IABP Buoy Positions

International Arctic Buoy Programme
Buoy Array: 7 Jun 2004
60-Day Drift Track

Missing ✕

500 km

IABP   Deployment Plans for 2004

AIR • SEA • ICE
Polar Science Center

Expected Drift: February - September

RUSSIA

EUROPE

70°N
90°E

IARC/AARI NABOS Cruise
(2 NOAA-PSC IMB)

70°N
180°

80°N
90°E

WHITE
TRIDENT
(7 ICEXAIR)

80°N
180°

NPEO
(2 NOAA-PSC IMB)

ALASKA

NPEO

70°N
150° W

WHOI
(Ocean)

CRREL
(2 NOAA-CRREL IMB)

EC
(2 NIC CES)

80°N
0°

70°N
120 ° W

CANADA

80°N
90°W

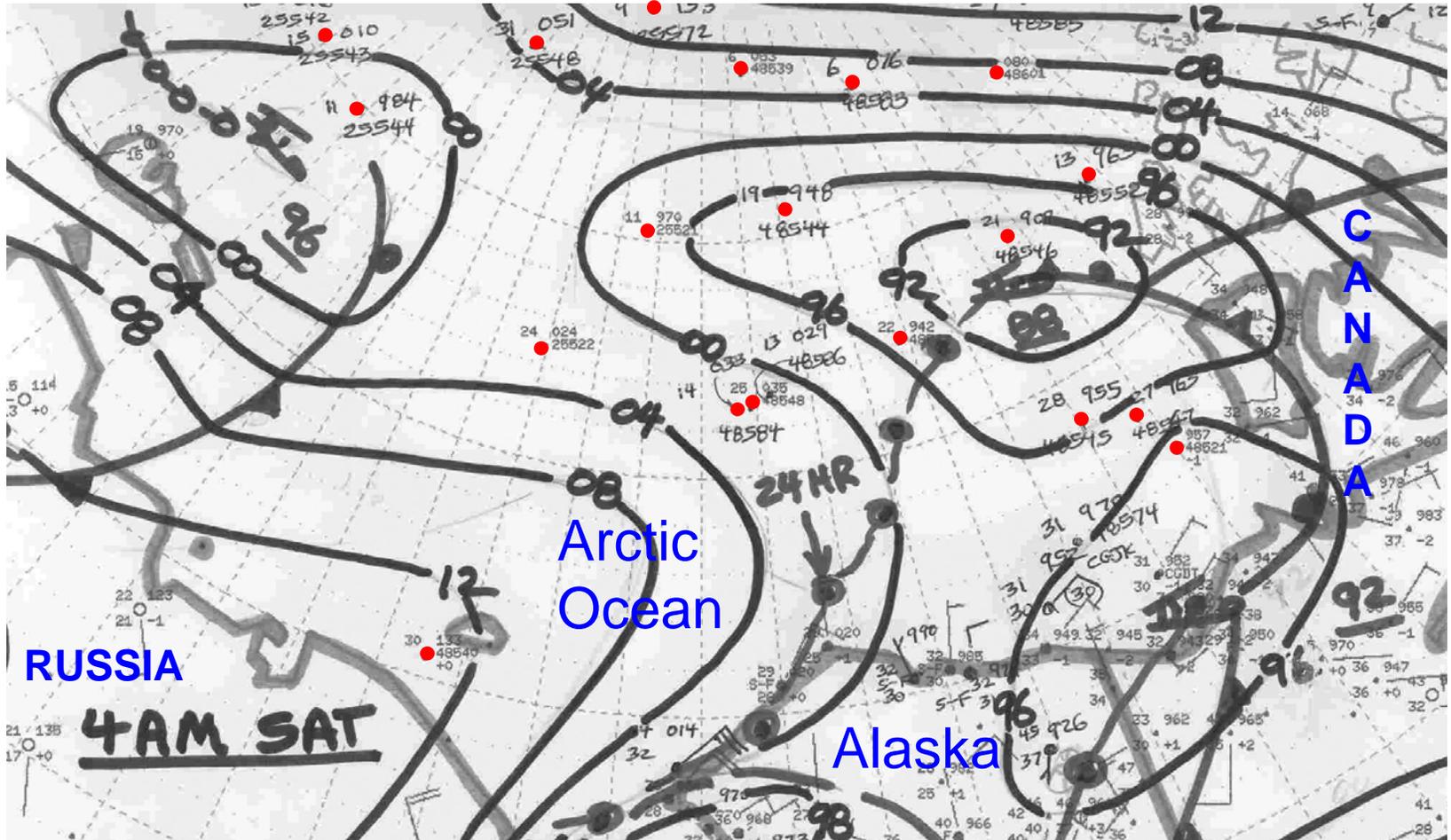GREENLAND
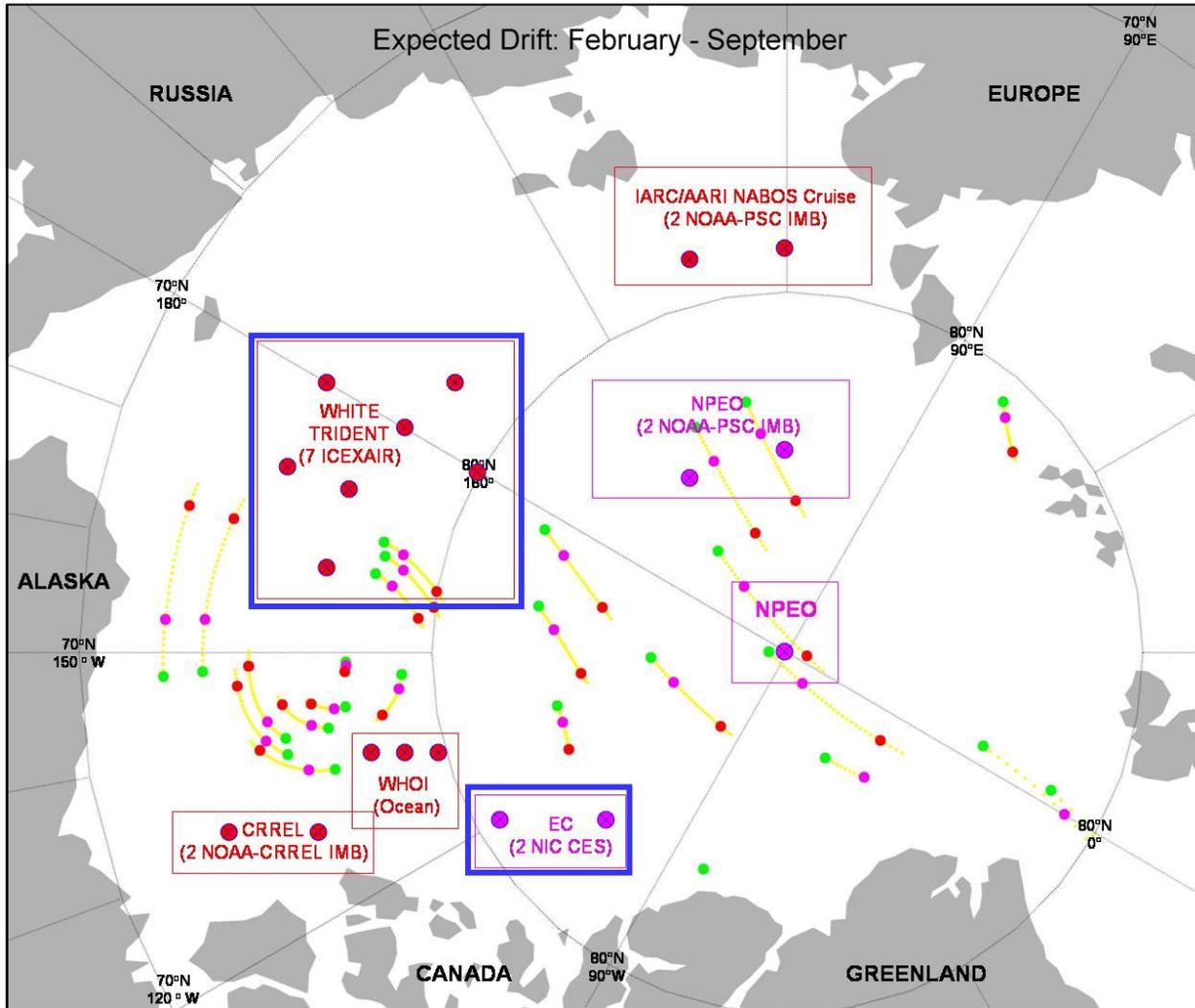
SPRING

- NPEO (Multiple buoys provided by NOAA/PMEL, JAMSTEC, & CRREL)
- **EC/NIC- CES** (80N 120W, & 80N 130W)

SUMMER

- IARC/NABOS Cruise – 2 NOAA-PSC IMB (North of Laptev Sea).
- CRREL/WHOI Cruise – 2 NOAA-CRREL IMB & 4 WHOI Ocean Profiling buoys.
- **WHITE TRIDENT Flight –7 ICEXAIR buoys** (Only 1 buoy has been contributed so far!)

IABP Data & Weather Forecasting

The observations (red dots) from the IABP are essential for analyzing and forecasting weather features in the Arctic. In this example, we show storm approaching Alaska from the Arctic Ocean. The IABP observations are essential in detecting and determining the strength and trajectory of storms from the Arctic Ocean. (Figure provided by Eric Stevens, NWS/NOAA, Fairbanks, AK)
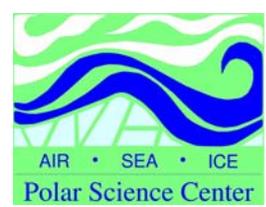
IABP Data & Arctic Climate Change:
Sea level pressure has decreased
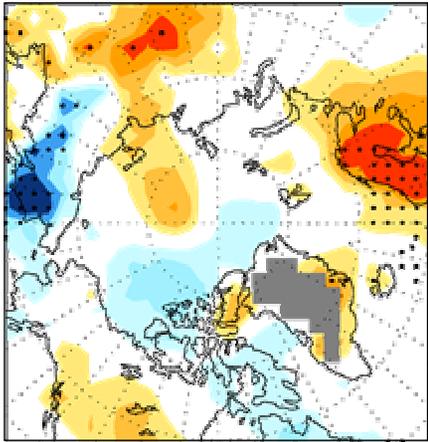## [1987 to 1994 minus 1979 to 1986]

Dramatic changes in Arctic climate have been noted during the past two decades. Observations from the IABP have played a significant role in the detection of this change over the Arctic Ocean. For example, one of the first indications of Arctic climate change was noted by Walsh et al. (1996) using IABP data.
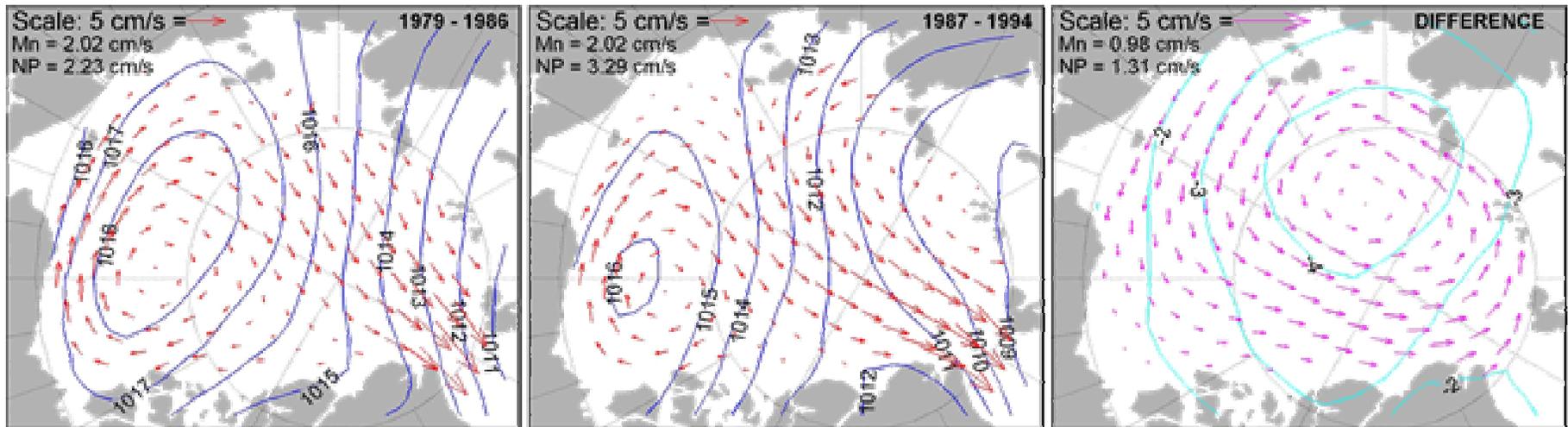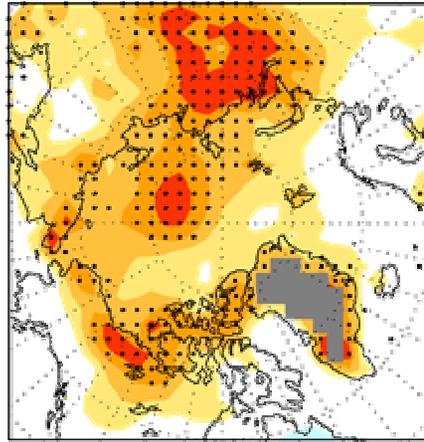

These figures show the mean field of SLP and ice motion for 1979–1986 (left), 1987-1994 (middle), and the difference between these two 8-year periods (right). These figures show a cyclonic anomaly in circulation, which has been linked to the Arctic Oscillation (Rigor, et al. 2002).
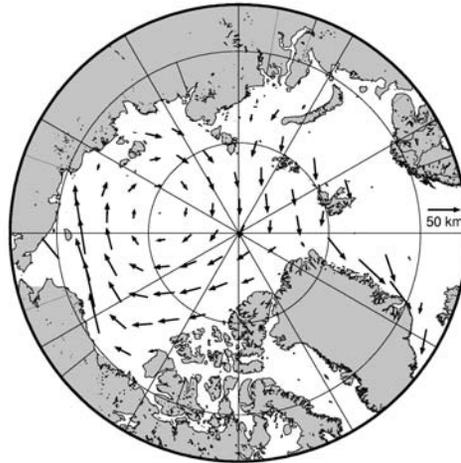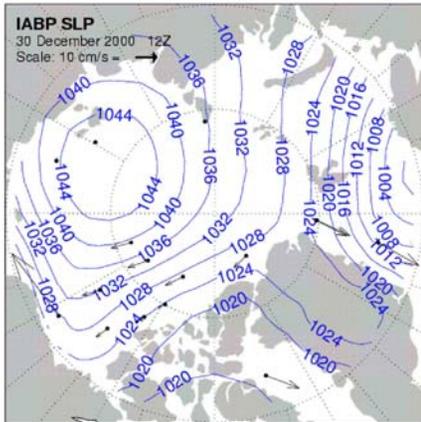
These figures show that the warming found over land extends over the Arctic Ocean, and is strongest during spring. Black dots show areas where the trends are significant at the 95% confidence limit. (Adapted from Rigor, et al. 2000.)

IABP Data & Model Validation: PIPS 2.0

Validation of Polar Ice Prediction System (PIPS) 2.0 Ice Motion (top right) against IABP SLP and buoy motion (top left). The lower figures show the analyzed ice concentration (bottom left) and thickness (bottom right). Courtesy of Ruth Preller, NRL.
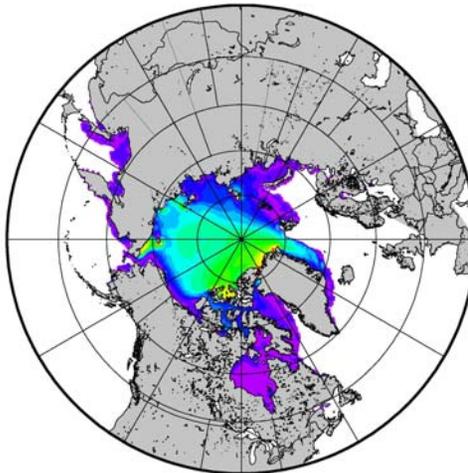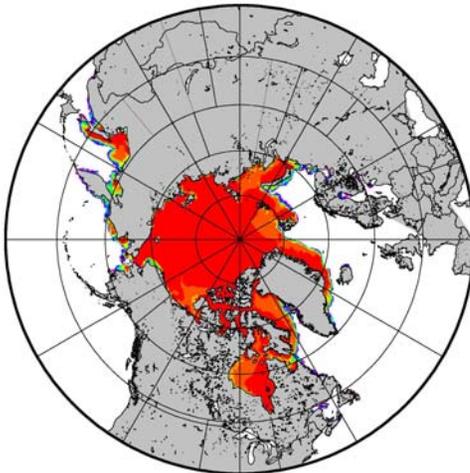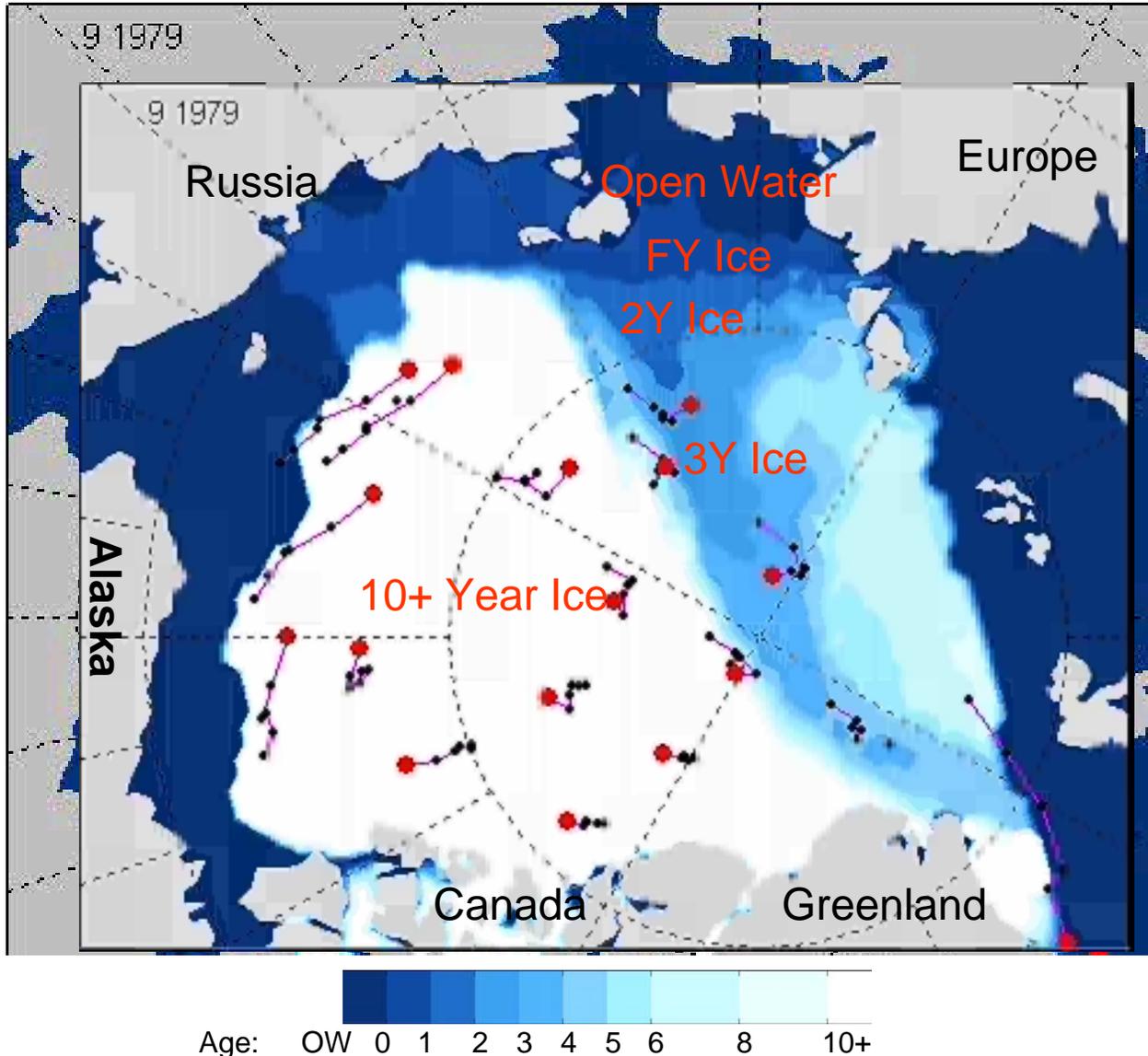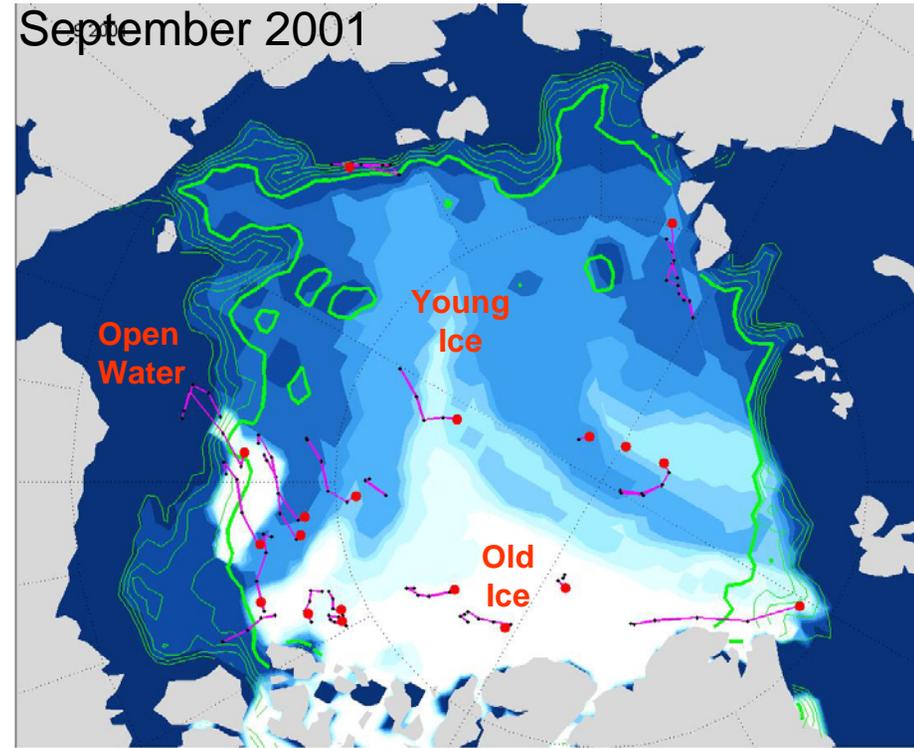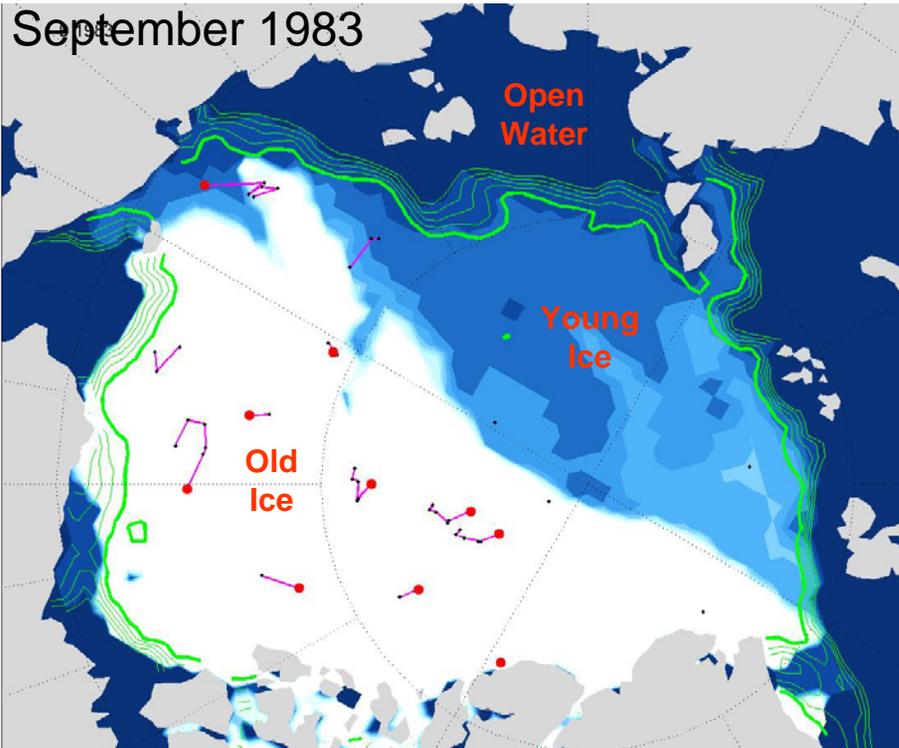
- **Age of Ice Model:**
    1. Advects ice using gridded ice motion from buoys and drifting stations;
    2. Forms new ice over open water each fall;
    3. Tracks age of ice that survives summer melt.

- **Time is shown on top left.**

- **Some things to note:**
    1.) Large area of old ice in the 1980's.
    2.) Area of old ice decreases with step to high Arctic Oscillation phase in 1989.
    3.) Area of old ice continues to decrease in 1990's.
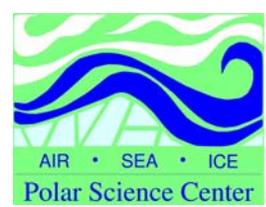   4.) Younger ice persists through today.

Age of Ice

September 1983 — Open Water, Young Ice, Old Ice

September 2001 — Open Water, Young Ice, Old Ice
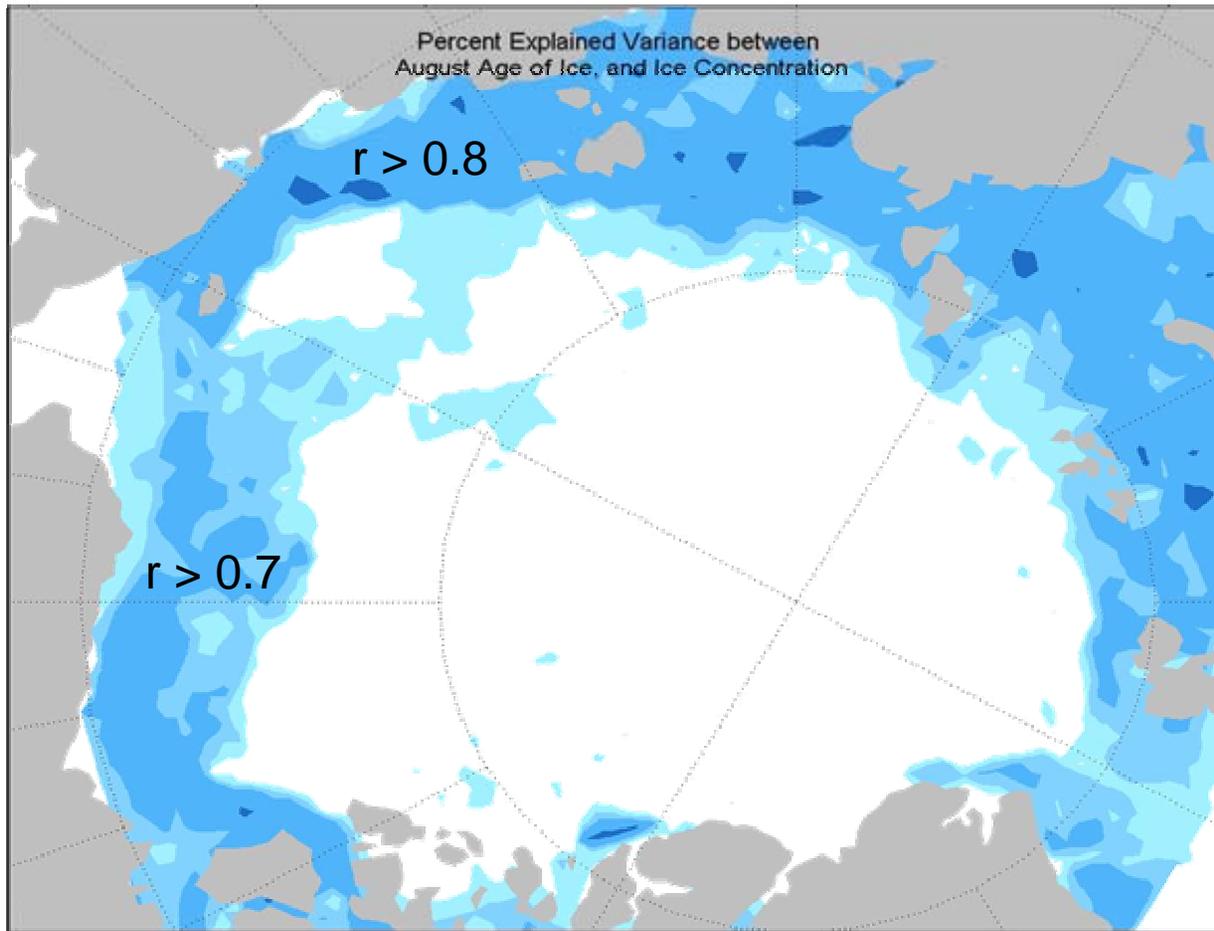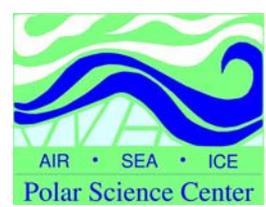
Age: OW 0 1 2 3 4 5 6 8 10+

- Area of old ice has decreased dramatically during the last 15 years.
- These changes are related to the Arctic Oscillation.

Predicting Summer Sea Ice Extent
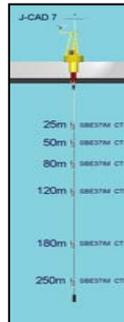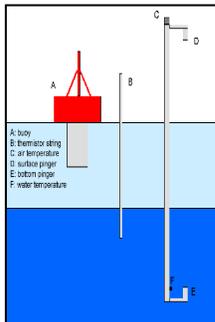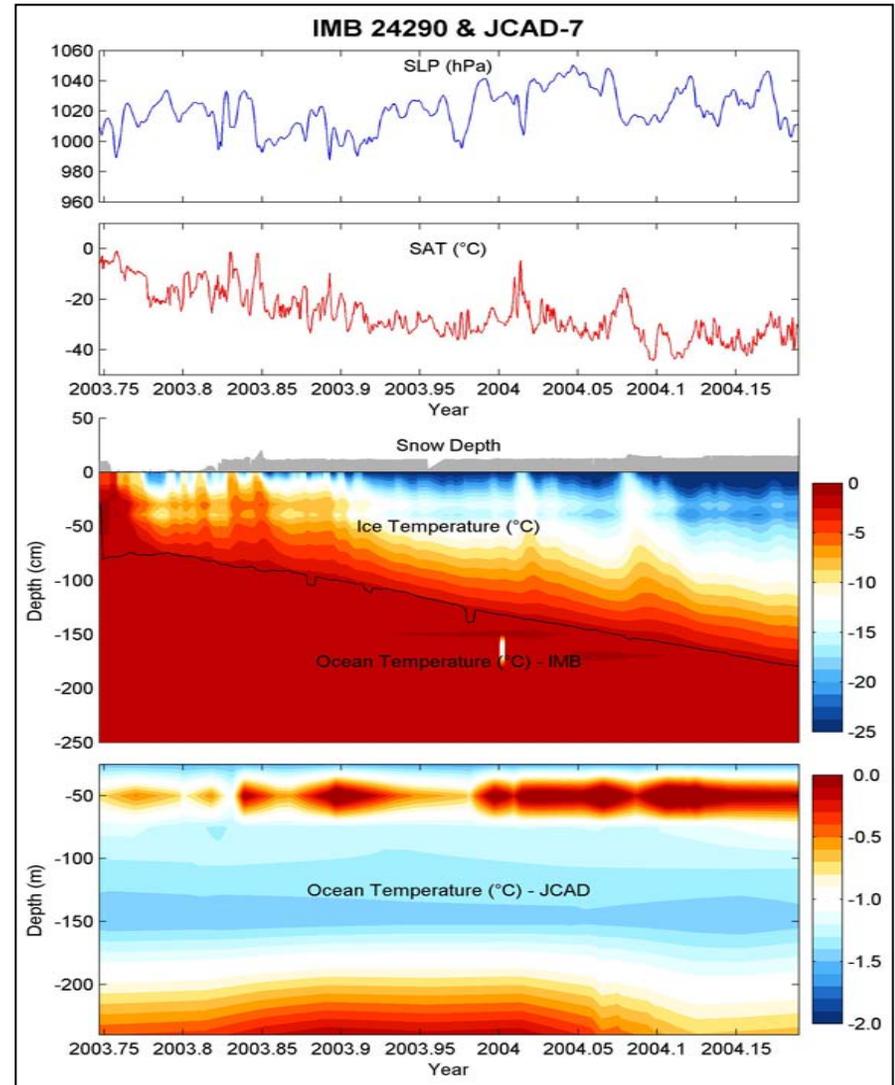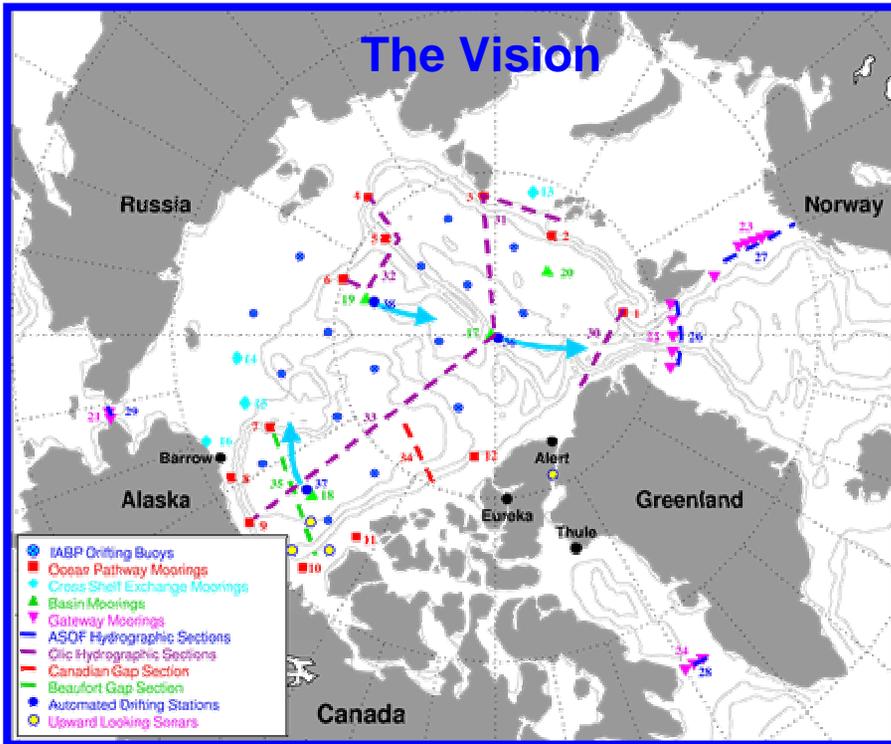## Variance Explained by Age of Ice

Percent Explained Variance between
August Age of Ice, and Ice Concentration

r > 0.8

r > 0.7

0   16.6   33.3   50.0   66.7   83.3   100
% Variance Explained

The Vision
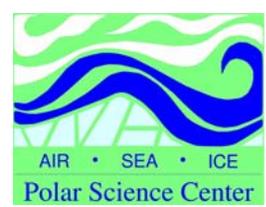
IABP   Results

The IABP provides meteorological and oceanographic data for real-time operational requirements and research purposes including support to the World Climate Research Programme (WCRP) and the World Weather Watch (WWW) Programme.

Data from the IABP have many uses. For example:
- Forecasting weather and ice conditions,
- Research in Arctic climate and climate change,
- Validation of satellites,
- Forcing, validation and assimilation into numerical climate models, and
- Tracking the source and fate of samples taken from the ice.

Over 450 publications have benefited from observations from the IABP!!!
For a list of these publications, click on http://IABP.apl.washington.edu/Citations.
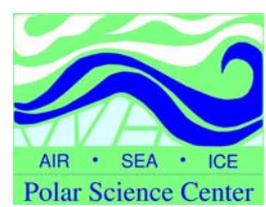
IABP   Organization

The IABP encourages participation by all groups, nationally and internationally.

The Backbone variables are needed by operational centers and are ingested into forecast-analysis models.   They are also needed as high quality analyzed fields by the research community.

The temporal sampling, accuracy and spacing of IABP sensors are determined by analysis of the scales of phenomena to be resolved, e.g. synoptic scale atmospheric pressure systems and associated ice motion; interannual and interdecadal anomalies of SLP, T, Ice Velocity.

Higher sampling rates, denser arrays, are welcomed.

Centralized responsibilities: Deployment plans; Logistics coordination; Communications and data transmission and ingestion; Production and dissemination of data sets; Outreach and PR.