

Seasonal Outlook for Ross Sea and McMurdo Sound 2009-2010

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ABSTRACT – *The National Ice Center issues a yearly seasonal outlook indicating the expected recession pattern for the Ross Sea during the upcoming Austral summer. Ice edges are depicted at 15 day intervals between 15 December and 15 February, for areas of less than or greater than four-tenths of ice. The predominant purpose of this forecast is to provide the National Science Foundation (NSF) insight for planning scientific and resupply mission support in route to and at McMurdo Sound.*

INTRODUCTION

The NIC provides planning and real time operational support to support the efforts of The United States Antarctic Program (USAP) through collaboration with NSF. Specifically, this outlook is provided as environmental awareness in order to safely plan for an ice breaking vessel to break the channel and escort an ice-strengthened tanker and an ice-strengthened cargo ship 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 indicate the boundary between areas with sea ice equal to or greater than 4/10ths of ice areas with areas less than 4/10ths of sea ice.

METHODOLOGY

Climatology

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

Models

While there are no validated sea ice forecasting models developed that would indicate this sea ice edge recession calculation, the results of the in-house *Helfrich Statistical Ross Sea Opening Model* [2], are considered in determining the final results of this outlook. This is a linear regression model, assisting in indicating the recession of the Ross Sea ice edge and a navigable

date for the area. Model variables include September Antarctic Oscillation values, vernal winds velocities off the Ross Ice Shelf, cumulative air temperatures, strength of the vernal Ross Sea Low, and the mean amplitude of ice extent latitude in October. Since this tool is still under evaluation and has not undergone peer review, it is treated as only one tool within the overall assessment.

Current Conditions

Based on the NIC ice analysis of 05-09 October 2009, the position of the northern ice edge was between a climatological mean and maximum across the majority of the Ross Sea.

As of mid October 2009, the majority of the Ross Sea fast ice was first and second year ice, with isolated amounts of multi-year ice along the western coast from Drygalski Ice Tongue south to Cape Royds. These areas are expected to remain late into the Antarctic summer melt.

However, the fast ice in McMurdo Sound remains mostly old ice. The fast ice edge was approximately 30 miles from the center of the turning basin with a reported average ice thickness of 84" (213cm), slightly thicker than last year. The ice thickness was measured by USAP's Jeffery Scanniello on 12 October 2009.

Observations

Additional input considered for this outlook includes:

- (a) Surface air temperature
- (b) Sea surface temperatures along the ice edge
- (c) On-site measurements of ice thickness
- (d) Fast ice extent in McMurdo Sound
- (e) Current location of ice edge compared to previous year for same time frame
- (f) Location and concentration of first-year and multi-year ice

OUTLOOK

Ross Sea ice conditions in early October 2009, reveal similarities to ice conditions found in early October of 1994, 1996, and 2005. During these analogue years, the unescorted date ($\leq 4/10$ ice coverage) was 12 January.

This year's (2009-2010) outlook is for the open water regions to melt with the typical hourglass pattern. After accounting for the various outlook methods and inputs above, it is projected that the Ross Sea ice band will be 70 nm to 90 nm in width and vessels will require icebreaker escort until approximately 18 January 2010. Navigable ice conditions for unescorted vessels ($\leq 4/10$) are expected after 19 January 2010 (Fig. 1).

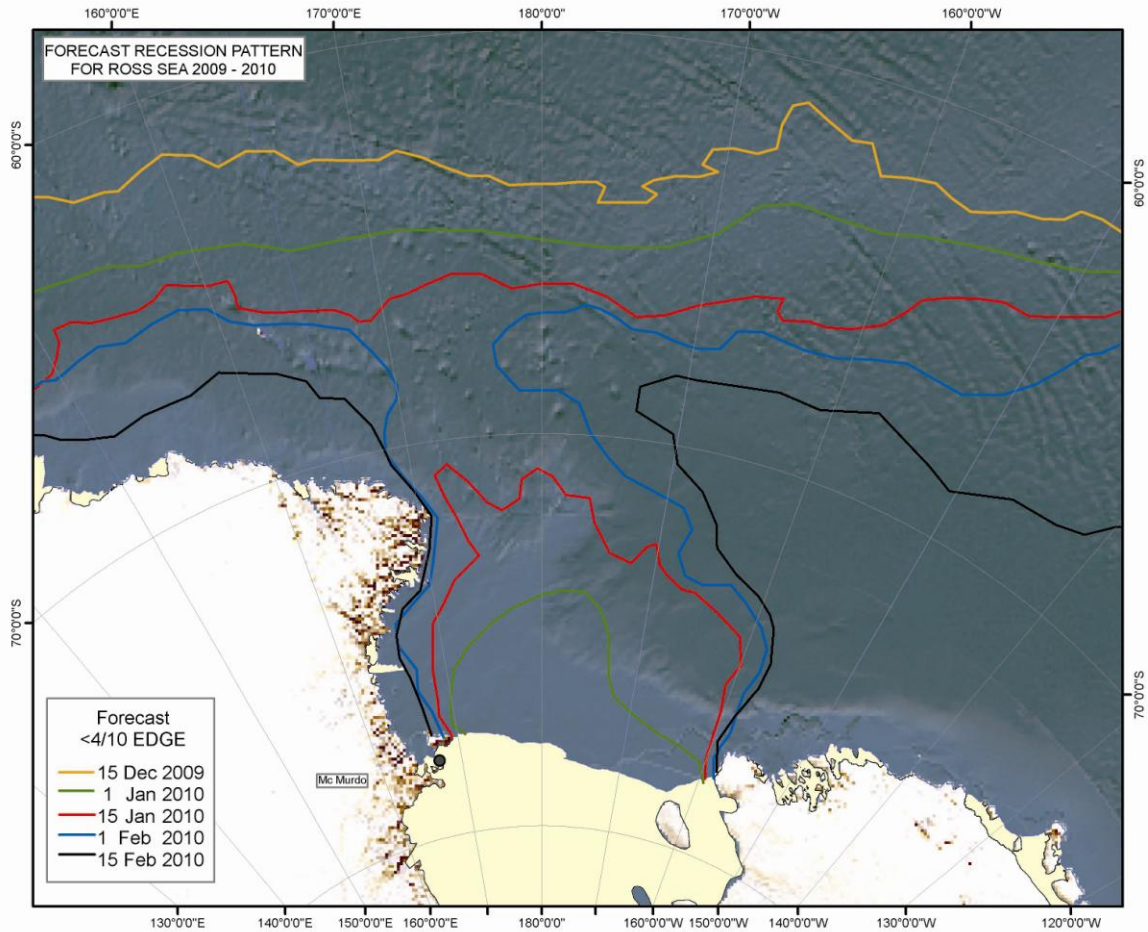


Figure 1. 2009-2010 Ross Sea Ice Edge Recession Outlook ($\leq 4/10$ edge).

As always, there are still 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; Tiem Charter Agreement for Ice-Breaking Vessel(s) to Assist re-supply of McMurdo Station, Antarctica.* http://www.nsf.gov/about/contracting/dcca_050044.doc (accessed Nov 19, 2009).

[2] Helfrich, Sean. *Helfrich Statistical Ross Sea Opening Model Results.* http://www.natice.noaa.gov/pub/outlooks/Ross_Sea/Ross_Sea/Ross%20Sea%20Outlook%202008-2009.pdf (accessed Nov 19, 2009).