Seasonal Outlook for Ross Sea and McMurdo Sound 2017-2018

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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 an ice-strengthened cargo ships to the pier at McMurdo Station, located at 77°51'S, 166°40'E [1].

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.

Current Conditions: Based on the USNIC ice analysis for 26 October 2017 the position of the northern ice edge was between the climatological max and min across the majority of the Ross Sea. Average temperatures for this past Antarctic winter of 2-5^{o}C above normal [3], could translate into thinner ice than usual.

As of late October 2017, the Ross Sea is covered with thick first year ice (>47" or >120cm), with a band of old ice between 66°S and 69°S stretching from 177°W westward to the Wilkesland Sea.

The fast ice along the coast in McMurdo Sound coast is primarily thick first year ice with the potential for isolated floes of second year ice embedded within. The fast ice extends approximately 14 nautical miles from the center of the turning basin with an estimated average ice thickness of 80" (203cm).

The atmospheric circulation of the southern high latitudes is dominated by a westerly circumpolar vortex that extends from the surface to the stratosphere, called the Antarctic Oscillation (AAO) [2]. The AAO had been in a slightly negative phase from the beginning of October until the first week of November indicating a weak westerly flow and Ekman drift transport of water and ice towards the north in the Southern Ocean and Ross Sea. Since then, the AAO has been positive and is forecast to remain

positive through early December. A positive AAO may inhibit melt by promoting stronger westerly winds, isolating Antarctica from warmer mid-latitude air.
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/aao/aao.shtml

Additional input considered for this outlook includes:

(a) Surface air temperature
(b) Sea surface temperatures along the ice edge
(c) Fast ice extent in McMurdo Sound
(d) Current location of ice edge compared to previous year for same time frame
(e) Location and concentration of first-year and multi-year ice
(f) Meridional wind anomaly in the Ross Sea
(g) NRL NESM 45 day model sea ice thickness and concentration forecast

OUTLOOK

The Ross Sea in mid-October revealed similarities to ice conditions found in mid-October 2011; during this year, the unescorted date was 7 February.

This year's (2017-2018) outlook is for the open water regions to melt with the typical hourglass pattern.

It is projected that vessels in the Ross Sea will require icebreaker escort until approximately 18 Jan 2018 after accounting for higher than normal air temperatures in the Ross Sea during the Austral winter, forecast AAO conditions, and significantly less old ice compared to normal. Navigable ice conditions for unescorted vessels (≤ 4/10) are expected after 19 January 2018.

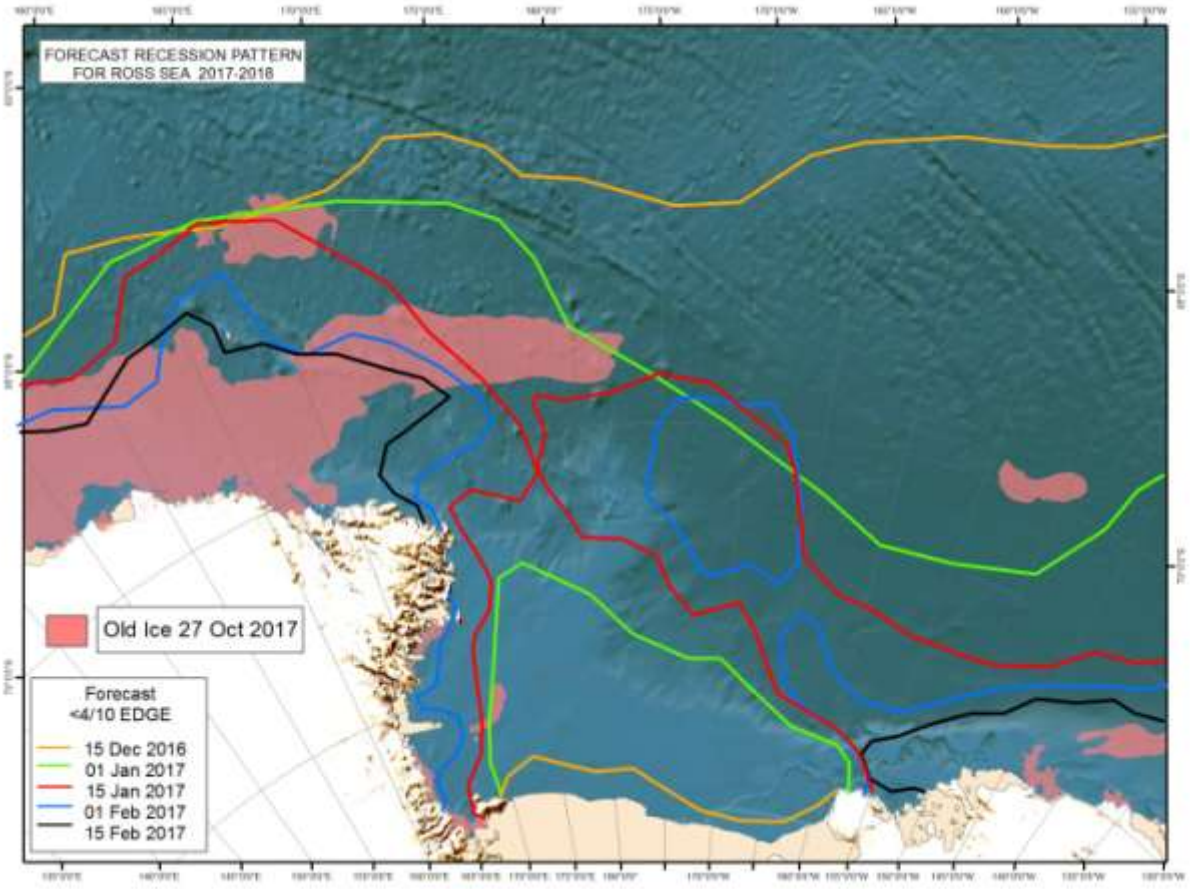

Figure 1. 2017-2018 Ross Sea Ice Edge Recession Outlook (<4/10 ice edge).

As always, there are numerous smaller icebergs scattered throughout the Ross Sea which can pose a hazard to navigation. Sea ice analyses for the Ross Sea can be obtained via the NIC website at: http://www.natice.noaa.gov

REFERENCES

[1] National Science Foundation. NSF Request for Information No. DCCA-050044; Time Charter Party Agreement for Ice-Breaking Vessel(s) to Assist Re-supply of McMurdo Station, Antarctica. http://www.nsf.gov/about/contracting/dcca_050044.doc .

[2] Thompson, D. W., and J. M. Wallace (2000), Annular modes in extratropical circulation, Part II: Trends, J. Clim., 13, 1018– 1036.

[3] Kalnay, E. and Coauthors, (1996), The NCEP/NCAR Reanalysis 40-year Project. Bull. Amer. Meteor. Soc., 77, 437-471.

[4] Metzger, E. J. et al., (2014), Operational Implementation Design for the Earth System Prediction Capability (ESPC): A First Look, Naval Research Laboratory, NRL/MR/7320—14-9498.