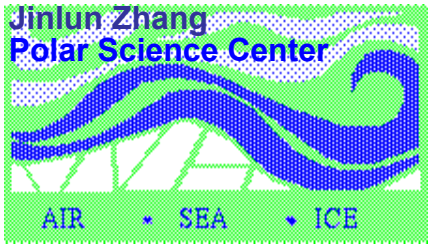
NOAA Sea Ice Forecasting Workshop 9/2011



Numerical Ensemble Seasonal Forecast of Arctic Sea Ice

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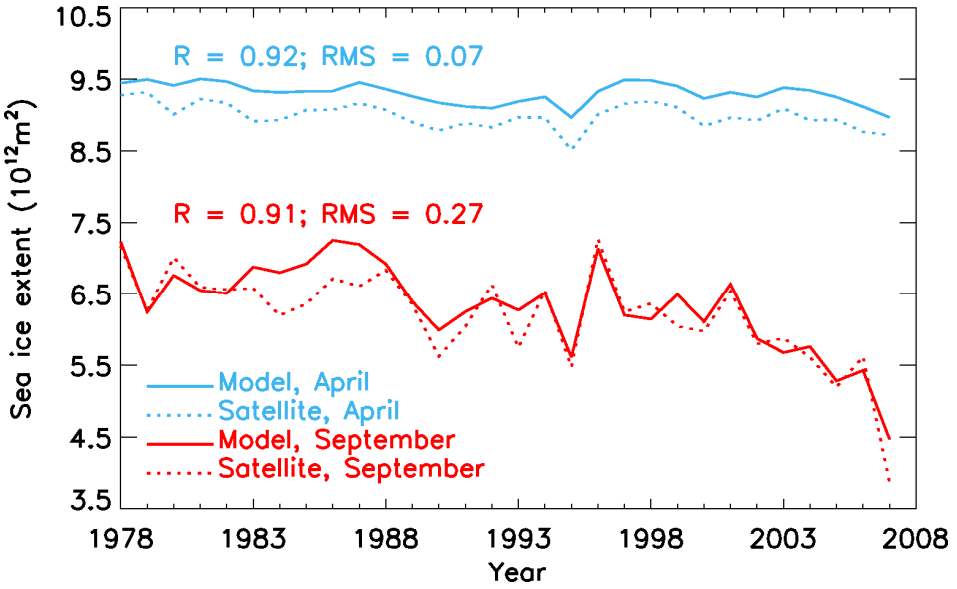
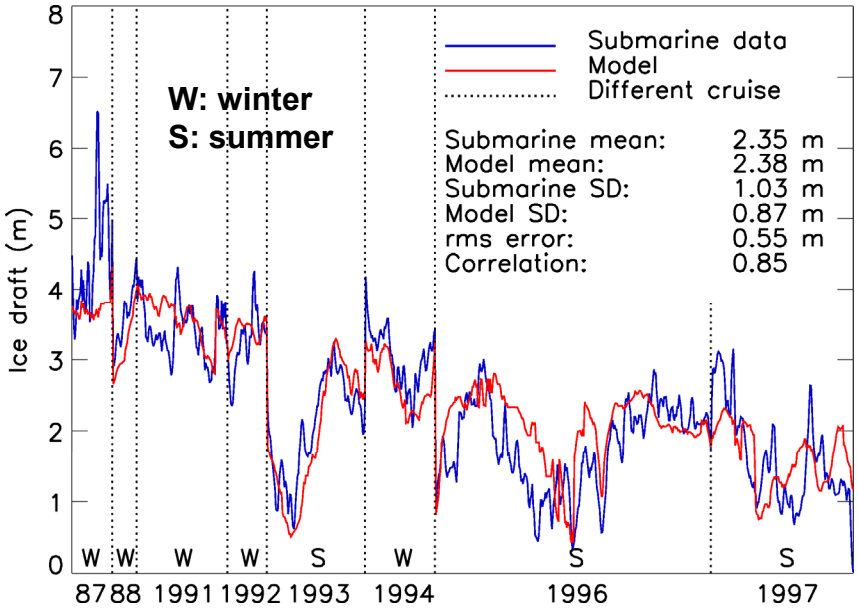
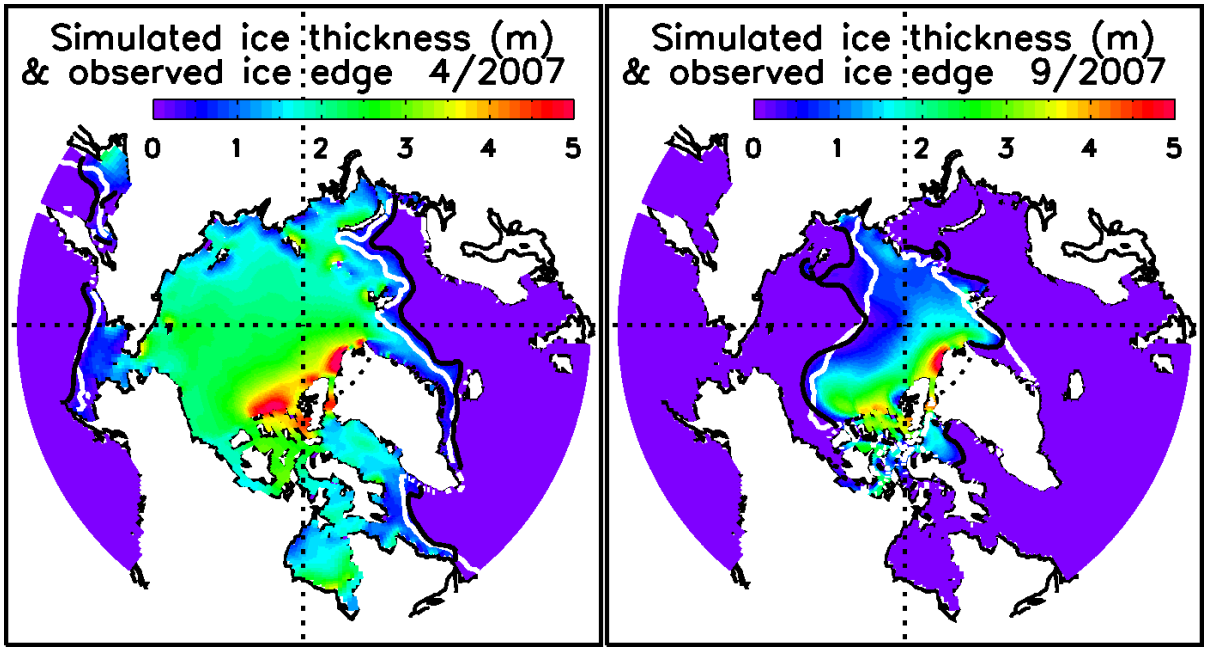
An Ensemble Seasonal Forecast System

- Based on the Pan-Arctic Ice−Ocean Modeling and Assimilation System (PIOMAS): ice-ocean model that assimilates satellite ice concentration and SST
- Assumption: the current climate is not fundamentally different from the recent past even though the Arctic is changing rapidly
- Conduct seasonal forecast using recent observational or reanalysis forcing
- Seven ensemble members driven by the NCEP/NCAR reanalysis forcing from the past seven years
- Aims to obtain "best possible" estimates of sea ice and ocean states as initial conditions for ensemble seasonal forecast: improve model physics and data assimilation and do near real-time hindcast
- Goal: predict both the size and shape of ice extent (ice edge location) and spatial distribution of ice thickness

Evaluating PIOMAS with no data assimilation



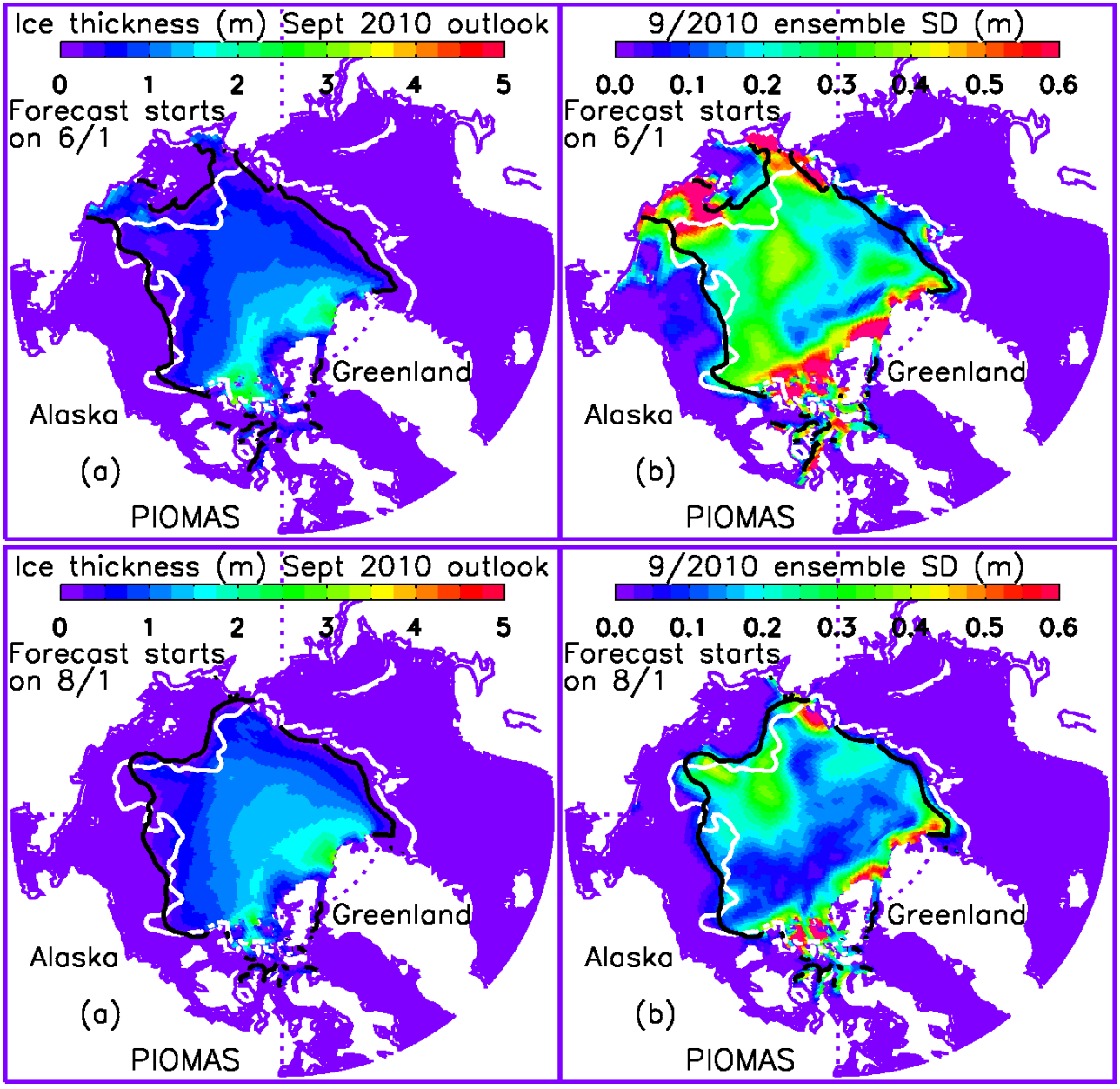




Black line:
model ice edge

White line:
satellite ice edge

Ensemble forecast of 9/2010 ice thickness and ice edge



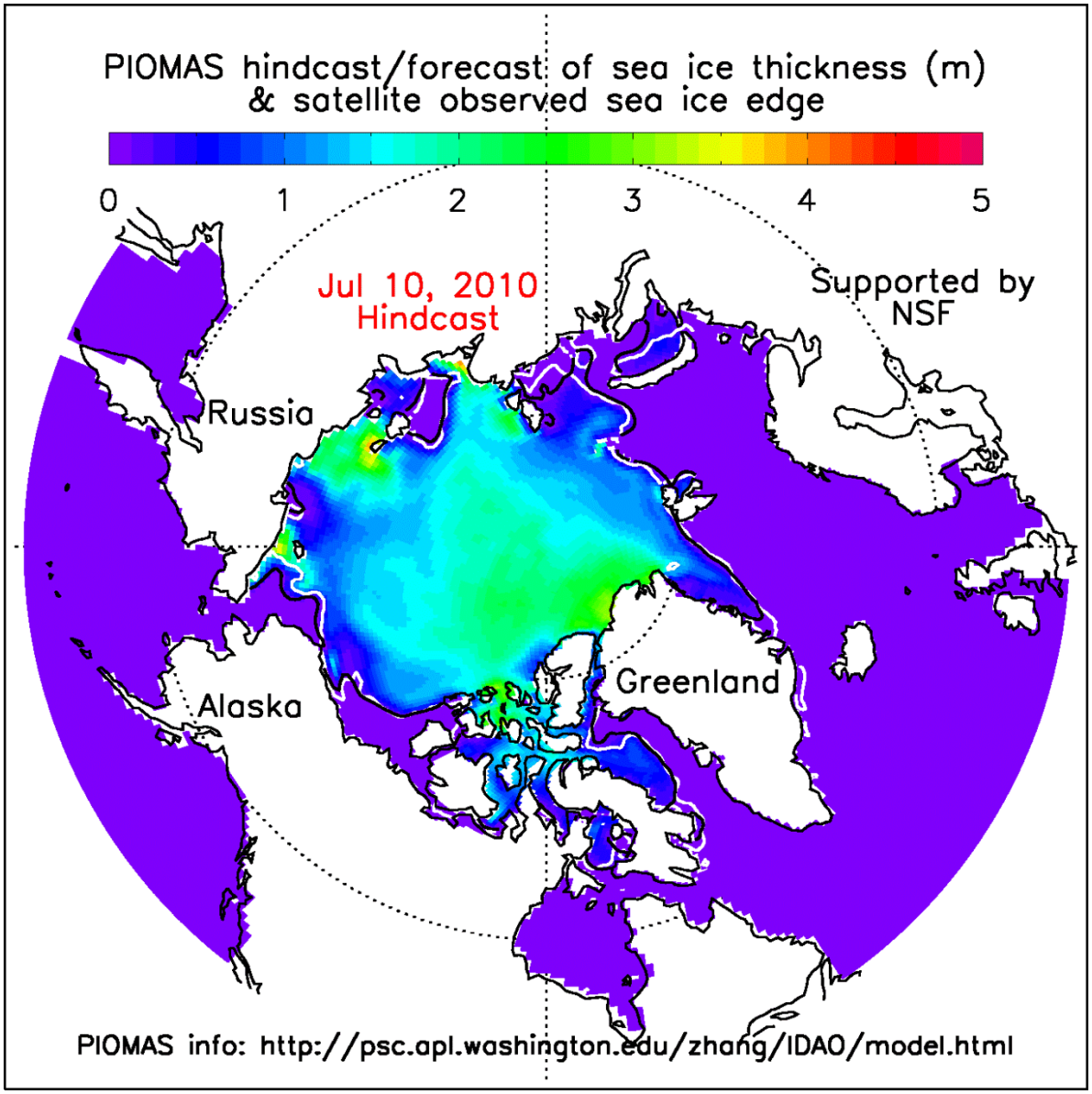
Forecast starts on 6/1/2010

Forecast range: 3–4 months

Forecast starts on 8/1/2010

Forecast range: 1–2 months

Movie: Hindcast and Forecast for Summer 2010



Forecast starts on 8/1/2010

Black line: model ice edge

White line: Satellite ice edge

Summary/Discussion

- Importance of atmospheric forcing in seasonal ice forecast – challenge to obtain predicted forcing on a seasonal scale
- An approach is to look back for solutions: using reanalysis forcing from the recent past for ensemble forecast
- Importance of initial ice/ocean conditions in forecast
- Need for improving model physics and data assimilation (including assimilation of ice thickness if there are enough observations?)
- Need for improving observational accuracy such as that of satellite ice concentration/extent in MIZ and for expanding observations (ice thickness?)