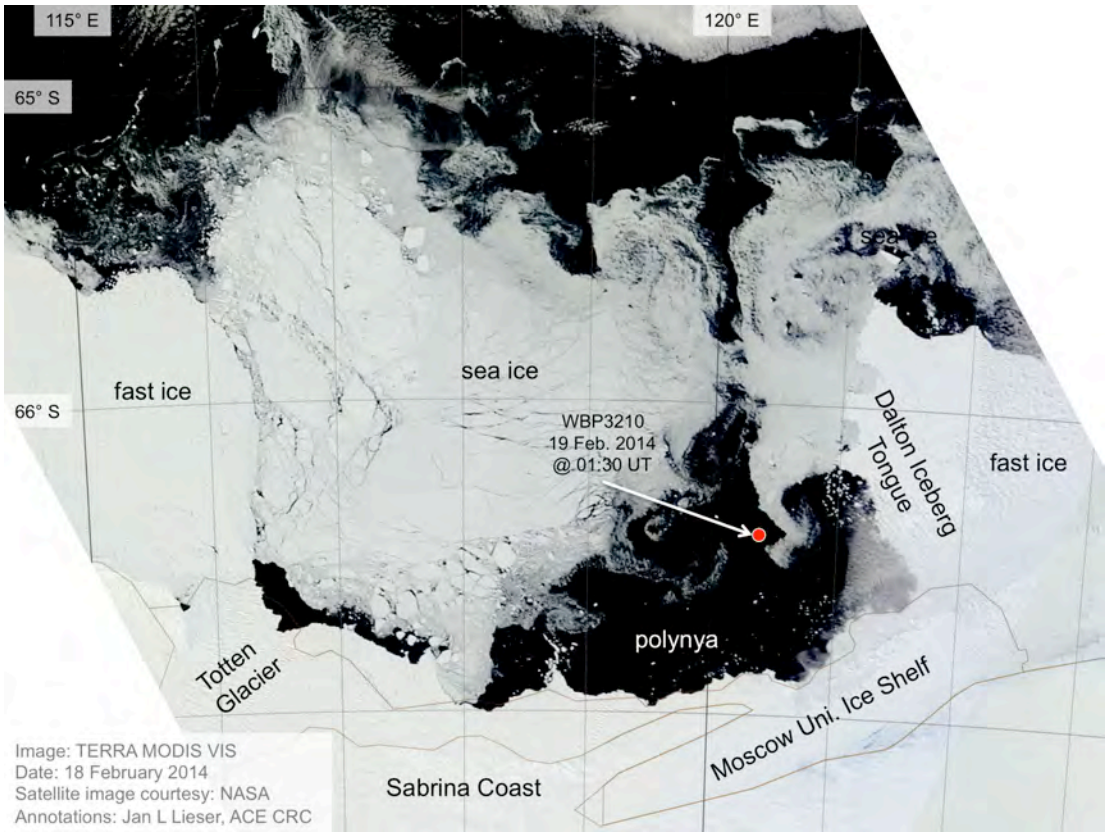

Figure 1: MODIS image, acquired 18/02/2014 and provided by NASA.

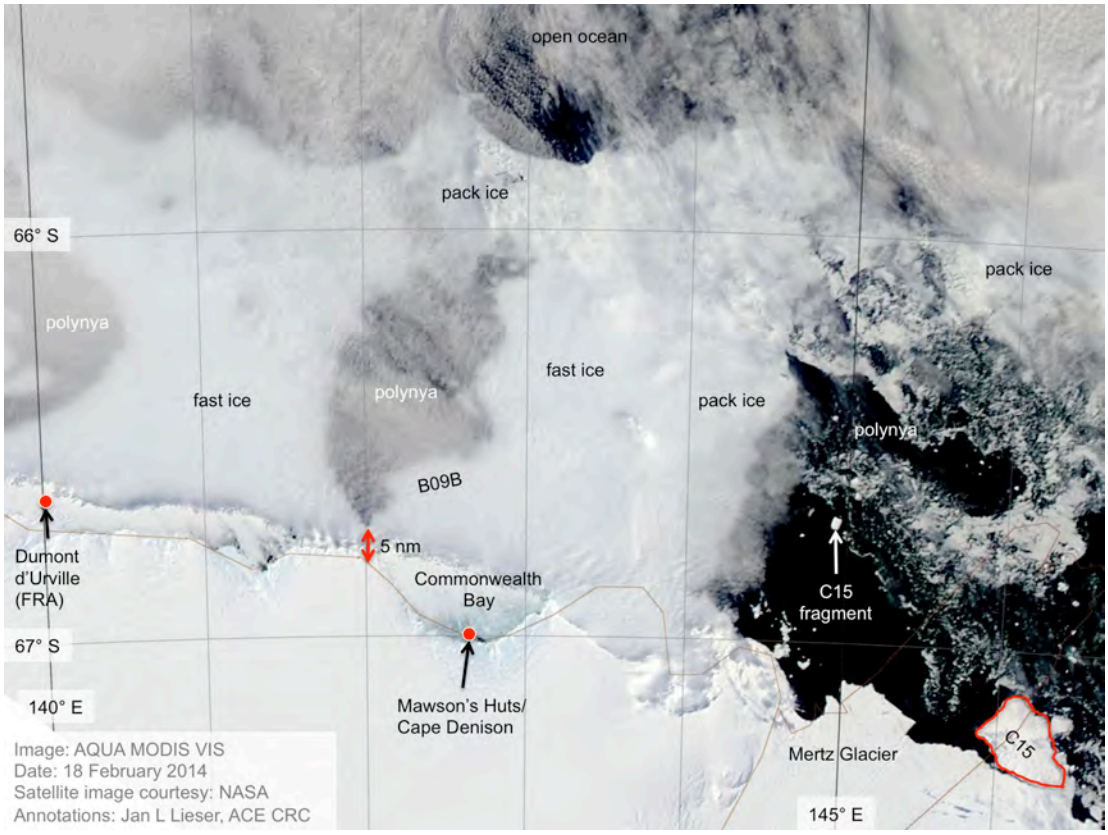

Figure 2: MODIS image, acquired 18/02/2014 and provided by NASA.

Sea Ice Report #08/2014

by the AAD/ACE CRC Sea Ice Group

20/02/2014

This report covers sea ice conditions off Mawson Station and off the Totten and Mertz glaciers.

- **Mawson Station**
  Figure 1 shows an essentially cloud free scene of sea ice north of Mawson Station and in the Cape Darnley polynya region. A recent low pressure system has pushed the pack ice northward away from the coast and westward along the fast ice edge. This results in a much thinner band of pack ice separating the polynya from the Southern Ocean and a relatively compact sea ice zone off the fast ice north of Mawson Station. East of 65° E, the southern boundary of the pack ice is a clearly defined line at the moment, while west of 65° E the northern boundary of the pack ice, the marginal ice zone, appears not overly fuzzy.

  The northern edge of the fast ice off Mawson Station has not changed significantly. But at the coast, to the east and west of the station, two new patches of open water can be seen since 13/02/2014. Also, a little piece of fast ice appears to have broken away from the southern edge of the polynya in the northwest of Mawson Station.

- **Totten Glacier**
  The region between Law Dome and the Dalton Iceberg Tongue is currently under thick clouds. The AMSR-2 data (Figure 2) show the overall sea ice extent, but the fast ice off the eastern flank of Law Dome and the fast ice east of the Dalton Iceberg Tongue show unrealistic (low) values. The position of RSV *Nathaniel B Palmer* (WBP3210, time annotated) is shown as a red dot. Note: the (grey) mask applied when computing sea ice concentration is out of date.

- **Mertz Glacier**
  The region between Dumont D'Urville Station and the Mertz Glacier is shown in Figure 3, with only minimal discernible clouds. The fragment of iceberg C15, which was identified in Sea Ice Report #07e/2014, can be seen about 43 nautical miles away from its break-off location.

  While the eastern edge of the fast ice surrounding iceberg B09B has not changed significantly, a large portion of the iceberg is now free of fast ice, around its westernmost corner and halfway along its northern side.

With best regards,

Jan, for the sea ice group.

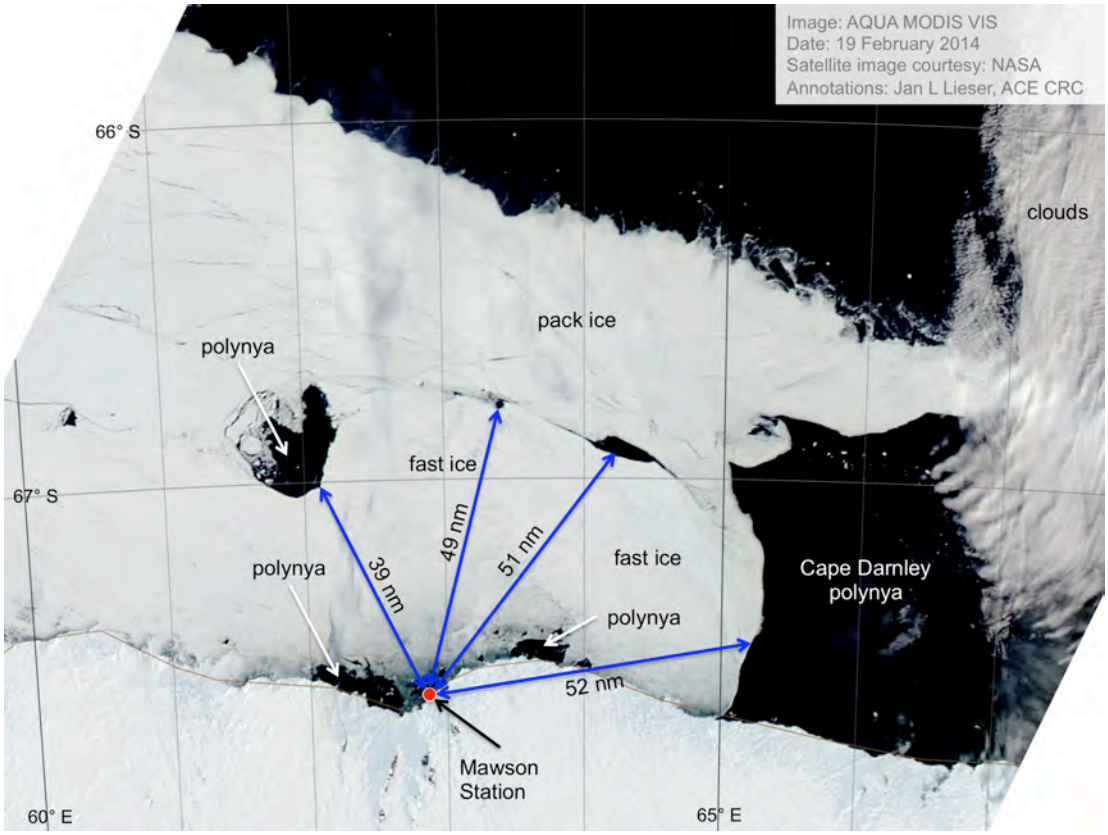

Figure 1: MODIS image, acquired 19/02/2014 and provided by NASA.

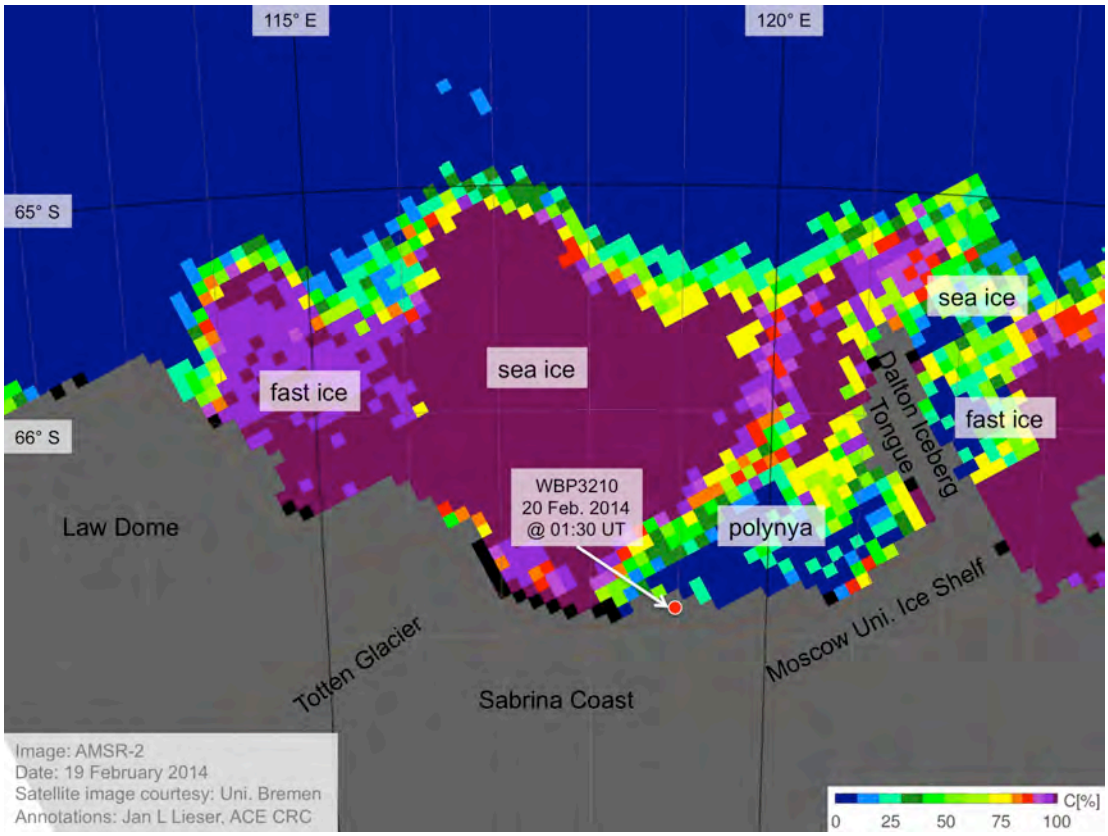

Figure 2: AMSR-2 image, acquired 19/02/2014 and provided by Universität Bremen.

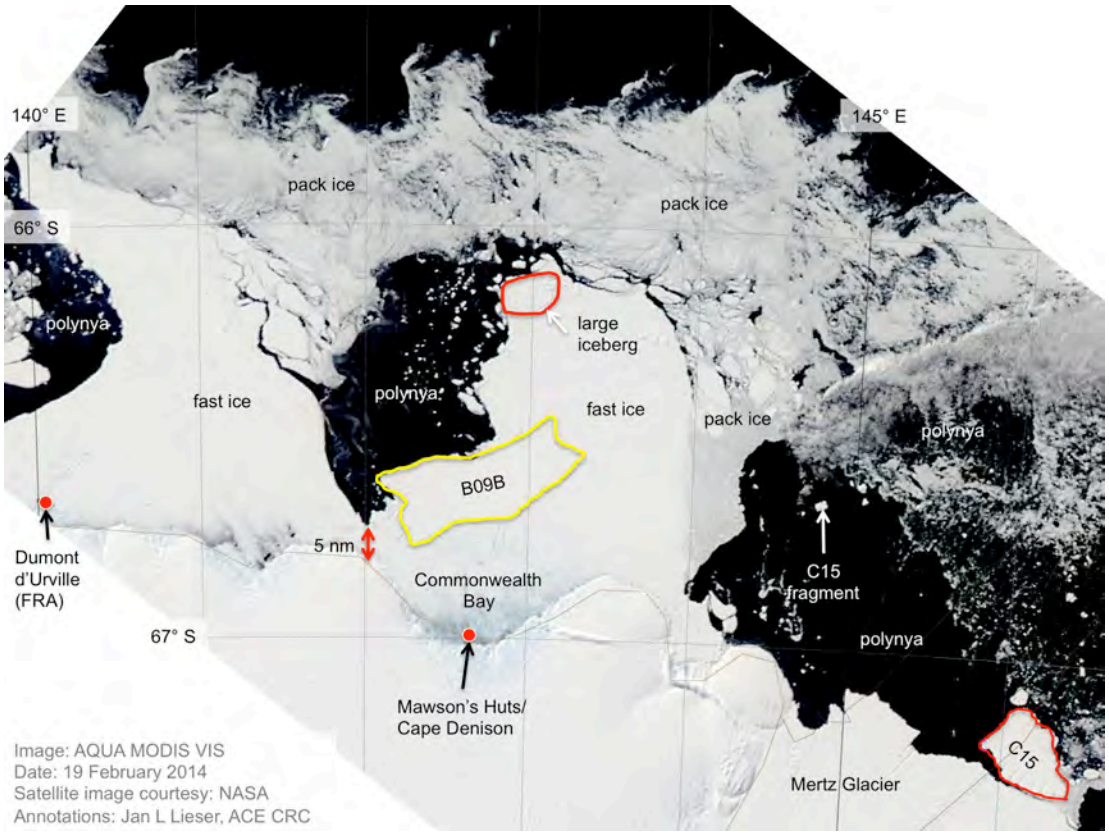

Figure 3: MODIS image, acquired 19/02/2014 and provided by NASA.

Sea Ice Report #08a/2014

by the AAD/ACE CRC Sea Ice Group

25/02/2014

This report updates on sea ice conditions off the Totten Glacier.

- **Totten Glacier**
  Between Law Dome and the Dalton Iceberg Tongue, the region is currently under full cloud cover. But the scene shown in Figure 1 is affected only by thin clouds and in the polynya north of the Moscow University Ice Shelf the open water areas can be distinguished from ice covered ocean. The position of RSV *Nathaniel B Palmer* (WBP3210, time annotated) is indicated by the red dot in the figure.

  Between 119° E and 121° E, an area of loose sea ice cover appears in this sector. Close to the coast, between 118° E and 119° E, a relatively large area of open water (a darker patch; marked 'OW' in Figure 1) with low sea ice concentration can also be identified.

With best regards,

Jan, for the sea ice group.

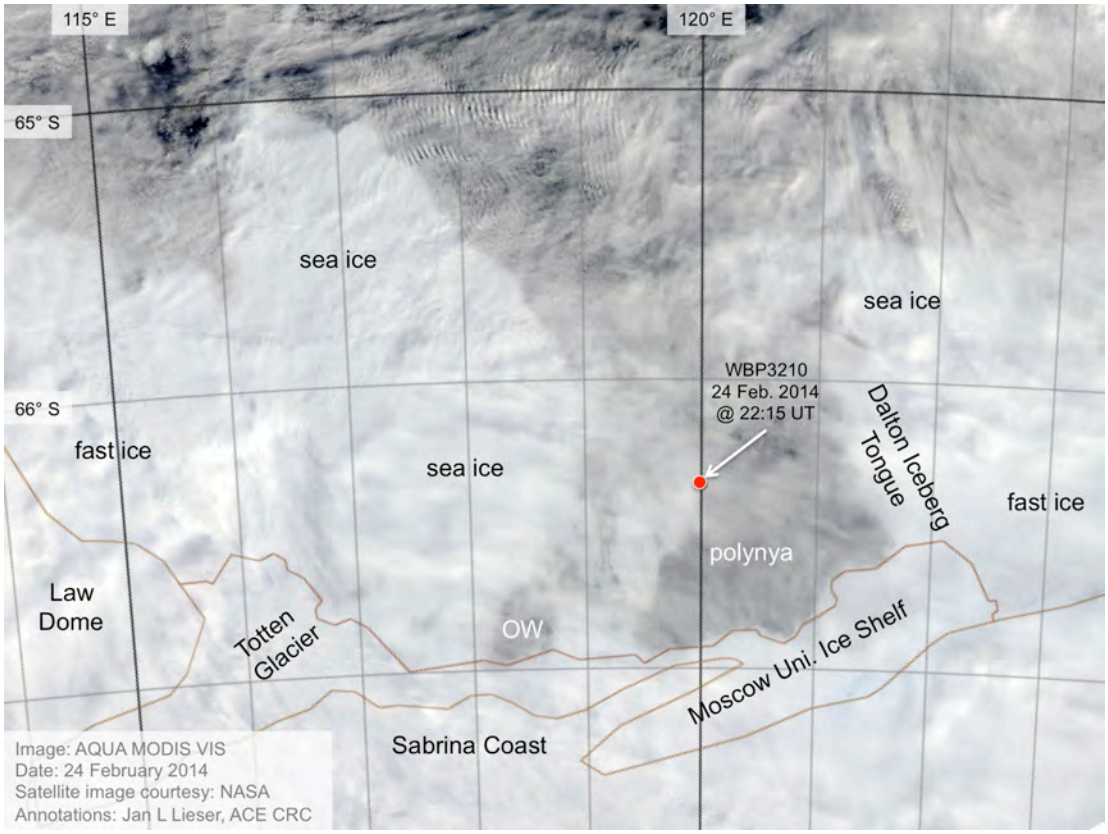

Figure 1: MODIS image, acquired 24/02/2014 and provided by NASA.

Sea Ice Report #09/2014

by the AAD/ACE CRC Sea Ice Group

27/02/2014

This report examines sea ice conditions off the Totten Glacier.

- **Mawson Station**
  In front of Mawson Station, sea ice conditions are currently monitored with additional satellite RADAR data, but no significant change has been detected in the fast ice until 20/02/2014. A new acquisition is scheduled for 28/02/2014.

- **Totten Glacier**
  Figure 1 shows sea ice conditions between the eastern flank of Law Dome and the Dalton Iceberg Tongue. The position of RSV *Nathaniel B Palmer* (WBP3210, time annotated) is shown as a red dot. The boundary between fast ice and pack ice north of Totten Glacier is marked with a red scribble line.

  The polynya region west of the Dalton Iceberg Tongue and the adjacent continental margin can be seen under clouds. The transition from the open water polynya to the sea ice off Totten Glacier is obscured, but the current strong easterlies are expected to compact this sea ice edge westwards. In front of Totten Glacier, the open water patch (annotated 'OW' in Figure 1) is also likely to shrink after this storm event. Immediately west of 120° E, a zone of low sea ice concentration remains between the polynya and the Southern Ocean.

With best regards,

Jan, for the sea ice group.

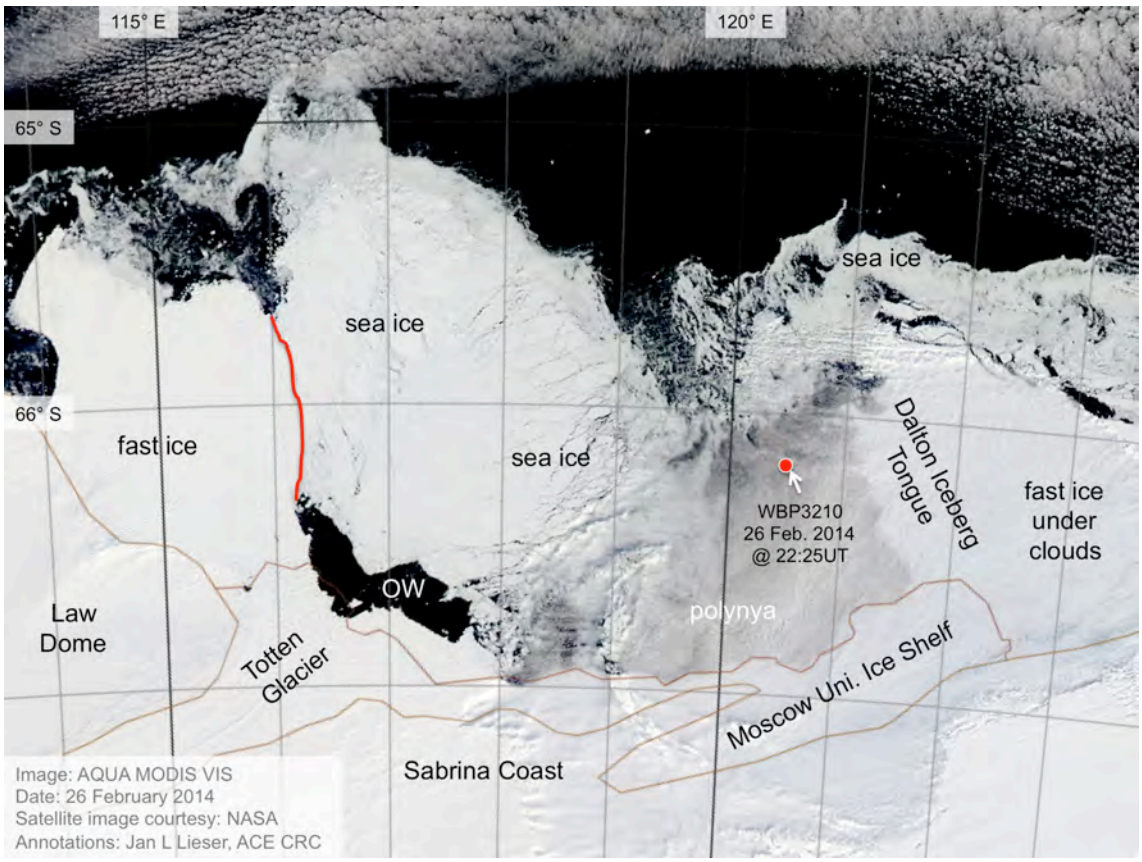

Figure 1: MODIS image, acquired 26/02/2014 and provided by NASA.

Sea Ice Report #09a/2014

by the AAD/ACE CRC Sea Ice Group

03/03/2014

This report updates on sea ice conditions off Mawson Station.

- **Mawson Station**
  Figures 1 and 2 show the same geographical frame as seen by the MODIS instrument and RADARSAT-2, respectively, three days apart. The large iceberg (located at about 67° S) has moved about 14.5 nautical miles westward between the two acquisitions. The fast ice edge around Mawson Station is indicated by a (partly dashed) red scribble line. The yellow scribble line indicates a transition zone between different types of sea ice surface roughness, based on the RADAR image. The area between the red and the yellow line could be ex-fast ice, which still shows roughness typical for fast ice but is actually not attached to the remaining large body of fast ice off Mawson Station anymore.

  While the coastal polynyas within a 25 nautical miles radius around Mawson Station appear to be still widening slightly, the Cape Darnley polynya is starting to fill again with new sea ice, closing the polynya from the north and east.

With best regards,

Jan, for the sea ice group.

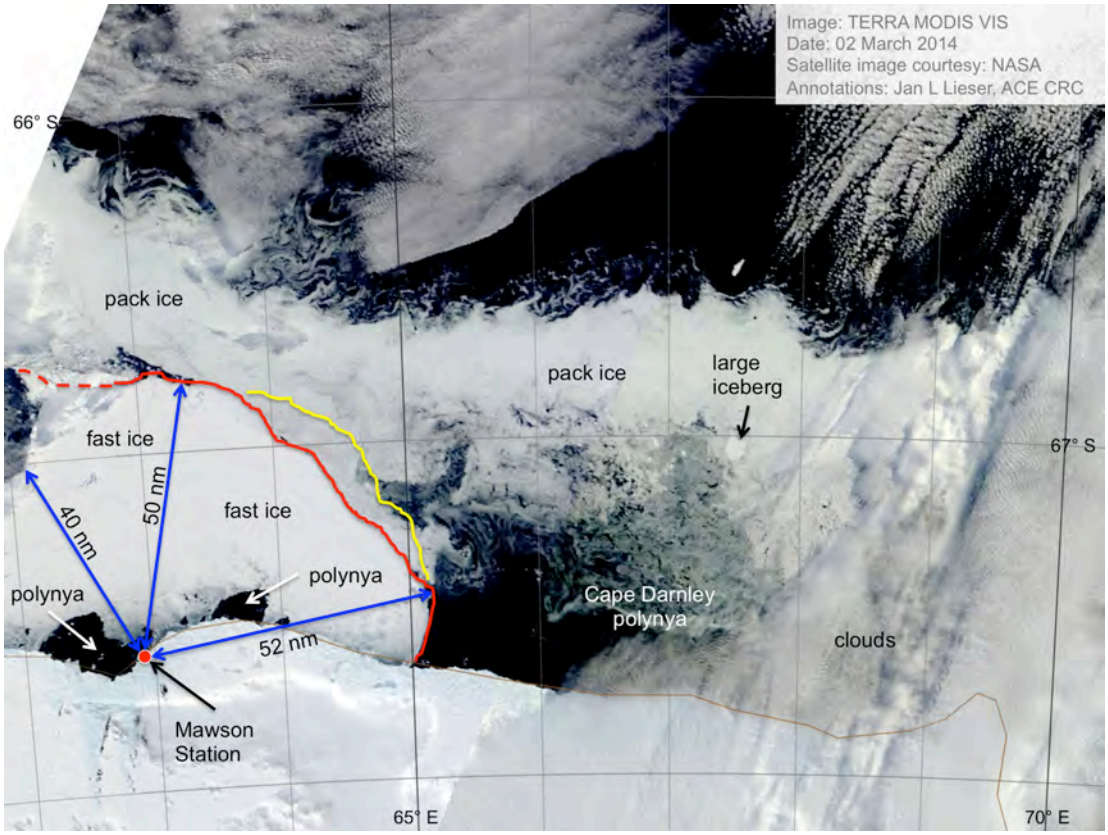

Figure 1: MODIS image, acquired 02/03/2014 and provided by NASA.

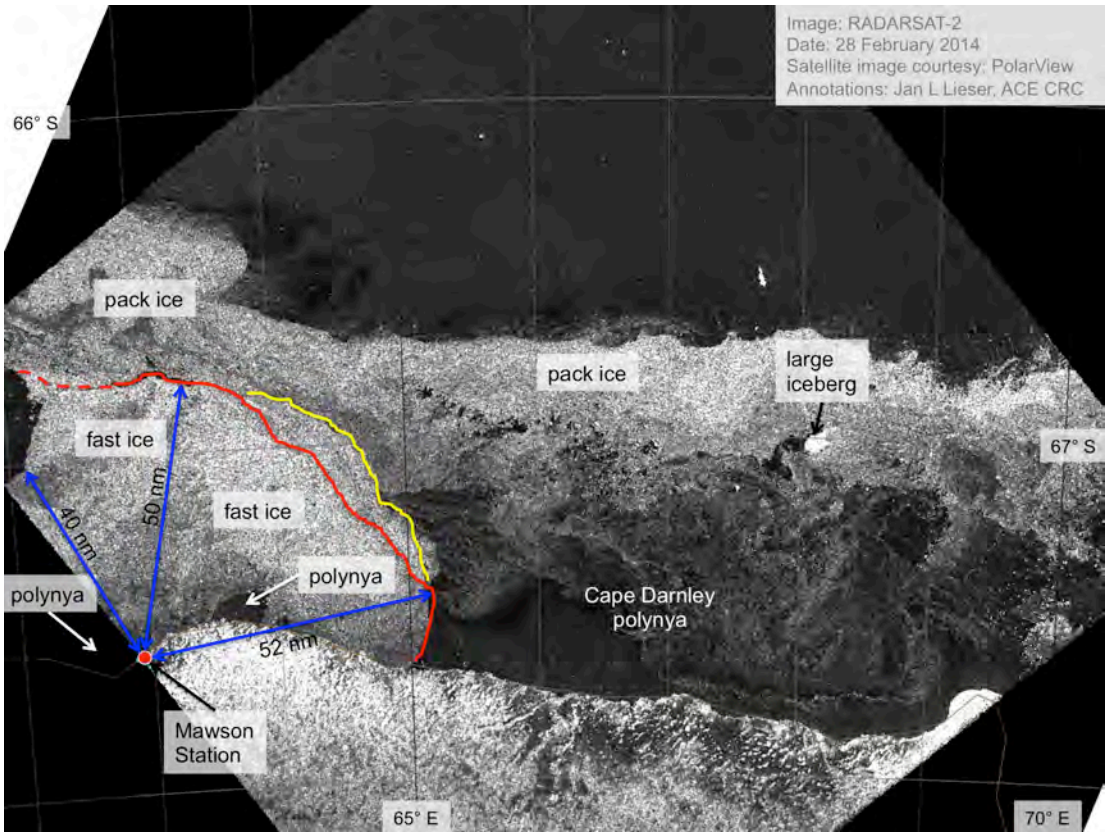

Figure 2: RADARSAT-2 image, acquired 28/02/2014 and provided by PolarView.

Sea Ice Report #09b/2014

by the AAD/ACE CRC Sea Ice Group

03/03/2014

This report updates on sea ice conditions off the Totten and Mertz glaciers.

- **Totten Glacier**
  Figure 1 shows AMSR-2 data as processed by the Universität Hamburg, Germany, at 3.125 kilometre resolution. The position of RSV *Nathaniel B Palmer* (WBP3210, time annotated) is given as a red dot.

  To the west of the Dalton Iceberg Tongue, the polynya is starting to freeze over, but northwest of the vessel's position some lighter sea ice concentration is still apparent in the band of sea ice connecting the northern tip of the Dalton Iceberg Tongue with the pack ice and fast ice off the Totten Glacier. At about 120° E, the lower values of sea ice concentration south of 66° S should be treated with caution, as this is a region covered by fast ice.

- **Mertz Glacier**
  Figure 2 shows an essentially cloud free scene of the Mertz Glacier region. While the overall distribution of icebergs and fast ice in the area has not changed significantly, the onset of sea ice formation is visible in the polynya, to the east of 144° E.

  Off the Mertz Glacier, some greenish discoloured sea ice is visible indicating probably some late summer/early autumn biological activity (see for comparison Sea Ice Report #09/2012).

With best regards,

Jan, for the sea ice group.

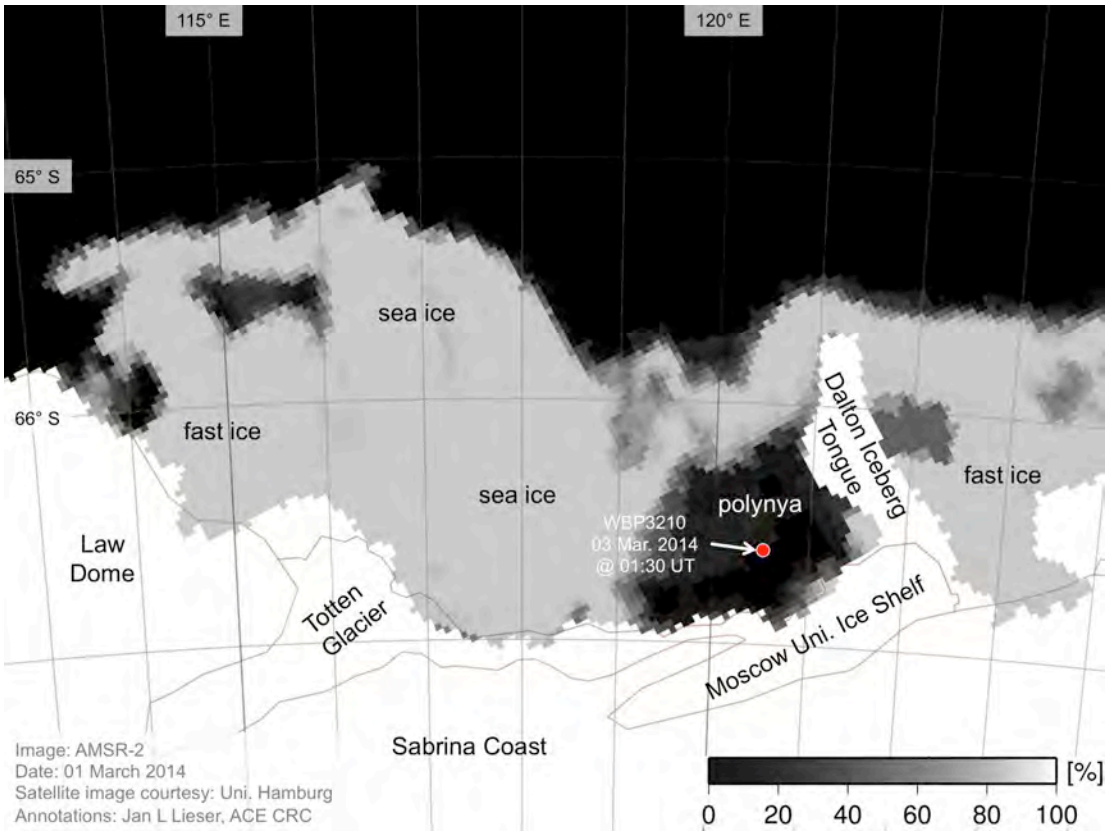

Figure 1: AMSR-2 image, acquired 01/03/2014 and provided by Universität Hamburg.

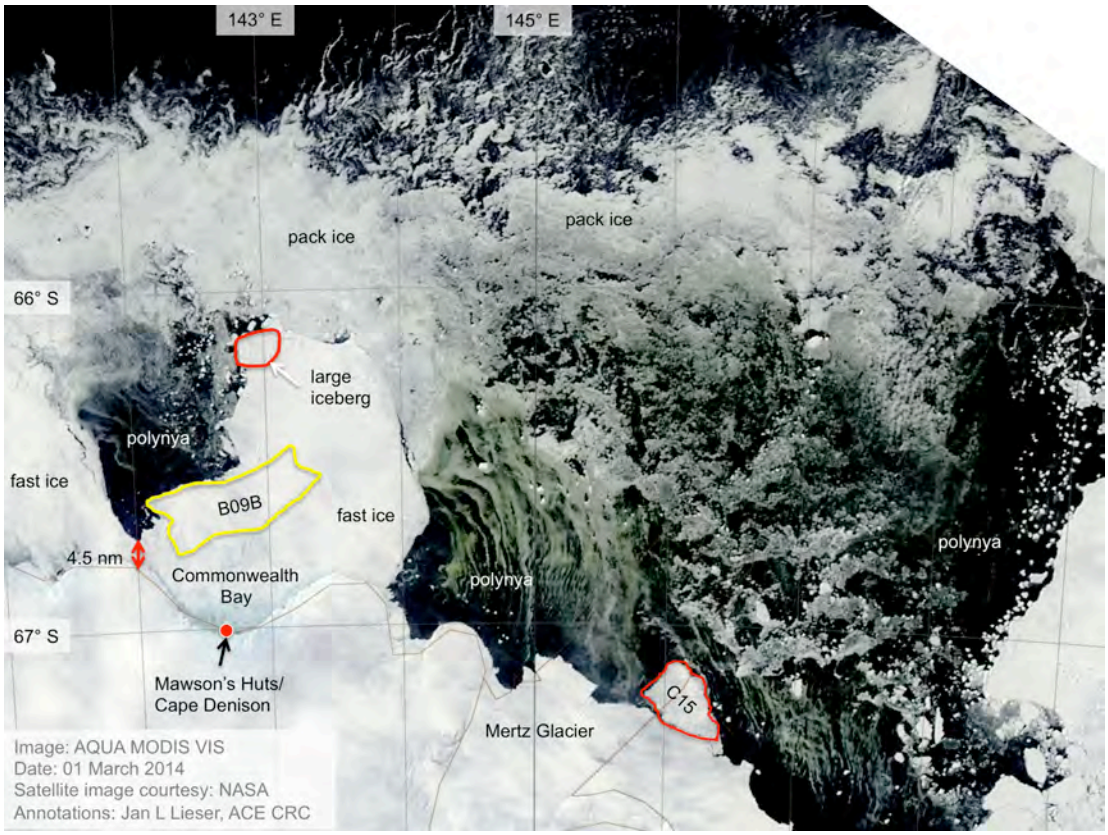

Figure 2: MODIS image, acquired 01/03/2014 and provided by NASA.

Sea Ice Report #10/2014

by the AAD/ACE CRC Sea Ice Group

06/03/2014

This report covers three regions of interest in East Antarctica.

- **Mawson Station**
  Figures 1 and 2 show the same geographical frame off Mawson Station as seen by the MODIS instrument and RADARSAT-2, respectively. The location of the fast ice edge is indicated by the red line in the MODIS image (Figure 1). Yesterday, between the two acquisitions by the different satellites, a substantial piece of fast ice has broken away from the eastern side of the fast ice surrounding Mawson Station. The now ex-fast ice is indicated by the light green shape in Figure 2. This event has shortened the distance from the fast ice edge at the Cape Darnley polynya to the station by about five nautical miles.

  In the sea ice zone north of the Cape Darnley polynya, the large iceberg annotated in both figures has moved about 23 nautical miles westward since 02/03/2014 (see Sea Ice Report #09a/2014) and is spinning anticlockwise. This rotation can be seen between Figures 1 and 2, where the westward shift is only about three nautical miles, but the angular movement is almost 90 degrees.

- **Totten Glacier**
  The scene of Figure 3 is almost entirely obscured by clouds, but the position of RSV *Nathaniel B Palmer* (WBP3210, time annotated) is shown as a red dot in the middle of the polynya west of the Dalton Iceberg Tongue. AMSR-2 data (not shown) suggest that the polynya is well defined and free of sea ice, and only about 20 nautical miles of medium high ice concentration (50% to 80%) exist between the polynya and the Southern Ocean, at the northern tip of the iceberg tongue.

- **Commonwealth Bay**
  To the west of iceberg B09B, fast ice has retreated completely and about five nautical miles of coast are now exposed to the polynya (see Figure 4). North of the berg, a large piece of fast ice has also broken away.

  In the Mertz Glacier polynya, some discoloured (greenish) sea ice can still be seen through the thin clouds.

  At the eastern side of the Mertz Glacier, iceberg C15 has moved about half a nautical mile in northwesterly direction in 30 days (between 02/02/2014 and 04/03/2014).

With best regards,

Jan, for the sea ice group.

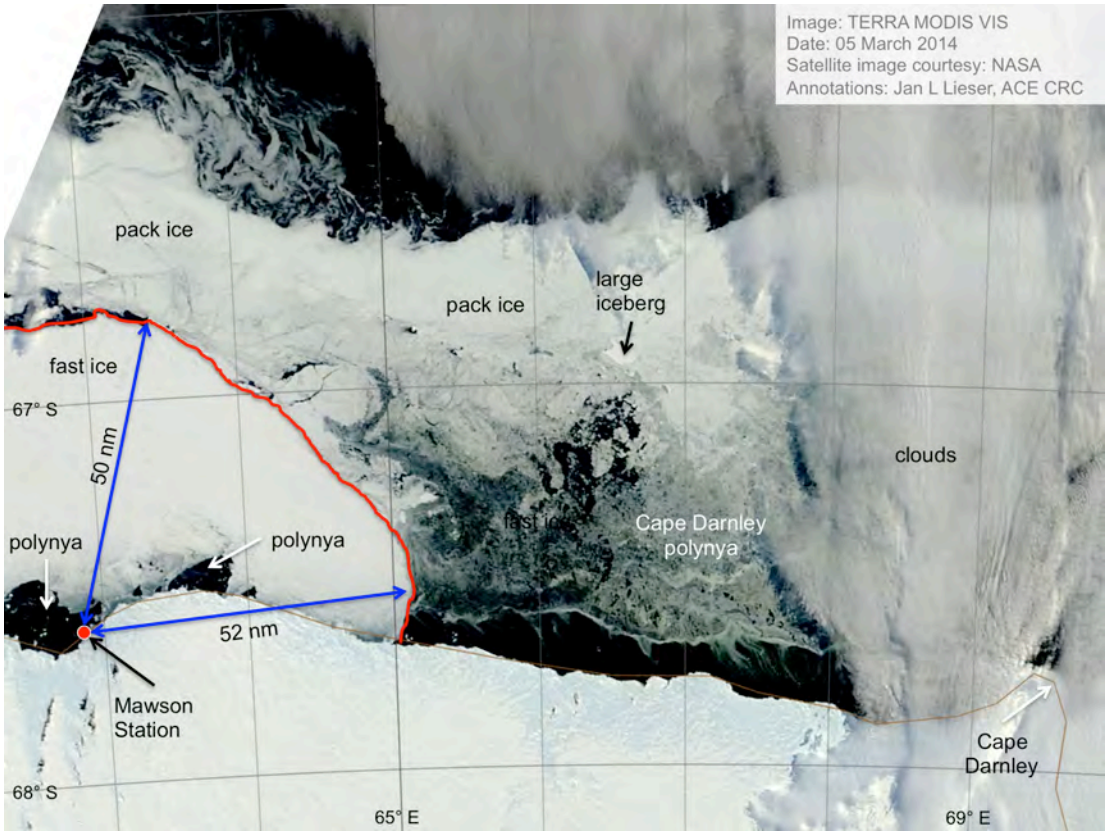

Figure 1: MODIS image, acquired 05/03/2014 and provided by NASA.

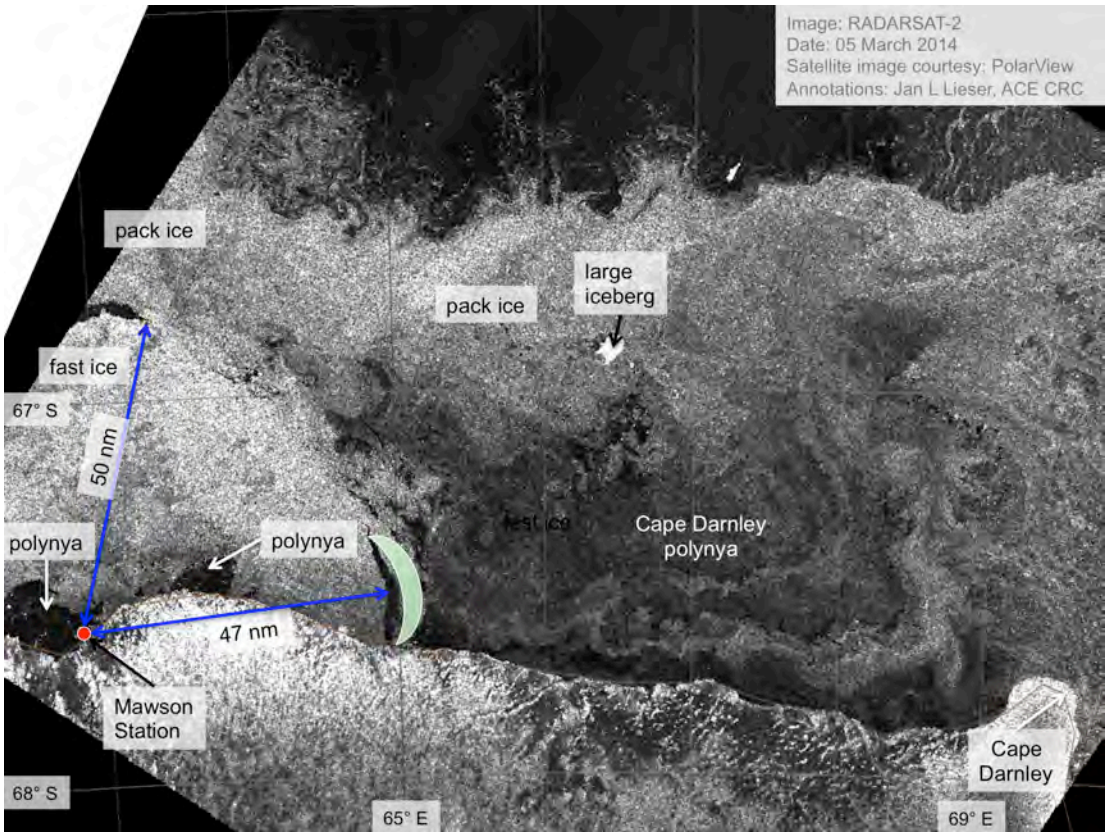

Figure 2: RADARSAT-2 image, acquired 05/03/2014 and provided by PolarView.

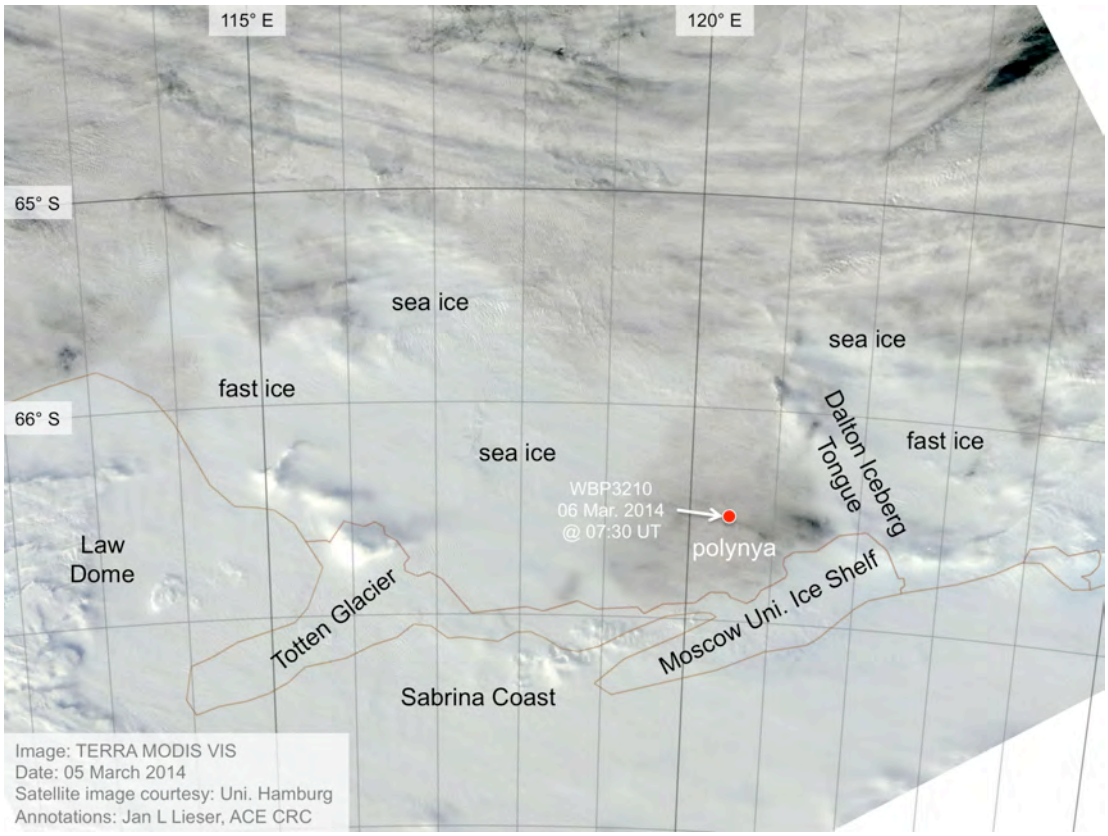

Figure 3: MODIS image, acquired 05/03/2014 and provided by NASA.

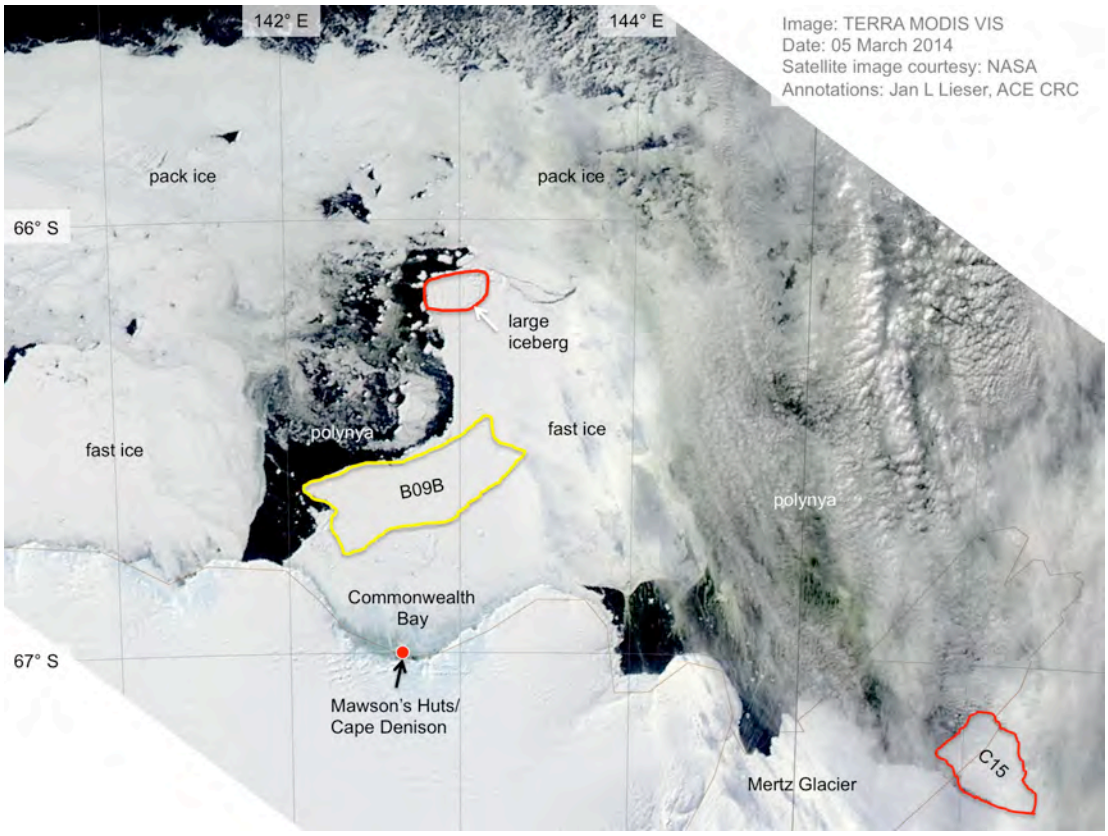

Figure 4: MODIS image, acquired 05/03/2014 and provided by NASA.

Sea Ice Report #10a/2014

by the AAD/ACE CRC Sea Ice Group

09/03/2014

This report updates on sea ice conditions off Mawson Station.

- **Mawson Station**
  Figures 1 and 2 show the same geographical frame off Mawson Station as seen by the MODIS instrument and RADARSAT-2, respectively. The region of interest between 62° E and 65° E is obscured by clouds in Figure 1, but the RADAR scene (Figure 2) shows clearly a thin sea ice cover in the coastal polynyas east and west of the station. From the two patches of open water north of Mawson Station, slightly shorter distances between the fast ice edge and the station are measured. This indicates that the fast ice seems to be retreating southward a little. The piece of fast ice that broke away from the eastern edge of the fast ice (see Sea Ice Report #10/2014) appears to have moved northward along the old fast ice edge. Therefore some of the ex-fast ice remains still local, but the new edge seems to be stable at about 47 nautical miles distance from Mawson Station.

  The large iceberg marked in both figures has moved 17 nautical miles between two RADARSAT-2 acquisitions (Figure 2 and Figure 2 of Sea Ice Report #10/2014) and about three nautical miles between the two satellite overpasses yesterday (Figures 1 and 2), only a few hours apart. Between the two acquisitions yesterday, the berg has rotated about 70 degrees. This shows that the sea ice zone in which the berg is travelling is highly mobile and under low horizontal pressure at the moment.

With best regards,

Jan, for the sea ice group.

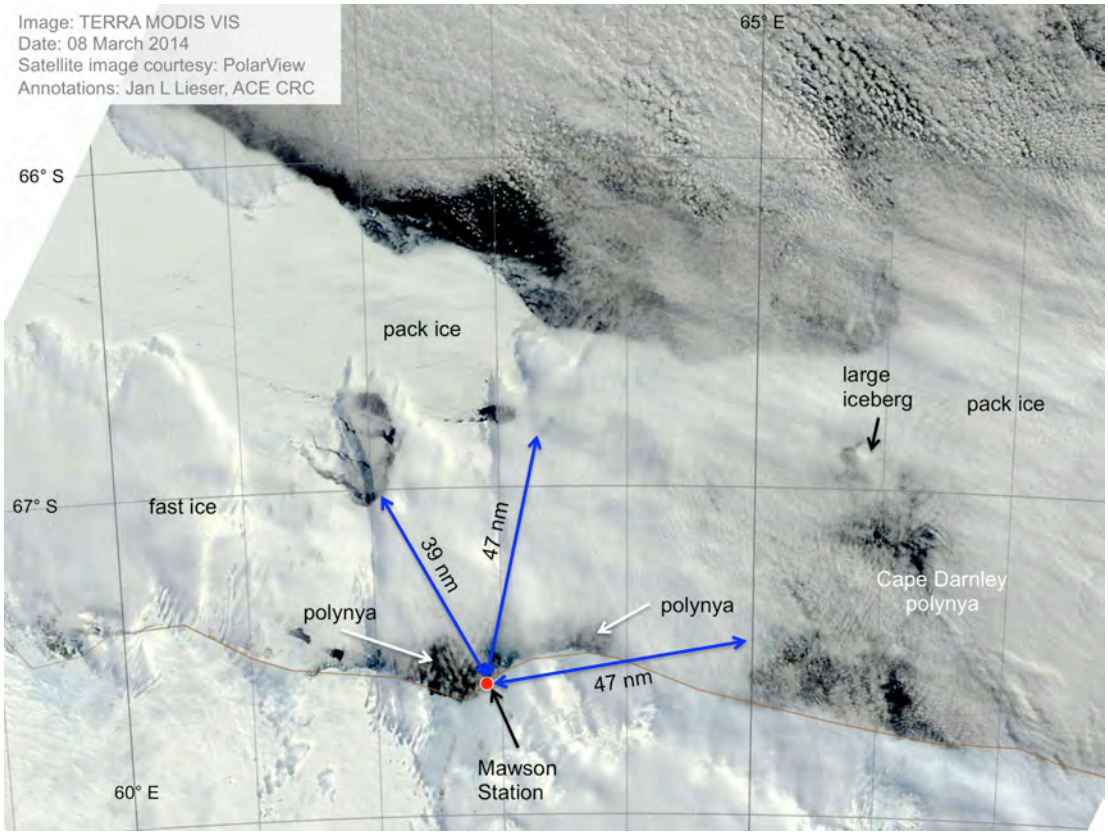

Figure 1: MODIS image, acquired 08/03/2014 and provided by NASA.

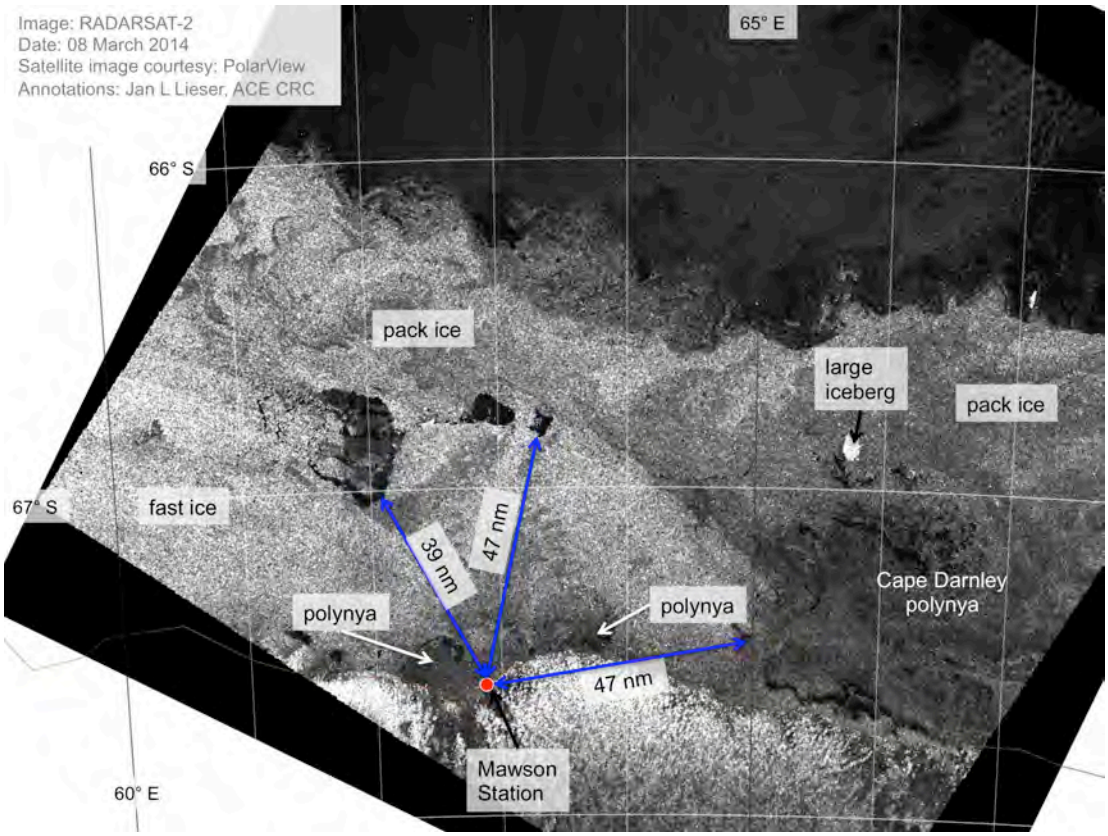

Figure 2: RADARSAT-2 image, acquired 08/03/2014 and provided by PolarView.

Sea Ice Report #11/2014

by the AAD/ACE CRC Sea Ice Group

12/03/2014

This report examines sea ice conditions between 60° E and 70° E, north of Mawson Station.

- **Mawson Station**
  Figures 1 and 2 show the same geographical frame off Mawson Station as seen by the MODIS and AMSR-2 instruments, respectively.

  The general sea ice conditions appear typical for late summer/early autumn with light sea ice concentration in the Cape Darnley polynya and only a small band of higher concentration consisting of sea ice that has just survived the summer season, centred at about 66° 30' S between 65° E and 70° E. The northern sea ice edge can be seen as a relatively well defined line in the AMSR-2 data (Figure 2), possibly caused by the persistent southeasterly winds recently.

  The visible image (Figure 1) is largely obscured by clouds and the location of the fast ice edge towards Cape Darnley polynya cannot be positively identified, but from AMSR-2 data (Figure 2) it is clear this edge is close to 65° E. North of 67° S and between 69° E and 70° E, a region with lower sea ice concentration can be seen immediately north of Cape Darnley.

  The location of the large iceberg identified in previous Sea Ice Reports can only be approximated through the clouds, but it appears to be still moving with the pack ice, north of Cape Darnley polynya.

With best regards,

Jan, for the sea ice group.

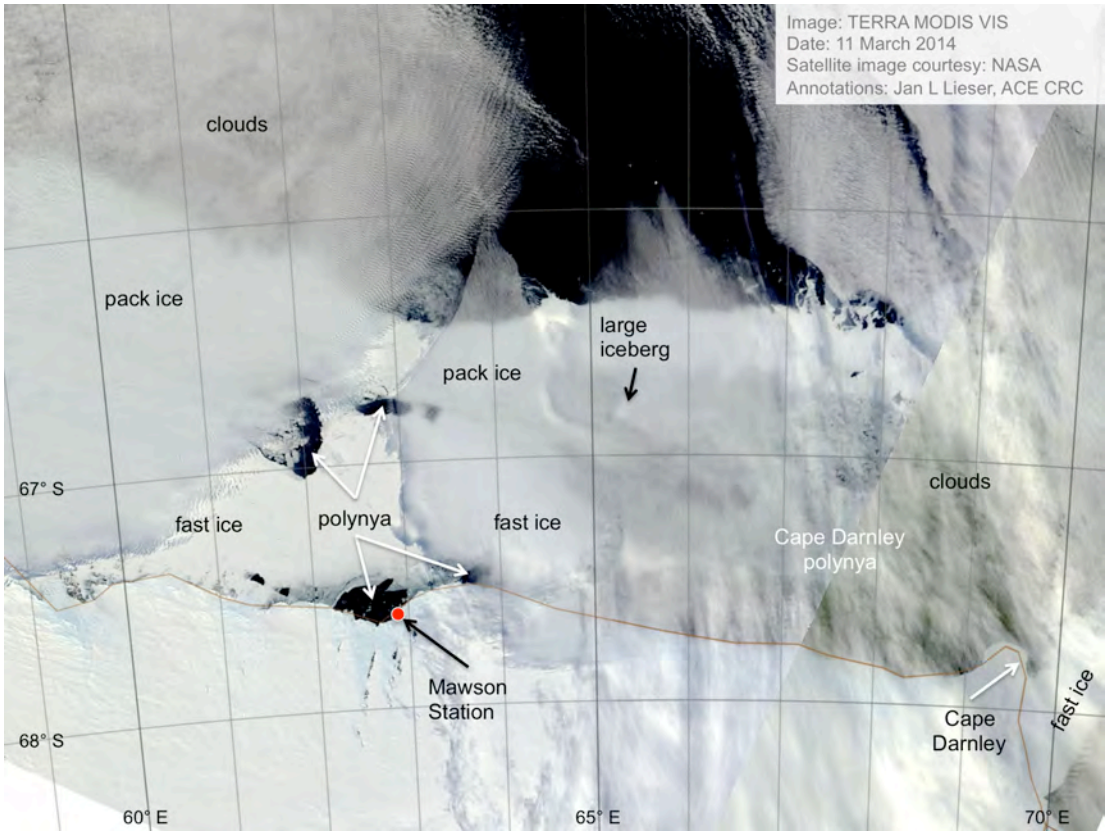

Figure 1: MODIS image, acquired 11/03/2014 and provided by NASA.

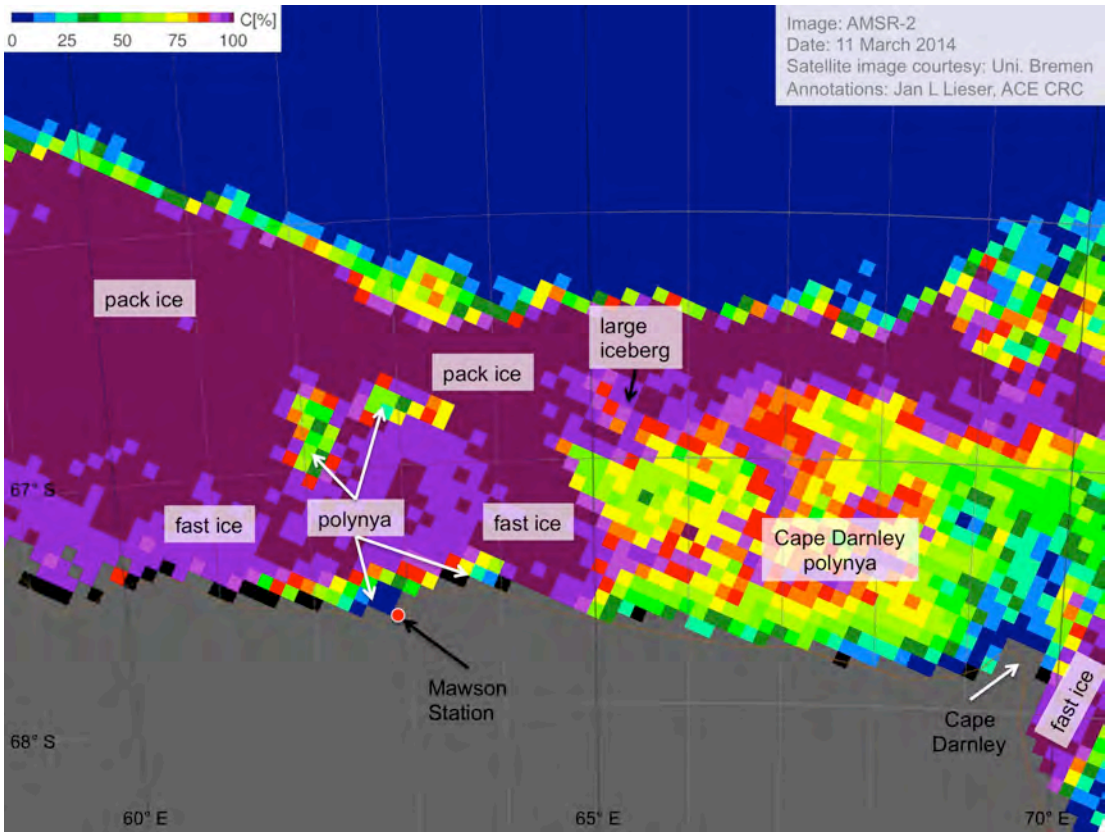

Figure 2: AMSR-2 image, acquired 11/03/2014 and provided by Universität Bremen.

Sea Ice Report #11a/2014

by the AAD/ACE CRC Sea Ice Group

14/03/2014

This report updates on sea ice conditions in Prydz Bay, off Davis Station.

- **Davis Station**
  Figures 1 and 2 show the same geographical frame of Prydz Bay and off Davis Station as seen by the MODIS and AMSR-2 instruments, respectively.

  Even though the freezing season seems fully established in the region the sea ice conditions appear still loose and highly variable, especially west of 75° E. The MODIS image (Figure 1) is largely obscured by clouds, but through some of the thinner clouds the sea ice surface can be seen. In the central part of the image, between 67° S and 68° S and 75° E and 77° E, large openings and leads can be detected within pack ice zone. In both figures, three large icebergs are identified floating freely through the sea ice. The surrounding of B09F indicates that the entire region is currently under low horizontal pressure. Note: D15 is stationary to the north of the West Ice Shelf.

  Close to the coast off Davis Station, open water is still maintained between the eastern edge of the Amery Ice Shelf and about 80° E (Figure 2). Note: The AMSR-2 image gives incorrect sea ice concentration values in the region of the Amery Ice Shelf and iceberg D15 (and the associated fast ice), due to an outdated land mask (shown in white).

With best regards,

Jan, for the sea ice group.

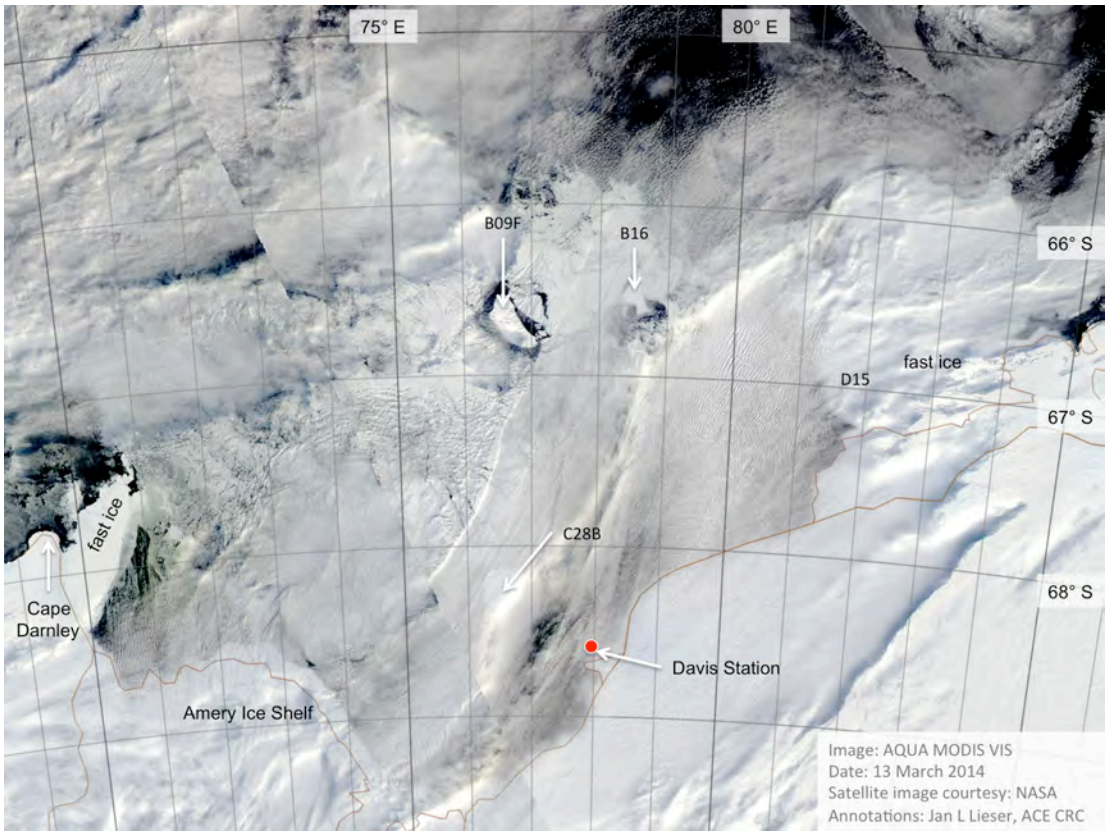

Figure 1: MODIS image, acquired 13/03/2014 and provided by NASA.

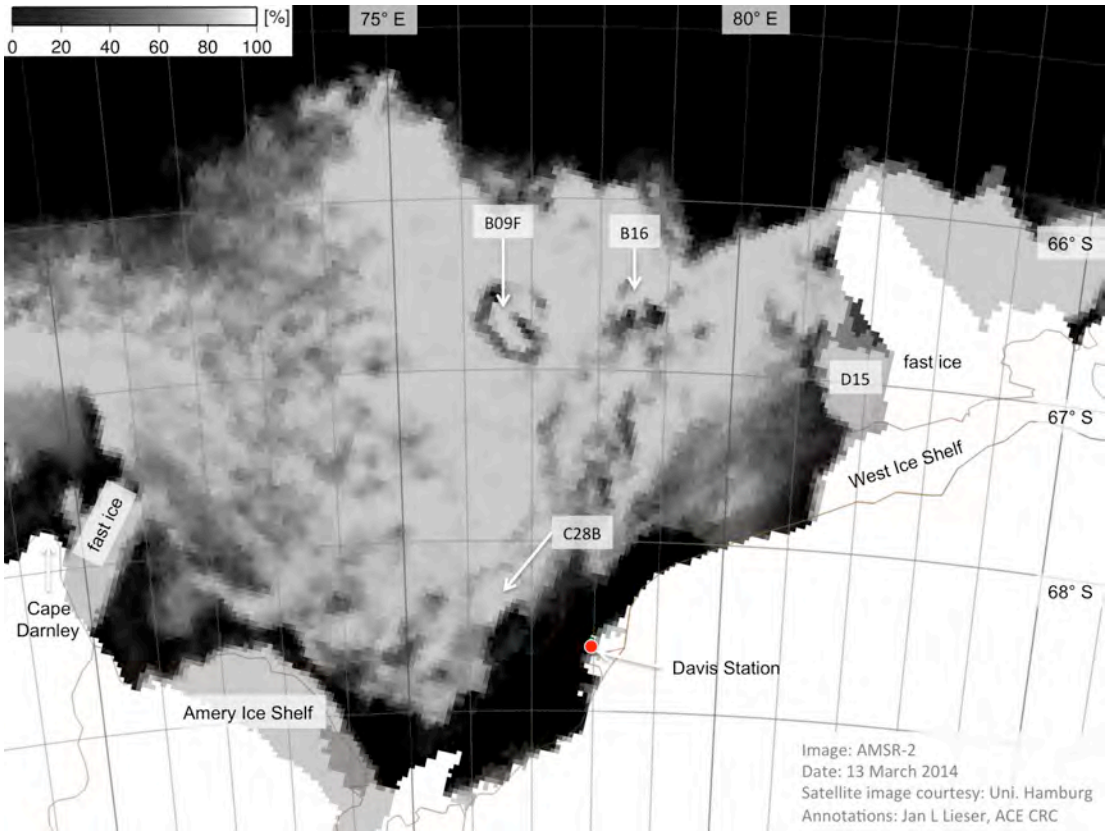

Figure 2: AMSR-2 image, acquired 13/03/2014 and provided by Universität Hamburg.

Sea Ice Report #11b/2014

by the AAD/ACE CRC Sea Ice Group

15/03/2014

This report updates on sea ice conditions in Prydz Bay, off Davis Station.

- **Davis Station**
  Figures 1 and 2 show the same geographical frame of Prydz Bay and off Davis Station as seen by the MODIS and AMSR-2 instruments, respectively.

  Sea ice conditions appear to have not changed significantly during the past 24 hours, but the MODIS image (Figure 1) provides a clearer view of the scene, between 77° E and 82° E. In this sector and between 66° S and 67° S, sea ice concentrations appear relatively high (around 80%), but the conditions around icebergs B09F and B16 still indicate low horizontal pressure. South of 67° S in the same sector, sea ice concentrations are low to moderate at the moment.

  Note: The AMSR-2 image gives incorrect sea ice concentration values in the region of the Amery Ice Shelf and iceberg D15 (and the associated fast ice), due to an outdated land mask (shown in white).

With best regards,

Jan, for the sea ice group.

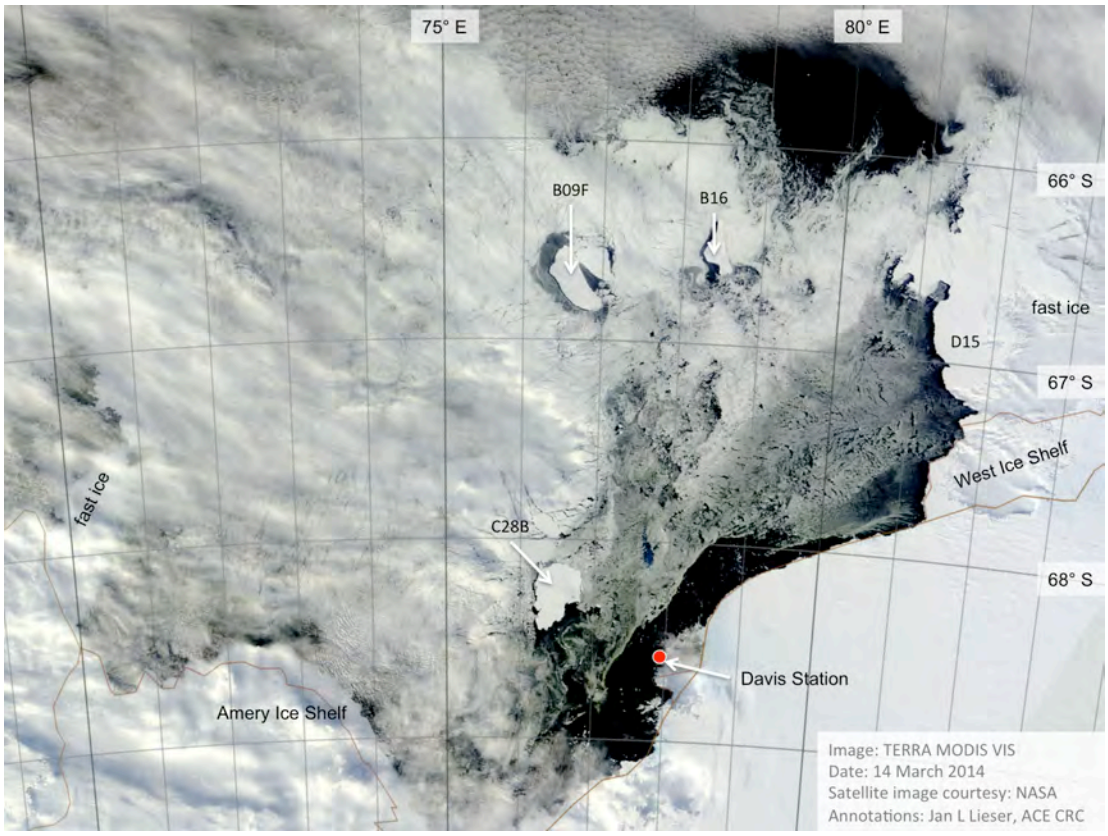

Figure 1: MODIS image, acquired 14/03/2014 and provided by NASA.

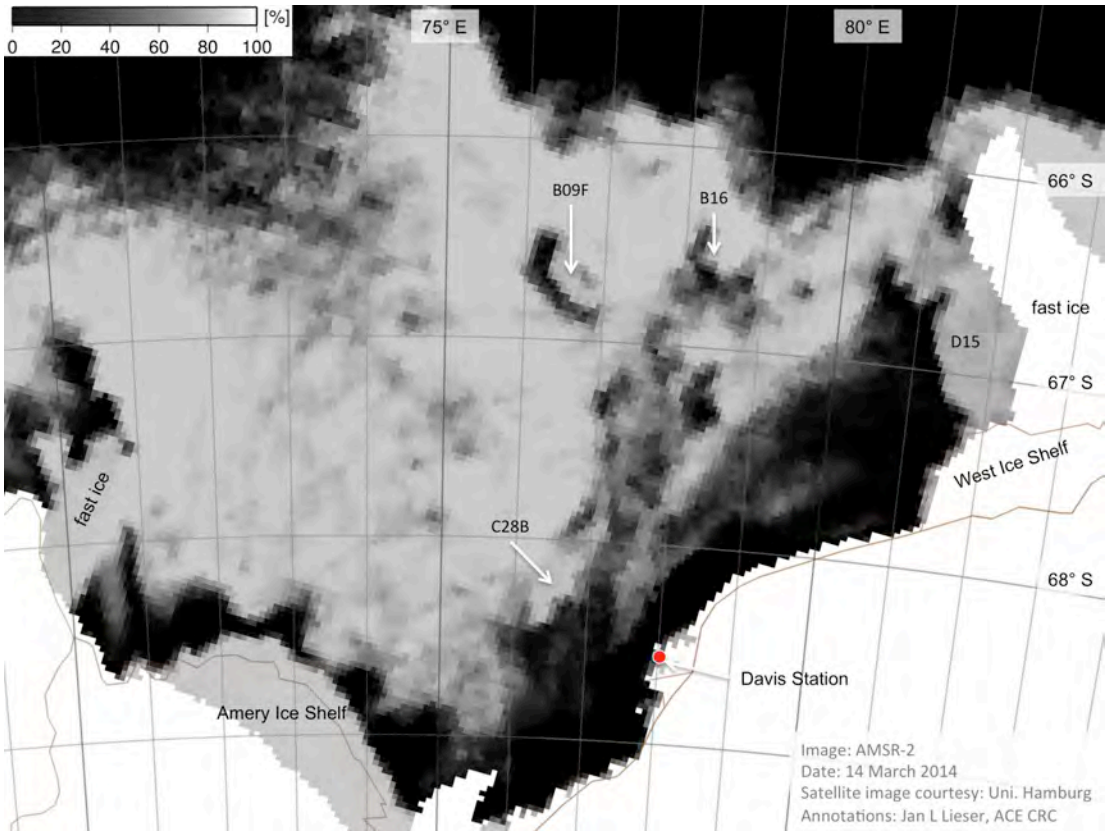

Figure 2: AMSR-2 image, acquired 14/03/2014 and provided by Universität Hamburg.

Sea Ice Report #11c/2014

by the AAD/ACE CRC Sea Ice Group

17/03/2014

This report updates on sea ice conditions in Prydz Bay and Commonwealth Bay.

- **Davis Station**
  Figures 1 and 2 show the same geographical frame of Prydz Bay and off Davis Station as seen by the MODIS and AMSR-2 instruments, respectively.

  Over the weekend, sea ice conditions appear largely unchanged. The MODIS image (Figure 1) provides an almost cloud free view of the scene with only thin clouds over parts of the marginal ice zone and over Davis Station and to the north from there. During the past two days, icebergs B09F and C28B have moved about four nautical miles in west-southwesterly direction, while during the same time iceberg B16 has traveled between six and eight nautical miles (the iceberg is rotating slowly, resulting is differential movement with the northern corner travelling a greater distance than its southern end).

  Overall, the region still seems to be under low horizontal stress, judging from the surroundings of the annotated icebergs (except for D15) and many leads and breaks visible in the interior pack ice of Prydz Bay, especially between 72° E and 75° E.

  The AMSR-2 image is provided for reference and comparison with previous reports. Note: The AMSR-2 image gives incorrect sea ice concentration values in the region of the Amery Ice Shelf and iceberg D15 (and the associated fast ice), due to an outdated land mask (shown in white).

- **Commonwealth Bay**
  In Figure 3, the Commonwealth Bay region is shown essentially cloud free. During the past few weeks, we note several regions of fast ice break up. Those regions are indicated by the orange shaded circles.

  The location of the Australian Bluewater Observing System (ABOS) polynya mooring is also given in the image. Just to the east of the mooring, a large piece of fast ice (about the same size as the large iceberg to the west of the mooring) has broken away, since the beginning of March.

  Fast ice retreat has continued around iceberg B09B, and some pieces have broken away from the fast ice north of Dumont D'Urville Station.

  Since 01/03/14, iceberg C15 has progressed about one nautical miles northwestward.

With best regards,

Jan, for the sea ice group.

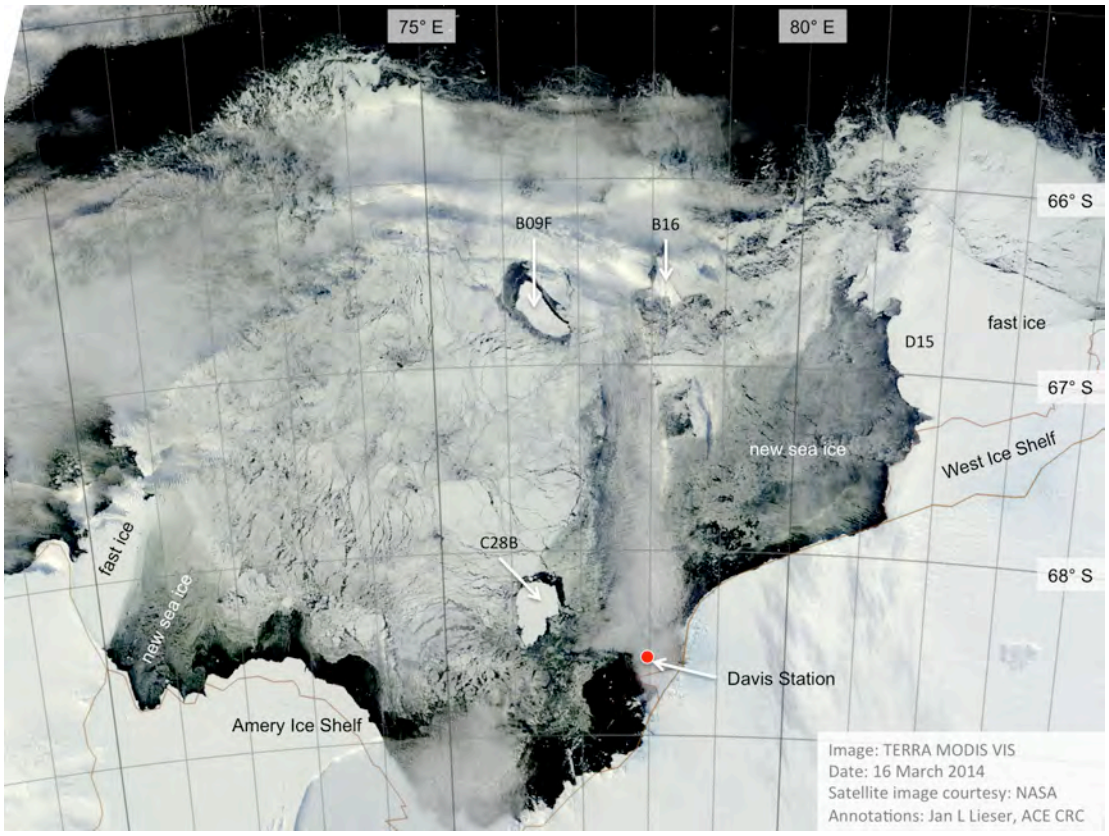

Figure 1: MODIS image, acquired 16/03/2014 and provided by NASA.

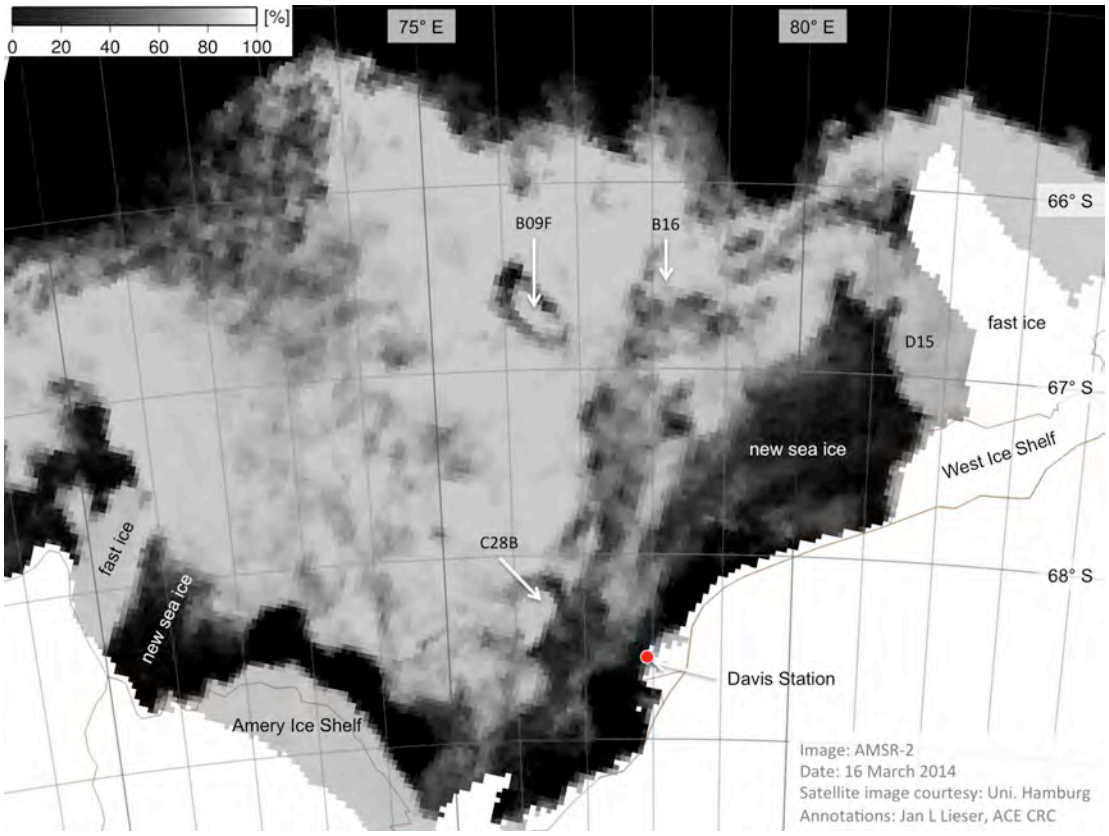

Figure 2: AMSR-2 image, acquired 16/03/2014 and provided by Universität Hamburg.

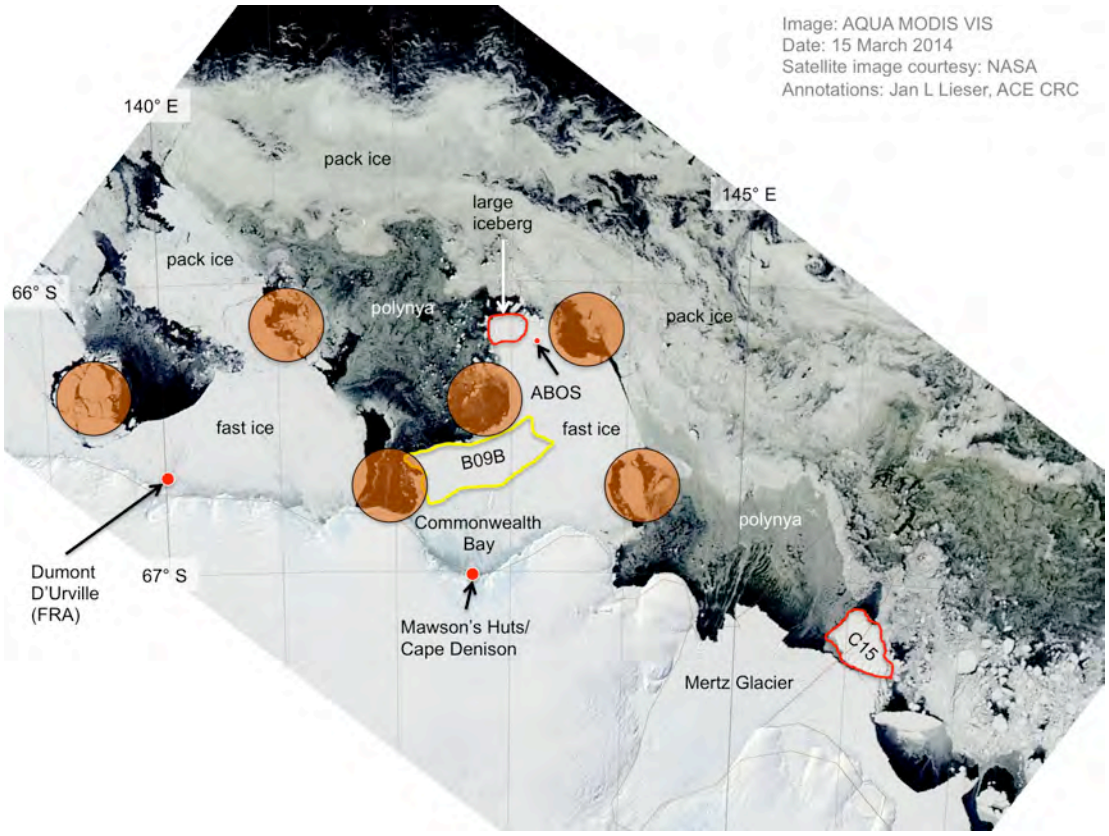

Figure 3: MODIS image, acquired 15/03/2014 and provided by NASA.

Sea Ice Report #12/2014

by the AAD/ACE CRC Sea Ice Group

19/03/2014

This report examines sea ice conditions in the larger Prydz Bay region and around Commonwealth Bay.

- **Mawson Station**
  The area between Mawson Station and Davis Station is shown in Figure 1. The sea ice zone is essentially cloud free, except for a cloud band in the east, from the eastern edge of the Amery Ice Shelf towards the northeast, covering icebergs C28B and B16 and Davis Station. As a result of the recent change in wind direction, the pack ice of Prydz Bay is moving in northerly directions and pushing the marginal ice zone northward. Around the large annotated icebergs, the sea ice is accumulating on the windward side, and open water can be seen in the lee of the bergs (most notable around iceberg B09F).

  In the Cape Darnley region, the fast ice to the east remains largely in place. The northern tip of this fast ice appears to be in close contact with the compacting pack ice of Prydz Bay. Only one larger lead can be seen stretching in southeast-northwest direction, at about 70° 50' E and 67° 12' S. To the west of the cape, the polynya is currently frozen over by new sea ice.

  Off Mawson Station, the polynyas close to the shore are also frozen over, but the open water in the north and northeast (just on the edge of the frame of Figure 1) at the fast ice edge are still maintained. The old fast ice edge towards the northeast of Mawson Station is indicated by the red dashed line. This side of the fast ice has accumulated some new ice formed in the polynya, but it is unclear how consolidated that is so far.

- **Commonwealth Bay**
  In the region between Dumont D'Urville Station and the Mertz Glacier, the fast ice break up continues as can be seen in Figure 2. The orange shaded circles indicate areas of recent change. In addition we note a major linear feature appearing in the fast ice to the east of iceberg B09B. This likely crack is marked by the (partly dashed) blue line.

  The location of the ABOS mooring (see Sea Ice Report #11c/2014) is marked with a little red dot.

With best regards,

Jan, for the sea ice group.

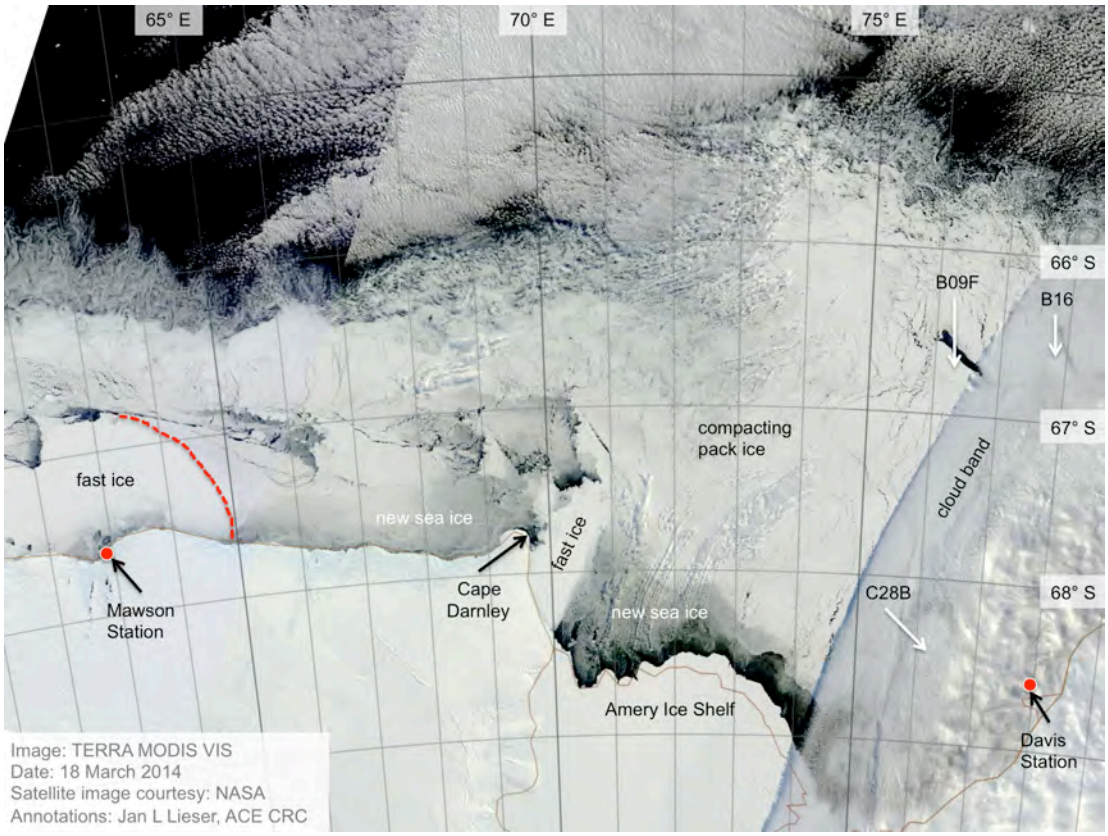

Figure 1: MODIS image, acquired 18/03/2014 and provided by NASA.

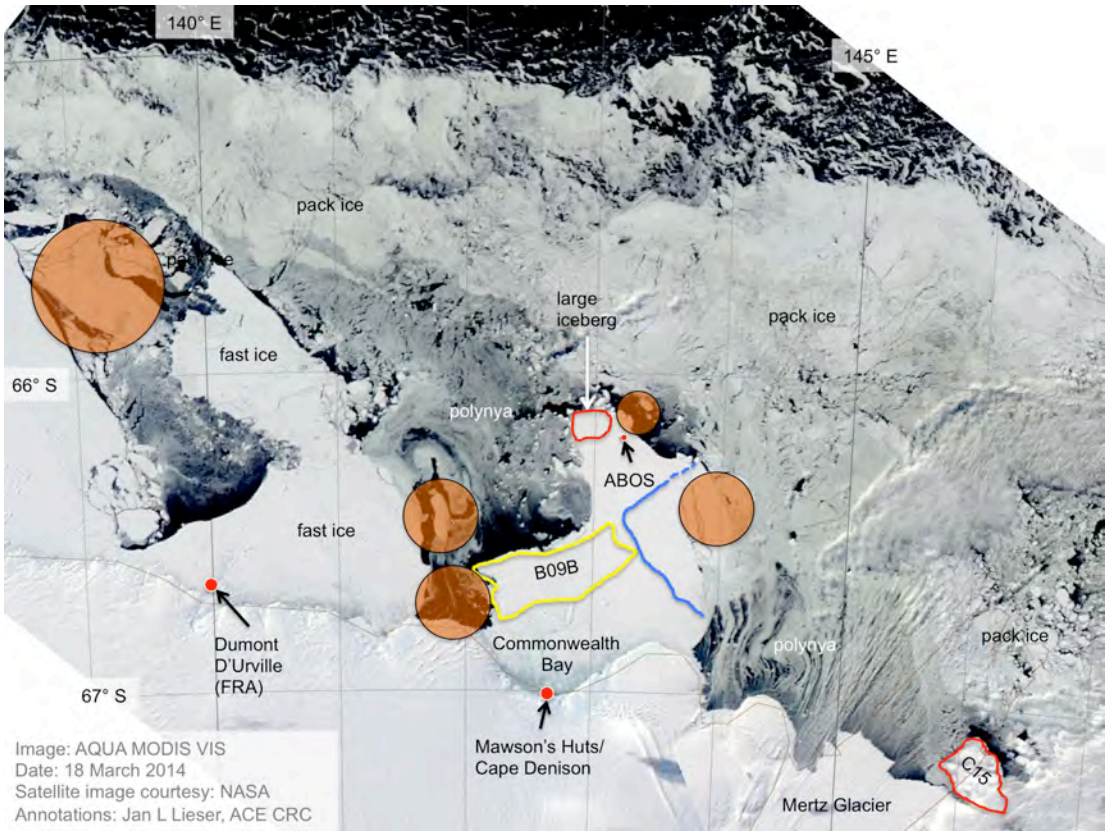

Figure 2: MODIS image, acquired 18/03/2014 and provided by NASA.

Sea Ice Report #12a/2014

by the AAD/ACE CRC Sea Ice Group

21/03/2014

This report updates sea ice conditions between Mawson and Davis stations.

- **Mawson Station**
  Figures 1, 2 and 3 show the same geographical frame off Mawson Station, as seen by Radarsat-2, and the AMSR-2 and MODIS instruments, respectively. Note: the MODIS image was acquired yesterday, the other two images were acquired the day before.

  From the RADAR image (Figure 1), three different types of sea ice can be distinguished north of the Cape Darnley polynya and the fast ice off Mawson Station. Those types are from south to north: new sea ice recently formed in the polynya close to the coast (darker grey), old sea ice to the north of it (of which most has survived the summer melt season, showing in lighter grey) and the marginal ice zone reaching north of 66° S.

  The fast ice edge is indicated by the red line in all three images. This line is partly dashed in areas where the unknown state of consolidation of sea ice adjacent to the fast ice prevents positive judgement as to whether it is landfast or not. Blue scribble lines in Figures 2 and 3 indicate recent rafting of new ice sheets. This is best detectable in the MODIS image (Figure 3).

  The large, fast rotating iceberg identified in previous Sea Ice Reports (see for example #10/2014) has now crossed 62° E on its way westward. At about 64° 43' E and 66° 27' S, another large iceberg is in the region creating a patch of open water in its lee. West of 66° E and north of 67° S, a few bright spots in the RADAR image (Figure 1) indicate the presence of medium sized icebergs.

- **Davis Station**
  Figures 4 and 5 show the same geographical frame of eastern Prydz Bay, north of Davis Station. The recent cruise track of RSV *Aurora Australis* in the area is indicated by the orange dots. Note: the land mask of the AMSR-2 image (shown in white in Figure 4) is out of date.

  To the northeast of Davis Station, new sea ice can be seen along the coast and on the western side of the West Ice Shelf and iceberg D15.

  North of the current ship's position, open water is visible in yesterday's MODIS image (Figure 5), even though the AMSR-2 data (Figure 4) indicate high sea ice concentration. The different resolution of the two sensors can be attributed to this apparent discrepancy.

  North of the fast ice north of iceberg D15, a large high concentration area of old sea ice can be seen about 11 nautical miles to the east of RSV *Aurora Australis*' current position. To the east of iceberg D15, some ex-fast ice has broken off the large sheet of fast ice. Between

82° E and 84° E, the separation is clearly visible in the MODIS image (Figure 5). To the north of this ex-fast ice and spanning a bit further to about 81° 30' E, a large lead separates the ex-fast ice from the old sea ice mentioned above.

To the west of the current ship's position between 78° E and 80° E, a region of medium high ice concentration (between 60% and 80%) can be identified in both, the AMSR-2 and MODIS images (Figures 4 and 5, respectively). However, the rest of the Prydz Bay area is filled with high concentration sea ice showing many leads predominantly north-south orientation, east of 75° E. To the west of 75° E and south of about 66° 30' S, the predominant orientation of leads shifts towards northeast-southwest, while north of 66° 30' S the orientation remains mostly north-south.

With best regards,

Jan, for the sea ice group.

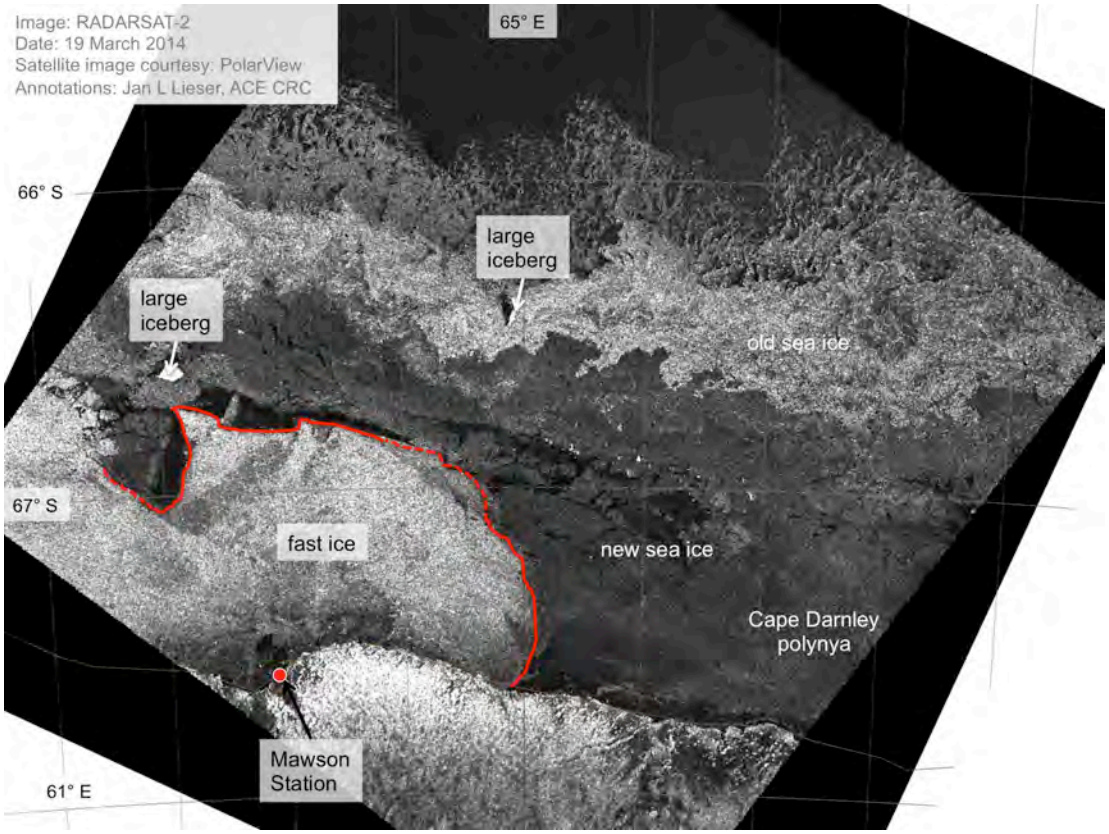

Figure 1: RADARSAT-2 image, acquired 19/03/2014 and provided by PolarView.

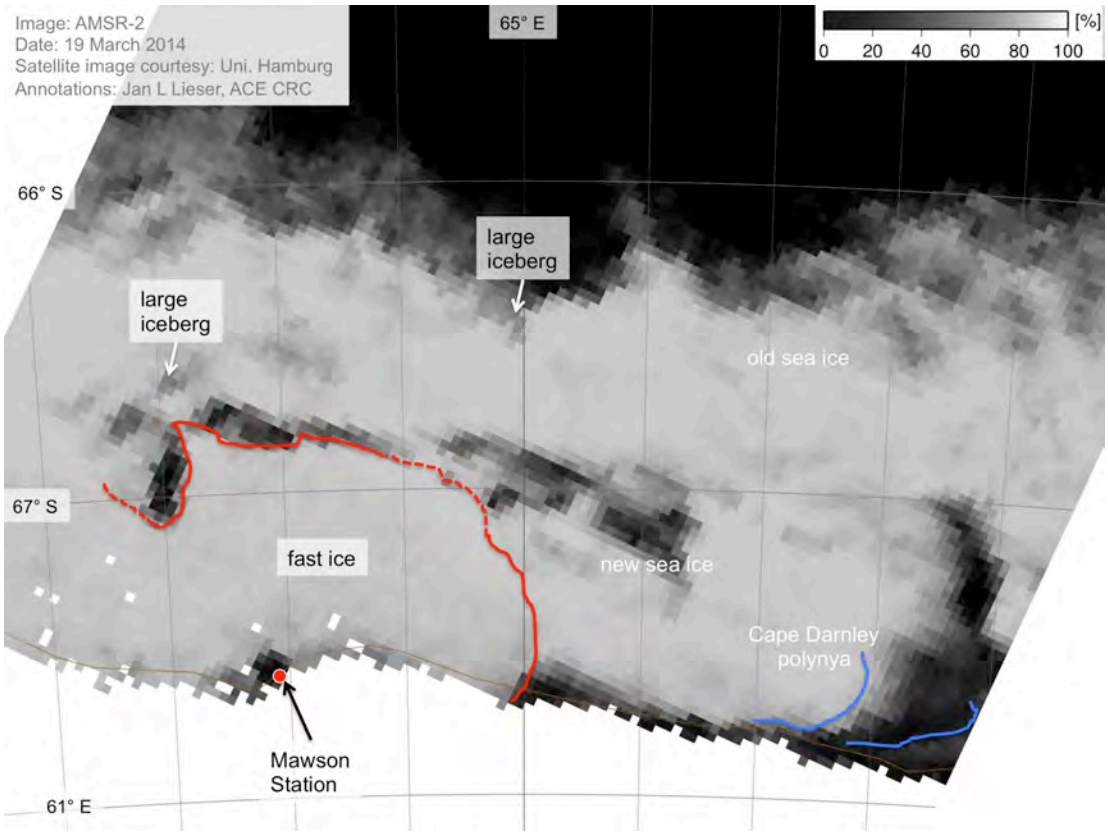

Figure 2: AMSR-2 image, acquired 19/03/2014 and provided by Universität Hamburg.

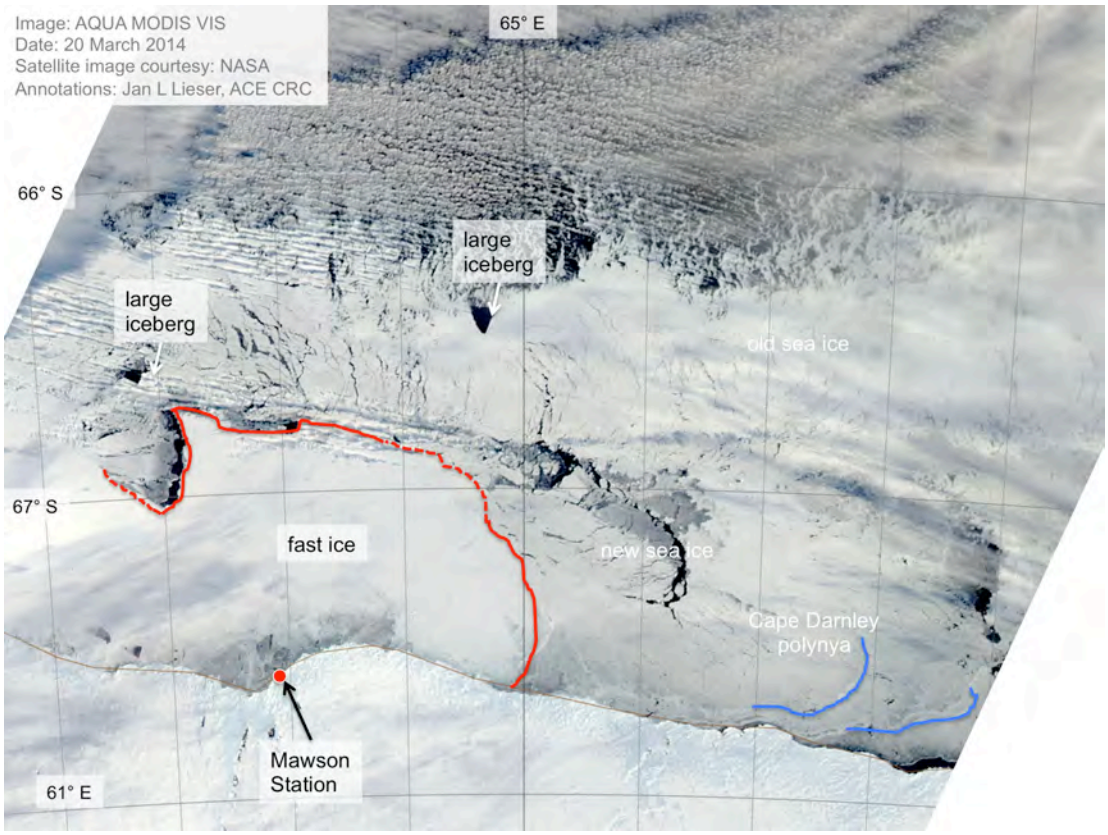

Figure 3: MODIS image, acquired 20/03/2014 and provided by NASA.

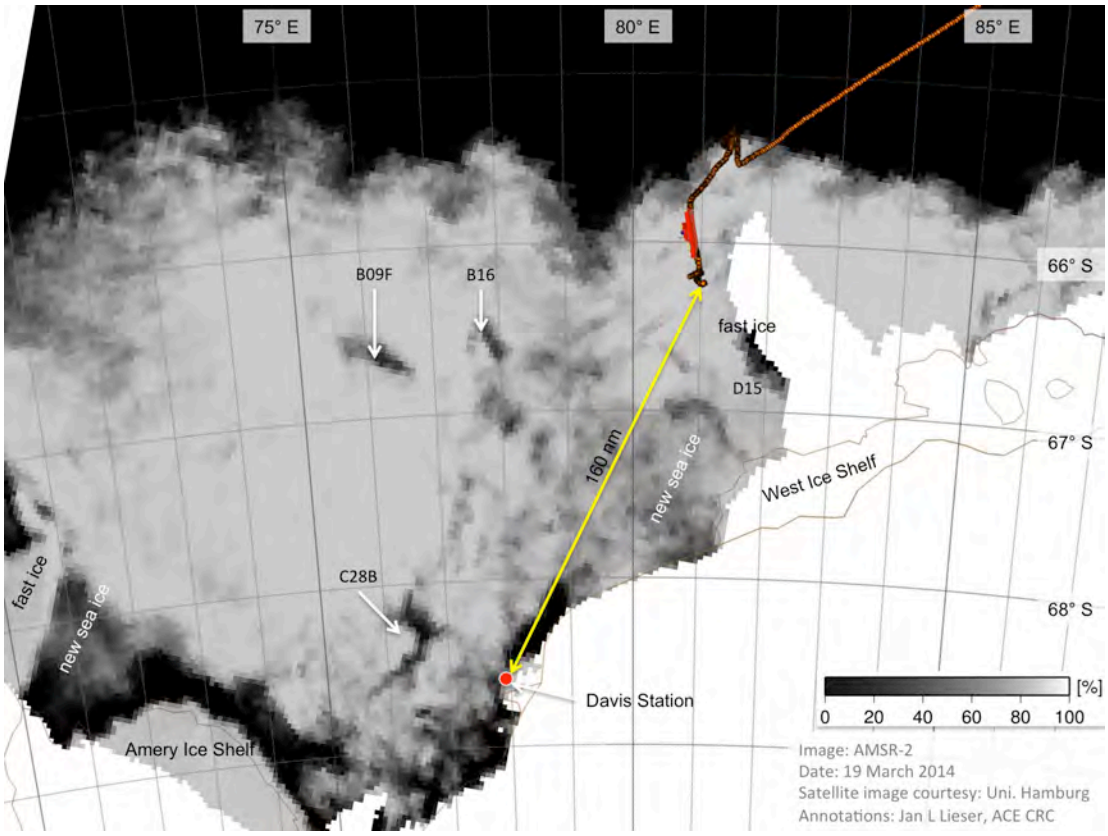

Figure 4: AMSR-2 image, acquired 19/03/2014 and provided by Universität Hamburg.

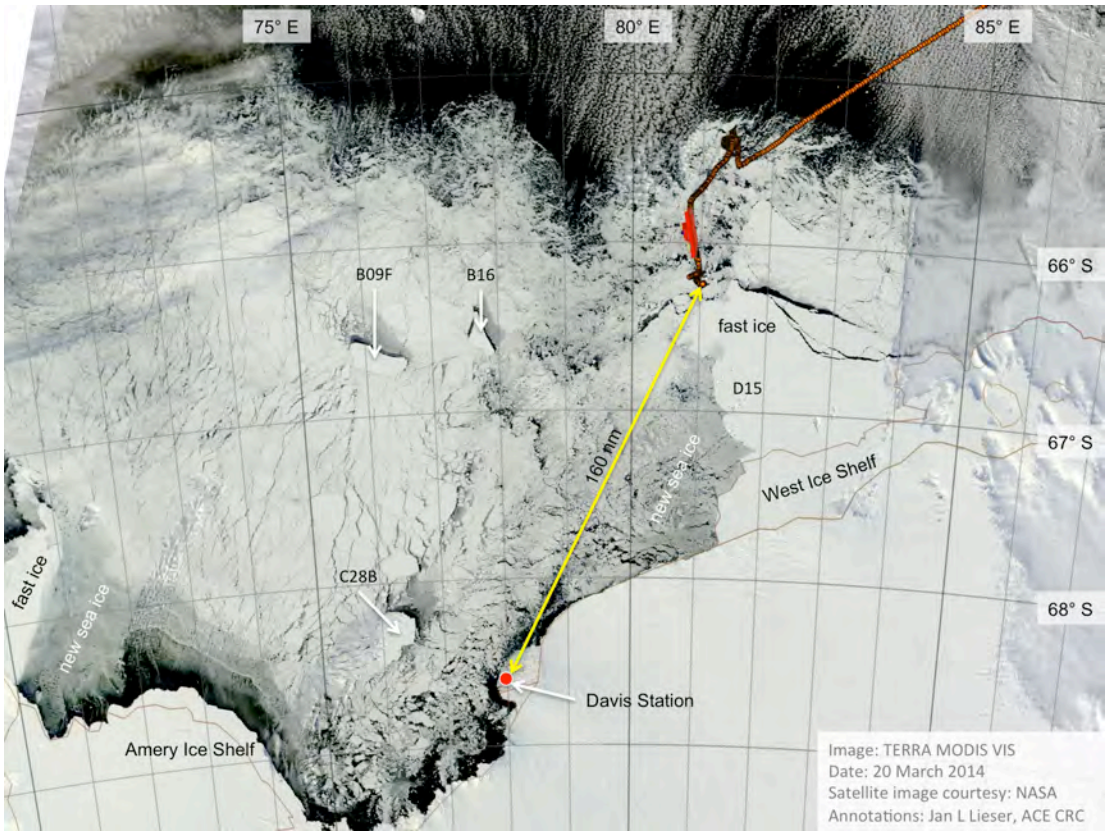

Figure 5: MODIS image, acquired 20/03/2014 and provided by NASA.

Sea Ice Report #12b/2014

by the AAD/ACE CRC Sea Ice Group

25/03/2014

This update report analyses a RADAR image acquired by the TerraSAR-X satellite of the European Aeronautic Defence and Space Company (EADS). Note: the geo-referencing of the central part of the image is expected to be correct, but the outer edges of the image are not right[1].

- **Mawson Station**
  Figure 1 shows a high resolution RADAR image of the Cape Darnley polynya region, between Mawson Station outside the image in the west and Cape Darnley outside the image in the east. The cruise track of RSV *Aurora Australis* up until about 01:00 UT today is shown as a thin red line. The thick red line denotes the fast ice edge to the north and east of Mawson Station. This line is partly dashed where the state of consolidation of accumulated sea ice is unknown to assess whether it is fastened or not.

  Three different zones of sea ice are identified in the image: close to the coast, new sea ice in the Cape Darnley polynya (and fast ice west of 65° E), north of this new sea ice and fast ice is a band of old sea ice roughly between 66° 12' S and 66° 45'S, and north of this band of old sea ice follows the marginal ice zone.

  The sea ice concentration image (Figure 2) is provided for reference.

With best regards,

Jan, for the sea ice group.

[1] While Cape Darnley appears in the RADAR image in the southeastern corner, it should be between 69° E and 70° E. Similarly, the little embayment in the fast ice edge on the western edge of the image is located to the east of 63° E.

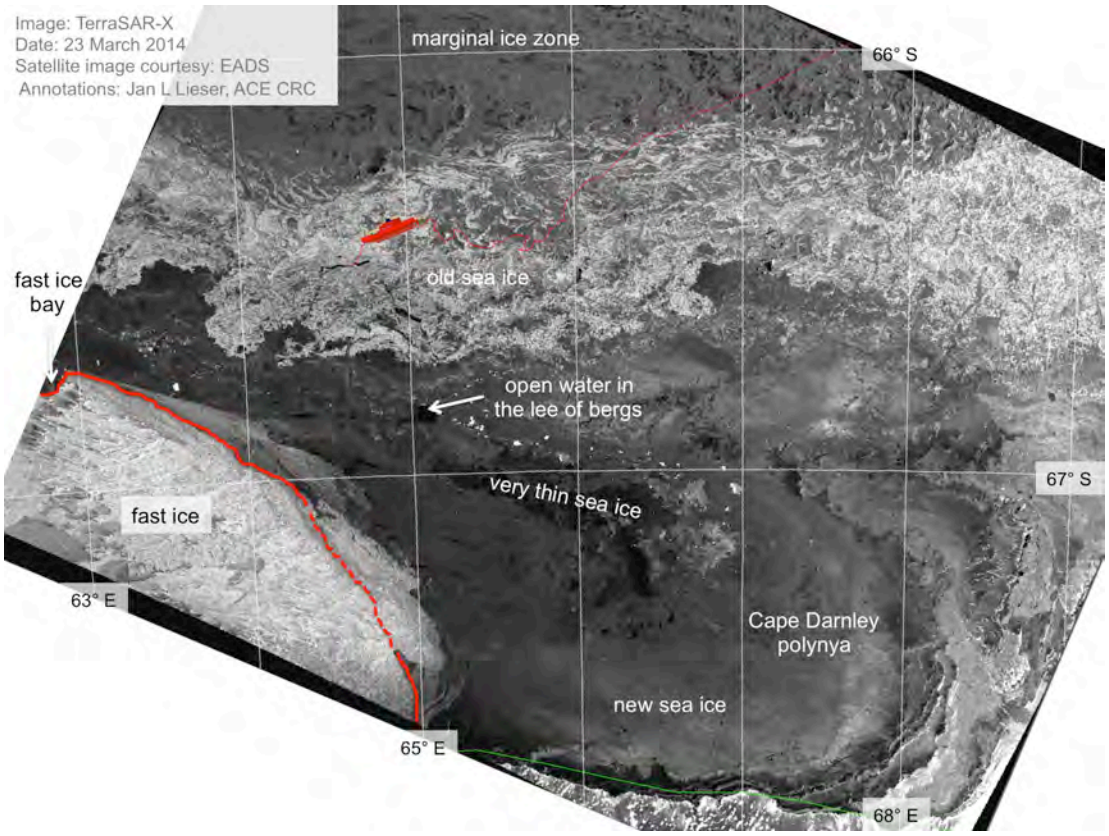

Figure 1: TerraSAR-X image, acquired 23/03/2014 and provided by EADS.

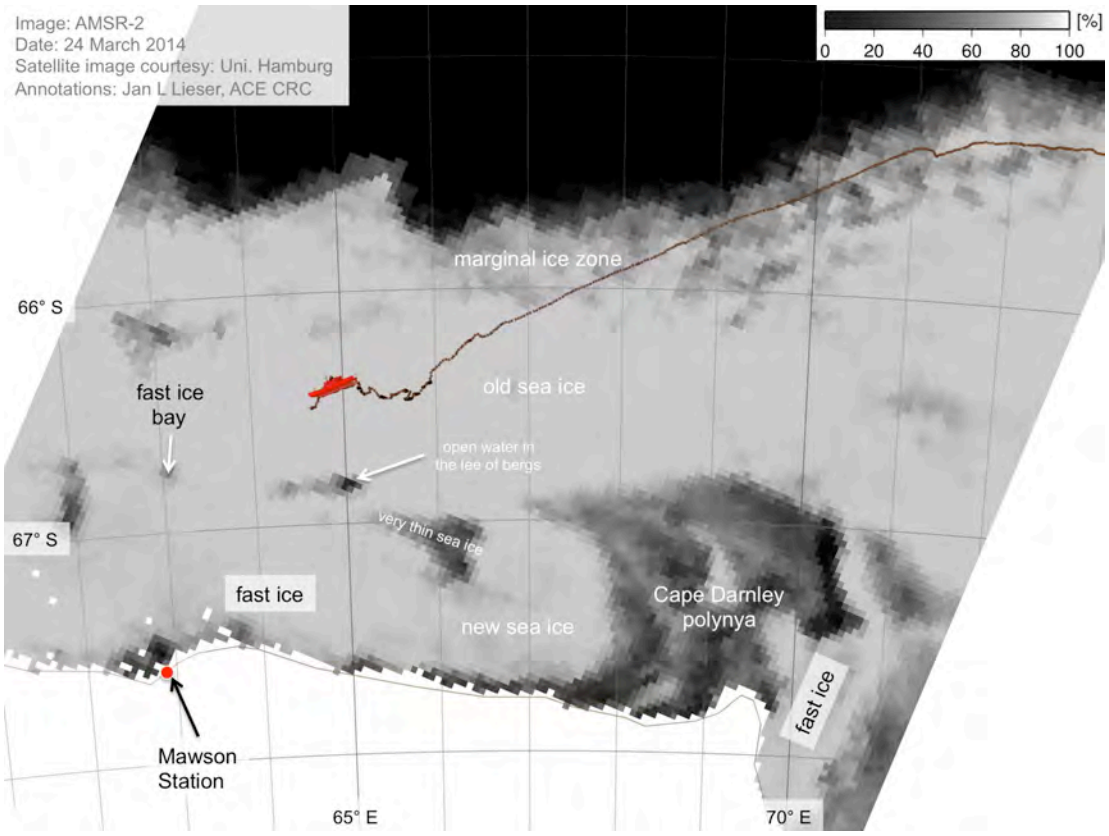

Figure 2: AMSR-2 image, acquired 24/03/2014 and provided by Universität Hamburg.

Sea Ice Report #13/2014

by the AAD/ACE CRC Sea Ice Group

26/03/2014

- **Mawson Station**
  The fast ice region off Mawson Station is shown in Figure 1. Parts of the scene are obscured by clouds. The fast ice edge is indicated by the red line. This line is partly dashed in areas where the state of consolidation is unknown. The cruise track of RSV *Aurora Australis* (up until approximately 25/03/14 22:30 UT) towards the fast ice edge is shown as an orange dotted line.

  The general sea ice conditions as discussed earlier (for example Sea Ice Report #12a/2014) has not changed. In Figure 1, three green shaded areas are identified where lee effects behind fast ice promontories creates persistent low ice concentration, thin ice regions. Those areas are high sea ice production regions, and sea ice accumulates at the windward opposite site of these embayments where it thickens and backfills the bay. This same mechanism is seen clearly in the western part of Cape Darnley polynya, where new sea ice is rafting on top of each other and forming larger floes.

With best regards,

Jan, for the sea ice group.

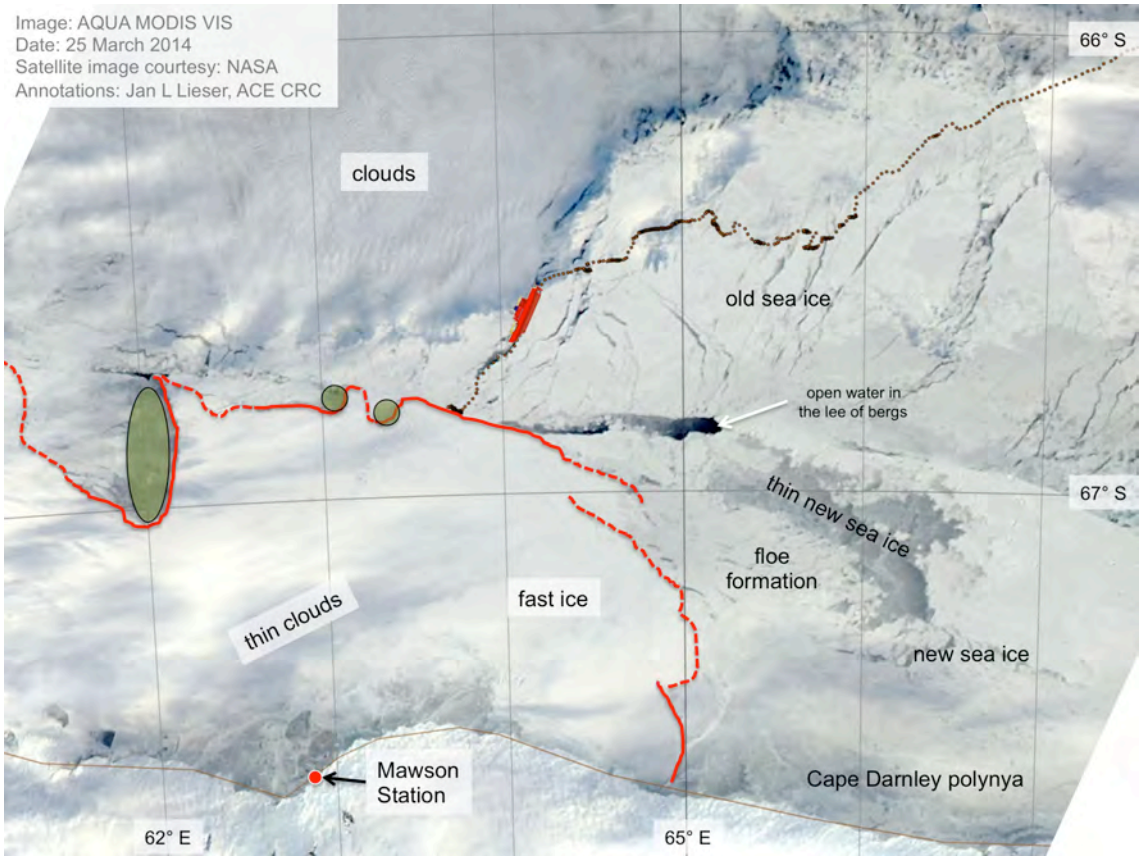

Figure 1: MODIS image, acquired 25/03/2014 and provided by NASA.

Sea Ice Report #13a/2014

by the AAD/ACE CRC Sea Ice Group

27/03/2014

This report updates on sea ice conditions in Commonwealth Bay.

- **Commonwealth Bay**
  Between 140° E and 145° E, some fast ice is still breaking up off Dumont D'Urville Station and around iceberg B09B. Areas of recent activity are indicated by orange shaded shapes in Figure 1.

  The position of the ABOS mooring (see Sea Ice Report #11c/2014) is currently free of sea ice.

With best regards,

Jan, for the sea ice group.

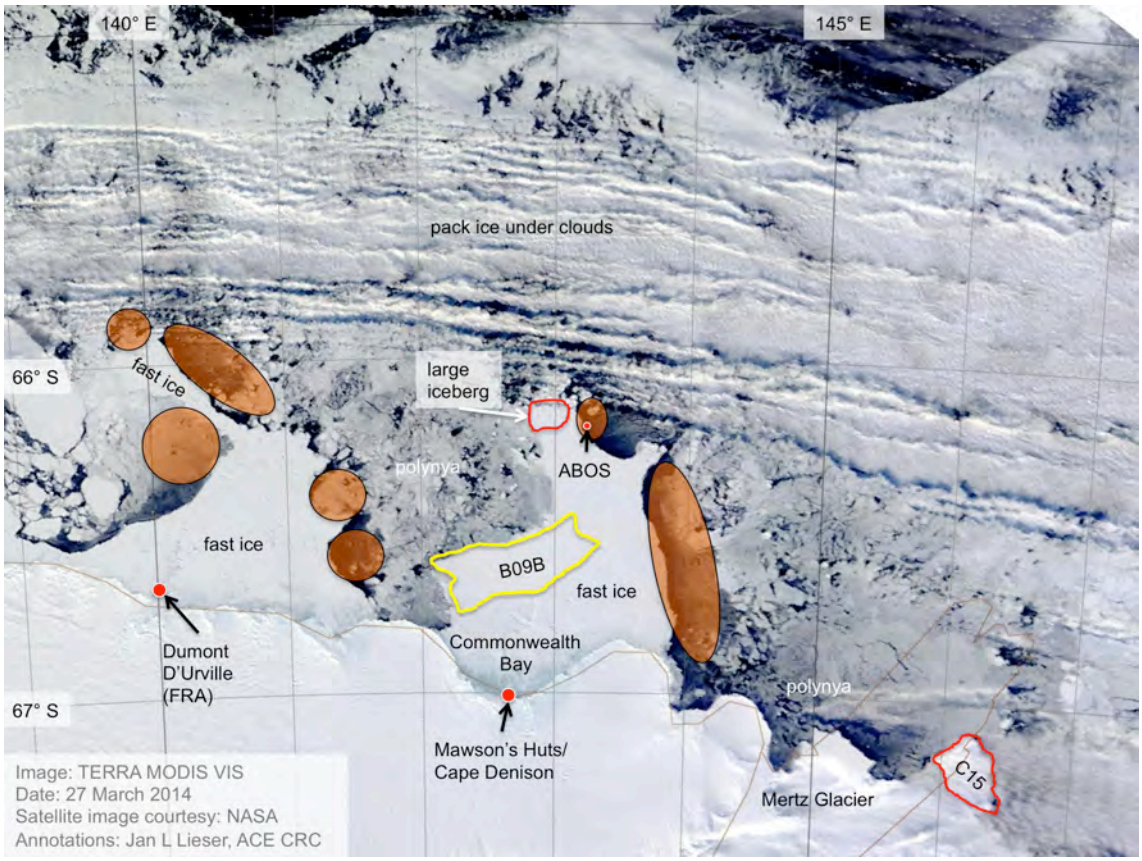

Figure 1: MODIS image, acquired 27/03/2014 and provided by NASA.

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Sea Ice Report #13x/2014

by the AAD/ACE CRC Sea Ice Group

27/03/2014

This extra report explores the full resolution potential of the TerraSAR-X data acquired on 23 March 2014 at 23:55 UT. The image shows the region of Mawson Coast and Lars Christensen Coast, between Mawson Station and Cape Darnley. This is a hindsight exercise to demonstrate the richness of detail of the 18 metre resolution data.

The grey-scale of the image represents feature roughness with respect to the satellite's main sensor, an X-band Synthetic Aperture RADAR (SAR; wavelength 31 mm, frequency 9.6 GHz). The data were acquired in ScanSAR imaging mode, the coarsest resolution of the three main imaging modes of the instrument.

In all three figures of this report, the location of RSV *Aurora Australis* at the time of data acquisition is indicated by a red circle.

Figure 1 shows an overview of the scene. This image is geo-referenced and the comments made to that respect with regards to Figure 1 of Sea Ice Report #12b/2014 do not apply here. The analysis of the image content remains valid.

Figure 2 provides a zoom of the overview image closing in on the position of RSV *Aurora Australis*. The ship can be seen inside the red circle as a very bright spot. At the time of the satellite overpass, the ship was sailing through a melange of old and new sea ice, which can be seen as brighter and lower grey values, respectively. No predominant zoning, for example due to sea ice ridging under pressure, can be detected. The two main sea ice types appear quite well mixed in that region.

Figure 3 shows almost the entire content of the red circle of Figure 2 at the full resolution of the data. Each square in the image represents 18 m by 18 m on the ground. RSV *Aurora Australis* is seen as a bright spot, because she is an almost ideal reflector for the RADAR instrument.

With best regards,

Jan, for the sea ice group.

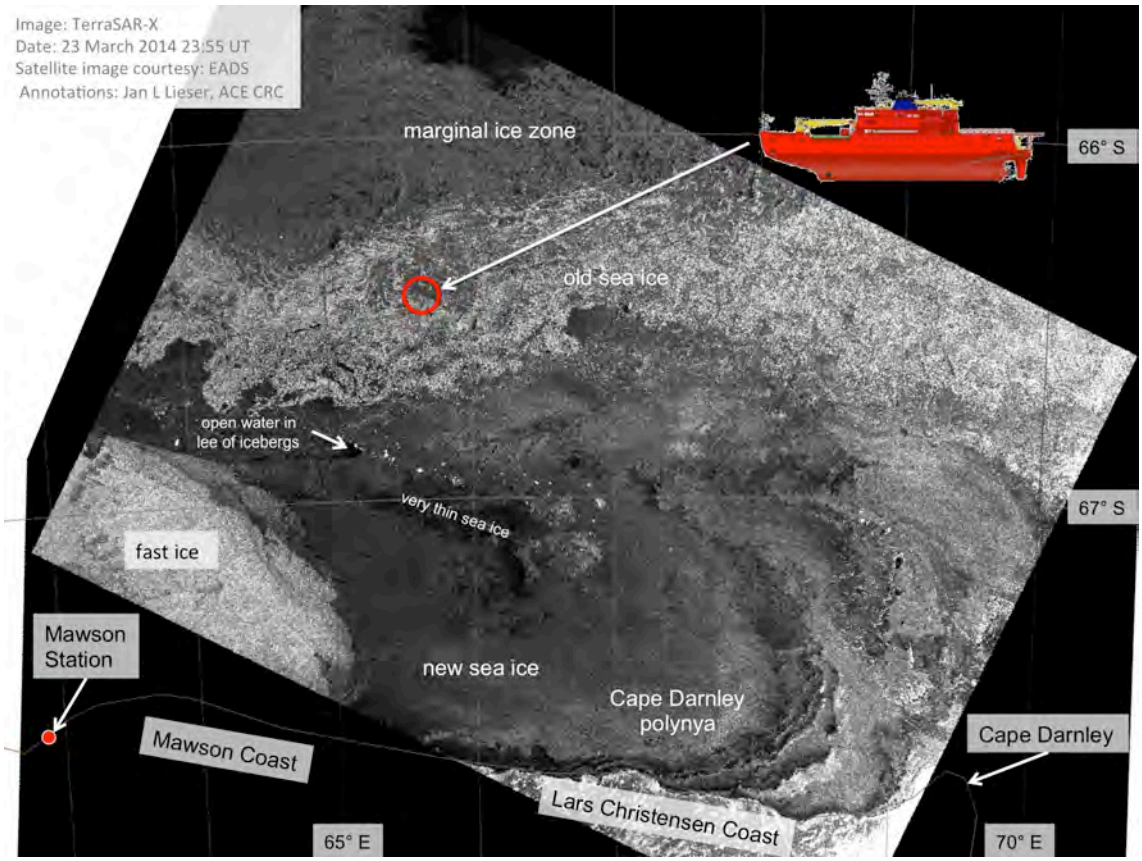


Figure 1: Overview image of TerraSAR-X data, acquired 23/03/2014 and provided by EADS.

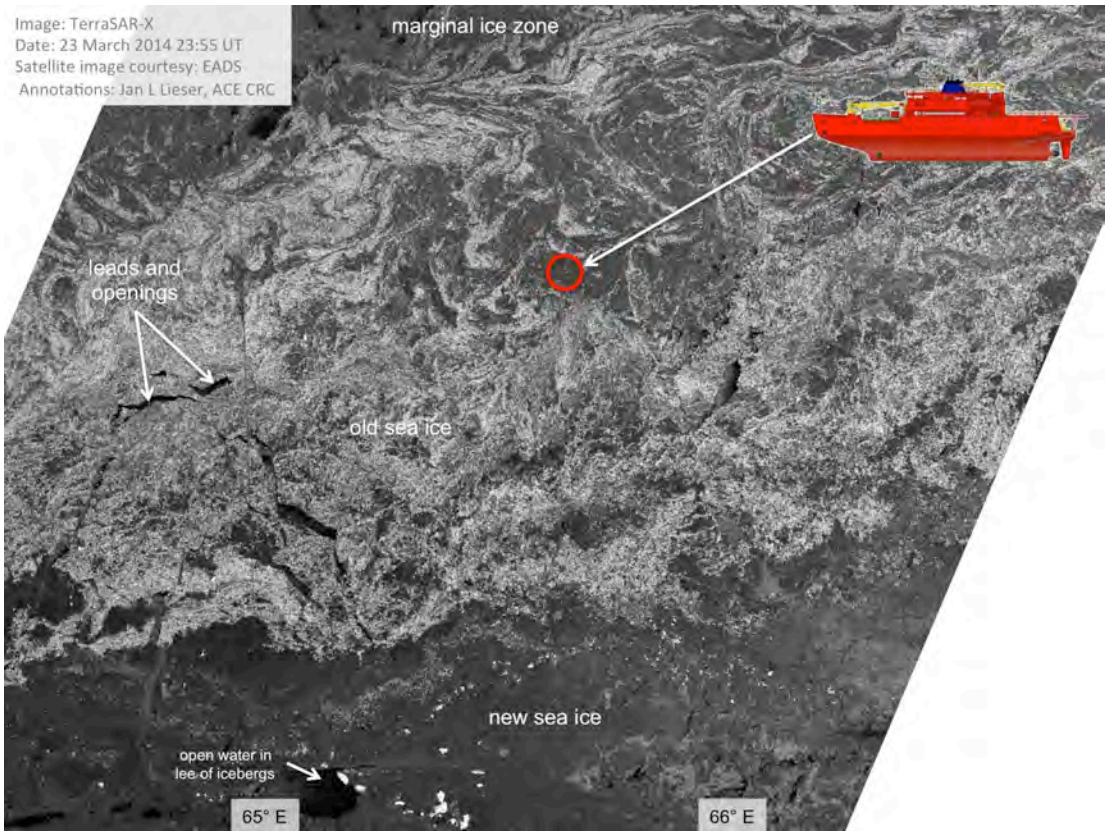


Figure 2: Zoom of Figure 1

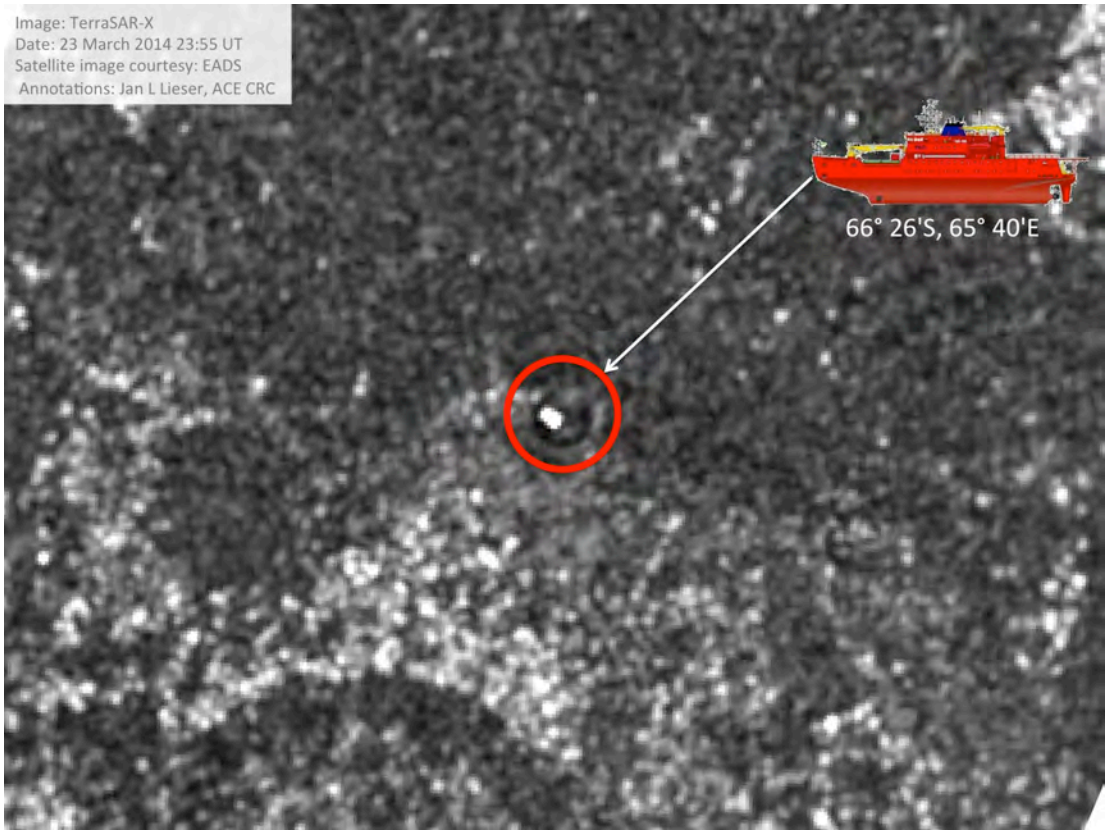


Figure 3: Full resolution detail of Figure 1 around the location of RSV *Aurora Australis* at the time of data acquisition.

Sea Ice Report #14/2014

by the AAD/ACE CRC Sea Ice Group

02/04/2014

- **Mawson Station**
  Figures 1, 2 and 3 show the same geographical frame, north of Mawson Station between 61° E and 67° E, as seen by TerraSAR-X, the AMSR-2 and MODIS instruments, respectively. Note: the MODIS image was acquired 01/04/2014, the other two data sets a day earlier. The cruise track of RSV *Aurora Australis* towards her current position in fly-off distance to Mawson Station, about 39 nautical miles northwest of the station, is shown as an orange dotted line in all three images.

  West of 63° 30' E, the solid red line denotes the edge of old fast ice with the dashed extension surrounding fast ice behind a series of icebergs. Blue scribble lines indicate major openings in the sea ice zone. The edge of the consolidated fast ice is expected to be close to these lines, but at least in two instances (between 63° 30' E and 64° E) large sheets of fast ice appear to be separating from the main fast ice body. East of 65° E, newly formed sea ice from the Cape Darnley polynya is accumulating against the old fast ice, but might only be loosely attached to it.

- **Commonwealth Bay**
  Figures 4, 5 and 6 show the same geographical frame, between 138° E and 148° E, including Commonwealth Bay and the Mertz Glacier. The location of the ABOS mooring (see Sea Ice Report #11c/2014) can be seen covered by pack ice (under clouds). During the past month, iceberg C15 has rotated clockwise around its southern tip resulting in a shift of its western edge about 2.5 nautical miles further north.

  Figures 5 and 6 are based on data from the same instrument (AMSR-2), that are processed with different algorithms resulting in a doubling in resolution for the sea ice concentration product by Universität Hamburg (Figure 5) compared to the same product by Universität Bremen (Figure 6). Both products are computed using an outdated land mask with respect to the Mertz Glacier tongue. At the location of iceberg B09B, it is also clear that both algorithms overestimate the size of the polynya to the north of the berg. The open water at 66° S and 138° E (and further west from there) is a consistent, recurring and wrong feature in the AMSR-2 data set; this issue has been raised with the data providers in Hamburg and Bremen.

With best regards,

Jan, for the sea ice group.

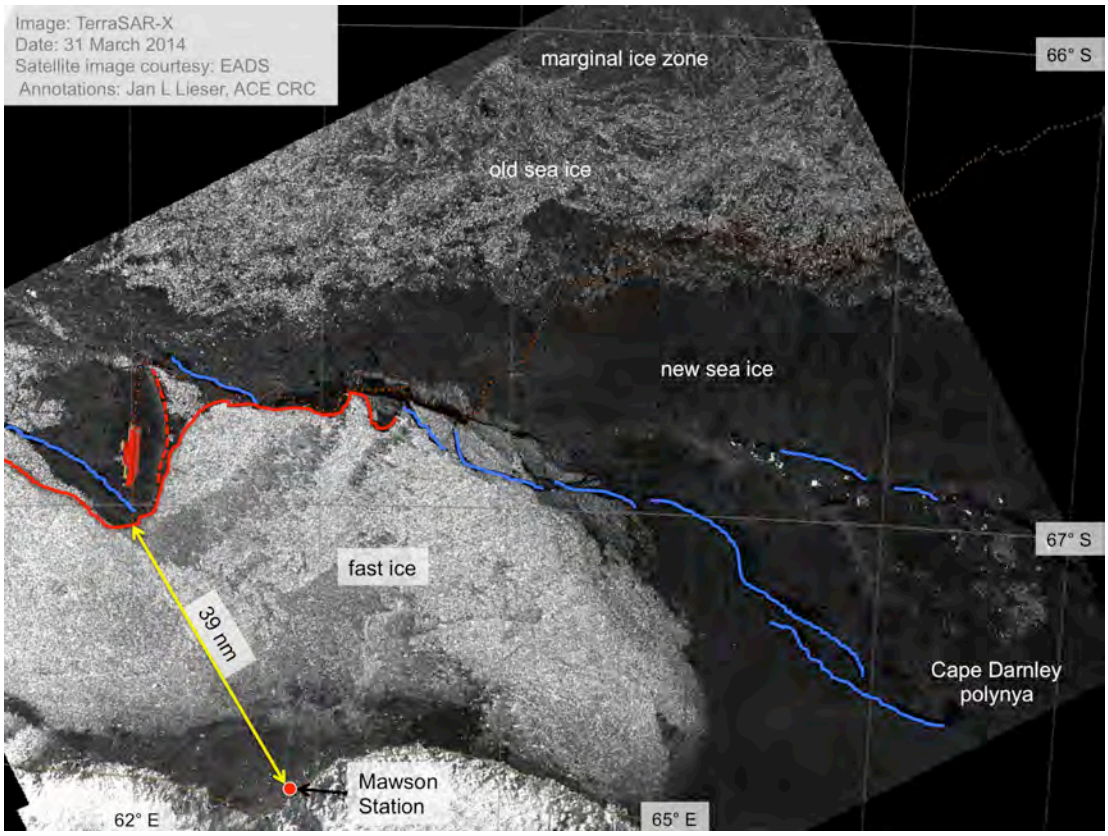


Figure 1: TerraSAR-X image, acquired 31/03/2014 and provided by EADS.

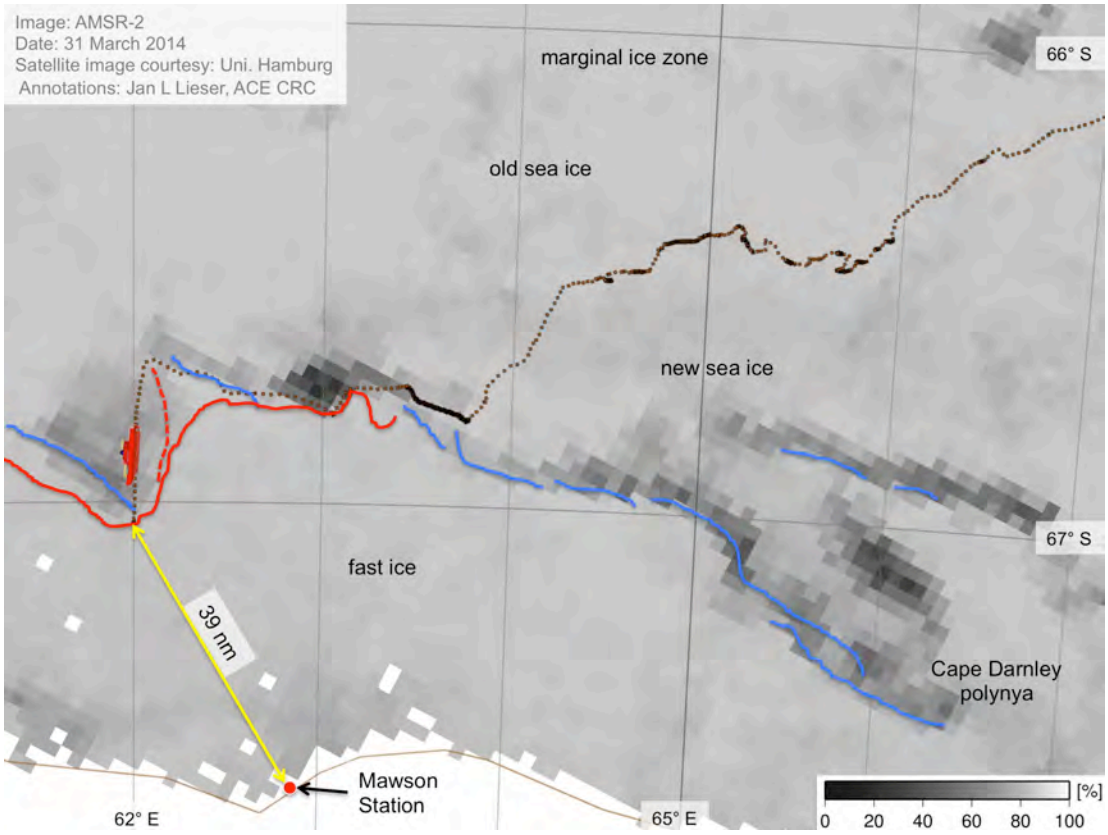


Figure 2: AMSR-2 image, acquired 31/03/2014 and provided by Universität Hamburg.

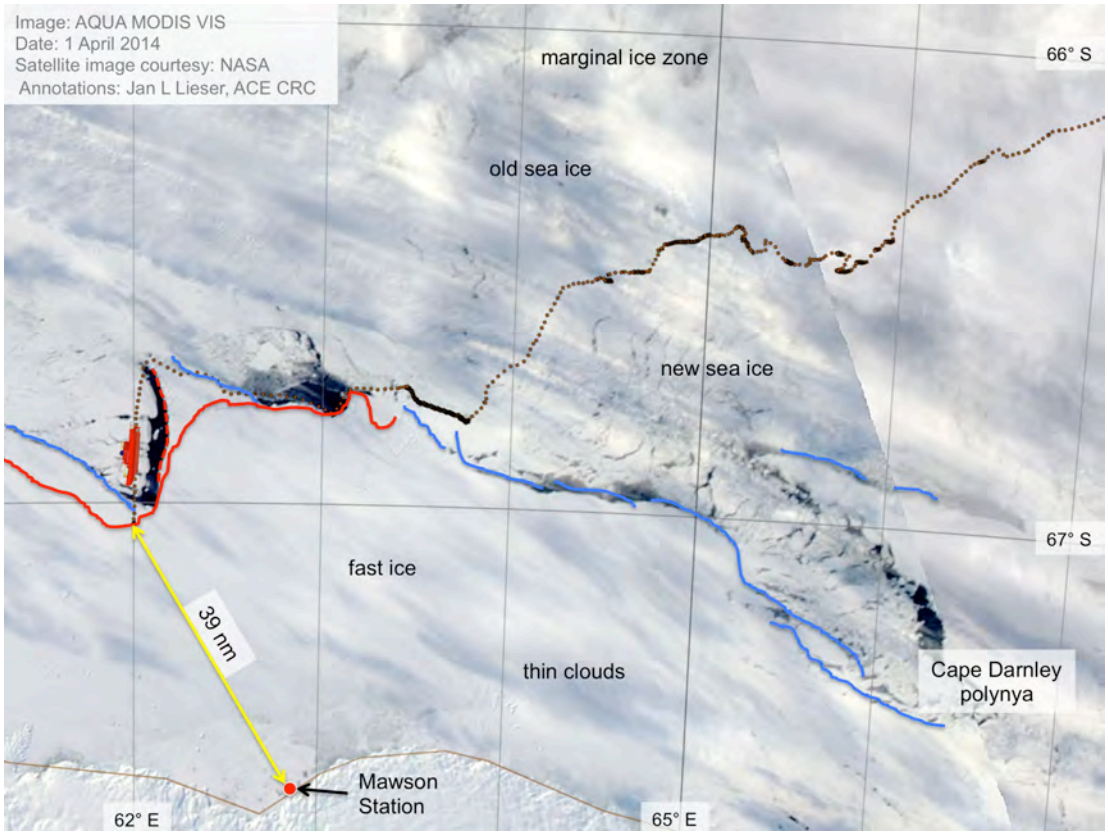


Figure 3: MODIS image, acquired 01/04/2014 and provided by NASA.

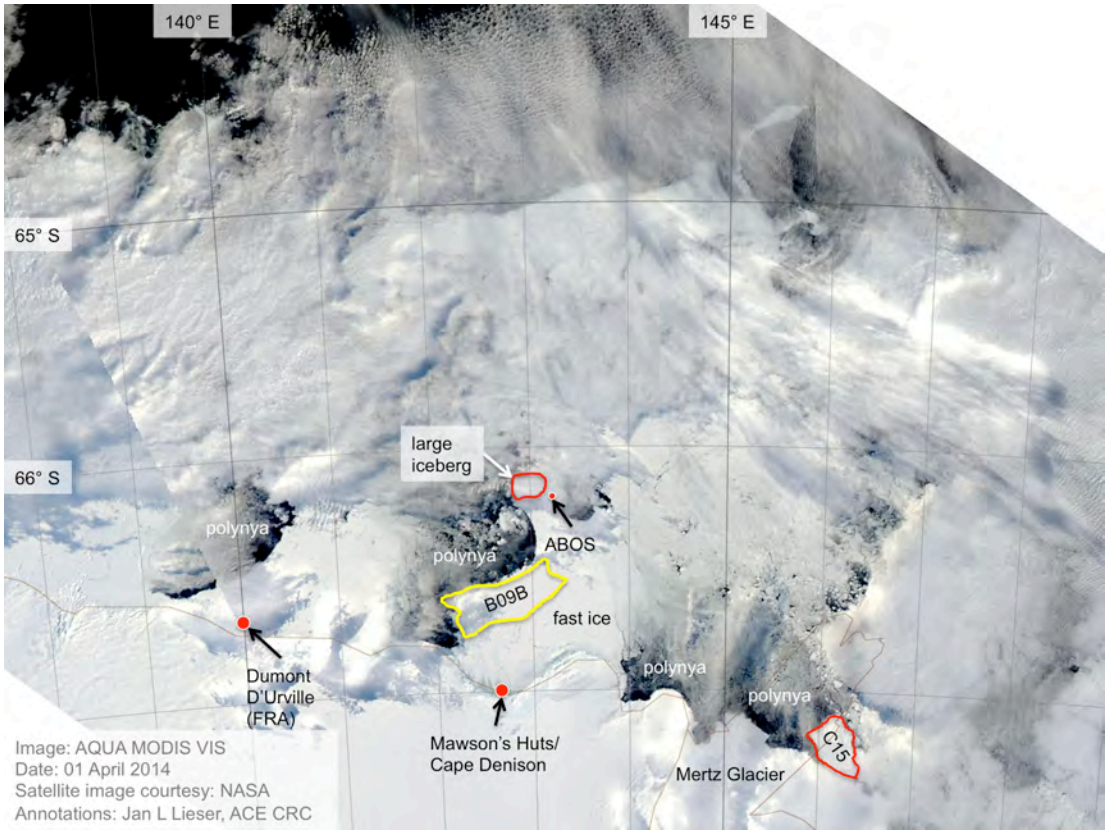


Figure 4: MODIS image, acquired 01/04/2014 and provided by NASA.

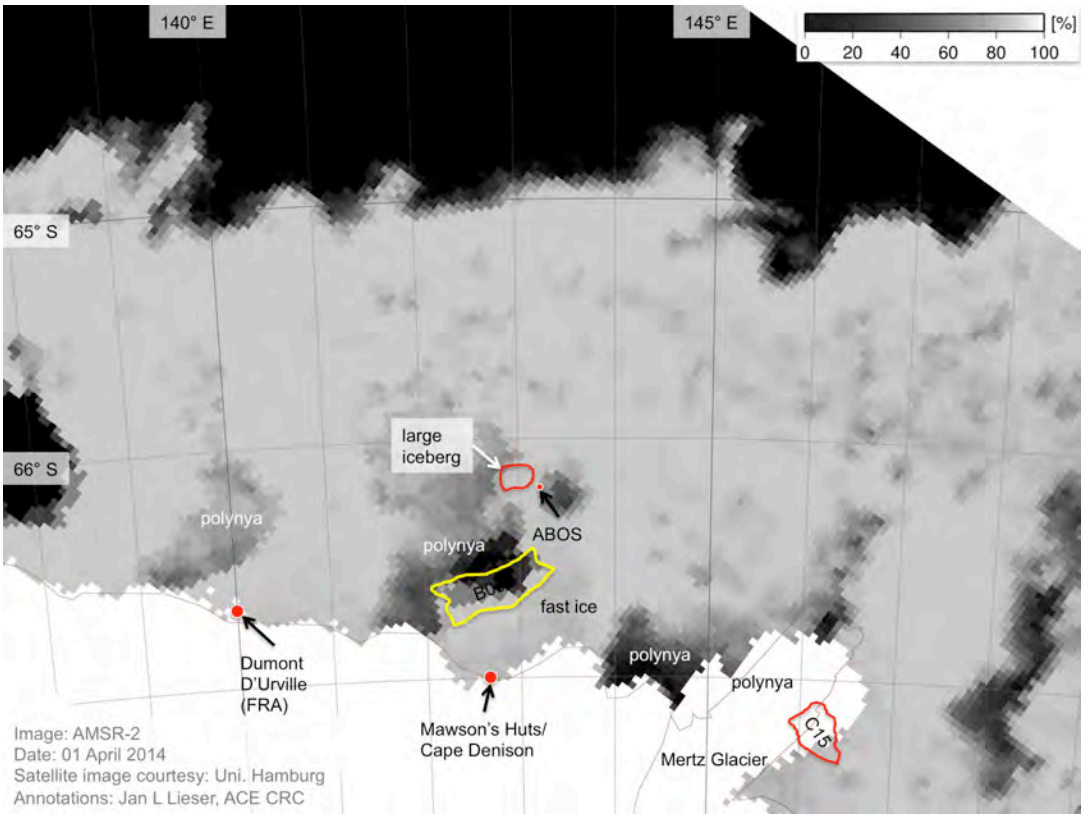


Figure 5: AMSR-2 image, acquired 01/04/2014 and provided by Universität Hamburg.

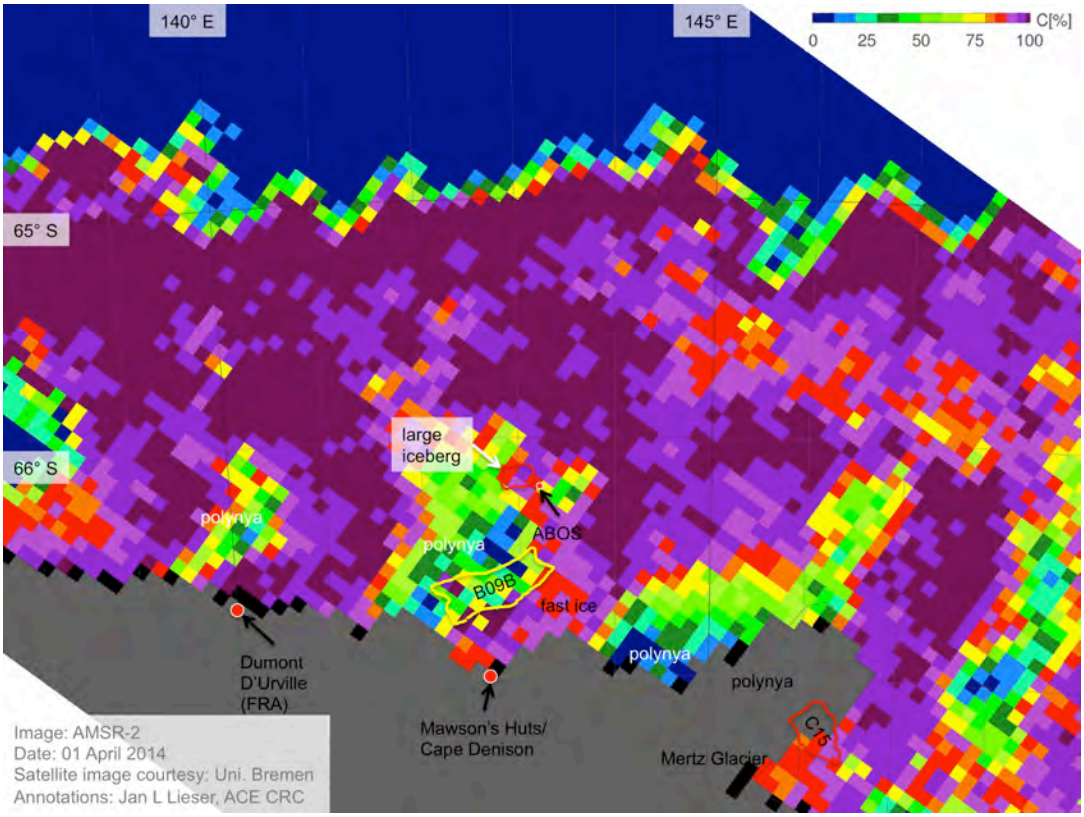


Figure 6: AMSR-2 image, acquired 01/04/2014 and provided by Universität Bremen.

Sea Ice Report #14a/2014

by the AAD/ACE CRC Sea Ice Group

03/04/2014

This reports updates on sea ice conditions off Mawson Station.

- **Mawson Station**
  A largely cloud free scene of the sea ice zone north of Mawson Station is shown in Figure 1. The red line indicates the edge of old fast ice to the north and east of the station. Blue lines indicate major cracks in recently accumulated sea ice loosely attached to the fast ice. West of 62° E, a large crack can be seen at the northern edge of the fast ice. The orange dotted line represents the cruise track of RSV *Aurora Australis*.

  North of 66° S, the marginal sea ice zone spans now more than one degree in latitude. South of 66° S, a band of old sea ice remains, approximately half a degree in latitude wide. Further south from there, new sea ice fills the polynya up to the coast, between 65° E and Cape Darnley (which is just outside the southeastern corner of the frame). West of 65° E, a large body of fast ice remains attached to the coast.

  The red shaded triangle centred at about 66° 30' E and 67° 05' S denotes an area where numerous icebergs are now surrounded by sea ice. This sea ice has formed a solid sheet that appears to be fastened between those bergs. From the southeast, this region appears to be accumulating pack ice. At the pointy end of this area (the northwestern tip of the slanted triangle), two streams of new sea ice that has formed in the Cape Darnley polynya appear to converge in the westward drift.

With best regards,

Jan, for the sea ice group.

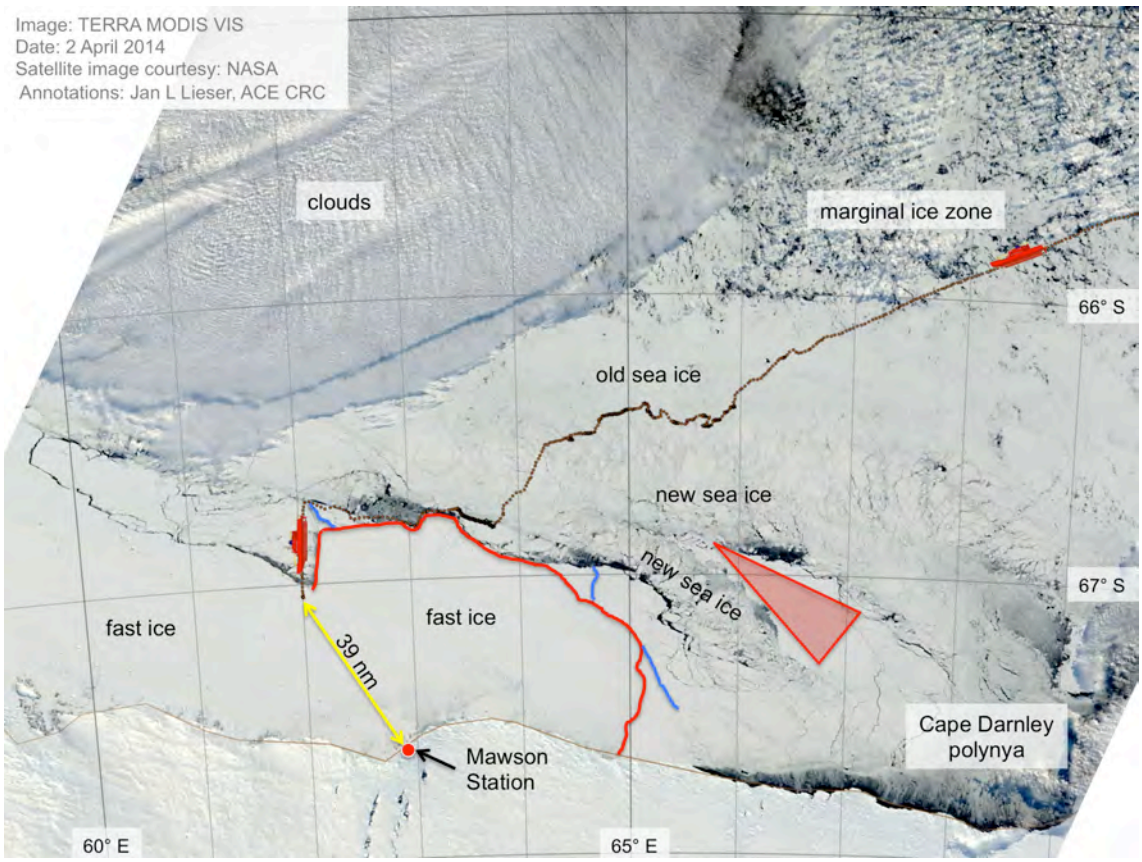


Figure 1: MODIS image, acquired 02/04/2014 and provided by NASA.

Sea Ice Report #14b/2014

by the AAD/ACE CRC Sea Ice Group

07/04/2014

This reports updates on sea ice conditions west of Mawson Station.

- **Mawson Station**
  Figures 1 and 2 show the same geographical frame west of Mawson Station as seen by the MODIS and AMSR-2 instruments, respectively. The cruise track of RSV *Aurora Australis* is indicated by the orange dotted line. The fast ice edge between the latest position of the the ship and iceberg B15T in the west is given by the red scribble line.

  The fast ice off Mawson Station continues along the coast towards King Edward Ice Shelf. The northern edge of this fast ice is well defined towards the eastern corner of iceberg B15T. The mixture of old and new sea ice drifting along this edge appears to be detached from the fast ice at the moment, which has opened a lead in northwest-southeast direction. West of 60° E, many cracks and leads are visible between the fast ice edge and 66° S, some in arched shape.

  To the north of iceberg B15T, the pack ice zone is narrow and only spanning about 30 nautical miles between the northern edge of the berg and the marginal ice zone.

  The sea ice concentration image (Figure 2) is provided for reference.

With best regards,

Jan, for the sea ice group.

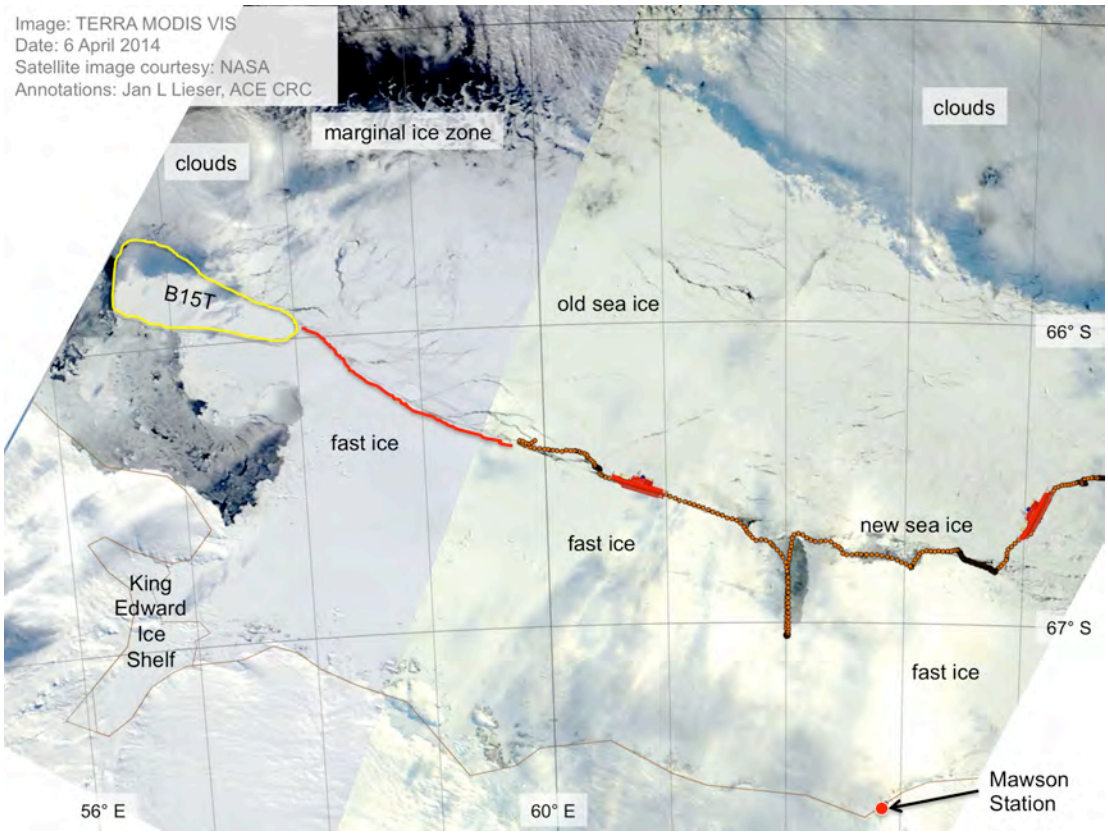


Figure 1: MODIS image, acquired 06/04/2014 and provided by NASA.

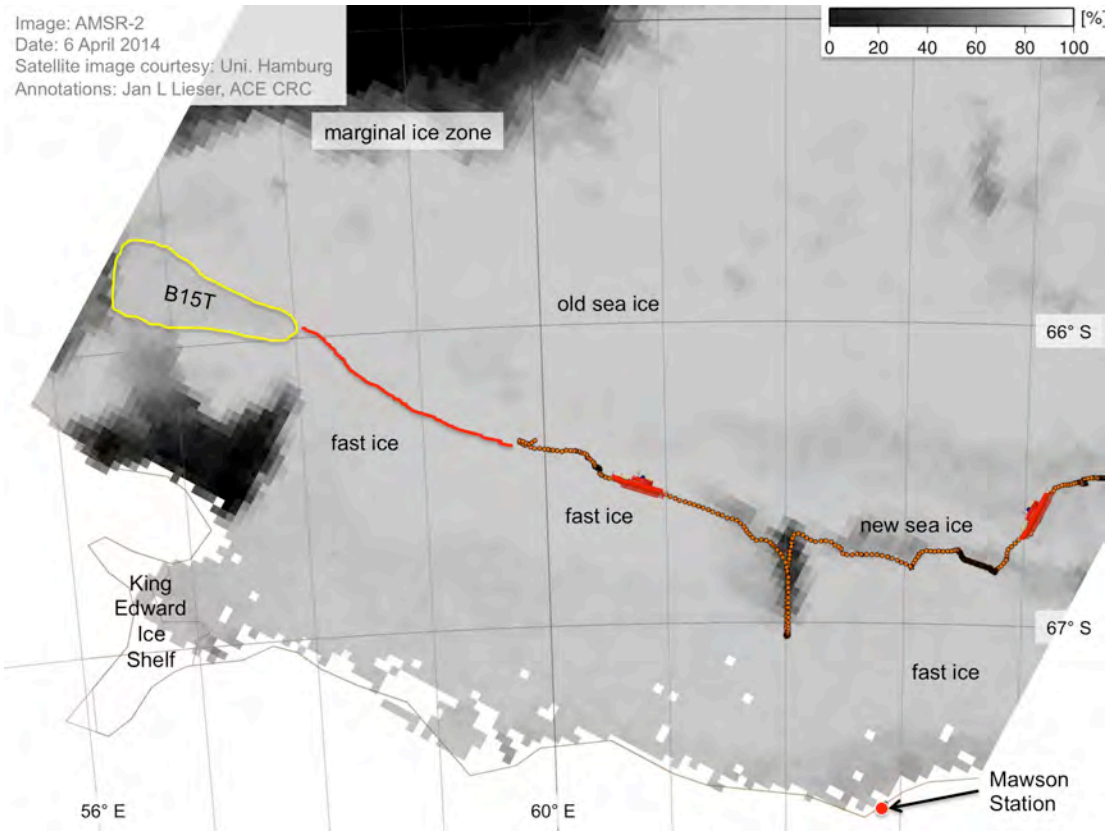


Figure 2: AMSR-2 image, acquired 06/04/2014 and provided by Universität Hamburg.

Sea Ice Report #14c/2014

by the AAD/ACE CRC Sea Ice Group

08/04/2014

This reports updates on sea ice conditions west of Mawson Station.

- **Mawson Station**
  The region west of Mawson Station is shown in Figure 1. The cruise track of RSV *Aurora Australis* is indicated by the orange dotted line.

  The northern edge of the fast ice off King Edward Ice Shelf is well defined. At about 58° E, the western end of the fast ice is the eastern corner of iceberg B15T.

  The following remarks are with respect to a quadrant between 56° E and 60° E, north of 66° S.

  The pack ice zone, including the outer edge of the marginal sea ice zone, spans only about one degree in latitude, but a few very large sea ice floes can be seen in the southern part of the mix. The largest of those floes are marked with red dots in Figure 1. Many cracks and leads surround these floes.

  Yesterday, between the earlier overpass by the TERRA satellite (not shown) and the overpass by the AQUA satellite about six hours later, the whole sea ice pack in the region had moved approximately 1.5 nautical miles in northerly direction, loosening the pack further. The transition between the pack ice and the marginal sea ice zone is at about 65° 40' S, approximately 25 nautical miles north of RSV *Aurora Australis*' current position.

With best regards,

Jan, for the sea ice group.

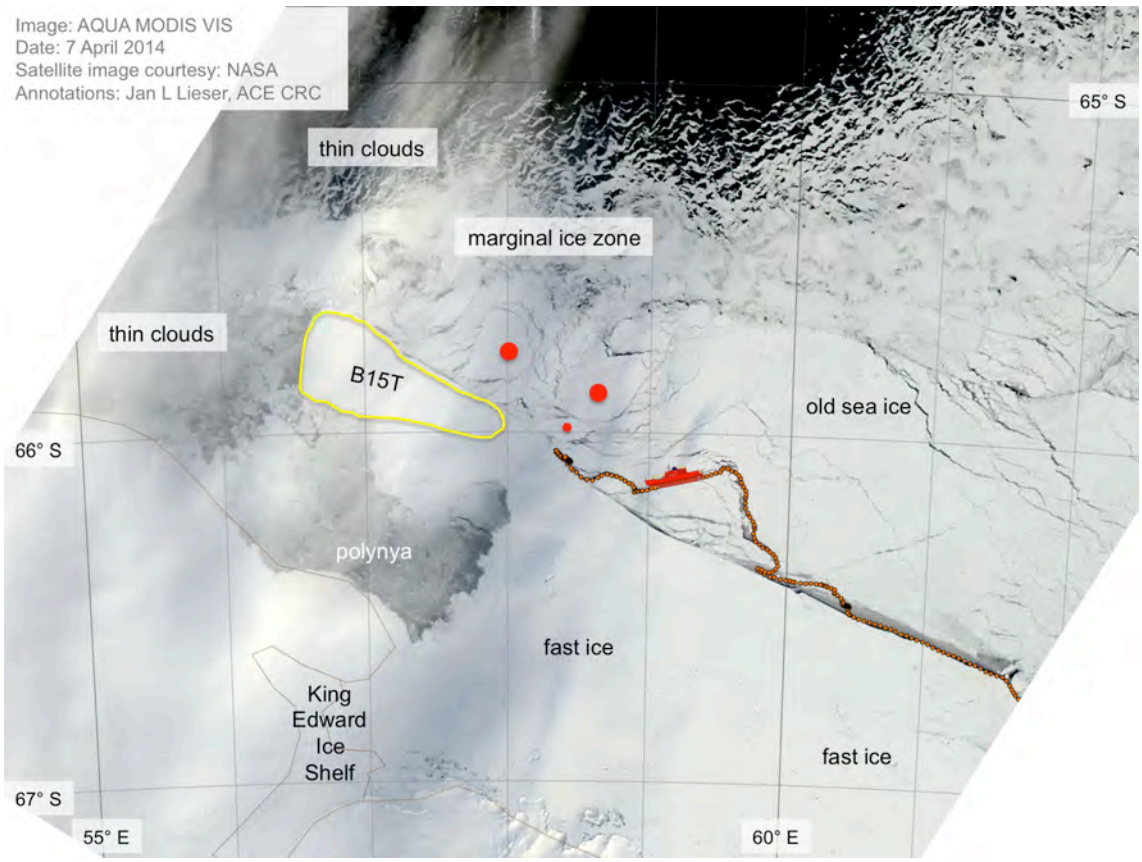


Figure 1: MODIS image, acquired 07/04/2014 and provided by NASA.

The Sea Ice Group:

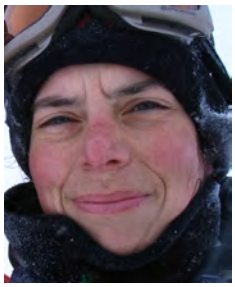
Jan L Lieser

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 fast-ice study.

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