From nowcasting to seasonal forecasting

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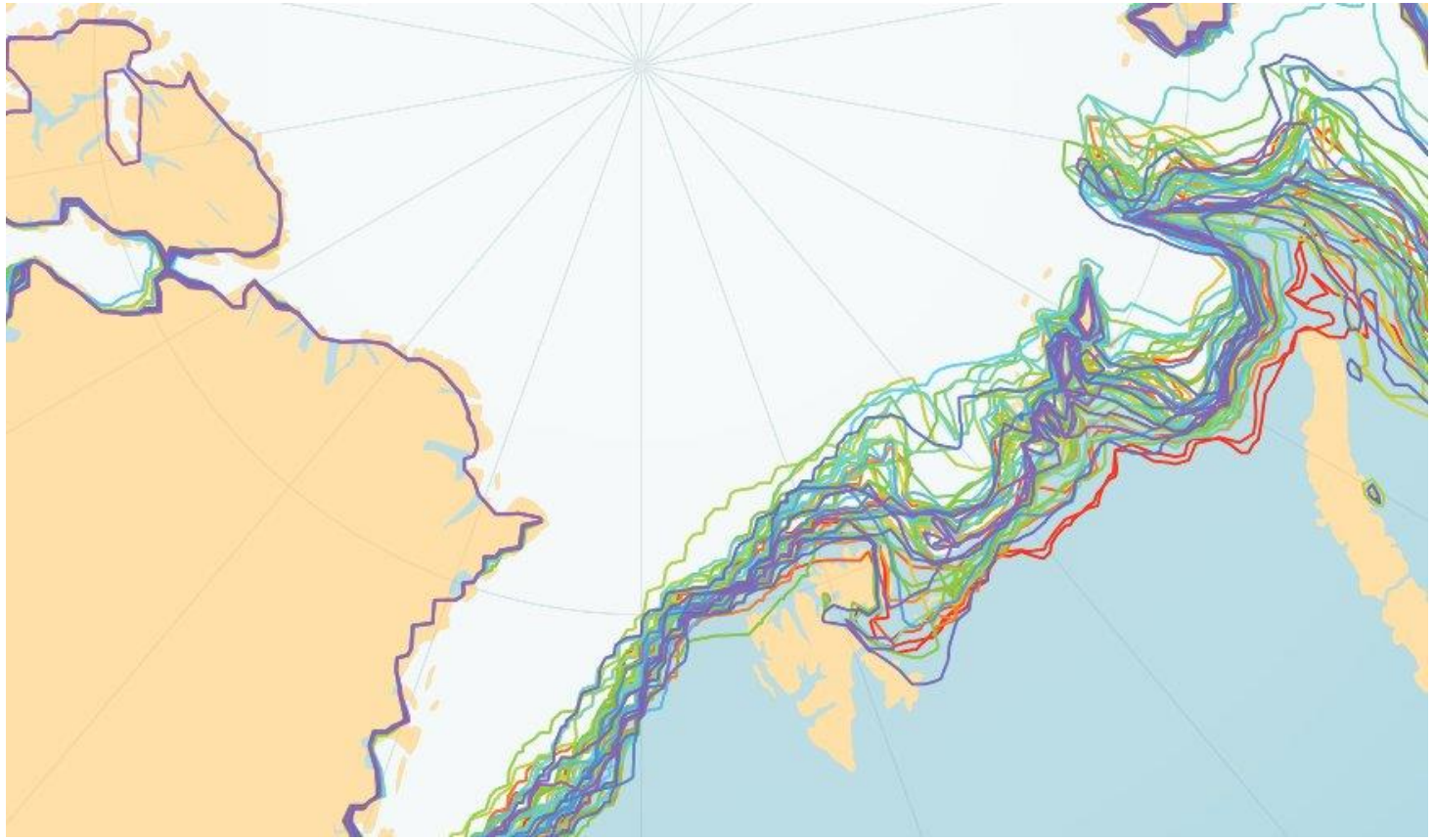
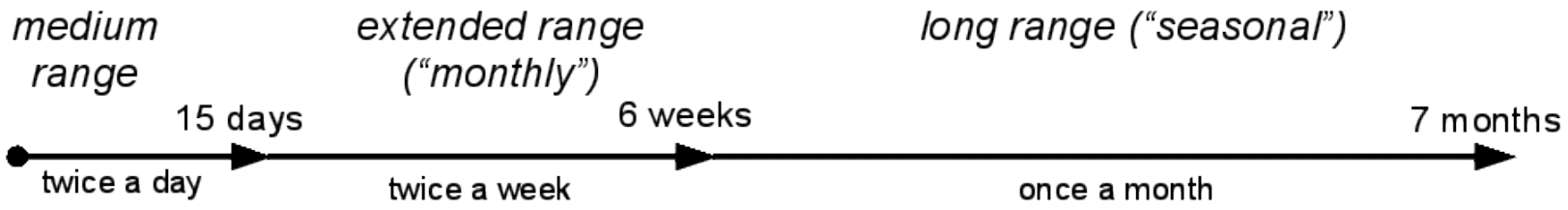


ECMWF

Seamless earth system ensemble predictions at ECMWF



- forecasts with 50 ensemble members, global domain with 18/36km resolution
- "seamless": very similar model with the same initial conditions across all time ranges
- includes dynamical sea ice model
  - since Nov 2016 operational in medium/extended range (Cycle 43R1)
  - planned late 2017 for seasonal range (System 5)

Connection to SPICES project

Extraction of information from remotely sensed sea ice observations to initialize global sea ice models is a challenge

- uncertainty of sea ice cover from passive microwave observations
- ice and snow thickness
- summer sea ice and melt ponds

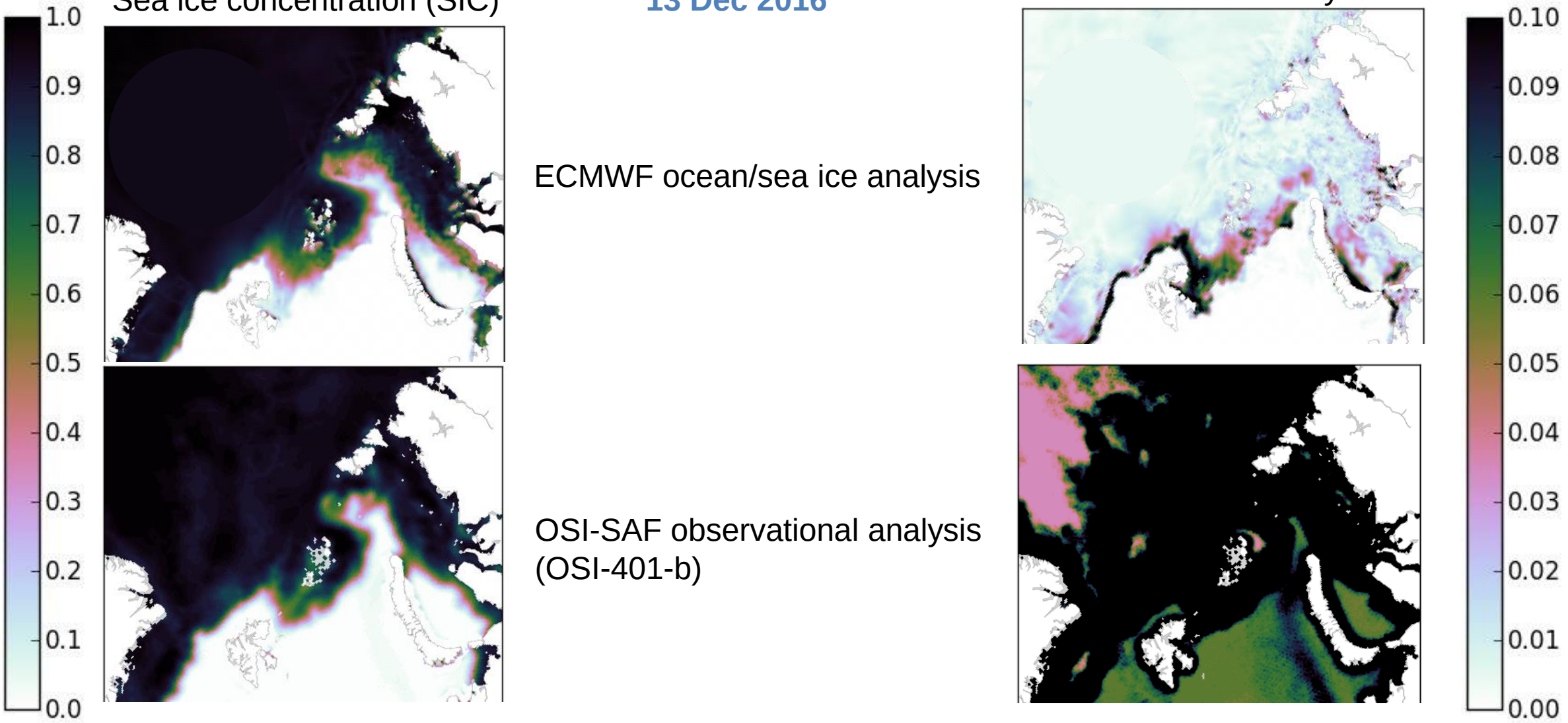
In SPICES, observational and modelling experts meet to tackle these challenges.

“Nowcasting” sea ice cover: combining information from observations and models

Sea ice concentration (SIC)

13 Dec 2016

SIC uncertainty



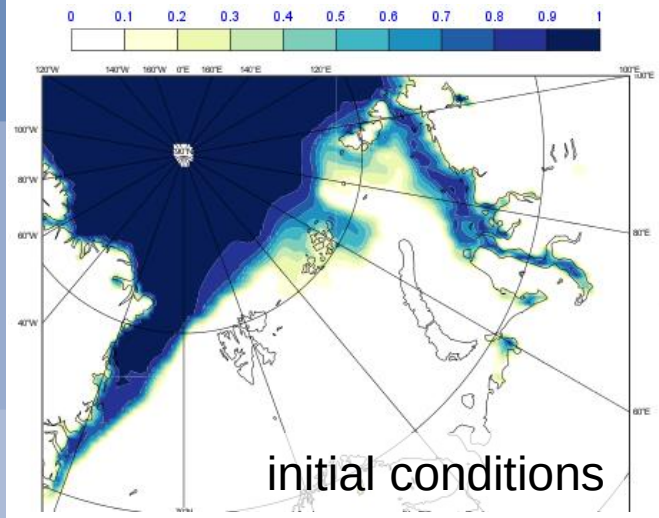
ECMWF ocean/sea ice analysis

OSI-SAF observational analysis (OSI-401-b)

ECMWF

Medium-Range forecasts of sea ice cover (15 days ahead)

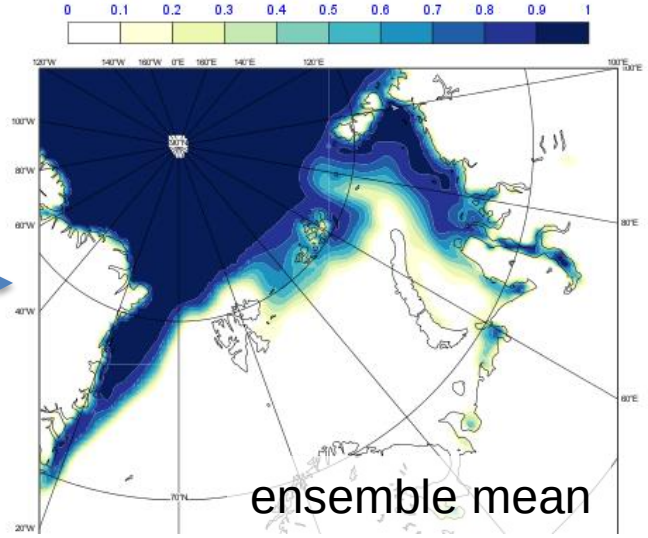
28 Nov 2016



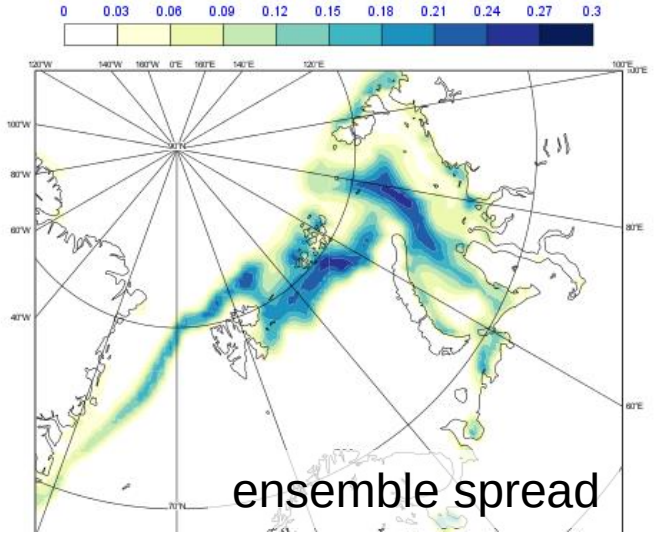
initial conditions

ensemble forecast

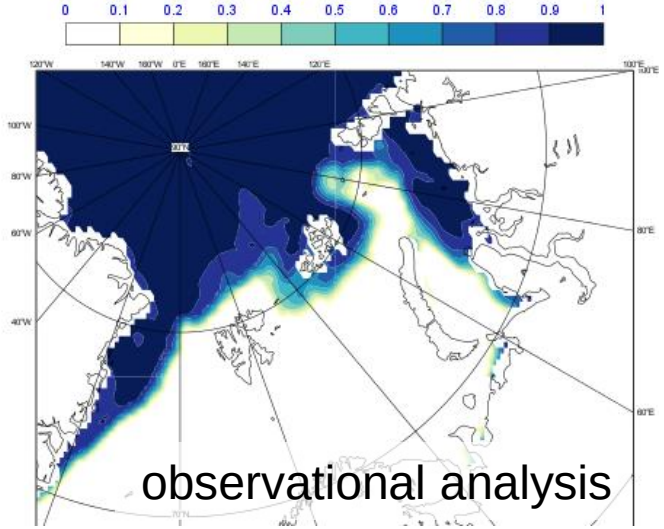
13 Dec 2016



ensemble mean



ensemble spread



observational analysis

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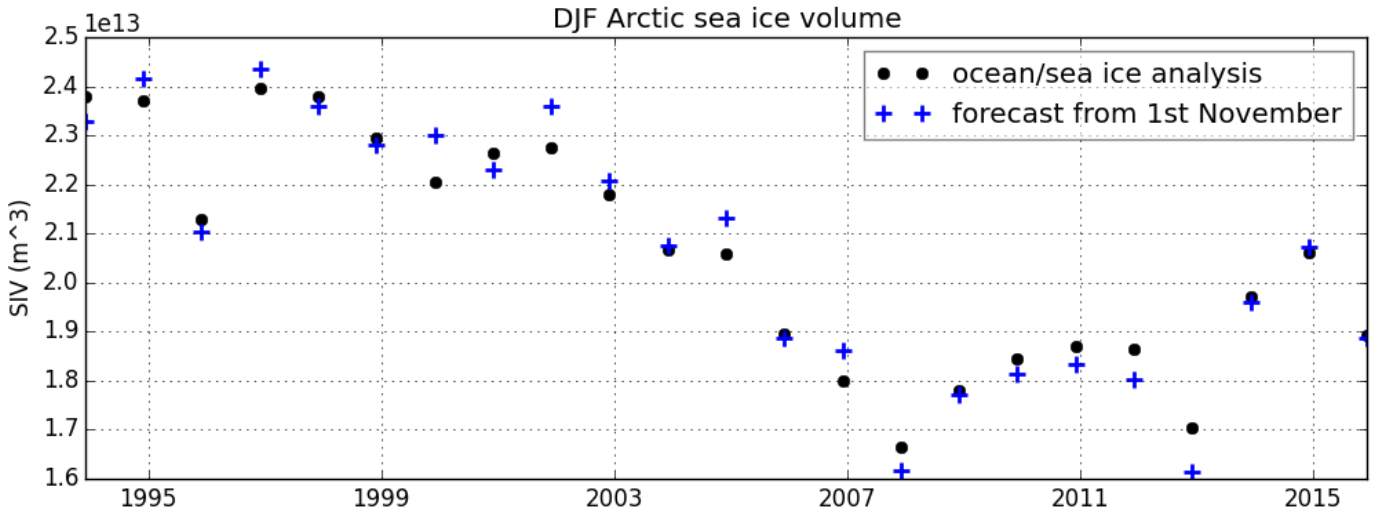
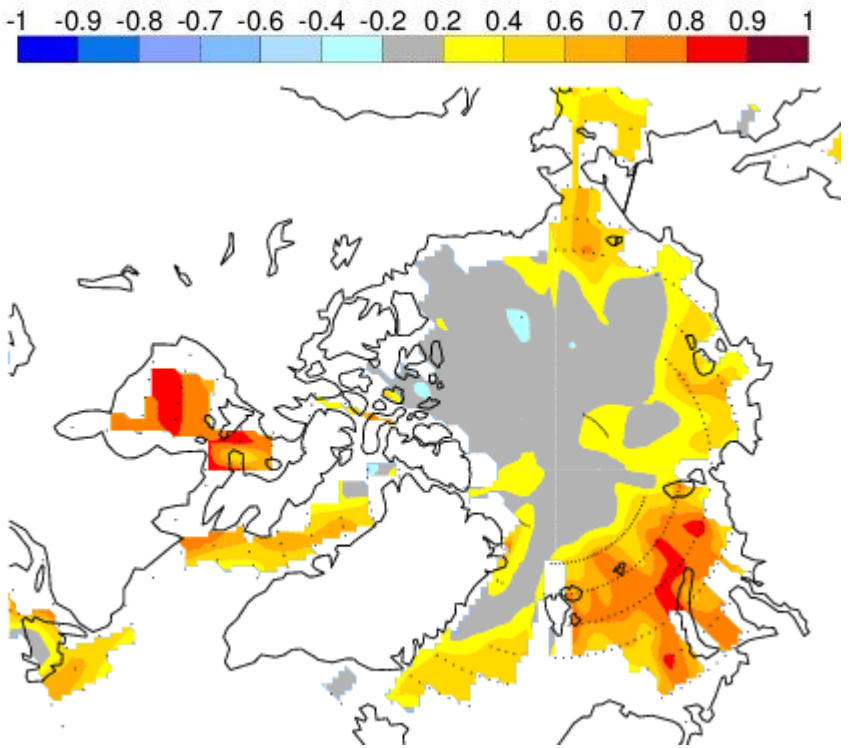
Sea ice outlook weeks and months ahead



Seasonal forecast and analysis values of DJF Arctic sea ice volume



Anomaly correlation skill
of DJF sea ice cover forecasts
for 1981-2015

ECMWF

Summary

- Sea ice forecasts require “Earth system” approach:
  initialize and forecast atmosphere, ocean sea ice together
- With increasing forecast lead time, uncertainties increase because
  - limited knowledge of initial conditions (SPICES!)
  - inherent limits to predictability (irreducible forecast errors)
  - forecast models have errors
- Hence, with increasing forecast lead time, skilful forecasts are only possible for larger areas, longer time periods and wider events