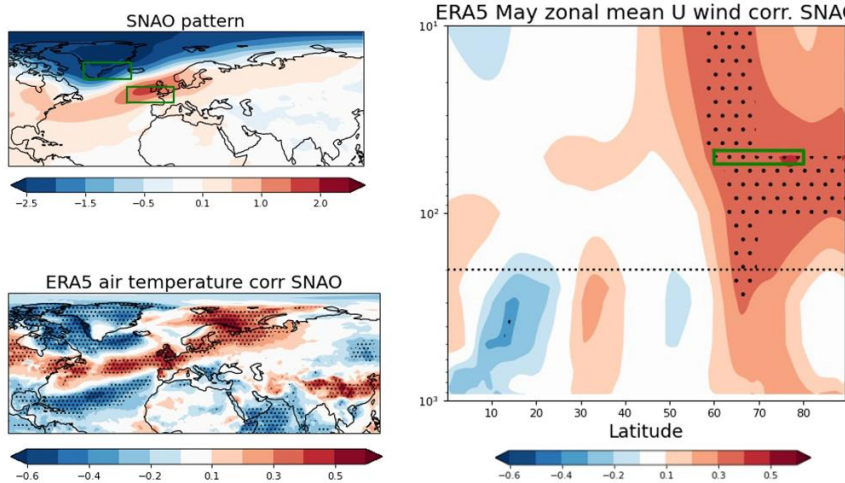


Announcement of a topic for:

Seminar Research **X**
Seminar Methods **X**
Master Theses X **X** (please mark one or more)

Topic	Quantifying the Influence of the Stratospheric Polar Vortex on Summer North Atlantic Oscillation and Its Impact on European Seasonal Predictions
Release Date	27.08.2024
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Description:	<p>Seasonal climate predictions for European summers are critical for various sectors, including agriculture, water management, and public health. However, current dynamical seasonal prediction systems often exhibit low skill, particularly in forecasting the Summer North Atlantic Oscillation (SNAO), a key driver of temperature and precipitation variability across Europe (1). Emerging research suggests that the springtime stratospheric polar vortex (SPV) may significantly influence the SNAO, thereby affecting summer climate temperature and precipitation (2). Despite these indications, the specific mechanisms and causal pathways are not well understood.</p> <p>Research Objectives</p> <p>This thesis aims to enhance the understanding and predictive skill of European summer climate by investigating the connection between spring SPV and the SNAO. The research will be conducted in two main parts:</p> <ol style="list-style-type: none"> 1. Quantification of the SPV and SNAO relationship in reanalysis: Causal inference techniques will be applied to ERA5 reanalysis data to quantify the influence of the spring SPV on the SNAO and its subsequent effects on European summer temperature and precipitation anomalies. This analysis will help identify periods where SNAO predictions can be made with higher confidence based on the state of the SPV. 2. Hindcast Skill Analysis with Ensemble Subsampling: Assess the predictive skill of European summer temperature and precipitation in the seasonal hindcast model SEAS5 by

	<p>selectively analysing ensemble members based on their SPV-SNAO relationship, following the approach described in Dobrynin et al. 2018 (3). This will test whether leveraging this relationship can enhance the accuracy of European summer predictions.</p> <div><p>Fig. 1: The SNAO and its links to boreal air temperature in the North Atlantic European region and the zonal mean u wind. The green box illustrates the region used to calculate the SPV index in May. Adapted from 1.</p></div>
Literature:	<ol style="list-style-type: none">1) Folland, Chris K., et al. "The summer North Atlantic Oscillation: past, present, and future." <i>Journal of Climate</i> 22.5 (2009): 1082-1103.2) Dunstone, Nick, et al. "Skilful predictions of the summer North Atlantic Oscillation." <i>Communications Earth & Environment</i> 4.1 (2023): 409.3) Dobrynin, Mikhail, et al. "Improved teleconnection-based dynamical seasonal predictions of boreal winter." <i>Geophysical Research Letters</i> 45.8 (2018): 3605-3614.