

The new Météo-France seasonal forecasting System 9

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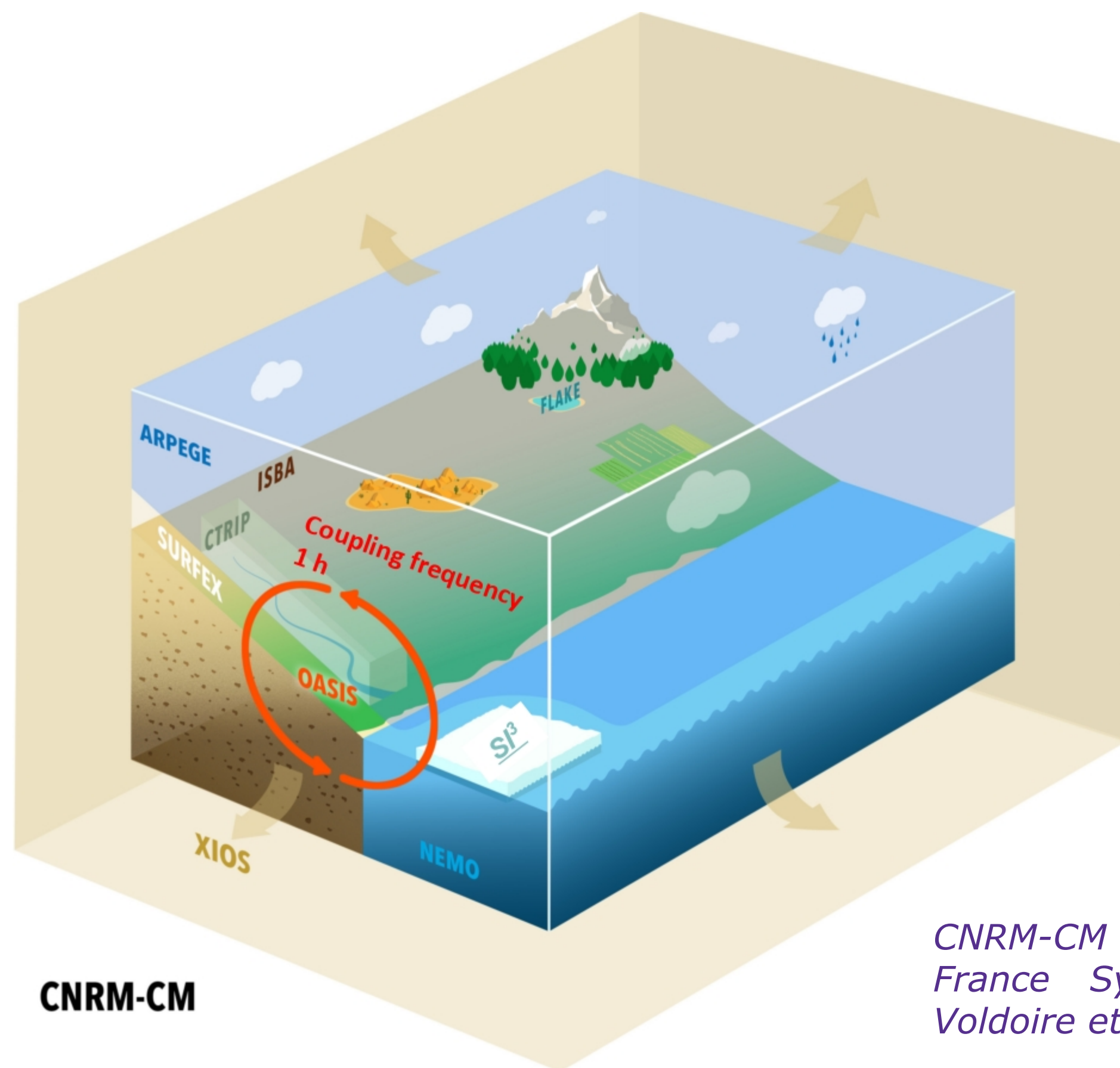
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CONTEXT

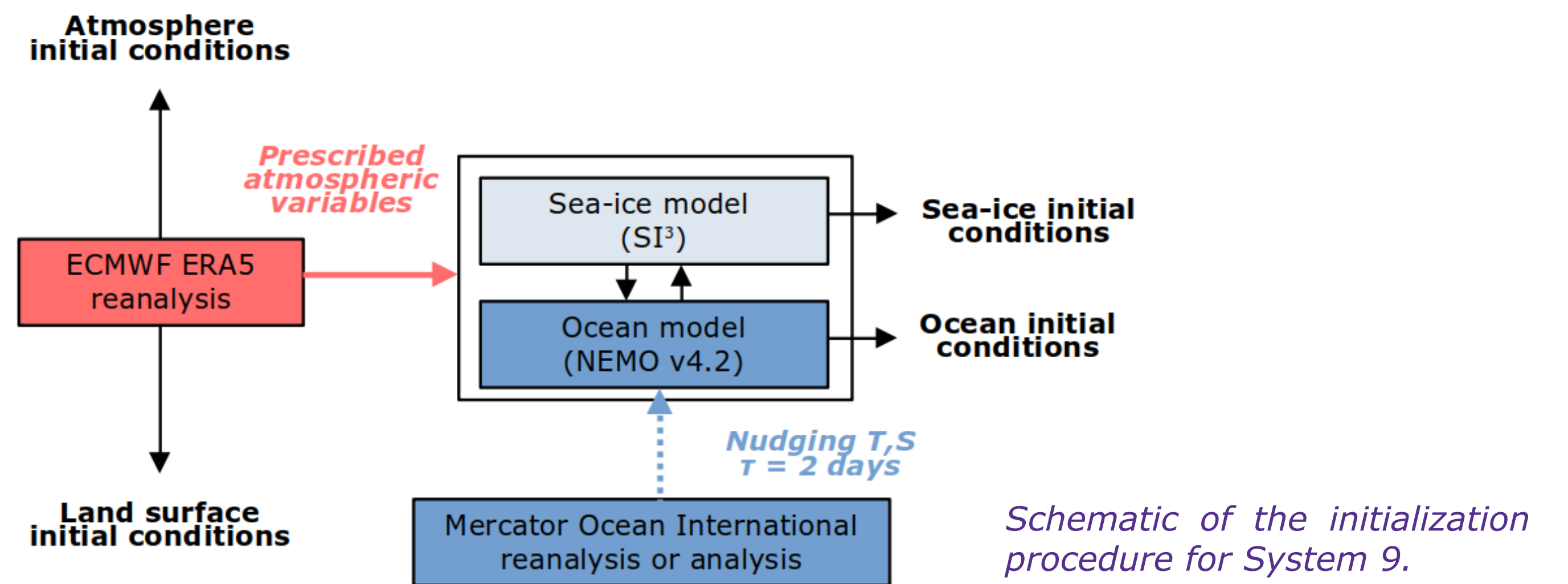
- Météo-France is a core **provider of seasonal forecasts** to the Copernicus Climate Change Service (C3S).
- In 2025 occurred a **major upgrade** of the Météo-France seasonal forecasting system.
- Overview of the comparison between the **former System 8** and the **new System 9**, both based on the CNRM-CM coupled model.



CNRM-CM components of Météo-France System 9, adapted from Voldoire et al. (2019).

MAIN DIFFERENCES SYSTEM 9 VS SYSTEM 8

	System 8	System 9
Ocean model	NEMO 3.6	NEMO 4.2
Sea-ice model	GELATO	SI ³
Radiation scheme	LW: Mlawer et al (1997) SW: Morcrette (1990)	ecRad (Hogan and Bozzo, 2016)
Initialization	Coupled	Separate (see figure below)
Reforecast period	1993-2018	1993-2024
Operational	July 2021 – April 2025	Since May 2025

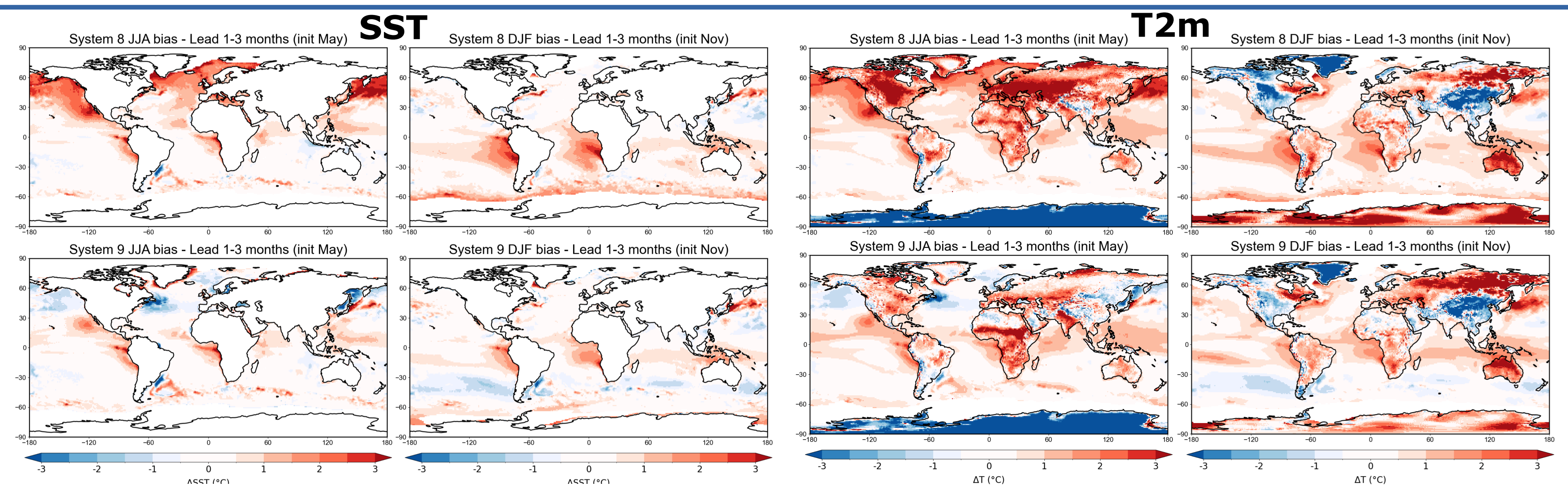


Schematic of the initialization procedure for System 9.

BIAS COMPARISON

- **Warm SST biases** of System 8 notably **improved in System 9** (likely effect of new ocean model)
- **T2m biases also improved** in System 9 (likely effect of ocean + radiation scheme)

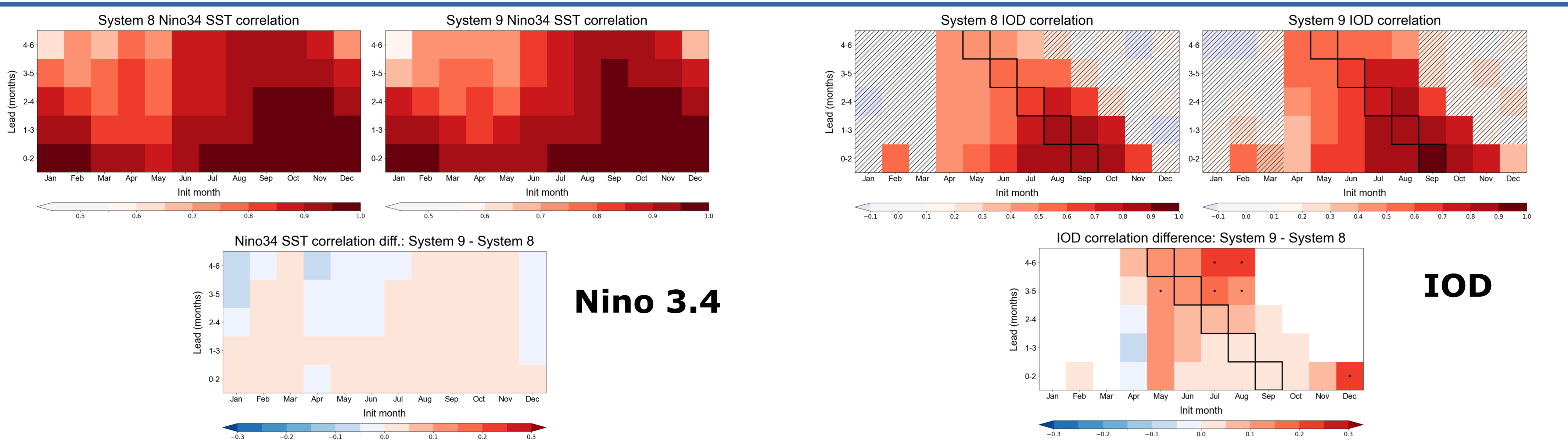
Comparison of SST (left) and T2m (right) biases of System 8 (top) and System 9 (bottom) in JJA (May init.) and DJF (Nov. init.).
Ref: ERA5.



ENSO + IOD PREDICTION

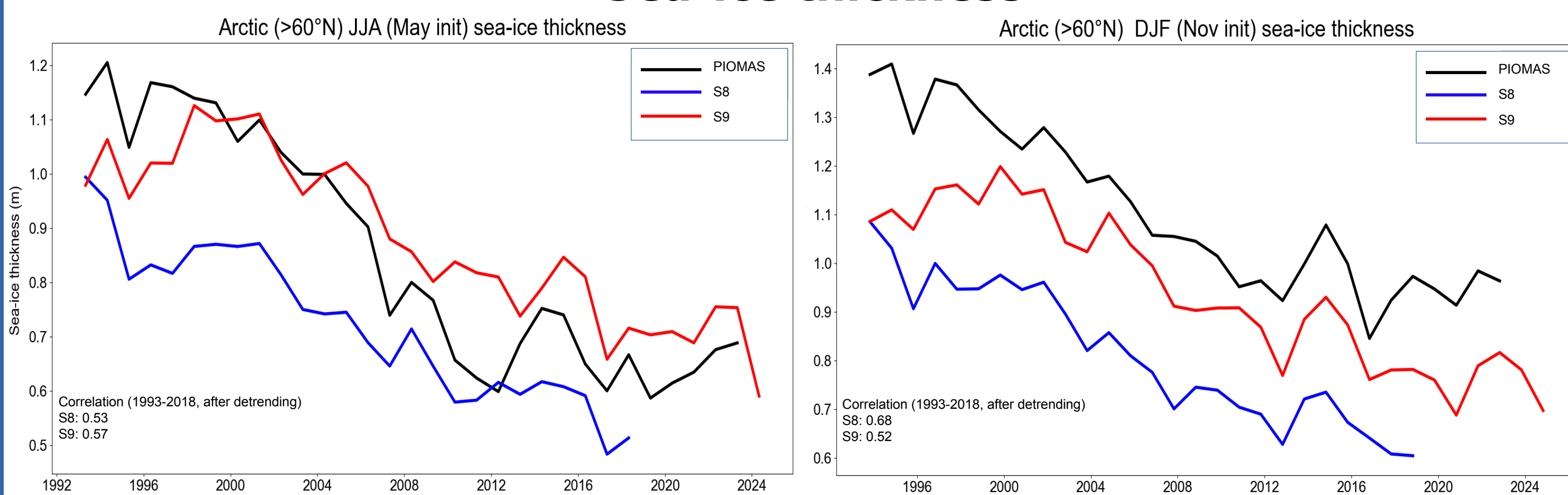
- **Similar ENSO** prediction skill as System 8
- **IOD prediction skill substantially improved**

Comparison of SST correlations for Systems 8 and 9 (top), and correlation differences (bottom), for Nino3.4 (left) and IOD (right) indexes.
Ref: ERA5.



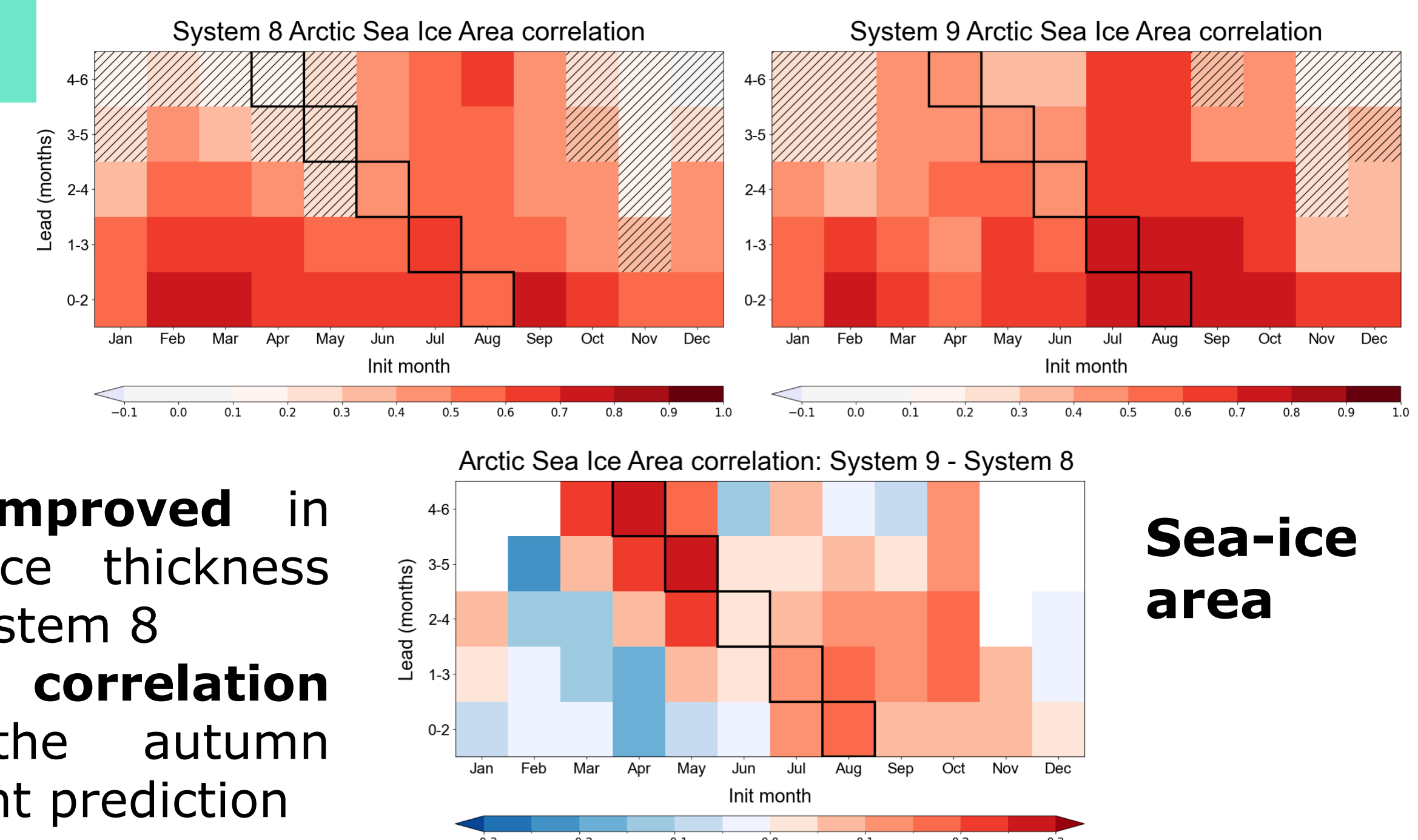
ARCTIC SEA-ICE PREDICTION

Sea-ice thickness



Time-series of sea-ice thickness prediction for Systems 8 and 9 in JJA (May init.) and DJF (Nov. init.).
Ref: PIOMAS

- **Bias improved** in Arctic sea ice thickness relative to System 8
- **Better correlation skill** for the autumn minimal extent prediction



Comparison of sea-ice area prediction correlations (top) and correlation differences (bottom).
Ref: PIOMAS

CONCLUSION

- System 9 is a state-of-the-art seasonal forecasting system
- Notable **improvements in the model biases**
- **Predictive skill similar to System 8 or better**
- Operational **since 1 May 2025**

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