



SPECS highlights

Research on teleconnections at BSC

DANAE project

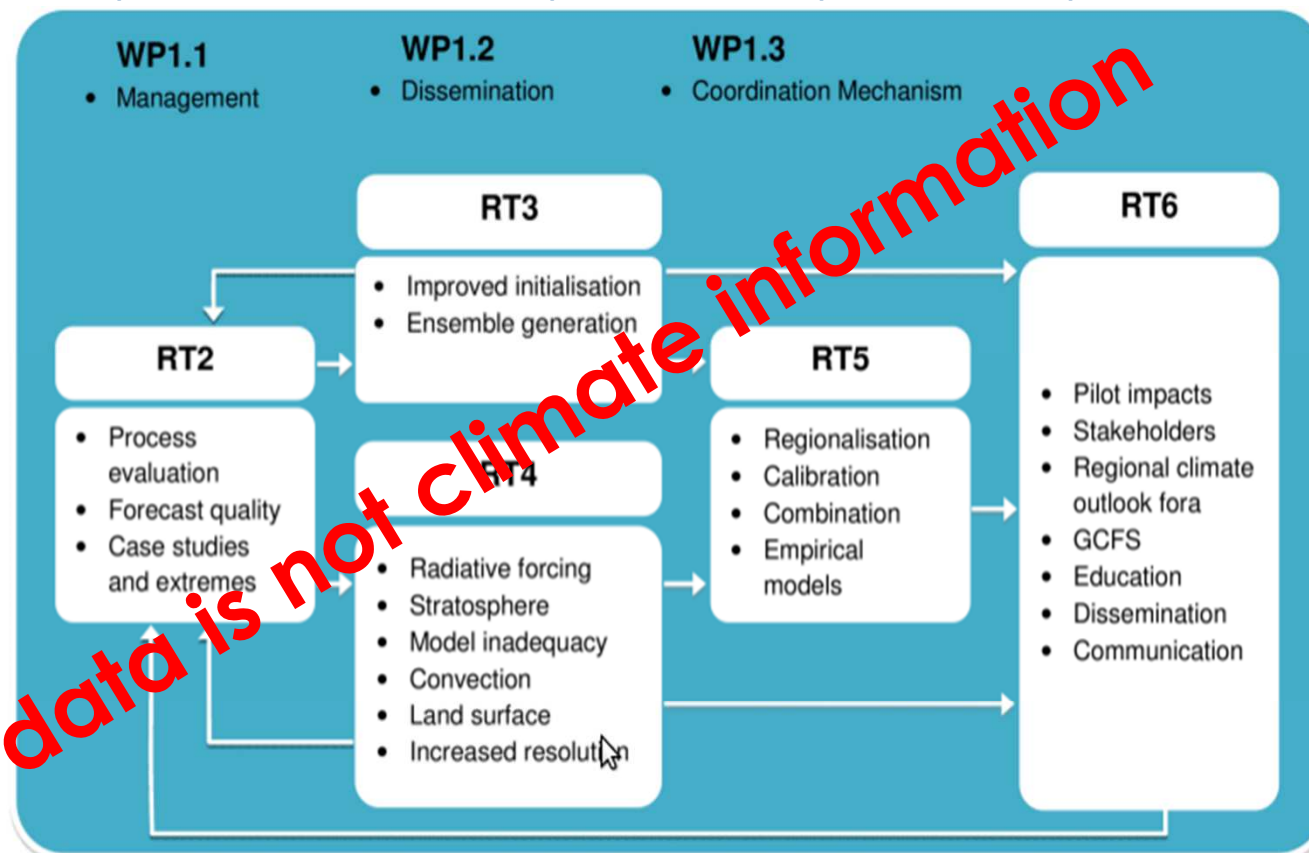
J. García-Serrano (BSC-ES)

with contributions from CPG, ESS,
Rein Haarsma (KNMI), Ileana Bladé (UB)

SPECS overview

Strong links to EUPORIAS, but also NAACLIM, IS-ENES2, PREFACE, ...

Forecast System	Project Partners
CNRM-CM5	CNRM, CERFACS
EC-Earth	KNMI, SMHI, BSC, ENEA
IFS/NEMO	ECMWF, UOXF
IPSL-CM5	CNRS
MPI-ESM	MPG, Uni-H
UM	UKMET



WP1.1: Management

WP1.2: Dissemination

WP1.3: Coordination across EUPORIAS, NAACLIM & SPECS

RT2: Evaluation of current s2d forecast systems

RT3: Forecast strategies

RT4: Improved systems

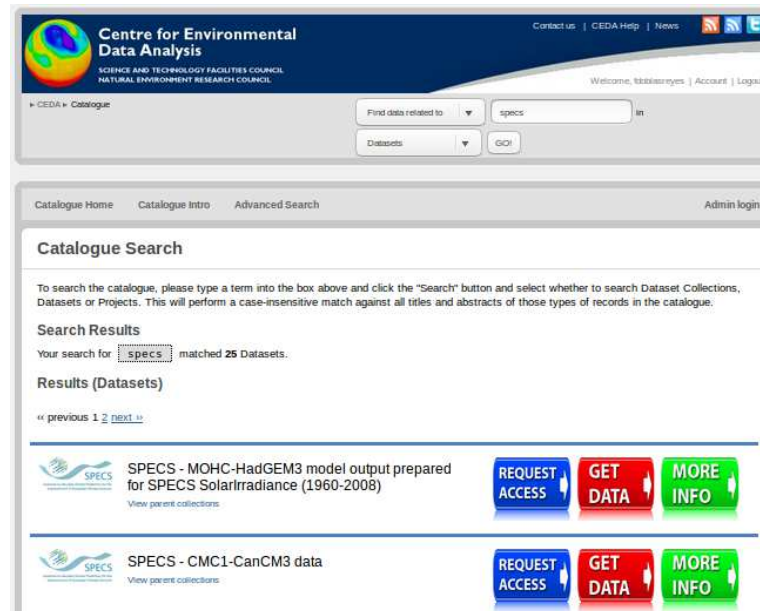
RT5: Calibrated predictions at the local scale

Coordinated experiments

Tenths of climate prediction experiments, seven models, with different configurations and parameterisations

Focus on both skill improvements and processes (case studies)

130 TB of output (and growing), most of it available from ESGF (a primer in climate prediction), curated in the long term



Centre for Environmental Data Analysis
SCIENCE AND TECHNOLOGY FACILITIES COUNCIL
NATURAL ENVIRONMENT RESEARCH COUNCIL

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Your search for matched 25 Datasets.

Results (Datasets)

« previous 1 2 next »

 SPECS - MOHC-HadGEM3 model output prepared for SPECS SolarIrradiance (1960-2008)
[View parent collections](#) [REQUEST ACCESS](#) [GET DATA](#) [MORE INFO](#)

 SPECS - CMC1-CanCM3 data
[View parent collections](#) [REQUEST ACCESS](#) [GET DATA](#) [MORE INFO](#)

Data management and experiment documentation are fundamental. They shouldn't be underestimated

Open access tools

Portals are useful, but open access tools allow to go beyond what is initially considered by portal developers

The packages created in SPECS can be better adapted to address specific problems in an interaction with the users

SpecsVerification: Forecast Verification Routines for the SPECS FP7 Project

A collection of new forecast verification routines for the SPECS FP7 project. The emphasis is on comparative verification of ensemble forecasts.

Version: 0.4-1
 Published: 2015-10-23
 Author: Stefan Siegert [aut, cre]
 Maintainer: Stefan Siegert <s.siegert at exeter.ac.uk>
 License: [GPL-2](#) | [GPL-3](#) [expanded from: GPL (≥ 2)]
 NeedsCompilation: yes
 CRAN checks: [SpecsVerification results](#)

Downloads:

Reference manual: [SpecsVerification.pdf](#)
 Package source: [SpecsVerification_0.4-1.tar.gz](#)
 Windows binaries: r-devel: [SpecsVerification_0.4-1.zip](#), r-release: [SpecsVerification_0.4-1.exe](#)
 OS X Mavericks binaries: r-release: [SpecsVerification_0.4-1.tgz](#), r-oldrel: [SpecsVerification_0.4-1.tgz](#)
 Old sources: [SpecsVerification archive](#)

Reverse dependencies:

Reverse depends: [easyVerification](#)
 Reverse imports: [s2dverification](#)

Linking:

Please use the canonical form <https://CRAN.R-project.org/package=SpecsVerification>

s2dverification: Set of Common Tools for Forecast Verification

Set of tools to verify forecasts through the computation of typical prediction scores against one or more observational datasets or reanalyses (a reanalysis being a physical extrapolation of observations that relies on the equations from a model, not a pure observational dataset). Intended for seasonal to decadal climate forecasts although can be useful to verify other kinds of forecasts. The package can be helpful in climate sciences for other purposes than forecasting.

Version: 2.5.0
 Depends: R (≥ 2.14.1), methods, [maps](#)
 Imports: [ncdf4](#), [GEOmap](#), [geomapdata](#), [mapproj](#), [abind](#), parallel, [bigmemory](#), [SpecsVerification](#), [plyr](#)
 Suggests: [easyVerification](#)
 Published: 2016-02-17
 Author: Virginie Guemas [aut], Nicolau Manubens [aut, cre], Louis-Philippe Caron [aut], Verónica Torralba [aut], Chloé Prodhomme [aut], Martin Ménégos [aut], Javier Garcia-Serrano [aut], Fabian Lienert [aut], Ludovic Auger [aut], Isabel Andreu-Burillo [aut]
 Maintainer: Nicolau Manubens <nicolau.manubens at bsc.es>
 BugReports: <https://earth.bsc.es/gitlab/es/s2dverification/issues>
 License: [GPL-3](#)
 URL: <https://earth.bsc.es/gitlab/es/s2dverification/wikis/home>
 NeedsCompilation: no
 SystemRequirements: cdo
 CRAN checks: [s2dverification results](#)

SantanderMetGroup / **downscaleR**

R package for statistical downscaling

4 branches, 25 releases, 7 contributors

Find file Clone or download

Latest commit c90882d 2 days ago

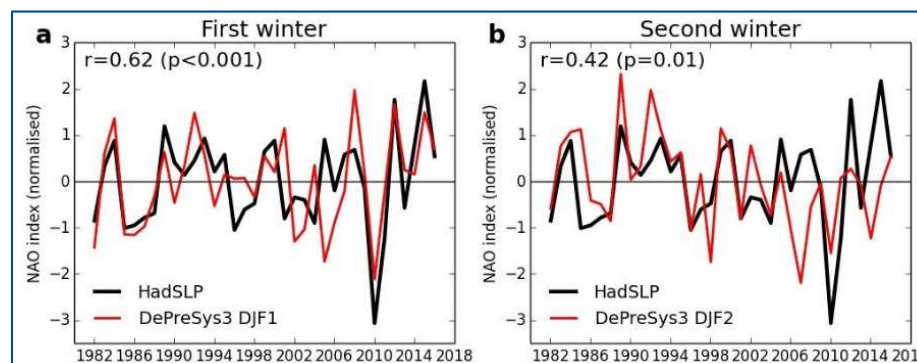
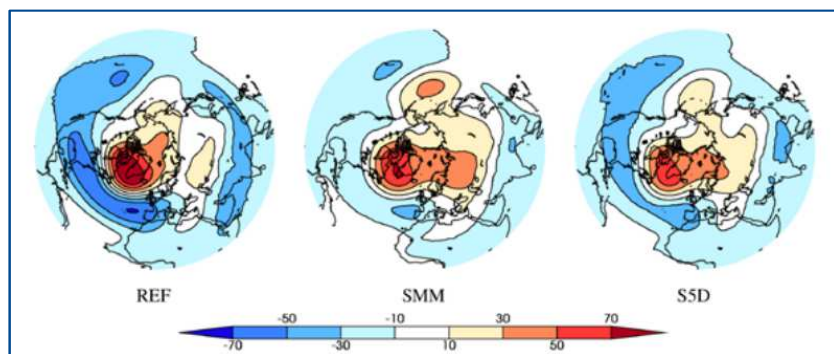
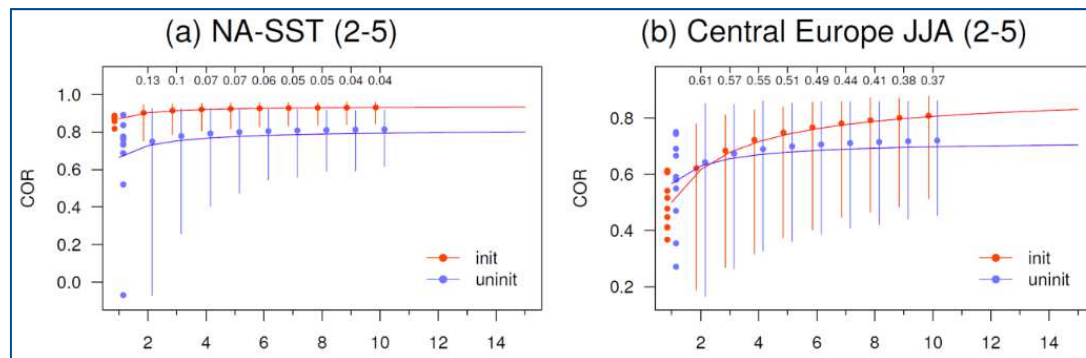
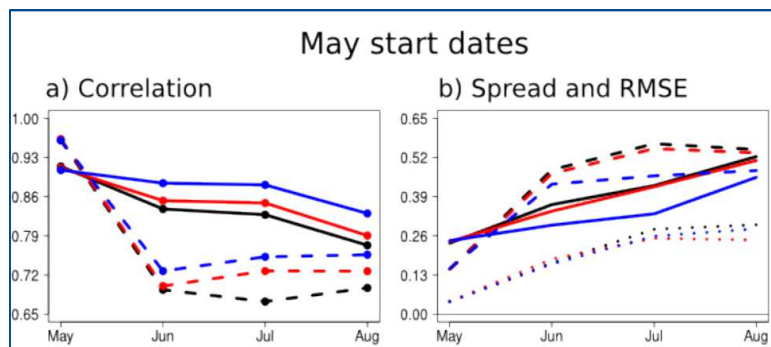
- in biasCorrection when applying the "delta" method and cross ... 2 days ago
- plotClimatology for lattice plots 4 months ago
- changes in subsetGrid and man-roxygen/templateObsPredSim 6 months ago
- date 12 days ago
- ignore update 2 years ago
- DESCRIPTION 12 days ago
- date 12 days ago
- date 16 days ago
- in README file 12 days ago

There is no magic recipe, users should be accompanied to make an efficient use of these tools

Some results...

Improvements in the resolution, vegetation treatment, stochastic parameterisations, initialisation, sampling (ensemble and hindcast size), ...

Improvements in forecast quality are found, but statistical significance is an issue



Improving the forecast systems takes long time; need to focus on those aspects that have a stronger impact for a wide range of users (e.g. NAO)

www.bsc.es



**Barcelona
Supercomputing
Center**

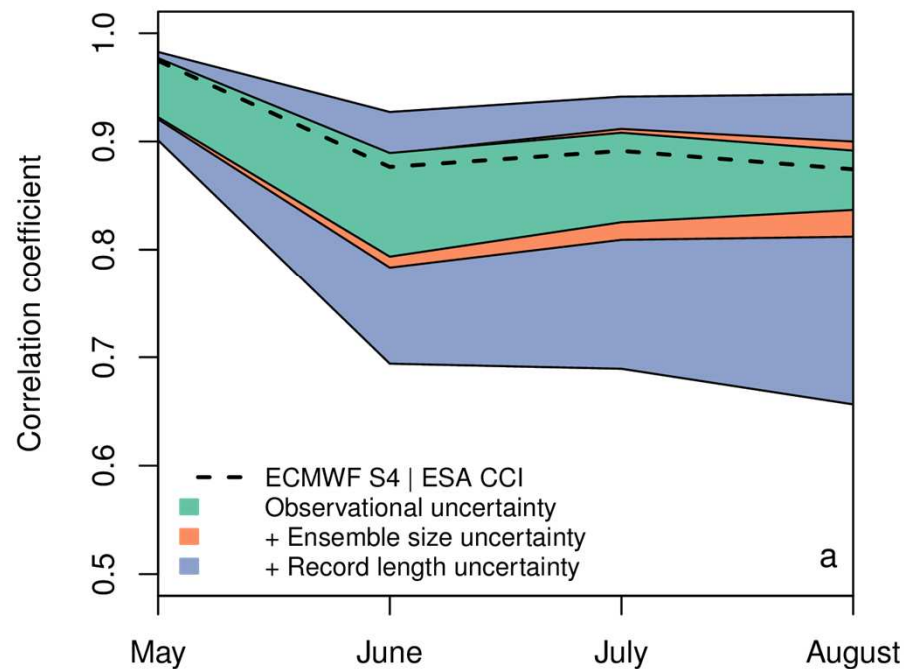
Centro Nacional de Supercomputación



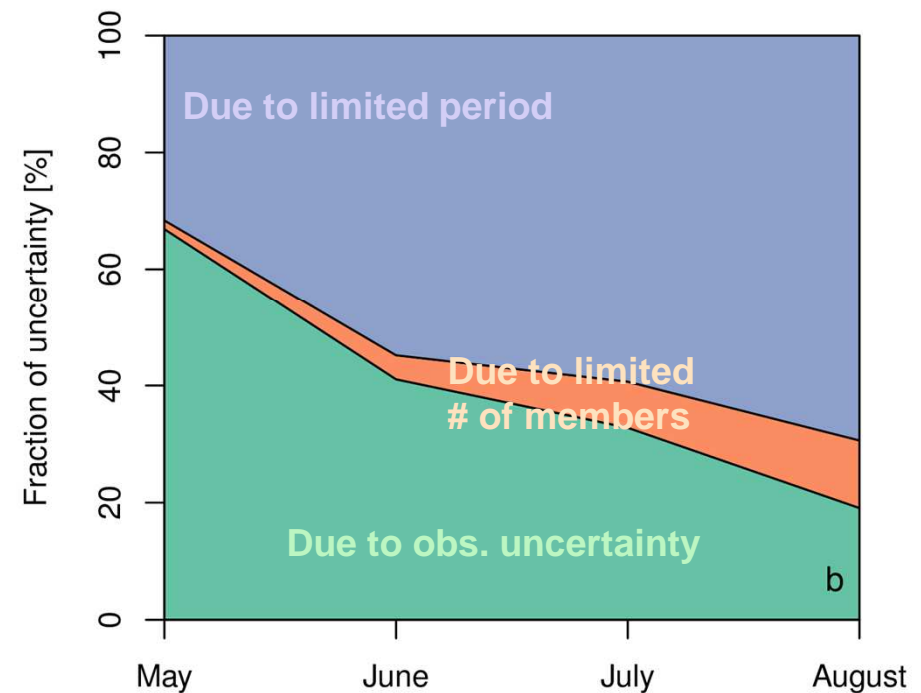
Research at BSC

- Ensemble forecast: ECMWF's S4
- Verification product: ESA-CCI
- Uncertainty envelopes estimated by bootstrapping

Prediction skill ENSO

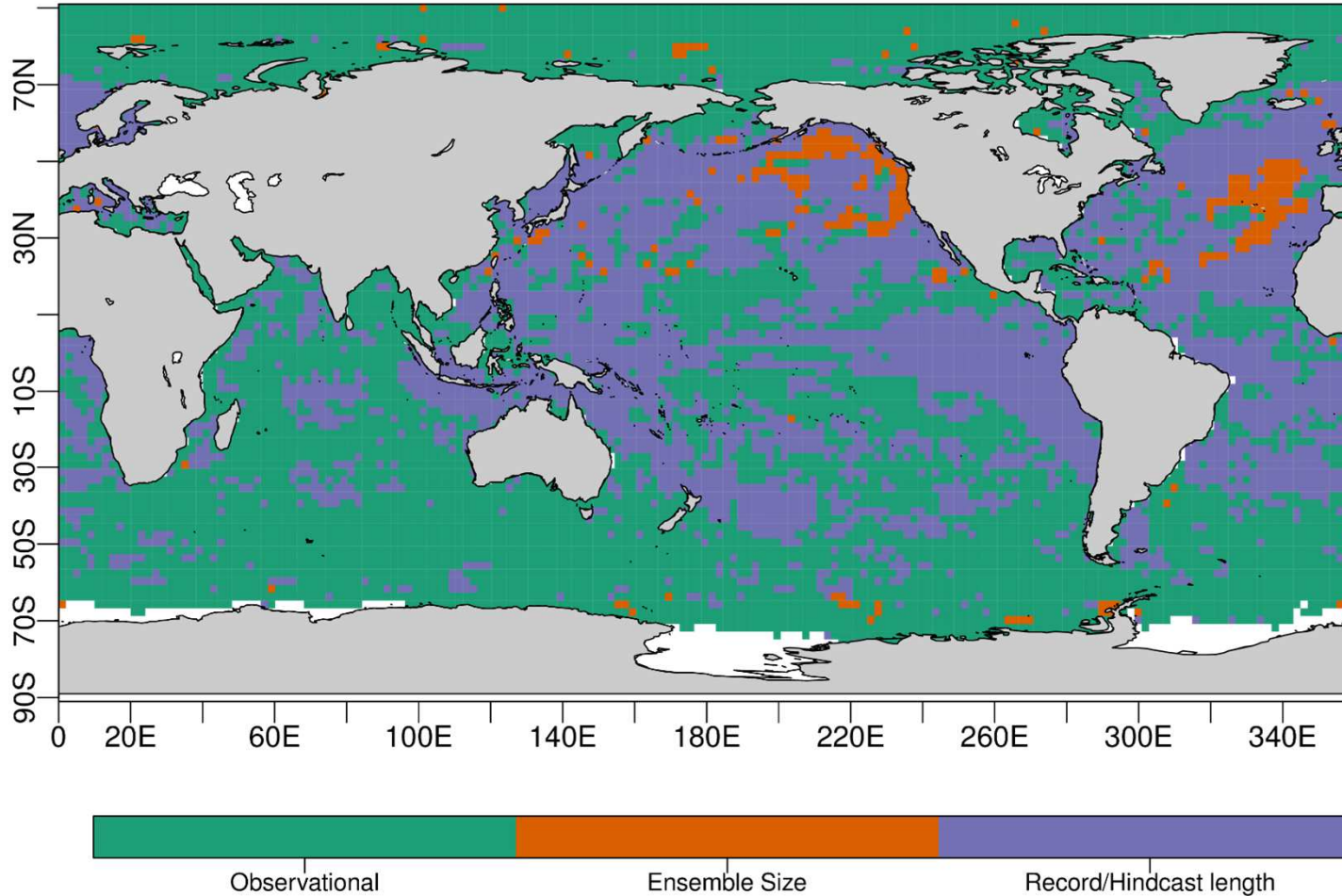


Correlation Uncertainty ENSO



Observational uncertainty accounts for 20-60% of total uncertainty in skill score!

Dominating source of verification uncertainty



The verification of SST forecasts is limited by observational uncertainty at high latitudes

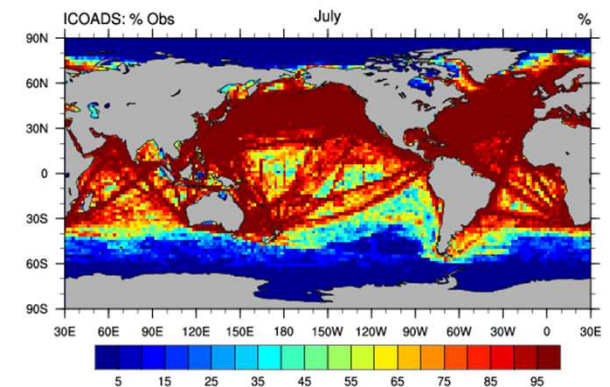
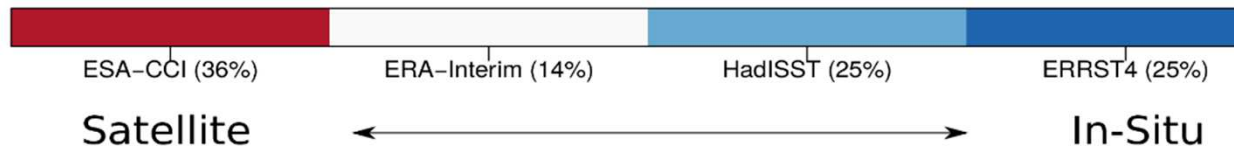
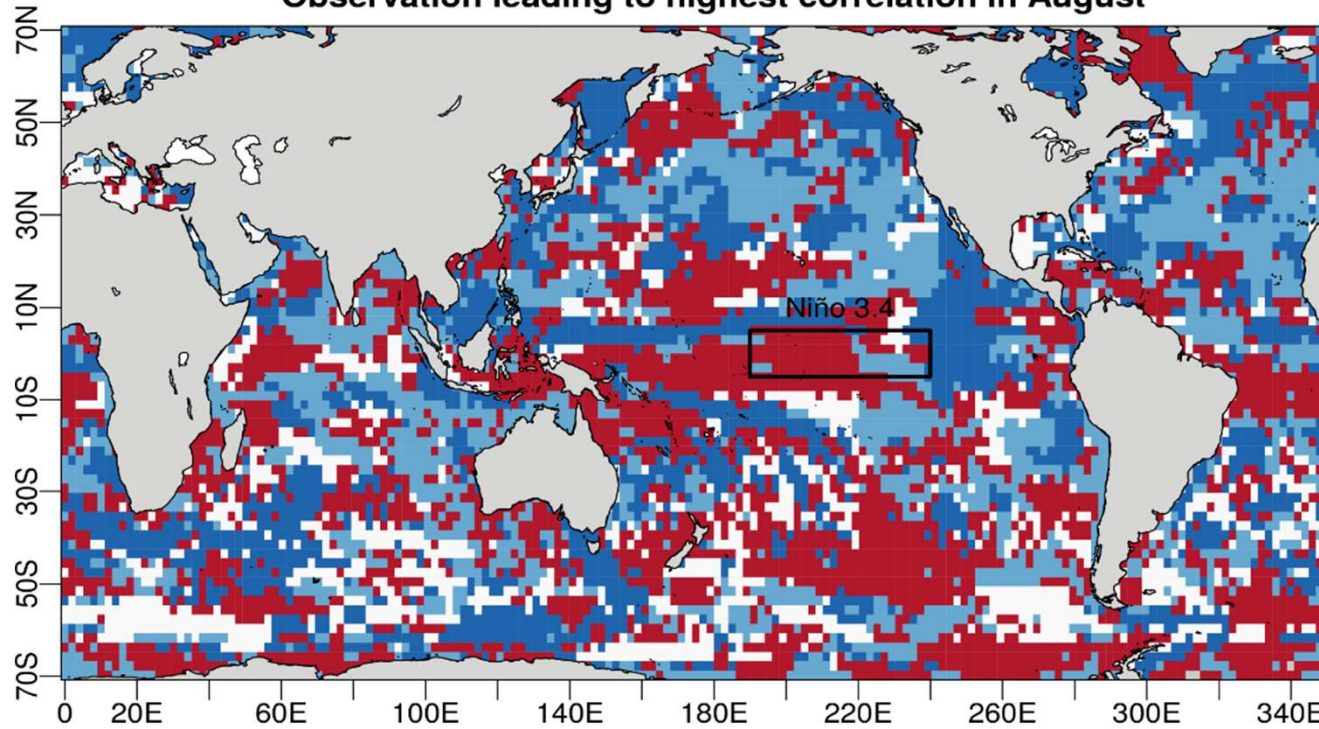
Uncertainty in (seasonal) forecast verification



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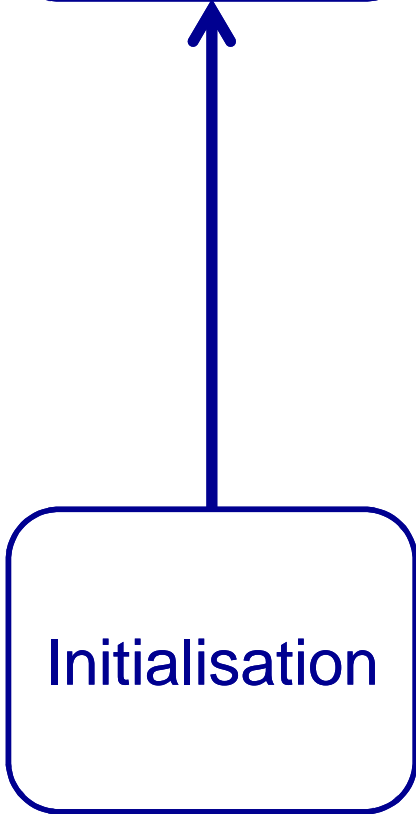


Observation leading to highest correlation in August

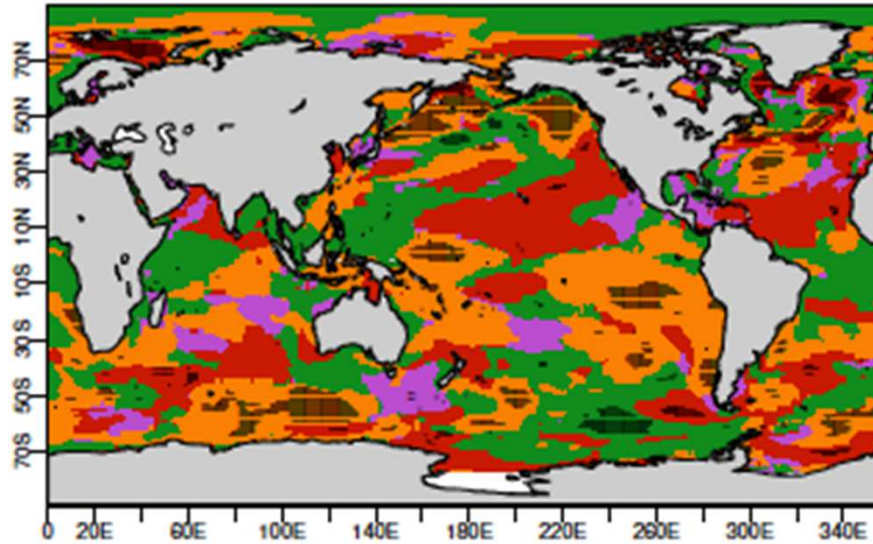


Massonnet et al. (2016, Science)

Climate
model



Initialisation



**Minimum RMSE
of the SST for the
forecast yrs 2-5,
get with different
initialisation**

Volpi et al. (2016, ClimDyn)

FFI

Full Field initialisation

OSI-AI

Ocean-Sea-Ice Anomaly initialisation

ρ -OSI-wAI

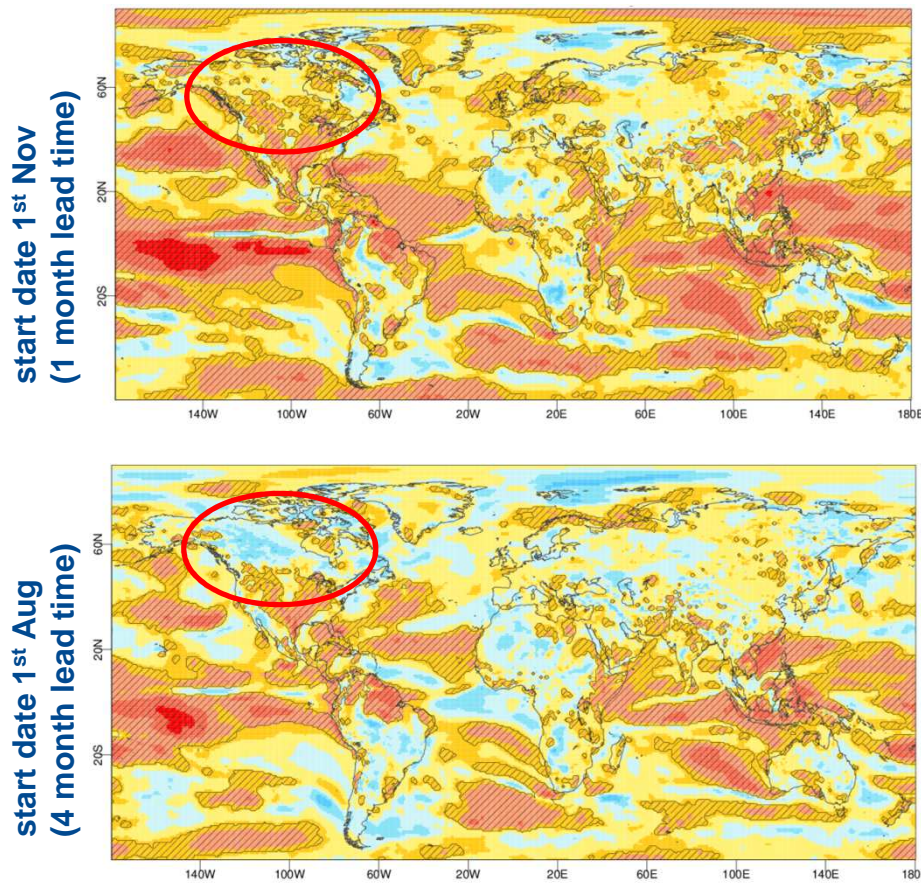
OSI weighted anomalies

NOINI

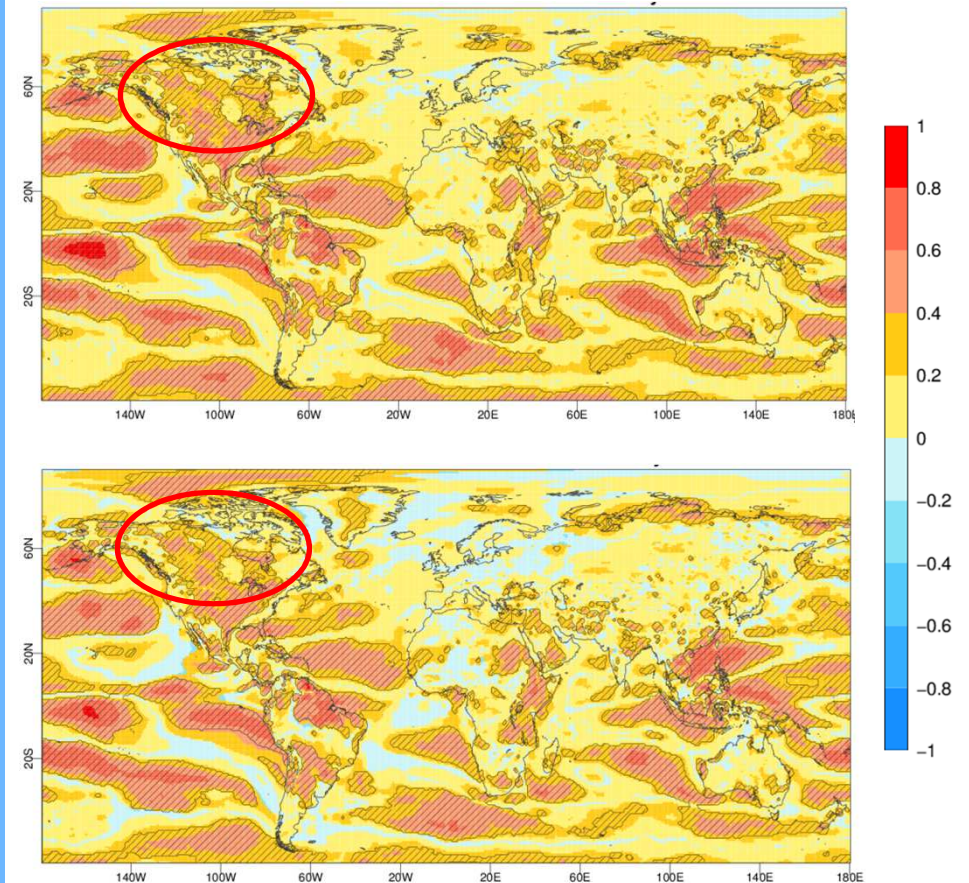
No Initialisation

Ensemble mean correlation: ECMWF S4 and ERA-Interim DJF season (1981-2015)

ECMWF S4 predicted 10m wind speed

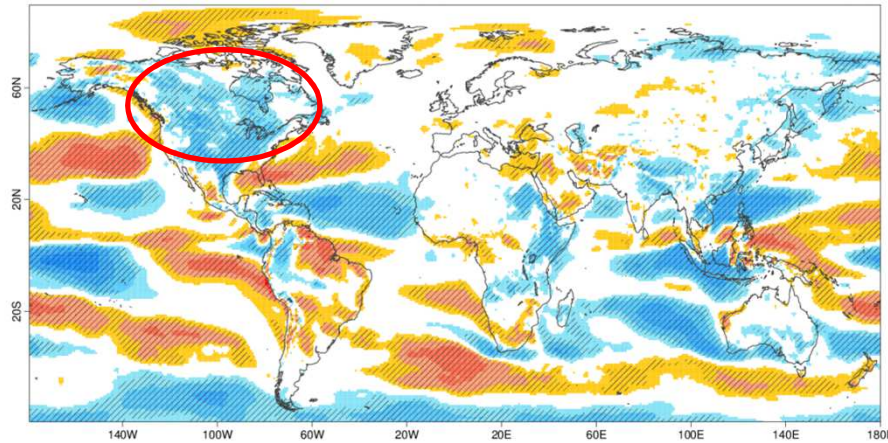


10m wind speed from ECMWF S4 predicted Niño3.4 index

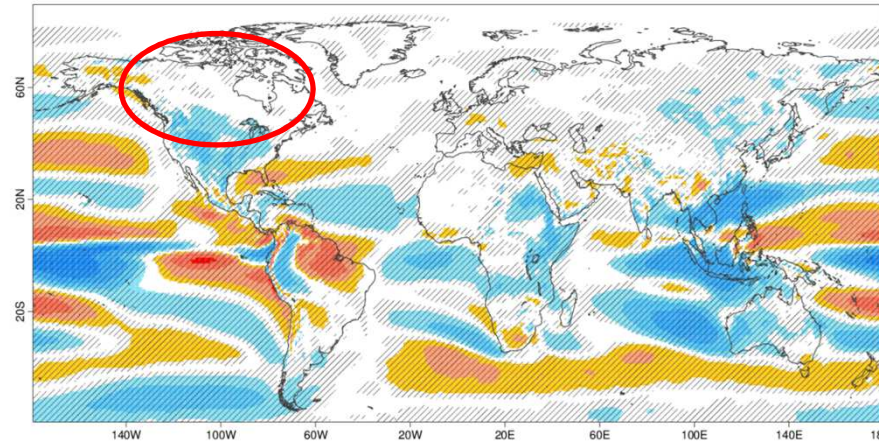


One-point correlation maps: Niño3.4 index and 10m wind speed DJF season (1981-2015)

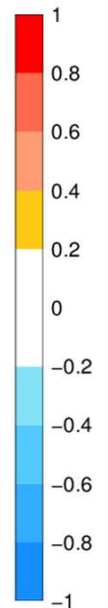
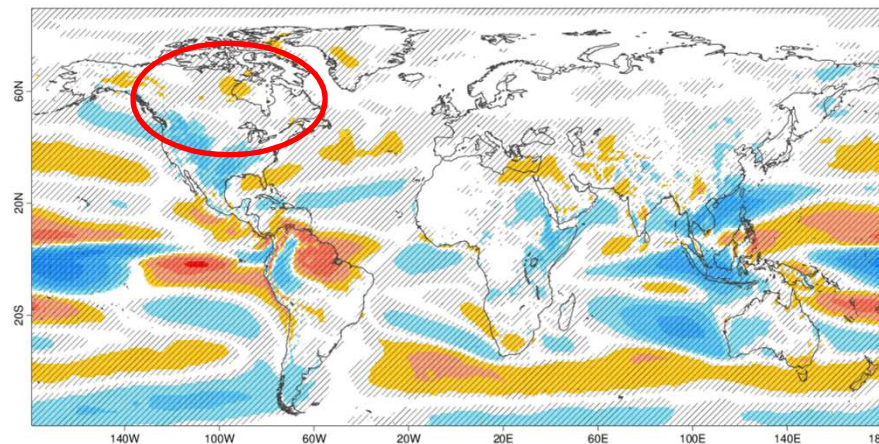
ERA-Interim



ECMWF S4, start date 1st Nov (1 month lead time)



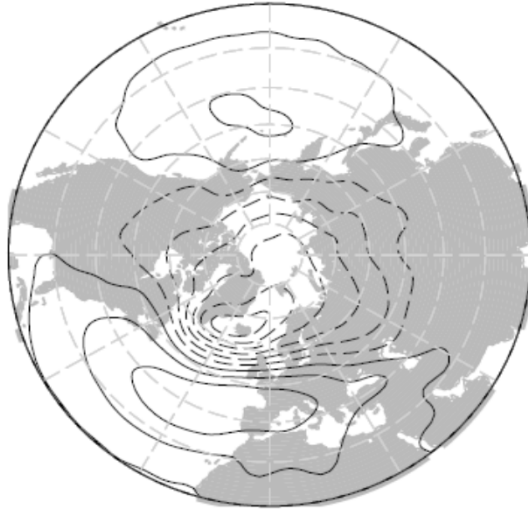
ECMWF S4, start date 1st Aug (4 month lead time)



On the hemispheric scale of the winter NAO

AO

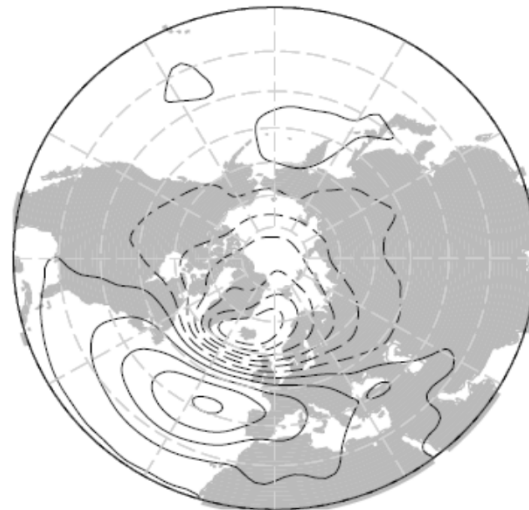
NH



(JFM, 1958-1999; Thompson et al. 2003)

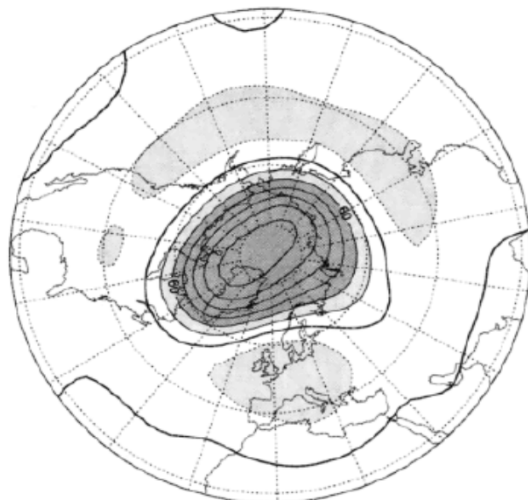
NAO

NH (Euro-Atlantic sector only)

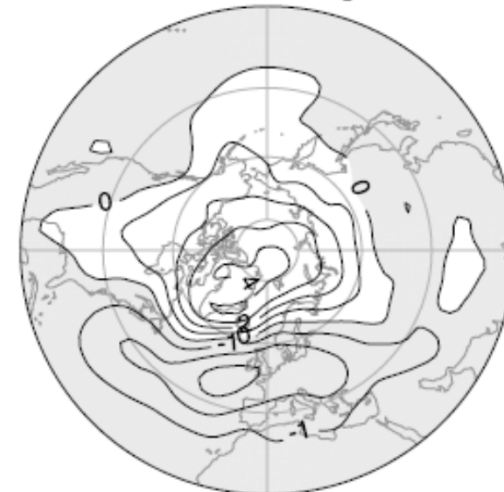


NAM at 50hPa

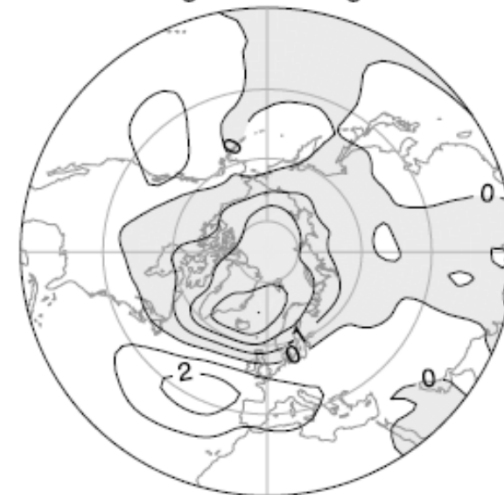
(Z50; Baldwin et al. 1994)



a Weak Vortex Regimes



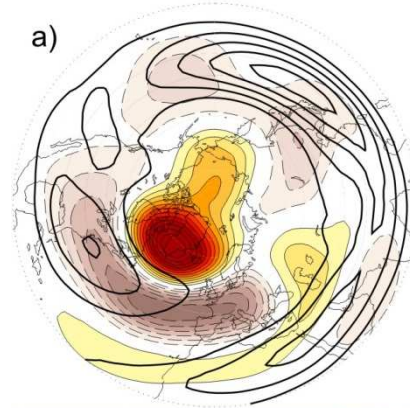
b Strong Vortex Regimes



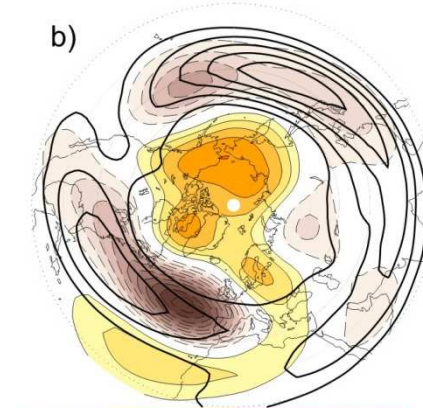
(SLP; Baldwin and Dunkerton 2001)

NAO/CWP
paradigm

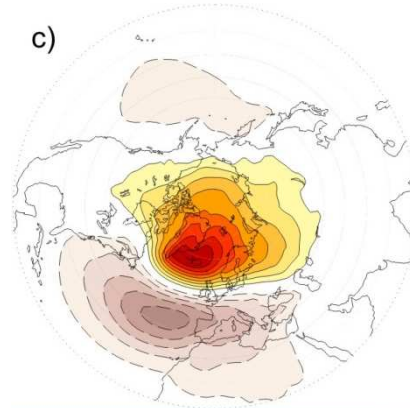
NAO x Z300 / ERA40 (JF)



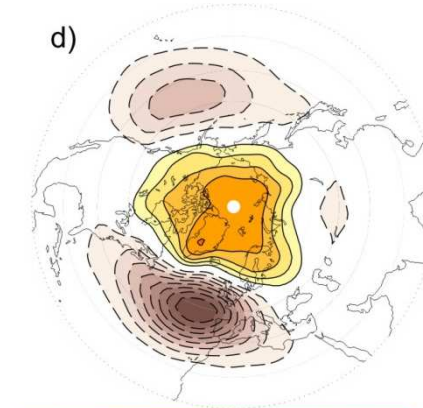
NAO x Z300 / SPEEDO (JF)



NAO x SLP / ERA40 (JF)



NAO x SLP / SPEEDO (JF)



winter NAO has a distinct global signature at upper-tropospheric levels
(Branstator 2002)

SPEEDY (e.g. Haarsma and Hazeleger 2007)

intermediate complexity AGCM

no stratosphere

T30 (96 lon x 48 lat)

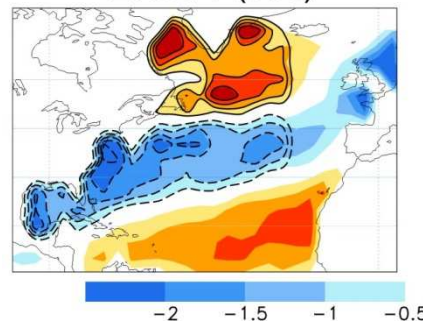
L7 (925, 850, 700, 500, 300, 200, 100)

200-member, 30-day long CTL + EXP (NAO+, NAO-)

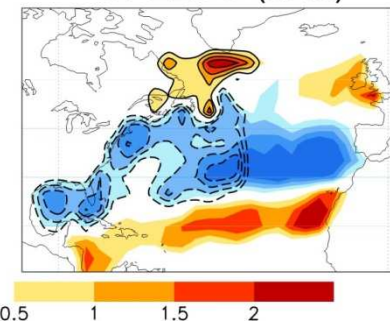
NAO/CWP
paradigm

[vs. *EC-EARTH3.2 T255L91*]

e) boundary conditions
ERSST (obs)

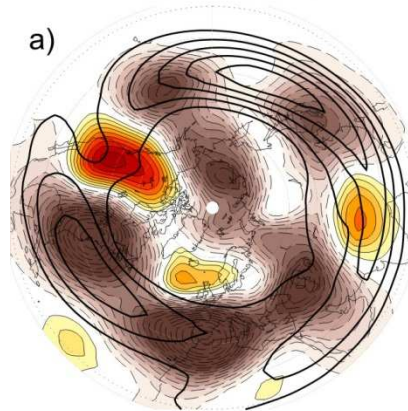


f) boundary conditions
SPEEDO (mod)

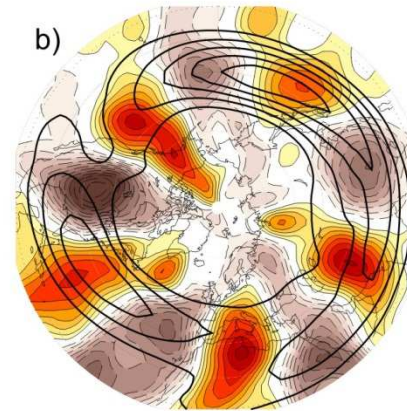


quasi-equilibrium, non-linear stage

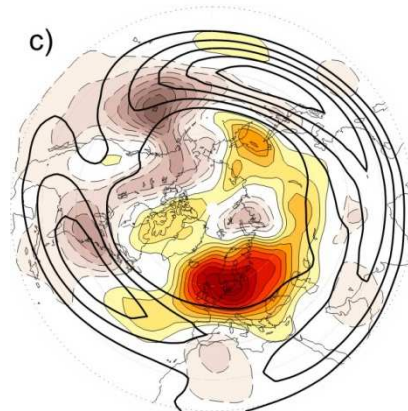
Z300 (15-30 days)



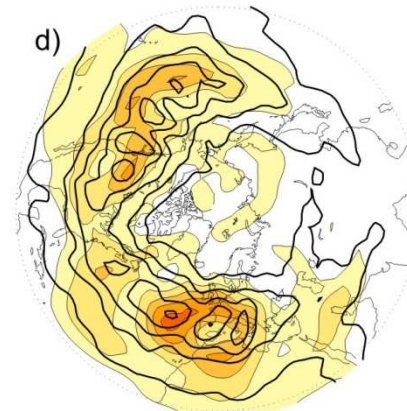
V300 (15-30 days)



Z925 (15-30 days)



PKE300 (15-30 days)

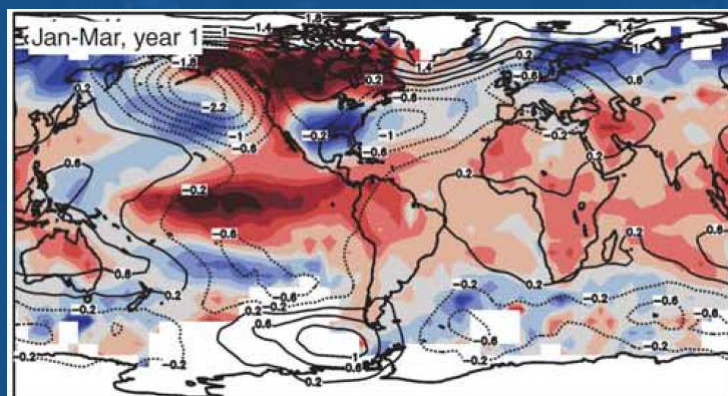


DANAE

“Dynamics And predictability of the ENSO teleconnection in the NAE region”

ref. CGL2015-68342-R / 146.400€

I. Bladé (UB), R. Haarsma (KNMI), T. Ambrizzi (USP), D. Matei (MPI),
A. de la Cámara (NCAR), M. Ábalos (NCAR)
+ 1 Postdoc / + 1 PhD



(Brönnimann 2007)

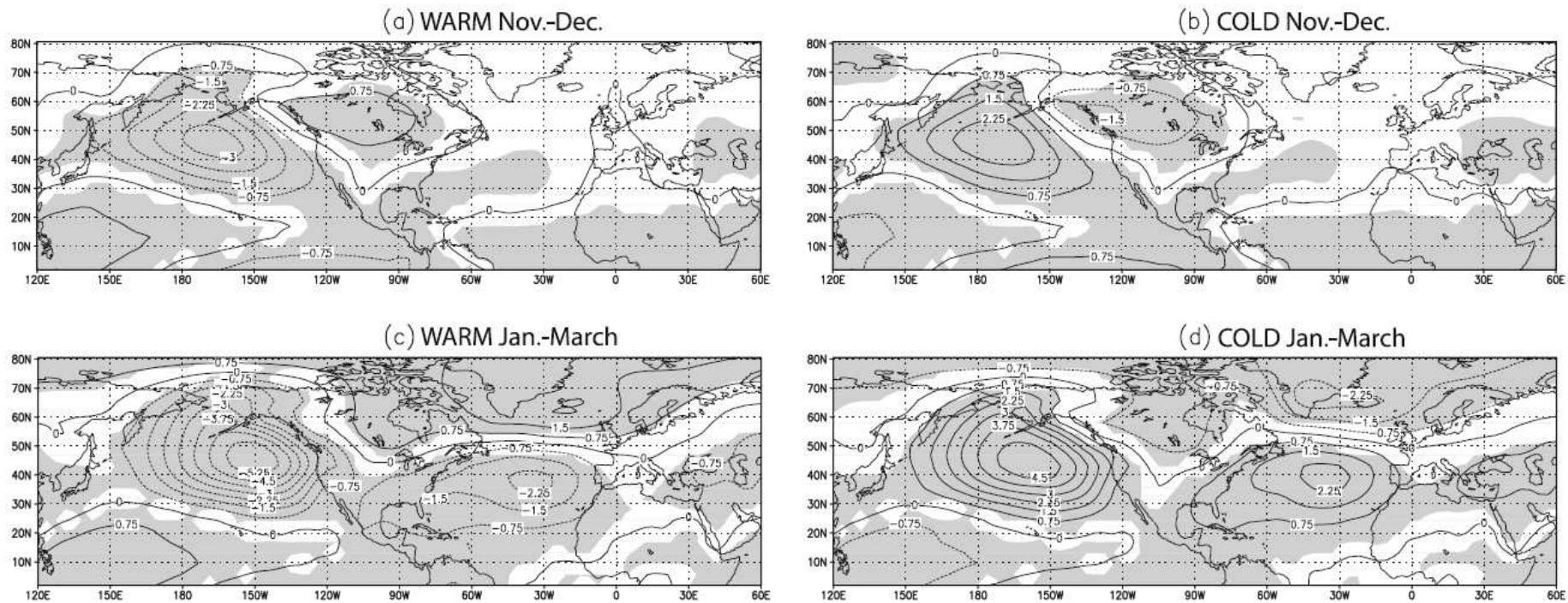
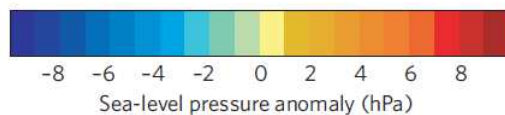
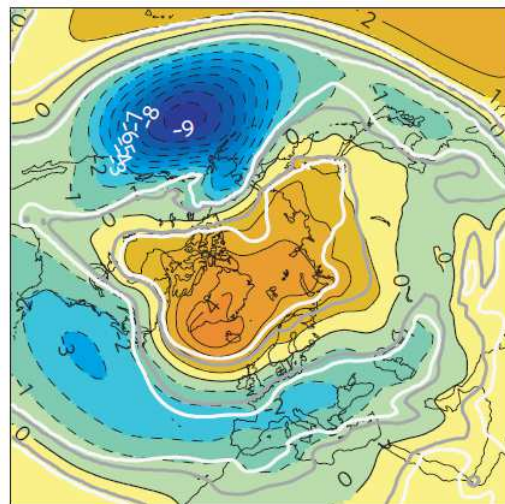
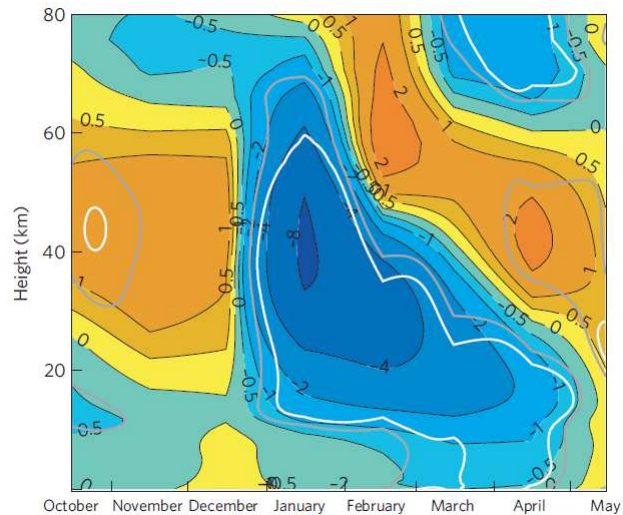
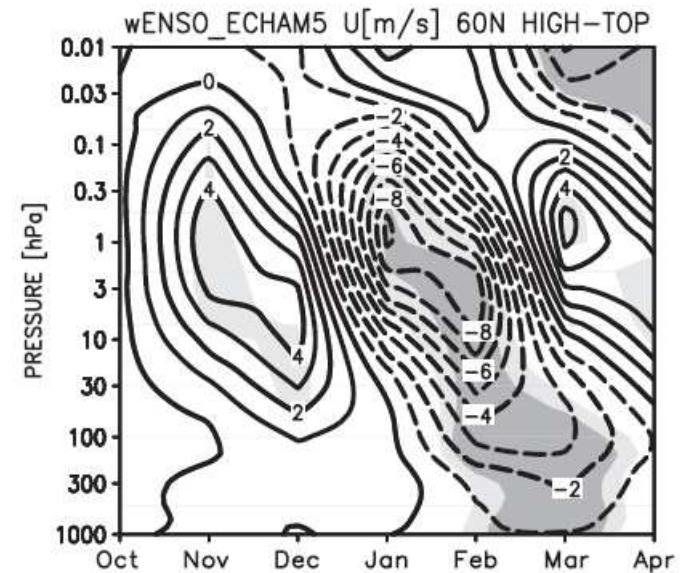
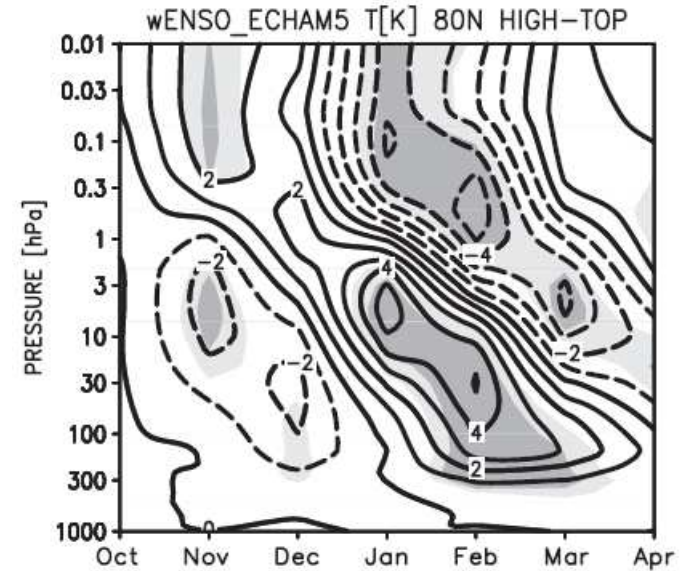


Figure 1. Mean sea level pressure anomaly (SLPA) (in hPa) in (a, b) November–December and (c, d) January–March during warm (Figures 1a and 1c) and cold (Figures 1b and 1d) ENSO events, respectively defined as Niño3 sea surface temperature anomalies (SSTA) $> 1\text{C}$ and $< -1\text{C}$. Positive (negative) SLPA are displayed as full (dashed) lines and shading indicates significant values at two-sided 10% significance level according to a Student’s t-test (the null hypothesis is that the difference between the cold and warm ENSO samples and the long-term mean is zero). SLPA and SSTA are high-pass filtered by removing all frequencies < 0.1 cycle-per-year before the analysis.

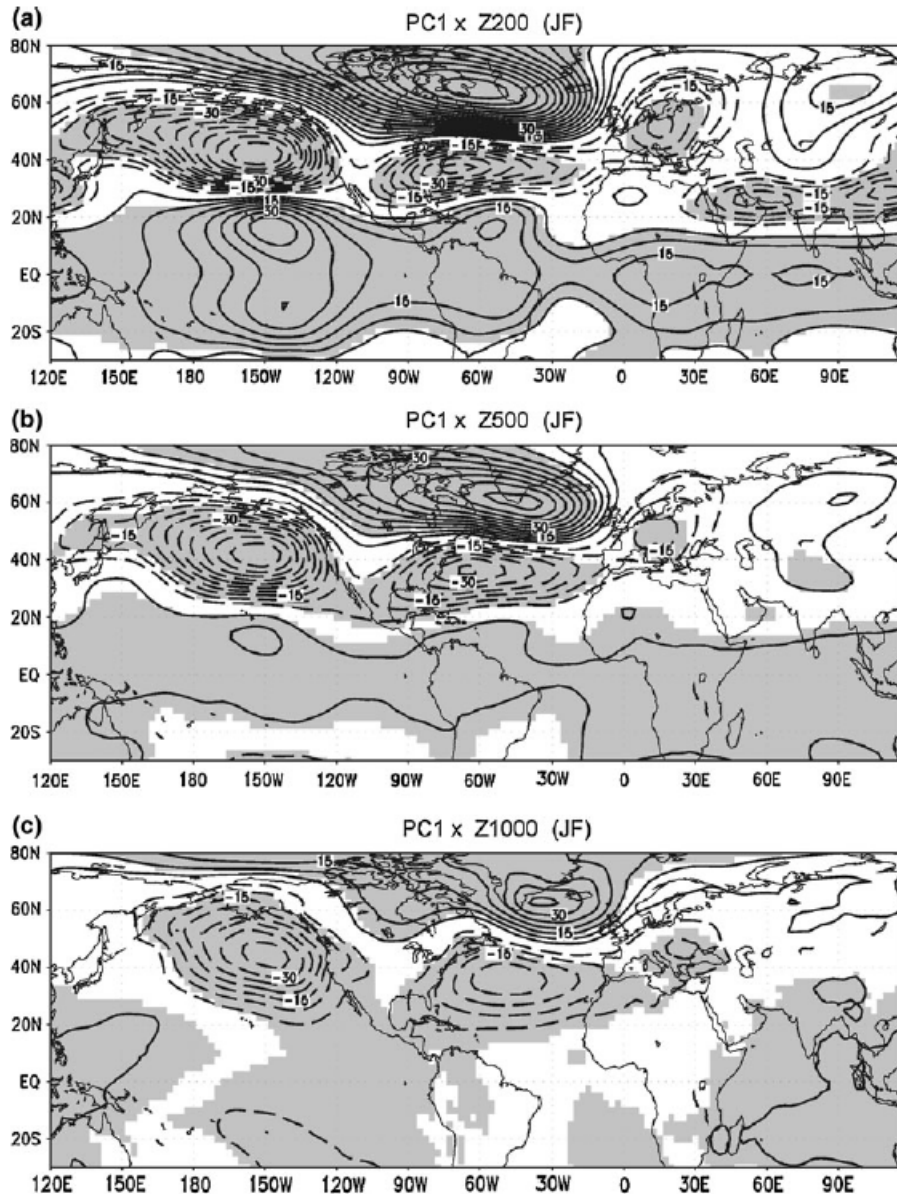
ENSO teleconnection to NAE mid/late-winter



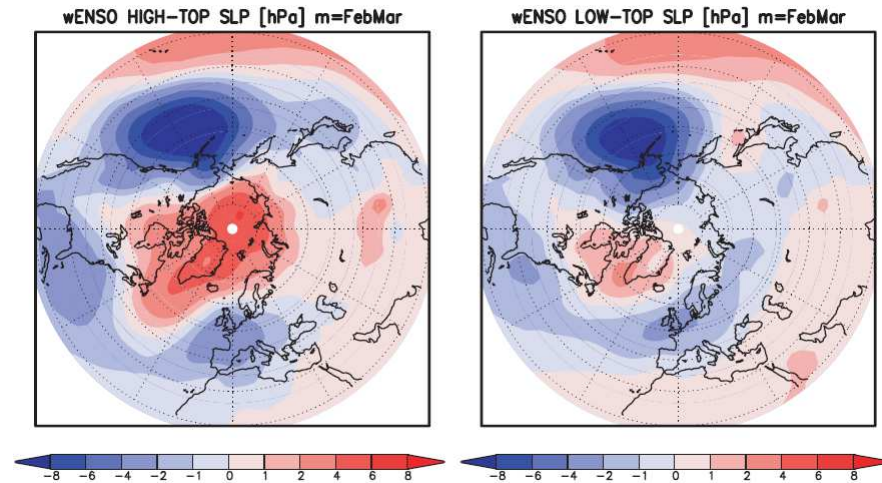
Ineson and Scaife (2009, Nat.Geo)



Cagnazzo and Manzini (2009, JCLIM)



García-Serrano et al. (2011, ClimDyn)



Cagnazzo and Manzini (2009, JCLIM)

- tropospheric pathway in JF?, which can explain the intraseasonal timing of the ENSO teleconnection (Bladé et al. 2008) at surface and in the polar vortex
- stratospheric pathway in FM?, acting as a positive feedback, helping the SLP anomaly to persist into early-spring



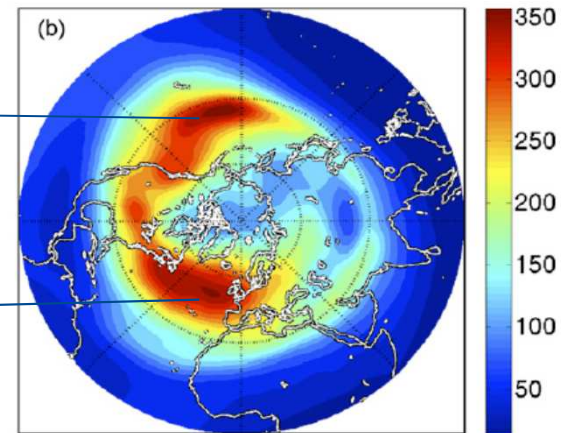
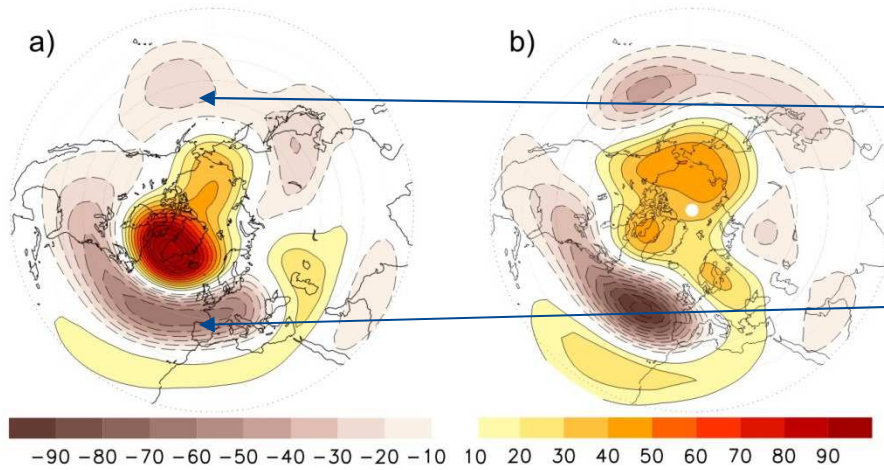
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EXTRA SLIDES

NAO x Z300 / ERA40 (JF)

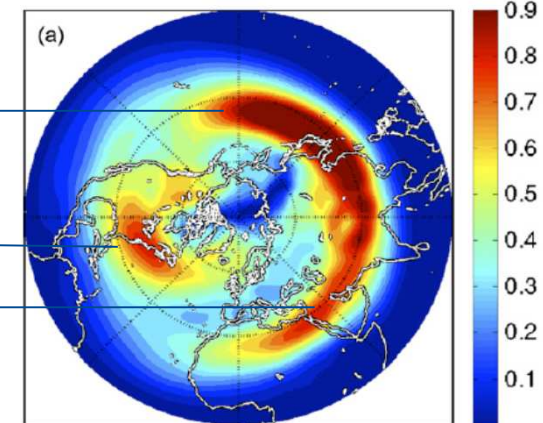
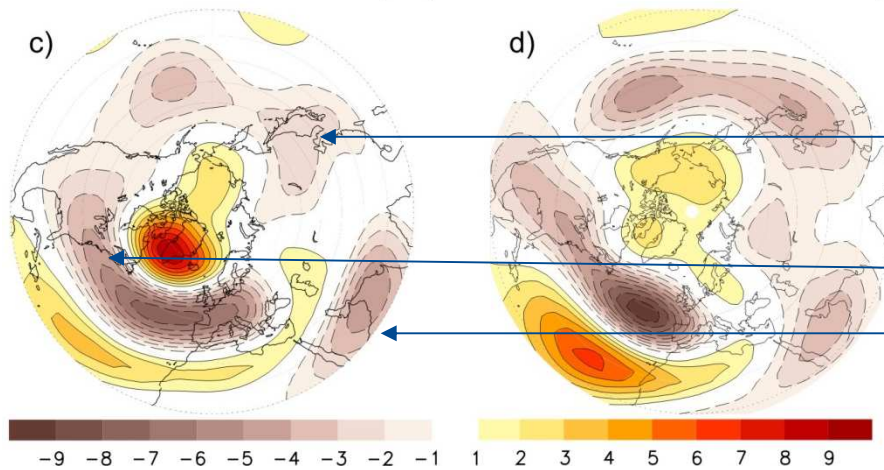
NAO x Z300 / SPEEDO (JF)



(pke_250hPa; Vallis and Gerber 2008)

NAO x PSI300 / ERA40 (JF)

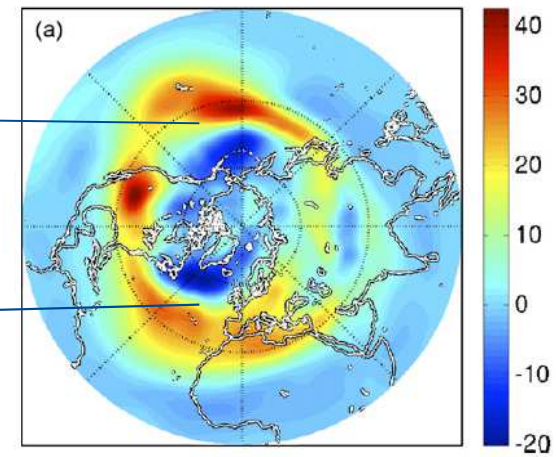
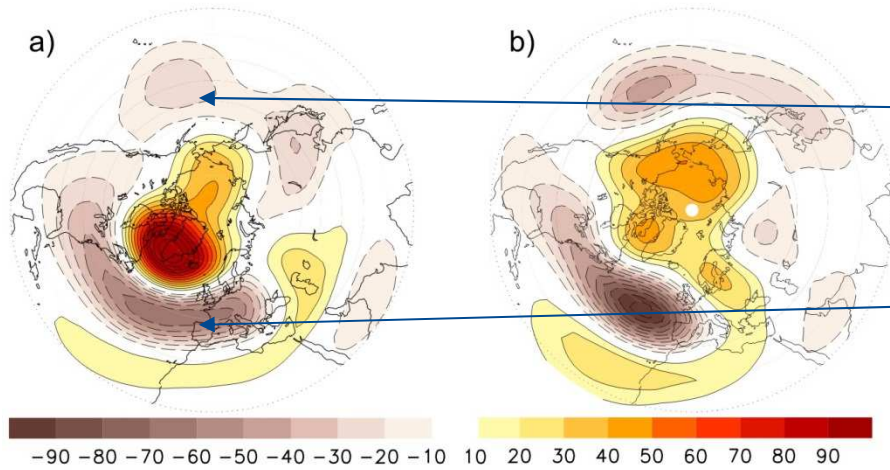
NAO x PSI300 / SPEEDO (JF)



($\sigma_{500\text{hPa}}$; Vallis and Gerber 2008)

NAO x Z300 / ERA40 (JF)

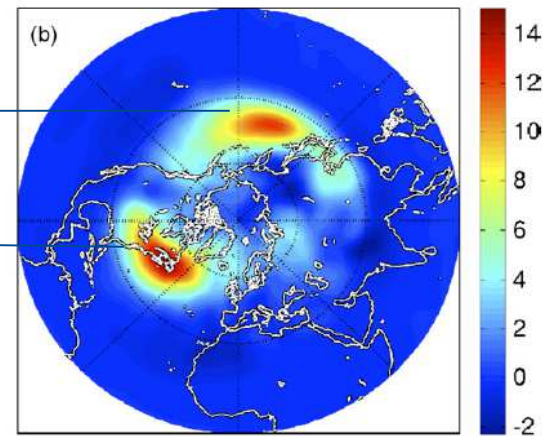
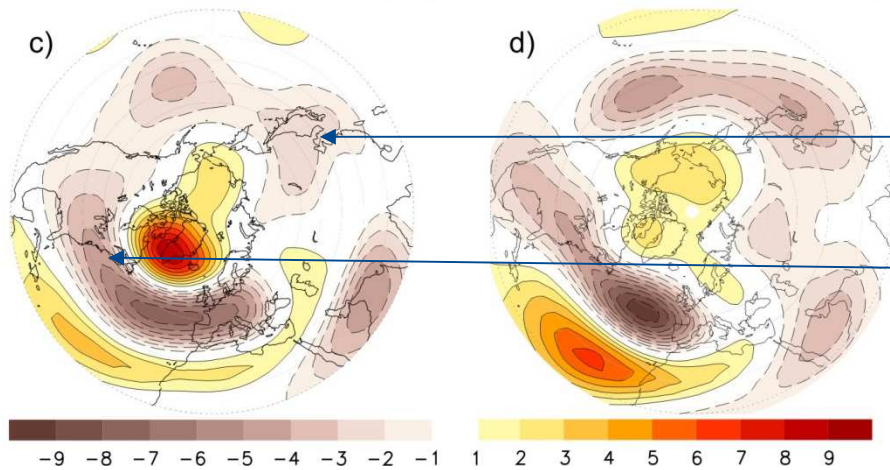
NAO x Z300 / SPEEDO (JF)



($u'v'$ _250hPa; Vallis and Gerber 2008)

NAO x PSI300 / ERA40 (JF)

NAO x PSI300 / SPEEDO (JF)



($v'T'$ _500hPa; Vallis and Gerber 2008)