Multi-model Assessment of Decadal Climate Predictability in the North Atlantic

Passos, L.[1,2]; Langehaug, H.[2,3]; Årthun, M.[1,2]; Eldevik, T.[1,2];
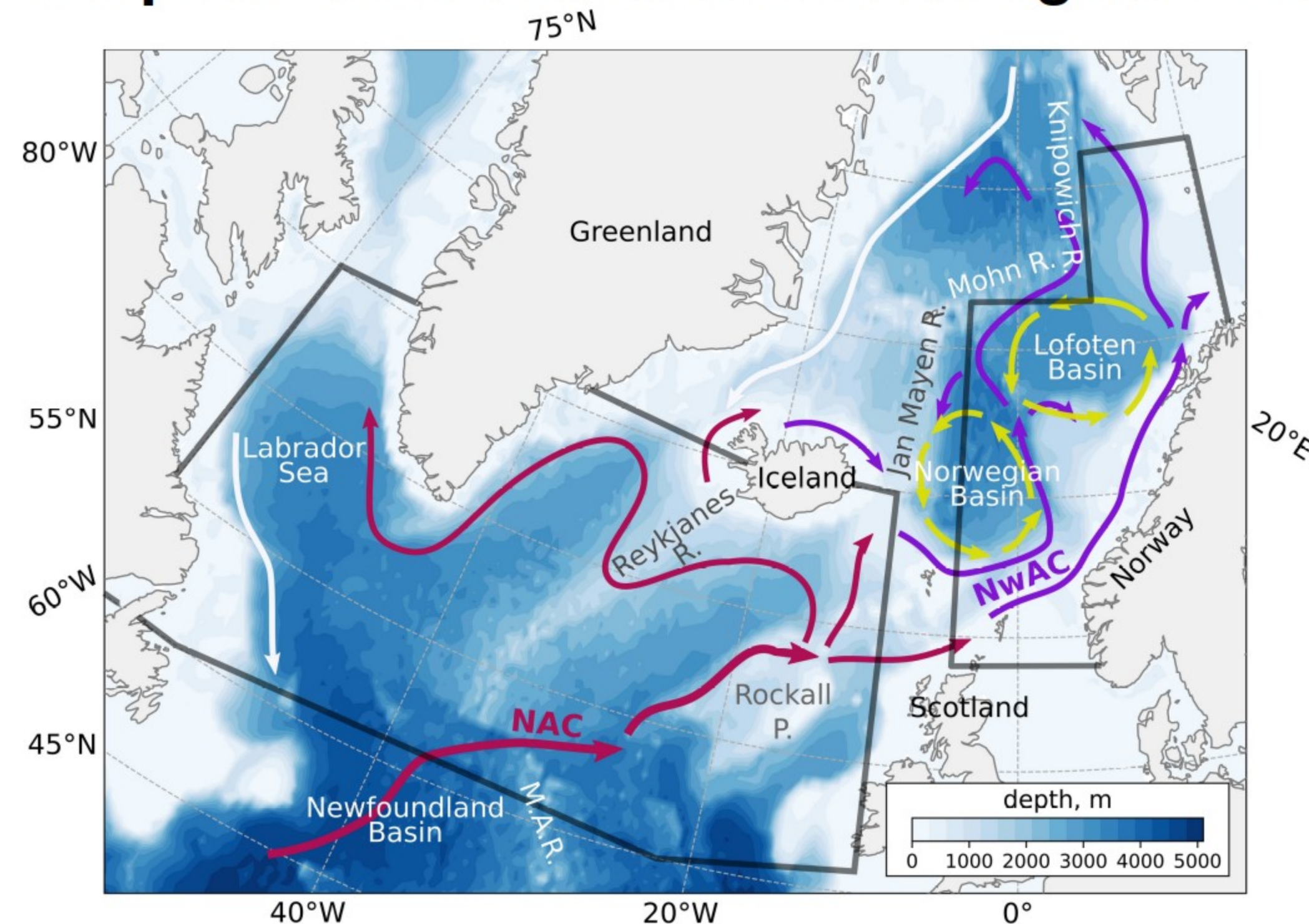
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BJERKNES CENTRE for Climate Research

Subpolar North Atlantic x Norwegian Sea

Skill in the Norwegian Climate Prediction Model [Jan-Apr]

- Skill larger for the Subpolar North Atlantic than for the Norwegian Sea;

- Decreased skill from CMIP5 to corresponding CMIP6 versions;

Subpolar North Atlantic

- Significant skill at almost all periods for SST and SSS;

- SST and SSS skill increase with DA complexity;

Norwegian Sea

- Less significant skill;

- There is relatively higher skill with respect to SSS than for SST;

- Increase of DA complexity do not increase skill.

Water Mass Transformation (WMT) in the Eastern Subpolar North Atlantic [CMIP6-Hist: 1950-2014] – initial evaluation

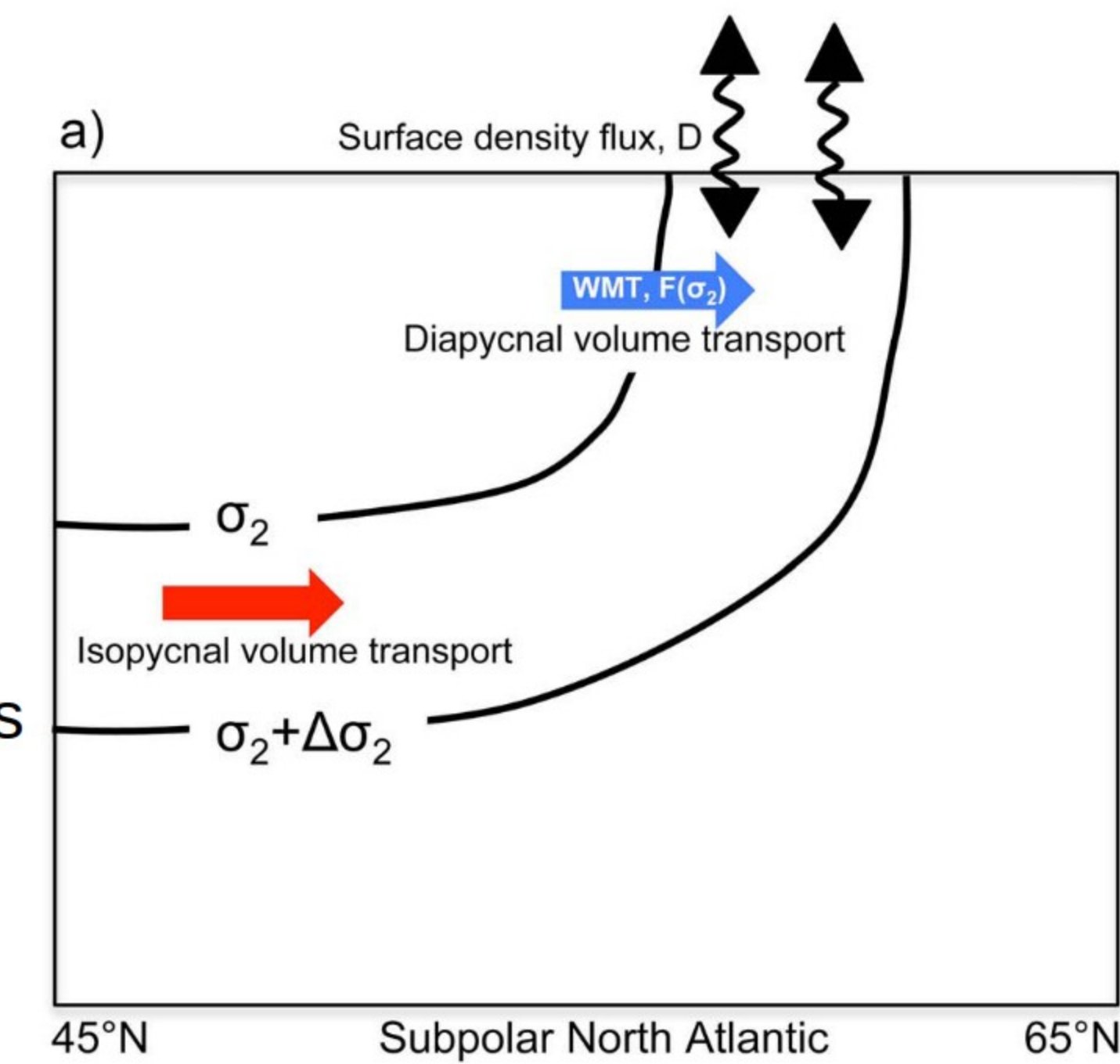### NorESM CMIP6-Hist Annual Mean
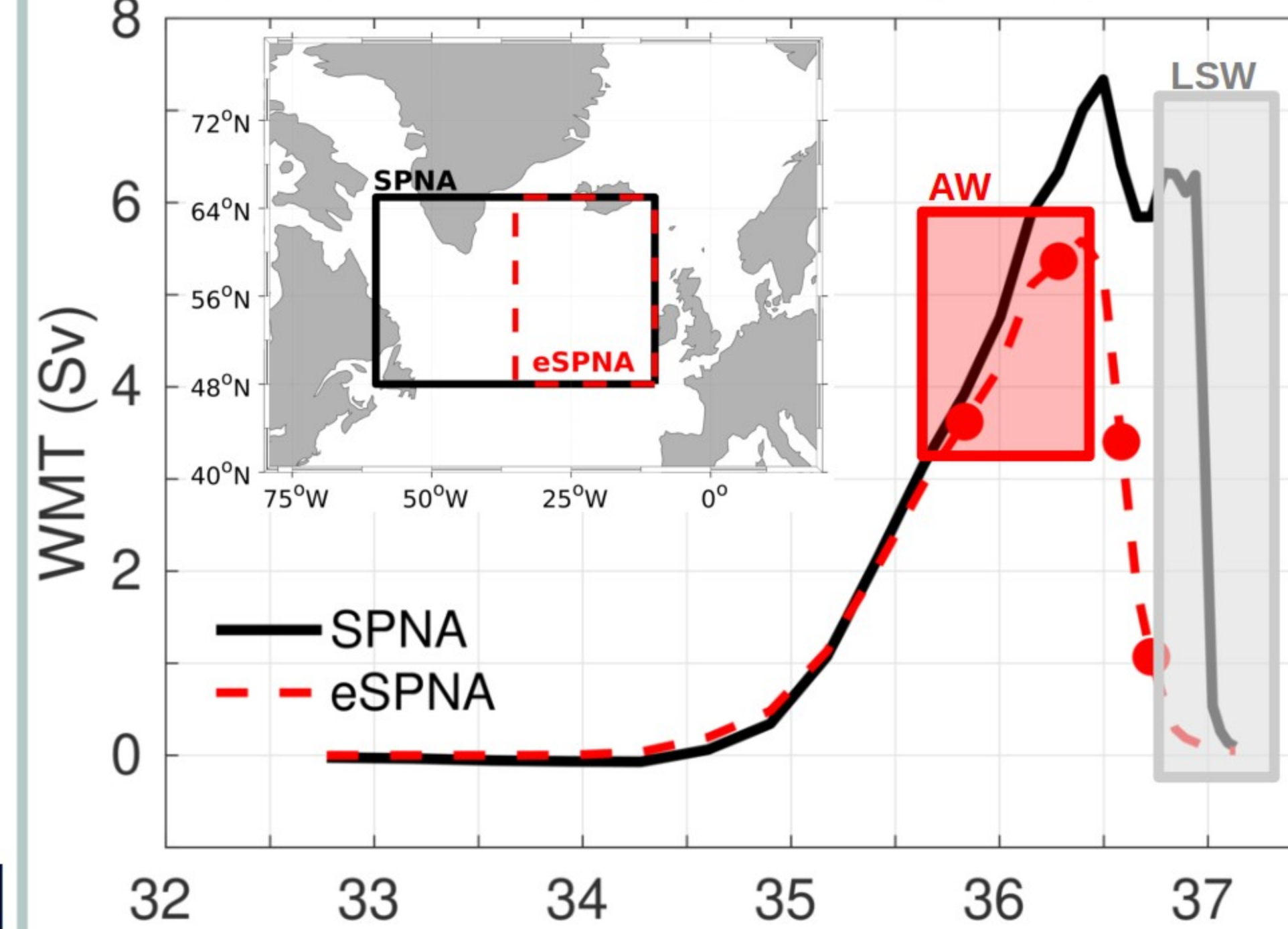
Main Goal

- Map water mass transformation based on Surface Buoyancy Fluxes in CMIP6 models;

- Investigate effects of water mass transformation in the SPNA on thermohaline anomalies propagating downstream into the Nordic Seas in CMIP6;

- Investigate the relation between the representation of water mass transformation and predictive skill in CMIP6;

Future Analysis

- Multi-model comparison with observation-based data;

- Investigate effects of the Subpolar North Atlantic on the Nordic Seas using Pacemaker-SPNA simulations;
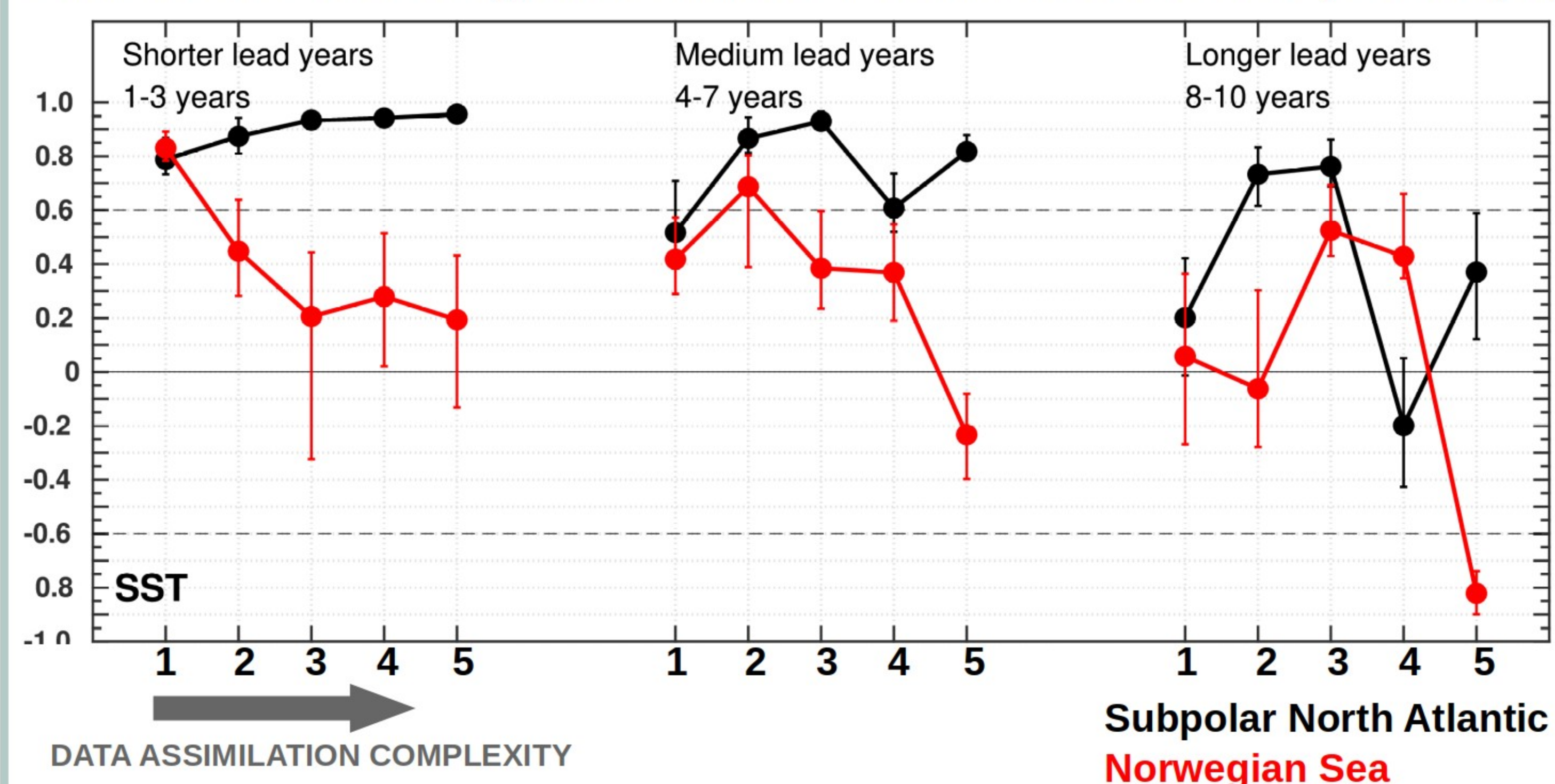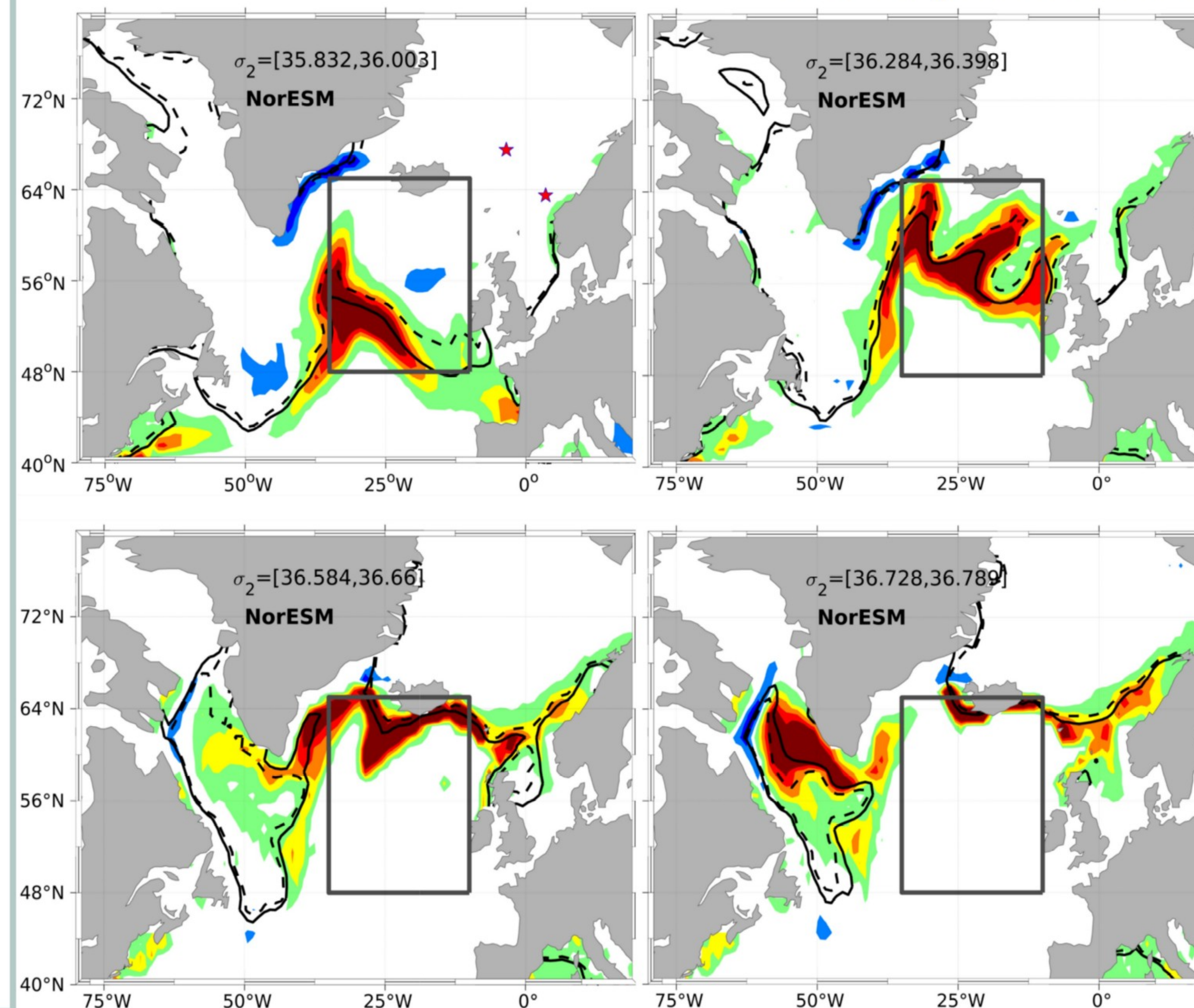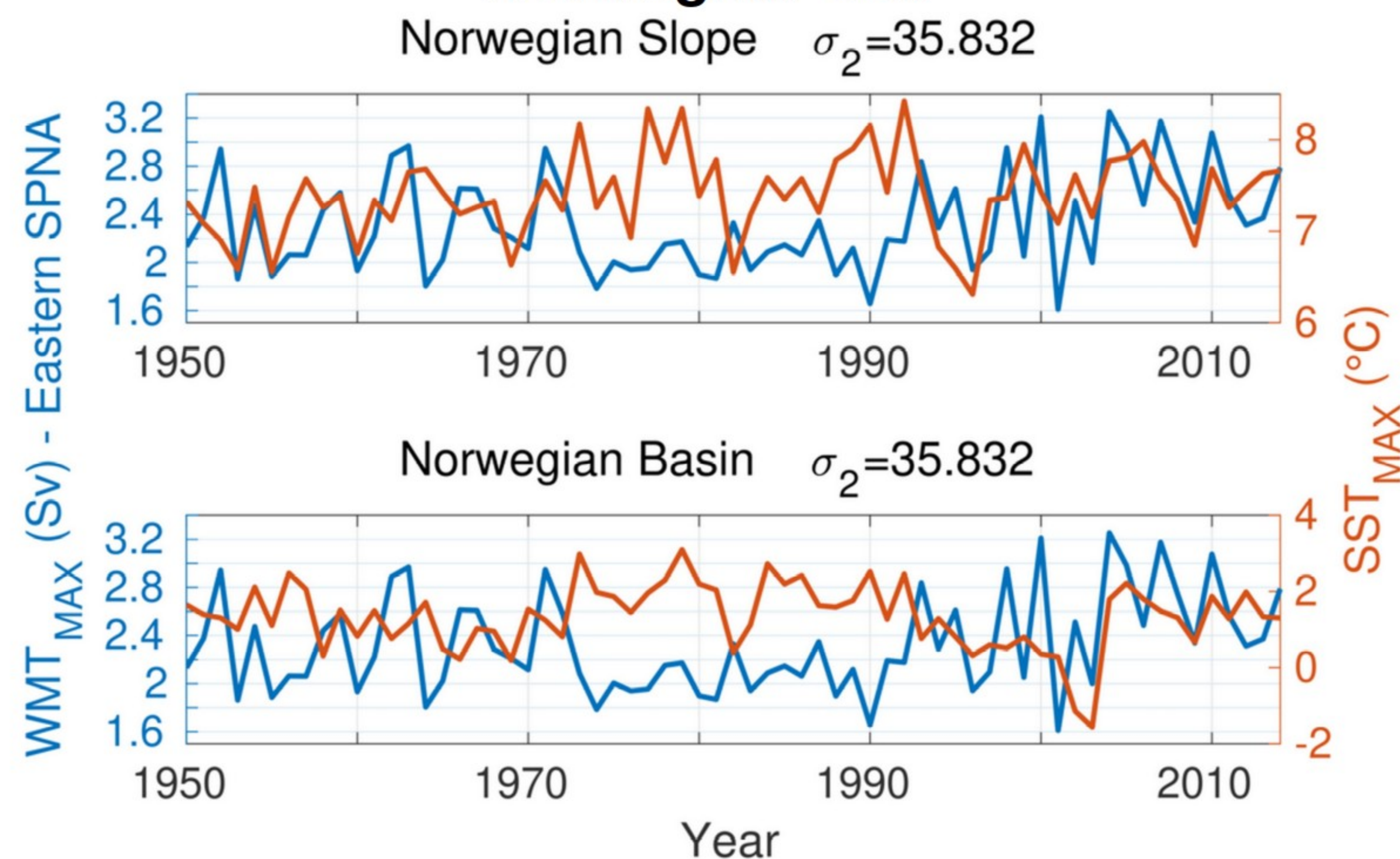

a)

Methodology

$$D = F_T + F_S$$

Density Flux

Thermal
$$F_T = \alpha \, C_w^{-1} \, Q_H$$

Haline
$$F_S = - \beta S \times Q_F$$

Preliminary analysis on WMT and SST in the Norwegian Sea

Norwegian Slope $\sigma_2 = 35.832$

Norwegian Basin $\sigma_2 = 35.832$

References (Main)
Brambilla et al., 2008: Subpolar Mode Water in the northeastern Atlantic: 2. Origin and transformation. *J.Geo. Res.*
Langehaug et al., 2012: Water mass transformation and the North Atlantic Current in three multicentury climate model simulations. *J. Geo. Res. Ocean*
Passos et al., *submitted*: Impact of initialization methods on the predictive skill in NorCPM - an Arctic-Atlantic case study.