7A.4 AN ASSESSMENT OF ARCTIC SEA ICE FORECASTS ON SEASONAL TIME SCALES

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1. Introduction

The extent of arctic sea ice during summer has declined to record minima during the past decade. Four of the lowest minima in the last 100 years were observed during this period, with the new record minimum was set in September 2007 (NSIDC, 2007). Can we predict these minima?

The ability to predict Arctic sea ice conditions has many important social and economic consequences (ACIA, 2004). Many species and cultures depend on the sea ice for habitat and subsistence. The lack of sea ice in an area along the coast may allow ocean waves to fetch up higher, producing stronger storm surges which may threaten low elevation coastal towns (Lynch, 2003). The extent of Arctic sea ice affects navigation from the Atlantic to the Pacific through the Arctic along the Northern Sea Route and Northwest Passage, which are as much as 60% shorter than the conventional routes from Europe to the west coast of the U.S. or Japan, and the decline of sea ice may increase access to natural resources (ACIA, 2004).

2. Methods

Operational prediction of sea ice conditions for the United States (and the world) is provided by the National/Naval Ice Center (NIC, www.natice.noaa.gov), which is an interagency collaboration between the Navy, National Oceanographic and Atmospheric Administration (NOAA), and the Coast Guard. The NIC currently provides 2-week global ice analyses and 30-day forecasts of sea ice conditions. However, some of the NIC's procedures are based on studies dating back to the 1970's, and recent advances in our understanding of Arctic climate provide some insight into how we may be able to improve our ability to predict Arctic sea ice conditions on weekly to seasonal time scales.

The decline of sea ice may be attributed to global warming (e.g. ACIA, 2004), but this decline may also be attributed to a change in the wind driven circulation of Arctic sea ice. In a series of papers, we showed that the prior winter Arctic Oscillation (AO) conditions explained most of the trends in summer sea ice extent in the Eurasian sector of the Arctic Ocean (Rigor et al. 2002), while in the Alaskan sector the recent extreme minima may be due to the drift of younger, thinner ice towards the Alaskan coast during

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the recent predominance of high to moderate AO conditions (Rigor and Wallace, 2004). Since it takes a number of years for sea ice to age, and thicken, these results imply that we may be able to predict the extent of summer sea ice months in advance.

This projects aims to transition research on arctic sea ice variability using observations from the International Arctic Buoy Programme (IABP, http://iabp.apl.washington.edu) into an operational sea ice forecast by the NIC as part of the NOAA's Transition of Research Applications to Climate Services program (http://www.climate.noaa.gov/cpo_pa/nctp/).

3. Summary

During the past two years we have observed an increased transport of the older (Nghiem et al. 2007), thicker perennial sea ice across the Arctic Ocean to be exported through Fram Strait into the Greenland Sea. This transport has left much of the Arctic Ocean covered by thinner, first-year sea ice which has less mass to survive the summer melt, especially in the Eurasian sector of the Arctic Ocean. Given these observations we predicted that the summer of 2007 would set a new record minimum in summer sea ice extent in the Arctic, and plan to discuss the skill of this forecast.

Forecasts of ice conditions are available at http://www.natice.noaa.gov and http://seaice.apl.washington.edu/Outlook/.

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