

Update #2 for the Ross Sea and McMurdo Sound Seasonal Outlook 2020-2021

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INTRODUCTION

The U.S. National Ice Center (USNIC) provides planning and real time operational support for the efforts of the United States Antarctic Program (USAP) through collaboration with National Science Foundation (NSF) and the U.S. Coast Guard (USCG). Specifically, this outlook is provided as environmental awareness to safely plan icebreaker operations in the McMurdo/Ross Sea channel and escort ice-strengthened tanker and ice-strengthened cargo ships to the pier at McMurdo Station, located at 77°51'S, 166°40'E [4].

In this specific outlook, the term “ice edge” is used to delineate the boundary between areas with greater than or equal to 4/10ths sea ice and areas with less than 4/10ths sea ice.

METHODOLOGY

Climatology: The rates of recession for the Ross Sea ice edge are predominately derived using an analog forecasting technique that relates historical observations of pre-season ice extent and thickness to the predicted severity of austral summer ice conditions. This analog data from climatological conditions is adjusted to reflect the expected impact of current meteorological and oceanographic conditions in the Ross Sea.

UPDATE

Current Conditions in McMurdo Sound: As of 03 January the fast ice extends 6 nautical miles from the edge to the turning basin with a loss of approximately 1 nautical mile in the past 2 weeks (Figure 1). From the satellite perspective, the fast ice doesn't show any significant weaknesses besides what looks like probable surface melt to the west of McMurdo Station.

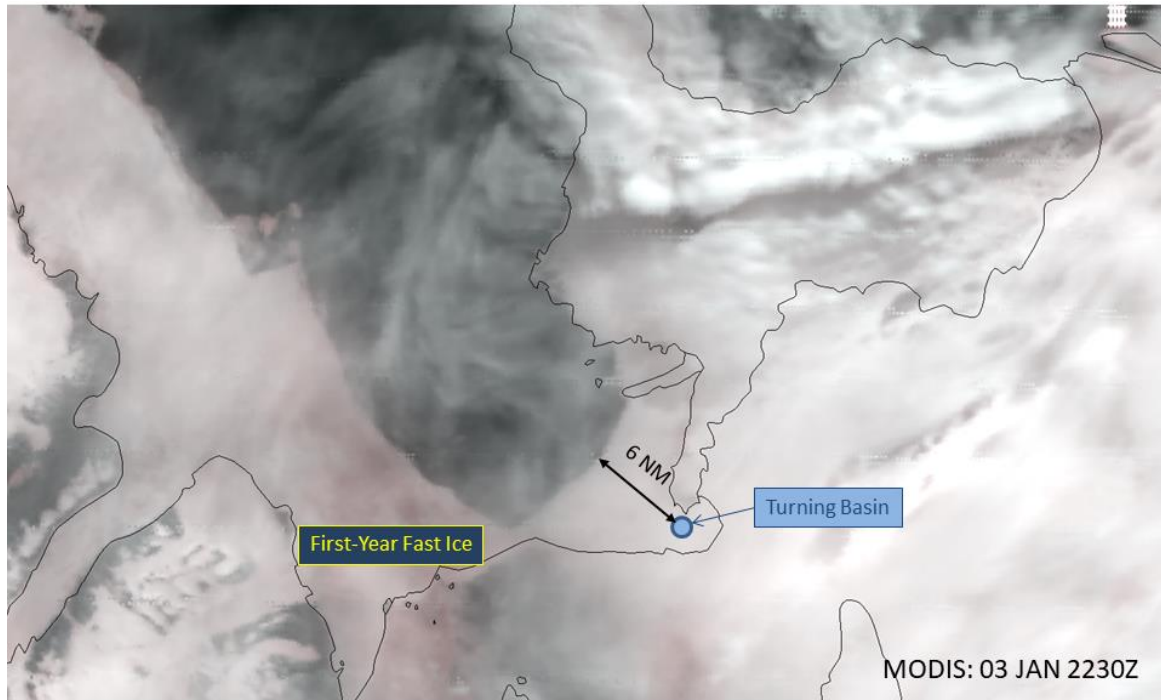


Figure 1. Fast Ice situation in McMurdo Sound as of 03 January 2021. MODIS Image 03 JAN 2230Z.

Looking at the USNIC sea ice analysis from 31 December (Figure 2) shows that the Ross Sea polynya is only marginally larger than it was 2 weeks ago and therefore the Outlook recession lines which predicted a large expansion was too ambitious with growing the polynya. The ESPC model run from mid-December forecasted that the polynya would remain very similar. Other differences are at the sea ice edge. The ice edge has melted well to the south of what the outlook predicted and the ice edge recession line is off by 100NM or more. It is clear now that the recession pattern analog of 2013-14 wasn't a great choice and enhanced melt from the north has been a major contributing factor in this season's melt out. There is still the chance that the date of opening could still be correct, although given the pace of melt so far it is looking likely it will occur at least a week before the 20 JAN date we forecasted.



U.S. NATIONAL ICE CENTER ROSS SEA OUTLOOK

PRODUCED: 04 JAN 2021

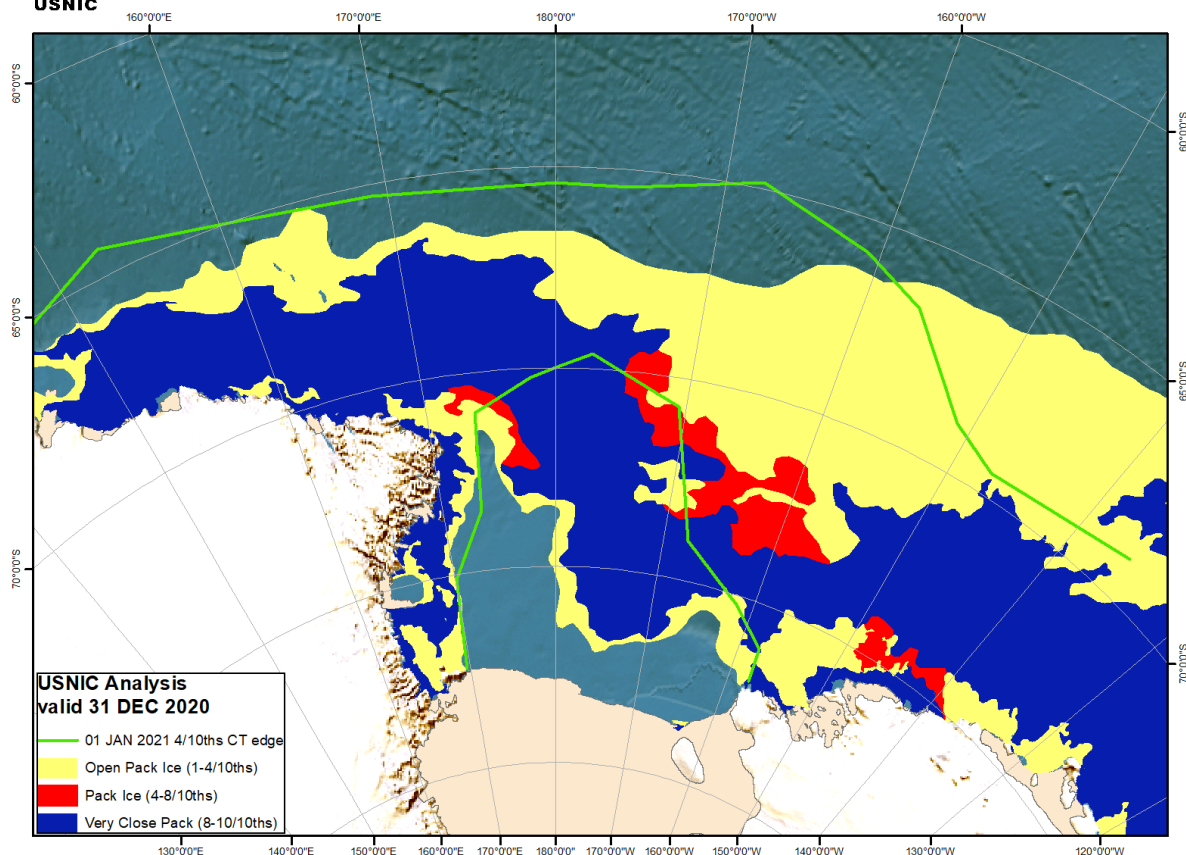


Figure 2. Ross Sea recession Outlook valid 01 Jan compared to USNIC hemispheric analysis valid 31 Dec.

Figures 3 and 4 look ahead, comparing the Navy Earth System Prediction Capability (ESPC) vs the USNIC Outlook. Figure 3 below shows the Outlook and the ESPC model forecast valid 15 JAN 2021. There are some large differences again, primarily that the model shows the Ross Sea open for transit through the pack ice and the Outlook does not. However, aside from having far too much ice remaining, the overall shape of the Outlook isn't too far off from what the model predicts, albeit with the ice much farther south of where the Outlook predicted. Given the pace of the melt back from the north and recent imagery, we feel that the model forecast for 15 JAN seems fairly likely to validate and the polynya should open around that time if not before.

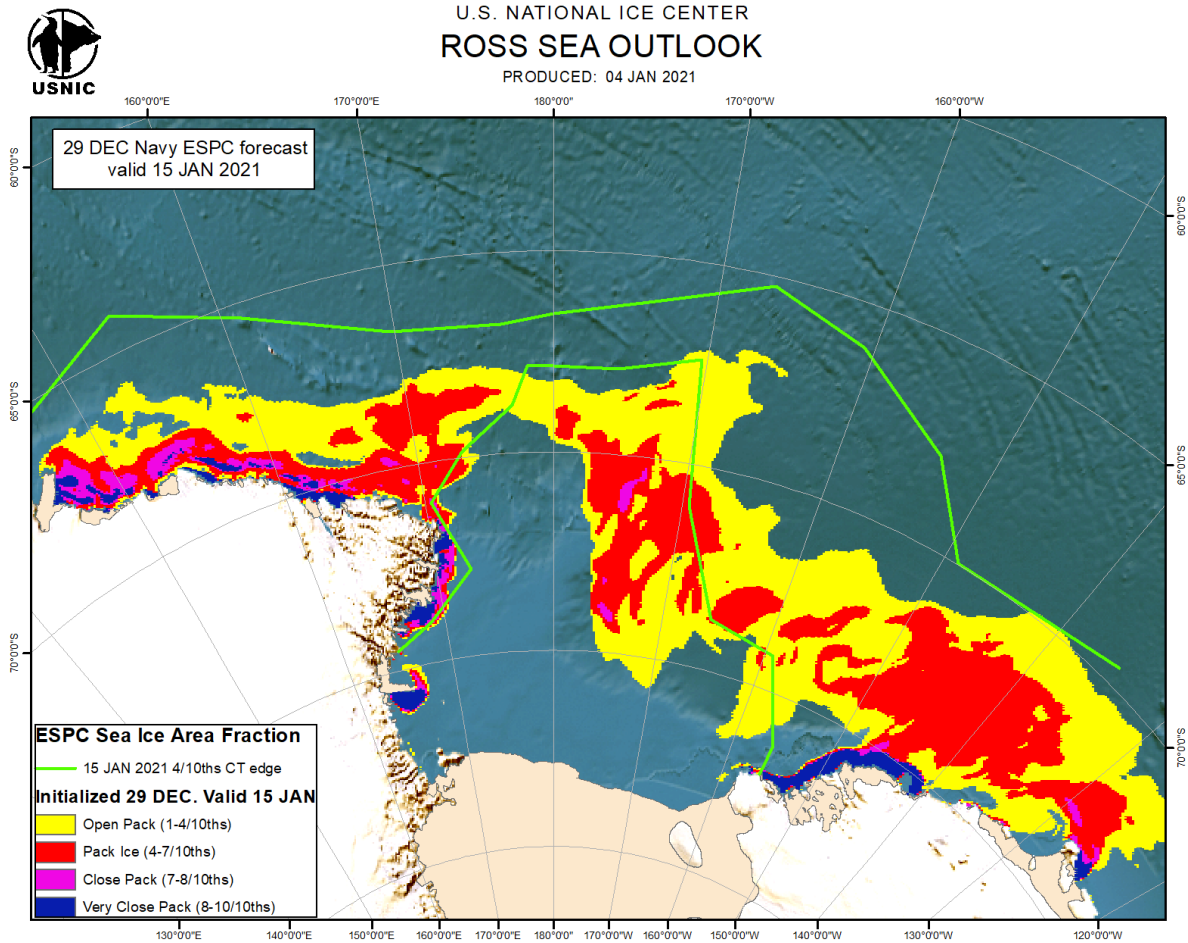


Figure 3. 15 Jan 2021 ESPC 17-day sea ice fraction forecast compared to 15 Jan 2020 USNIC Outlook (green line).

In Figure 4 (below), valid 01 FEB, the ESPC model is still forecasting a massive amount of melt and has marginally less ice than even the 15 DEC forecast showed. The Outlook likely maintains too much ice as has been shown all along. However, if the model is close to correct with an additional month of melting through February, it could make for a truly sea ice free central Ross Sea this season.

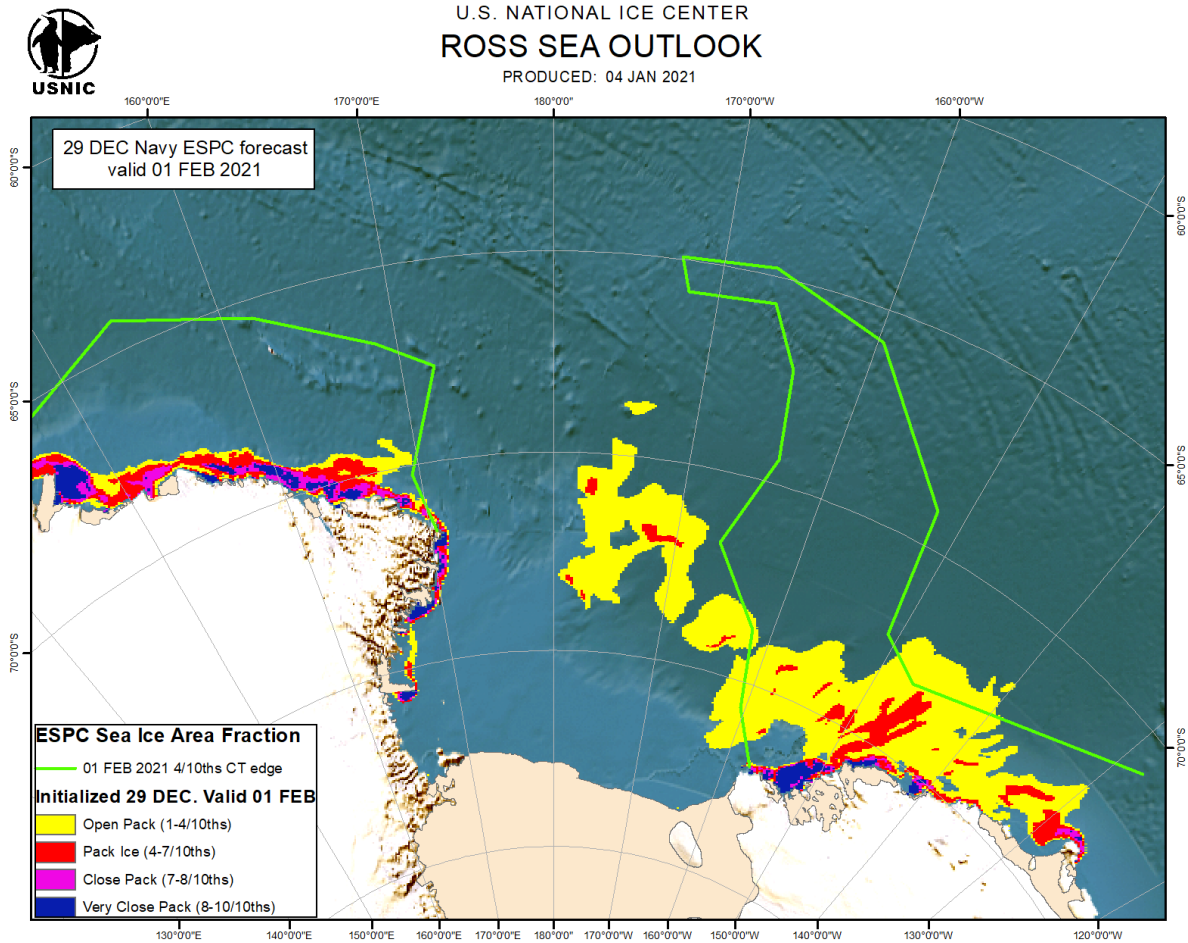


Figure 4. 01 Feb 2021 Navy ESPC 33-day sea ice fraction forecast compared to 01 Feb 2021 USNIC Outlook (green line).

REFERENCES

- [1] Brechtel, N. (2020), McMurdo Sea Ice Report November 16, 2020.
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