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MACKENZIE DELTA AND BEAUFORT COAST SPRING BREAKUP NEWSLETTER

Report **2018-07**

May 25, 2018 (Friday)

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Welcome to Breakup 2018

Welcome to the 2018 Mackenzie and Beaufort breakup season! We are now into our 13th season of the breakup newsletter, which was started by Steve Solomon in 2006. Each year we think will be the last, but the feedback is positive and the annual spectacle of breakup is hard to resist. We hope this year will be good to everyone, without too much flooding. We will try to keep you posted on events as they unfold. As always, photos and on-the-ground reports are the really interesting pieces and we'll try to pass on any you can send us as we watch the gauges and the satellite imagery.

This year will be the third breakup season for the Mackenzie-Beaufort Breakup group on Facebook <https://www.facebook.com/groups/1745524288993851/>. Over time we hope this forum hosted in the ISR will take over as the main place to share observations and experience during breakup in the Delta and the coastal communities of the region. We need to start thinking about how observations can be archived to add to our collective knowledge of breakup timing and processes and there may be roles for many partners in doing this.



The original purpose of the newsletter was to document flooding over the outer Mackenzie Delta in support of various research programs. Over recent years, we have expanded the scope to consider all aspects of breakup and spring flooding in the ISR region and Gwich'in communities in and near the Delta. Funding for our current breakup monitoring activity is

from the Climate Change Geoscience Program of the Geological Survey of Canada, Natural Resources Canada.

This year, in addition to sharing the newsletter to our mailing list of 390 addresses, we are posting the newsletters on the CACCON (Circum-Arctic Coastal Communities Knowledge Network). Along with the 2017 reports, the reports so far this season can be found at: www.caccon.org/mackenzie-beaufort-break-up-newsletter/

Please let us know if you do not wish to receive these reports (contact info above) and we will take you off the list. We hope you will feel free to pass this on to others and if they contact us we can add them to the list. For those of you living in the north, we welcome any observations of timing of events, extent of flooding, evidence of breakup, or anything out of the ordinary, and we thank you for all of the feedback received so far.

For those interested in conditions further south, we recommend that you contact Angus Pippy (Water Survey of Canada) in order to receive his very useful High Water Report: contact Angus at 867-669-4774 or angus.pippy@ec.gc.ca.

Water level data presented in our newsletters are courtesy of Environment Canada (Water Survey of Canada) and are derived from their real-time hydrometric data website at http://www.wateroffice.ec.gc.ca/index_e.html, which we acknowledge with thanks. Particular thanks to colleagues in Inuvik for keeping so many of the delta gauges operating through the difficult breakup season. Weather reports and forecasts are also from Environment Canada (Meteorological Service of Canada) at <http://weather.gc.ca>. Ice road conditions are from the GNWT Department of Transportation road reports and travel alerts (@GNWT_DOT). Daily MODIS imagery is courtesy of NASA Worldview at <https://earthdatnasa.gov/labs/worldview/>.

Current Conditions

The weather in the region is mostly overcast and cool today. Inuvik has periods of snow through the day and more in the forecast tonight, with a high of +1 °C and a low of -1 °C. Aklavik is much the same, with a high of +2 °C and low of 0 °C. Fort McPherson has snow changing to rain, with high +3 °C and a low of 0 °C as well. In Tuktoyaktuk, there is drizzle and a risk of freezing drizzle, high +2 °C, low -1 °C, and wind northeast 20 km/h, becoming northeast 30 this evening. Paulatuk has rain ending this afternoon, then cloudy, with high +3 °C and low 0 °C, wind calm. Ulukhaktok has 40% chance of flurries, a high of -2 °C, low -4 °C, wind east 40 gusting to 60, and snow in the forecast for tonight, with wind east 30. Sachs Harbour has drifting snow, a mix of sun and cloud, high 0 °C, low -7 °C, and wind east 40 km/h gusting to 60.

Water levels

The post-snowmelt recession continues in the Mackenzie River at Tsiigehtchic (10LC014) with water level down 0.8 m over 24 hours and the discharge is back to <15 000 m³/s, the same flow as on May 14 (Figure 1). Daily mean water levels show that this year's flood peak was fairly typical (Figure 2). As noted yesterday, this was the earliest this decade except for 2016, and occurred more than a week earlier than in 2013.

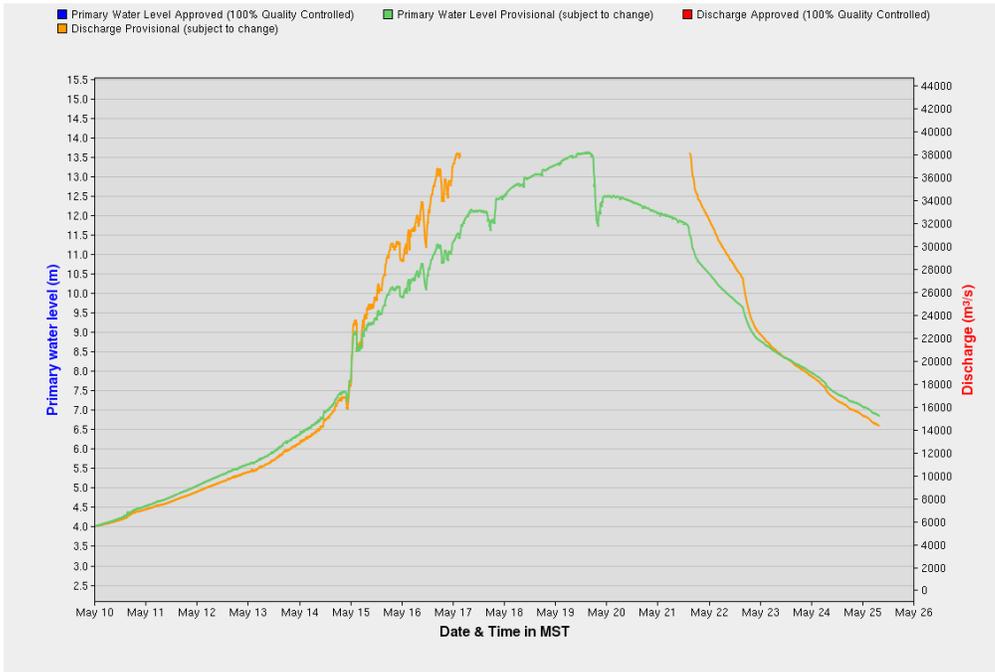


Figure 1. Provisional water level and discharge for Mackenzie River at Tsiigehtchic (10LC014) since May 10 (courtesy Water Survey of Canada).

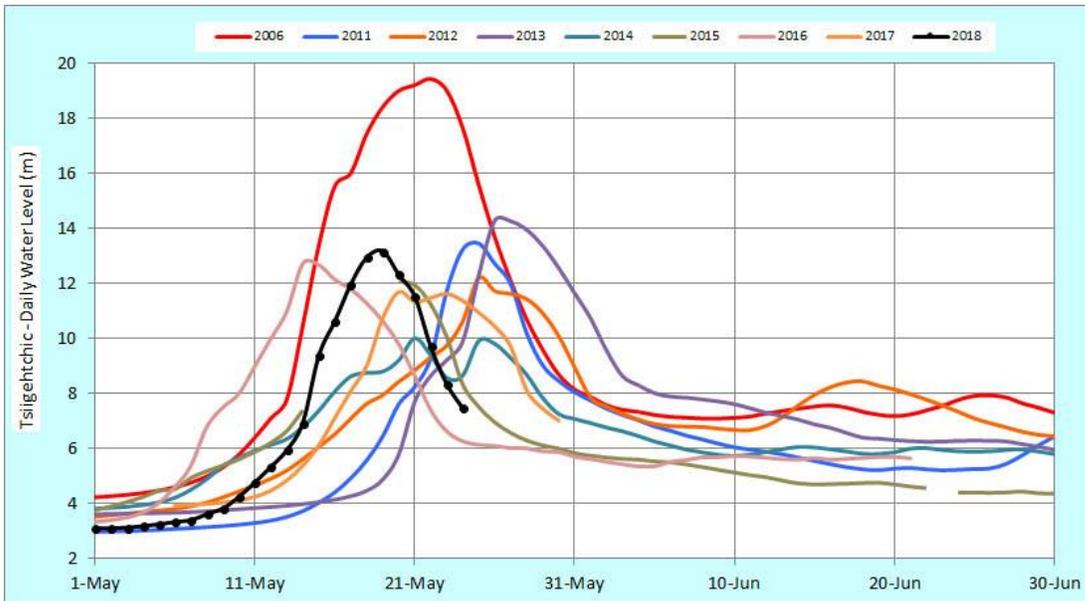


Figure 2. Daily mean water levels in Mackenzie River at Tsiigehtchic (10LC014) in the flood year of 2006 and years this decade (2018 in black).

Water levels in the central delta have been steady or rising slowly. The gauge in Peel Channel just upstream of Aklavik (10MC003) showed no change over 24 hours to 07:30 MDT this morning. However, there is a distinct drop in the level over the past few hours (Figure 3). By contrast, the water level in East Channel at Inuvik is still rising rapidly, up 20 cm over 24 hours to 07:30 MDT this morning, and the rate appears to have

accelerated during the day (Figure 4). Daily mean water levels at Inuvik have continued climbing at a fairly steady rate over the past week (Figure 5), more or less parallel to the rates in 2006 and 2014 following an earlier more rapid climb (Figures 4 and 5).

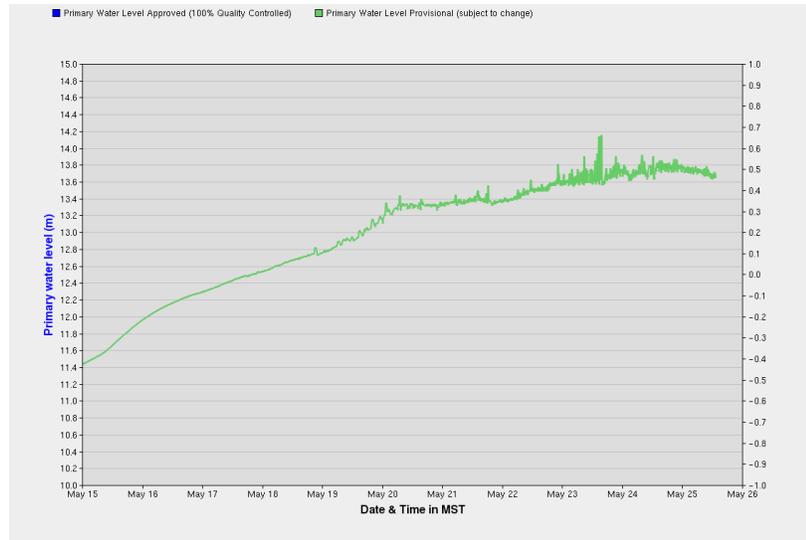


Figure 3. Provisional water level in Peel Channel at Aklavik (10MC003) since May 15 levels (courtesy Water Survey of Canada).

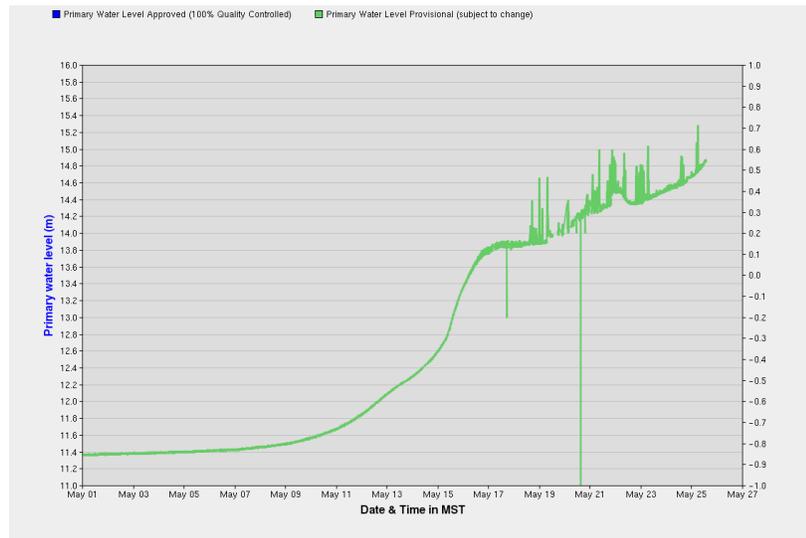


Figure 4. Provisional water level in East Channel at Inuvik (10LC002) since May 1 (courtesy Water Survey of Canada).

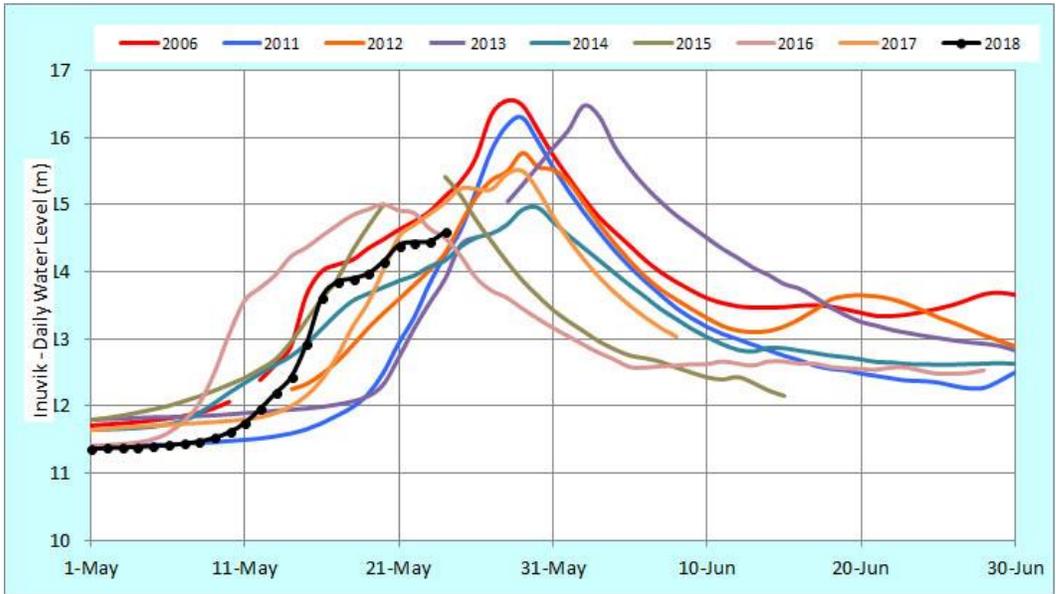


Figure 5. Daily mean water levels in East Channel at Inuvik (10LC002) in the flood year of 2006 and years this decade (2018 in black).

Reports from the Delta indicate that the ice has cleared out of some channels. Gerry St. Amand reported on Facebook from Semmler’s Channel, northwest of Inuvik:

“Our channel ice ‘sailed’ away yesterday in big sheets of ice! And is now cleared from end to end. Water level rising very slowly causing not too much action. The mouth of the channel is now jammed with a big sheet of ice from the main river (what we call ‘Kaglik’s River’). It’s coming, slow but sure! Weather supposed to get warmer in the next few days, so this may help. Everyone in the Delta, be safe out there!”

He also posted these photos (Figure 6). Thanks Gerry!



Figure 6. Two views of Semmler's Channel free of ice, as of yesterday, May 24 (courtesy of Gerry St. Amand through the Mackenzie-Beaufort Breakup group).

Napoiak Channel above Shallow Bay (10MC023) continues its steady rise in level, up 16 cm over 24 hours as of 12:00 MDT (Figure 7). In the outer delta, the level in Reindeer Channel at Ellice Island (10MC011), after a plateau May 17-19, has been rising steadily since May 20 and accelerated more recently, up 6 cm over 24 hours to 12:00 MDT (Figure 8).

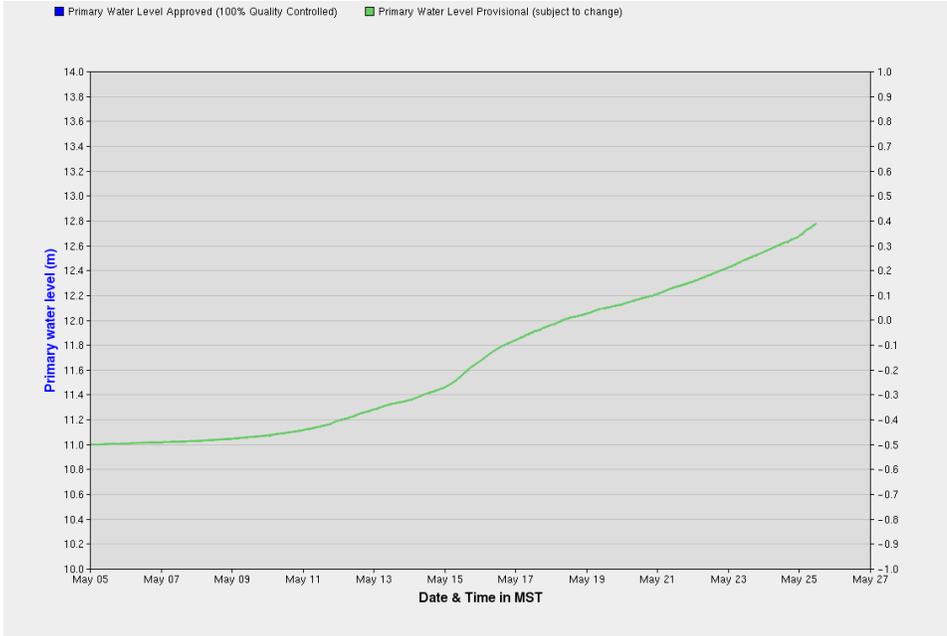


Figure 7. Provisional water level in Napoiak Channel above Shallow Bay (10MC023) since May 5 (courtesy Water Survey of Canada).

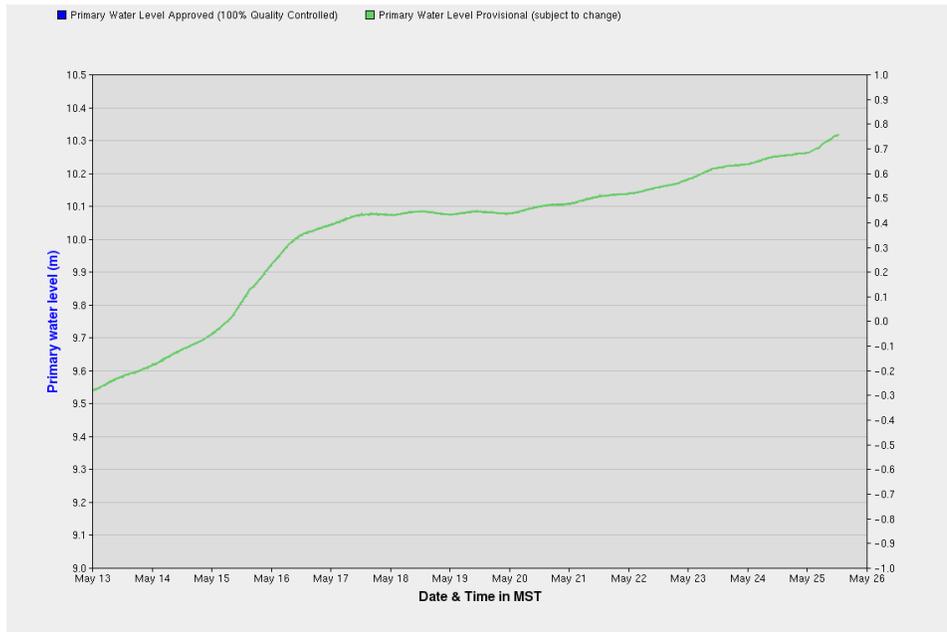


Figure 8. Provisional water level in Reindeer Channel at Ellice Island (10MC011) since May 13 (courtesy Water Survey of Canada).

The pattern is very similar at Tununuk (10LC012) (Figure 9), indicative of conditions at the trifurcation, including flow to Reindeer Channel and to East Channel to Kittigazuit Bay. Downstream in Middle Channel at Langley Island (10MC010) the levels also have a similar pattern, although there is much more noise (ice disturbance?) in this record (Figure 10). And in Kuluarpak Channel at Taglu Island (10LC021), although the total change in level is much less near the delta front, again the pattern is the same: a plateau followed by slow rise and acceleration today (Figure 11). These changes in water level are consistent with the rapid spread of ice overflow off the delta front and expansion of overbank flooding evident in the satellite imagery.

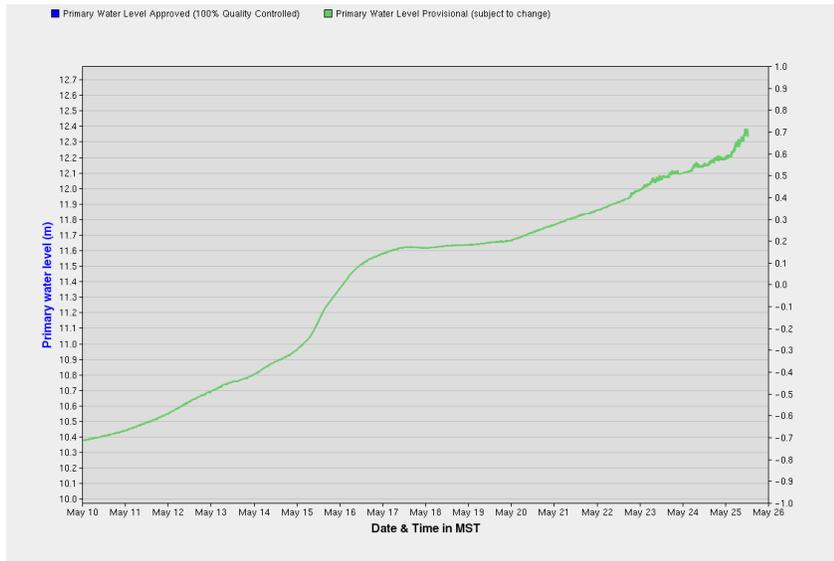


Figure 9. Provisional water level at Tununuk (10LC012) since May 10 (courtesy Water Survey of Canada).

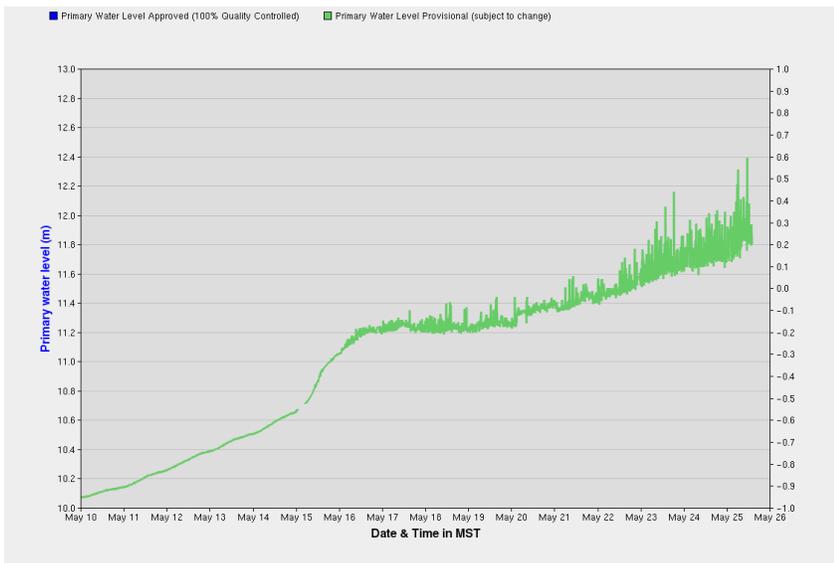


Figure 10. Provisional water level at Middle Channel at Langley Island (10MC010) since May 10 (courtesy Water Survey of Canada).

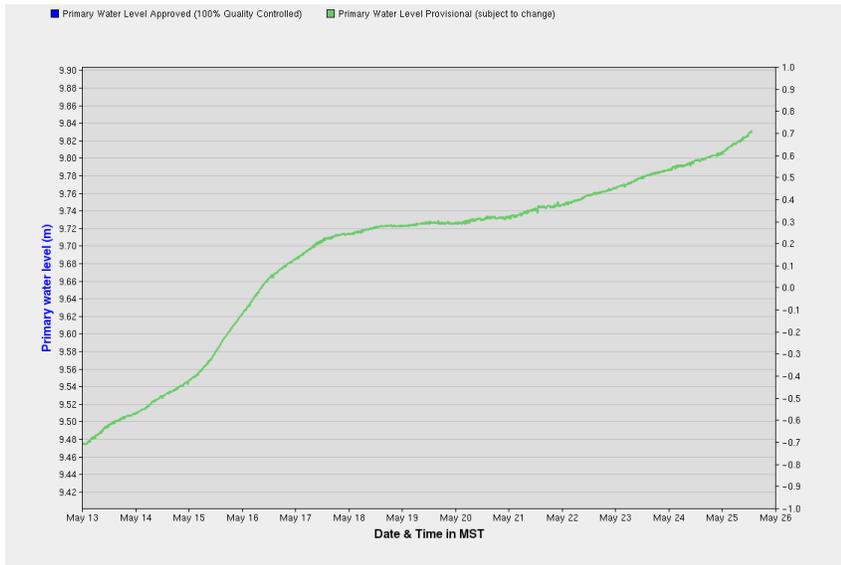


Figure 11. Provisional water level in Kuluarpak Channel at Taglu Island (10LC021) since May 13 (courtesy Water Survey of Canada).

Satellite Imagery

MODIS imagery the past couple of days has been partially obscured by cloud and there will be no optical imagery today due to weather conditions reported above. We include here Terra images for the outer delta from Wednesday May 23 (Figure 12) and Thursday (yesterday) May 24 (Figure 13). These show ongoing expansion of overflow, including progressive northward spread of overflow off Middle and Kumak channels along the west side of Garry Island. As of Wednesday, we see flow in Harry Channel spreading out over the ice in Beluga Bay, expansion of surface water off Kumak Channel to Kendall Island, but no overflow up the east side of Garry Island yet. There are very small amounts off Arvoknar Channel and a small western distributary, but further spread off the Olivier Islands and in Shallow Bay. There is evidence now of marginal flooding in East Channel extending to Kittigazuit Bay. Extensive overbank flooding of the delta plain has spread northward to southern Ellice Island and Langley Island (Figure 12). There is also now some outflow in the west, fed ultimately from Peel Channel, near Tent Island.

Visibility yesterday was much more obscured (Figure 13) but still we are able to see further development of the trends observed the day before, particularly the northward extent of over-ice flooding off Middle Channel and overflow in the west.

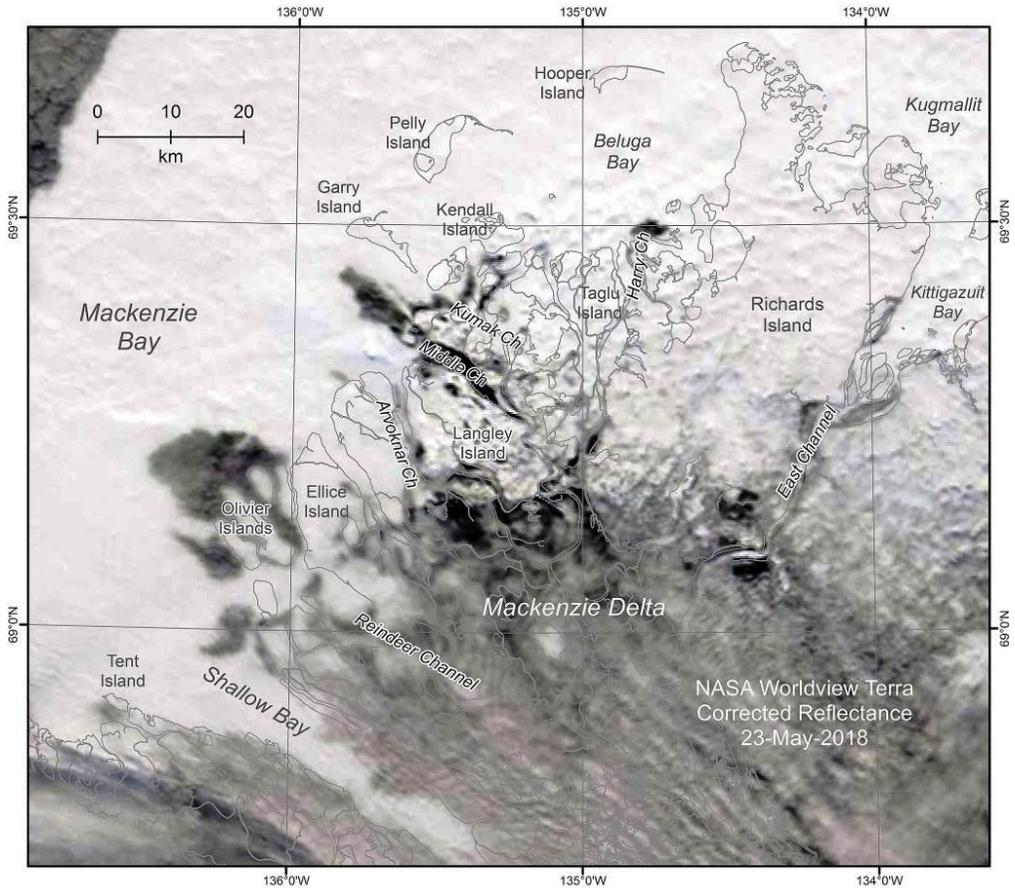


Figure 12. NASA Worldview Corrected Reflectance from the Terra satellite for 23 May 2018, showing the outer Mackenzie Delta.

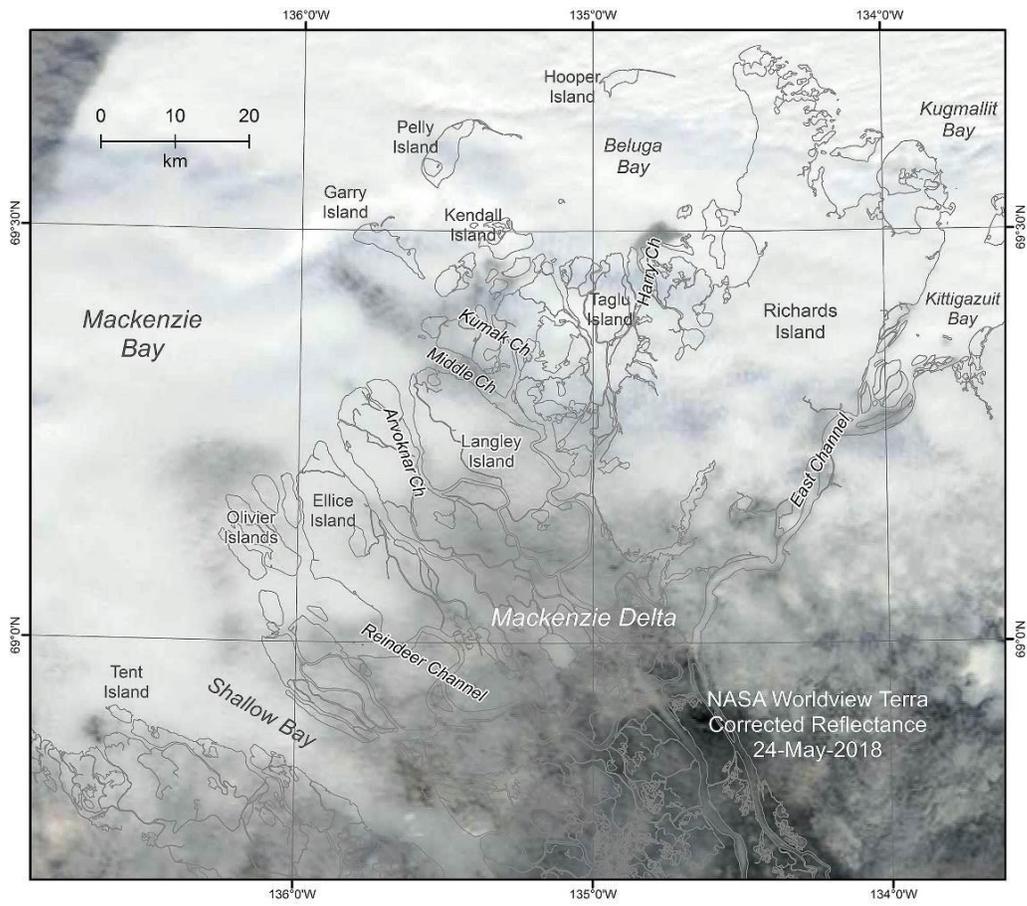


Figure 13. NASA Worldview Corrected Reflectance from the Terra satellite for 24 May 2018, showing the outer Mackenzie Delta.