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Some results of High-Resolution forecast experiments in the Tropics

EC-Earth3.3 vs CNRM-CM6

A. Carreric, P. Ortega and many collaborators

Forecast systems: 2 climate models

	Components	Resolution SR HR	Atmospheric initialisation	Oceanic initialisation
EC-Earth3 	 IFS cy36r4  NEMO v3.6  LIM3  Oasis	 80 40  100 25	ERA5	in-house reconstruction (NEMO3.6 based)
CNRM-CM6.1 	 Arpège v6  NEMO v3.6  Gelato v6  Oasis	 160 60  100 25	ERA-interim	Glorys (NEMO-based)

Hindcast period: 1993-2014

Ensemble: 20 members

Initialisation in May

Predictive skill in the tropics

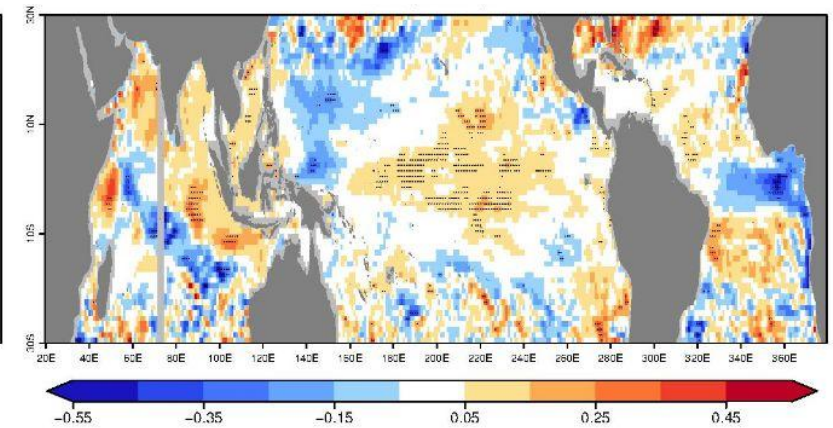
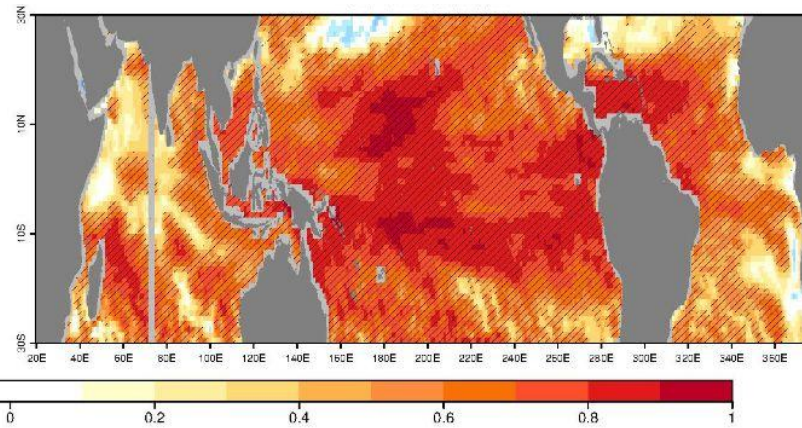
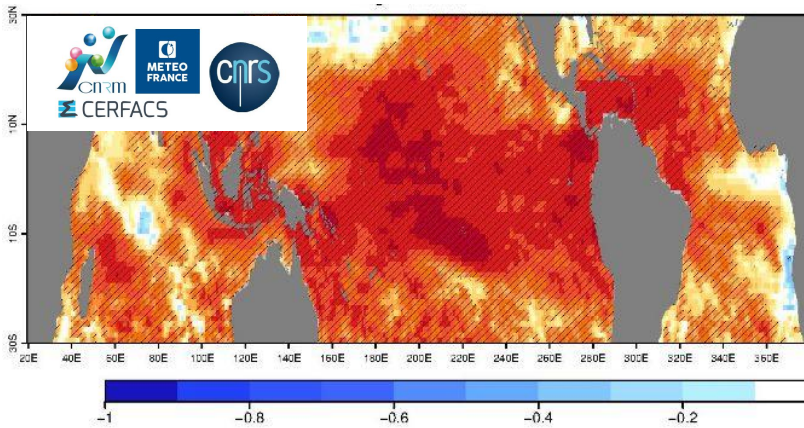
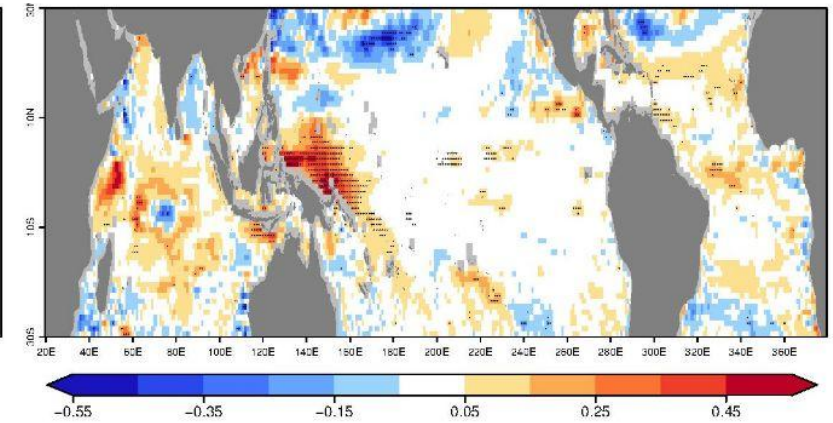
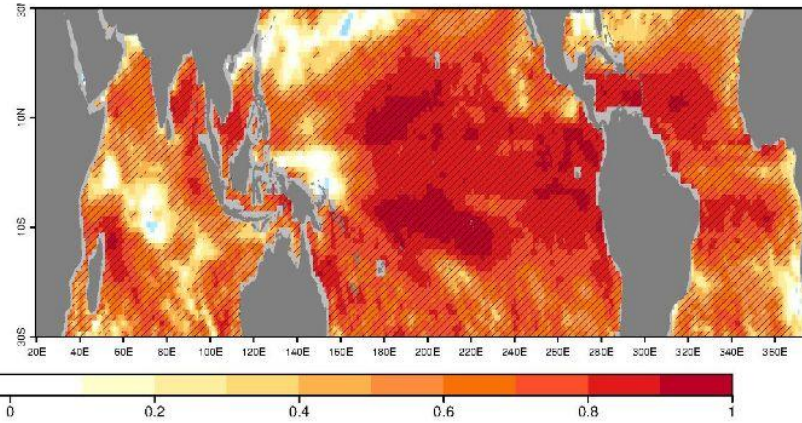
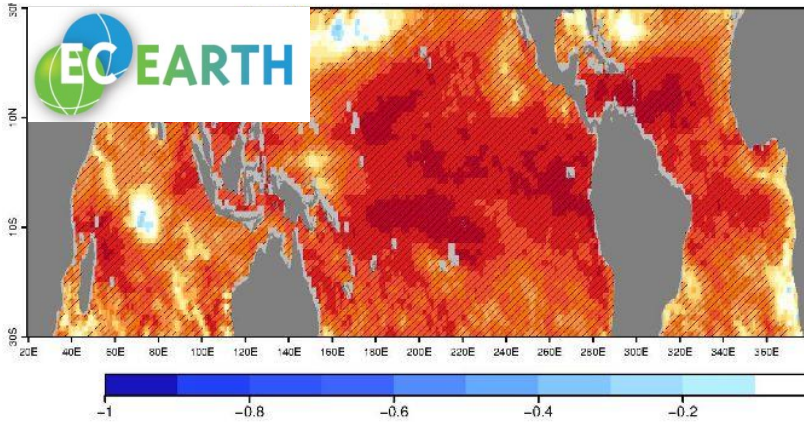
Sea surface temperature - JJA

Reference: SSTCCI v2.1

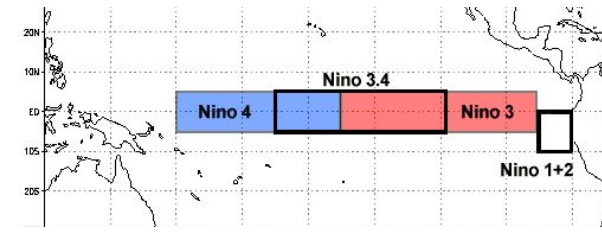
High Res

Standard Res

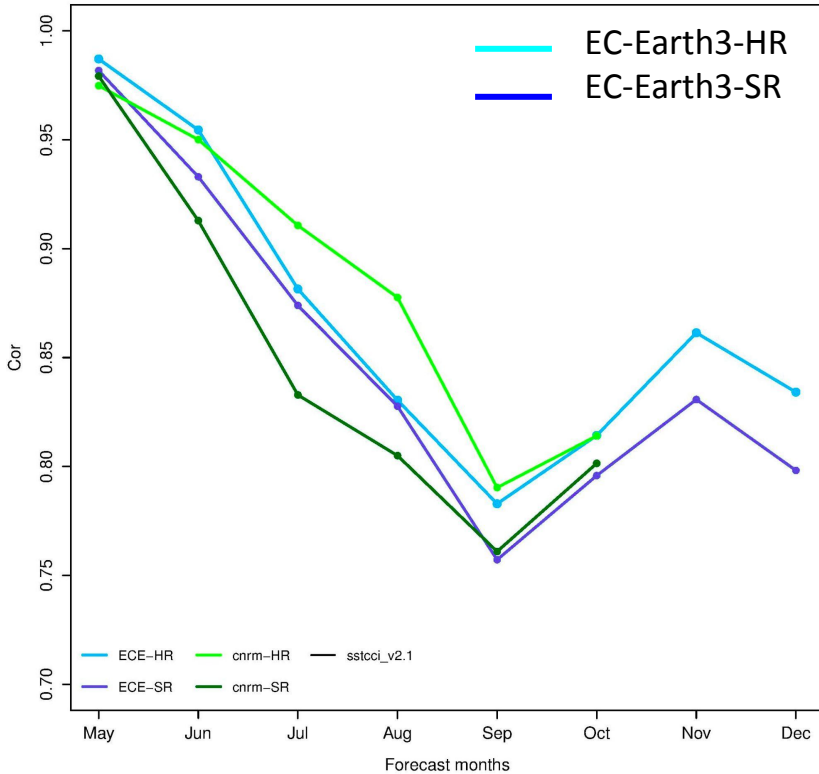
Correlation differences



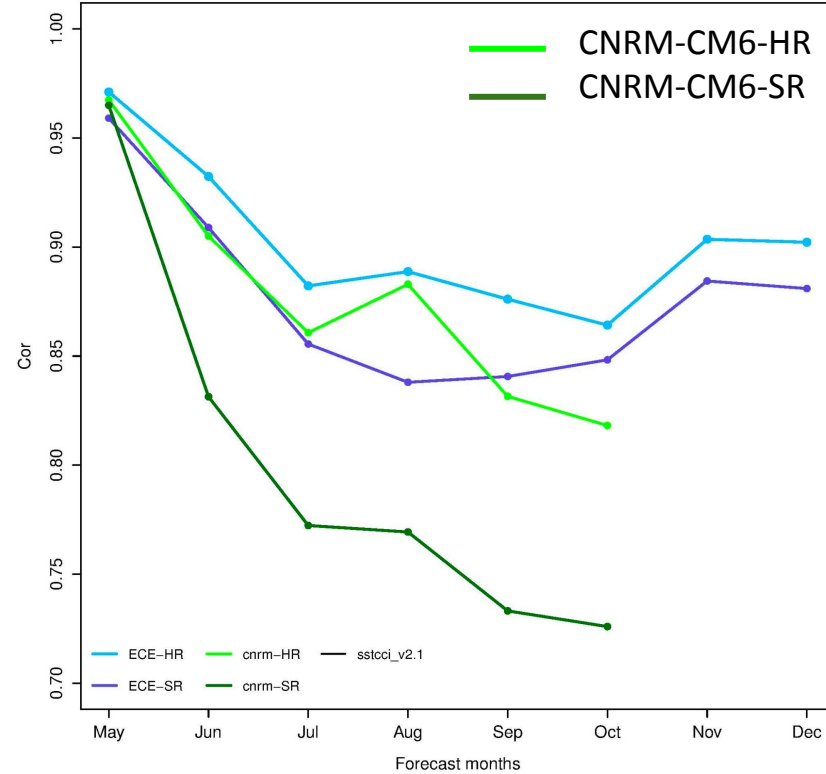
Timeseries ACC Niño regions



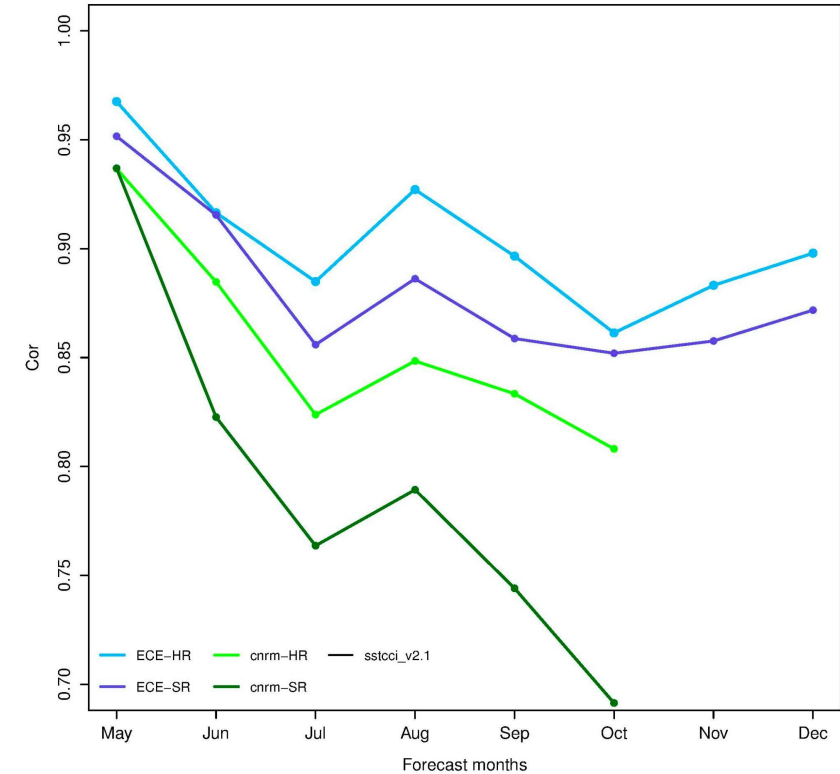
Niño4



Niño3.4



Niño3



Improvement of the skill with higher resolution for both models.
In the Niño4 region, smaller improvement in EC-Earth3.

Teleconnections with the Equatorial Atlantic



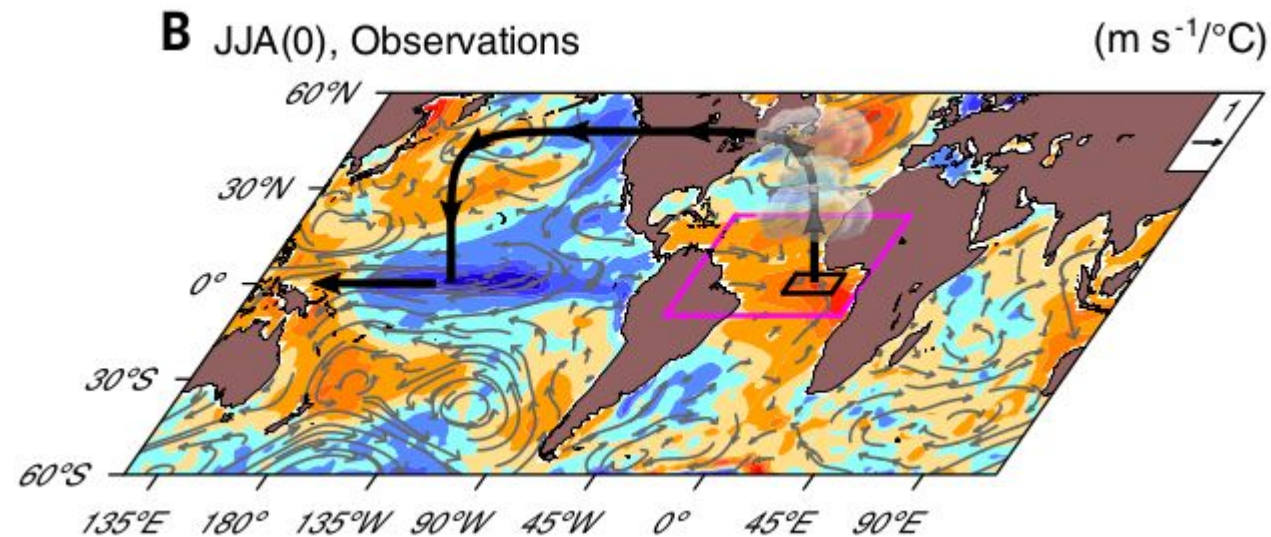
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Teleconnections with the Equatorial Atlantic

Summer (JJA) Atlantic Niños (Niñas) favor the development of Pacific Niños (Niños) the following winter (DJF).

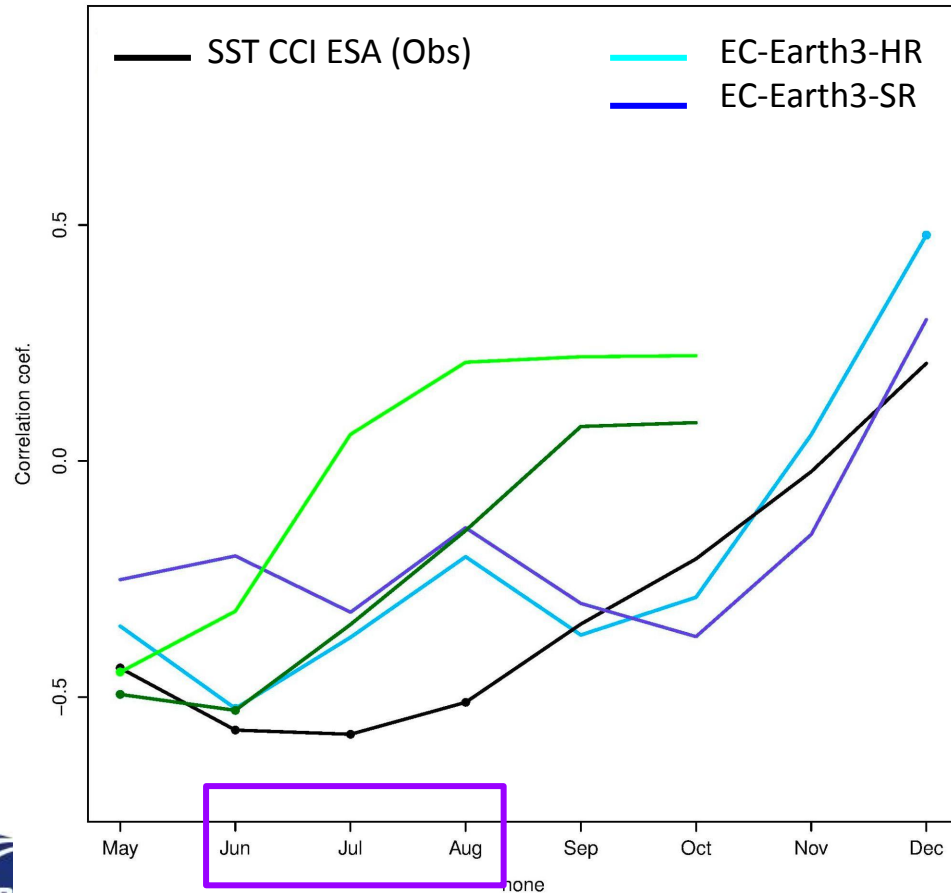
Rodríguez-Fonseca et al. (2009), Ding et al. (2012)



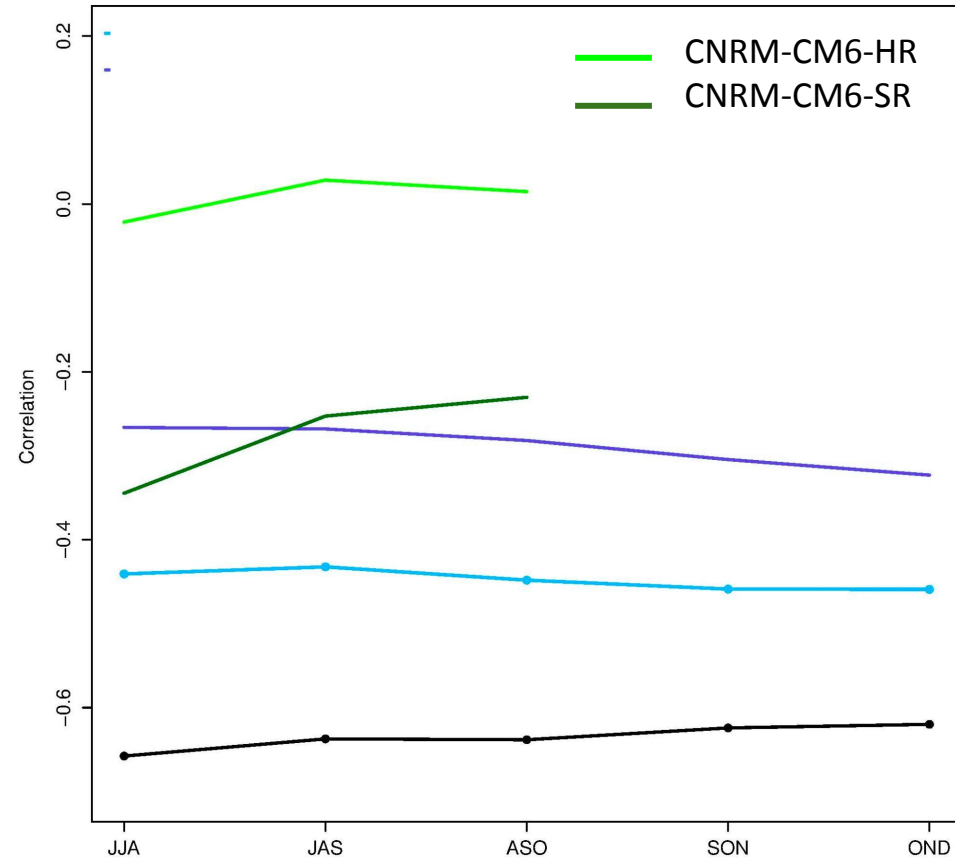
Cai et al., 2019, Science

In the seasonal forecasts

Correlation ATL3 and Niño3.4 SSTA



Correlation ATL3 JJA and Niño3.4 lagged seasons SSTA



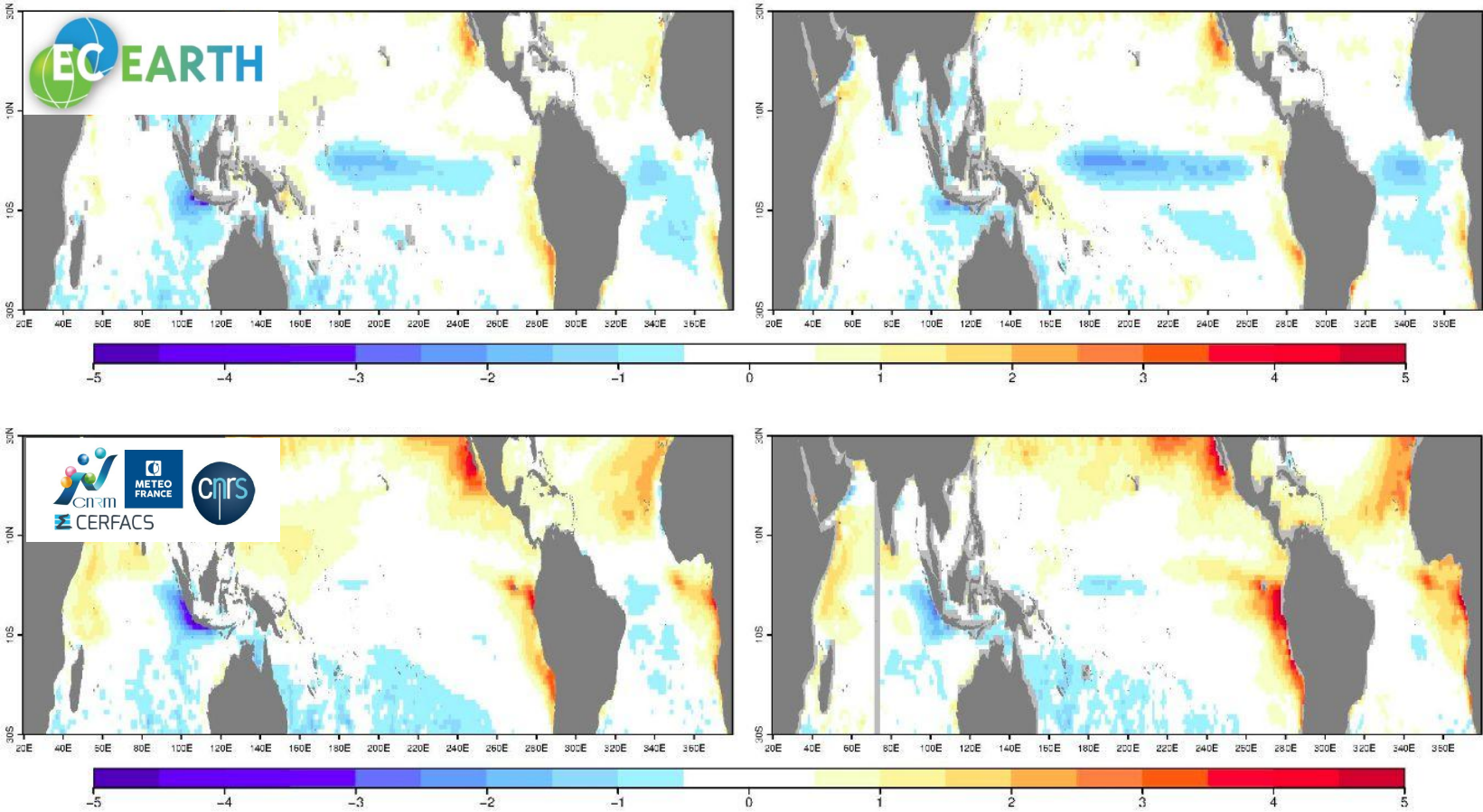
Limitations

Bias in the mean state

Kucharski et al. (2015), Richter et al. (2018), Exarchou et al. (2021)

High Res

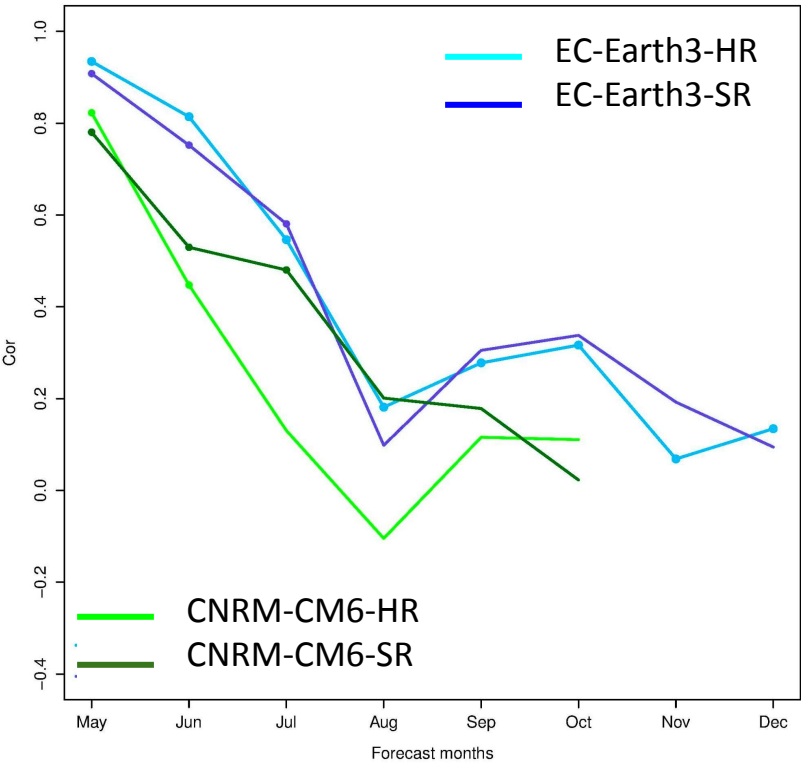
Standard Res



Predictive skill in ATL3

Exarchou et al. (2021)

ATL3



Loss of skill in the western Pacific: the Blue Hole



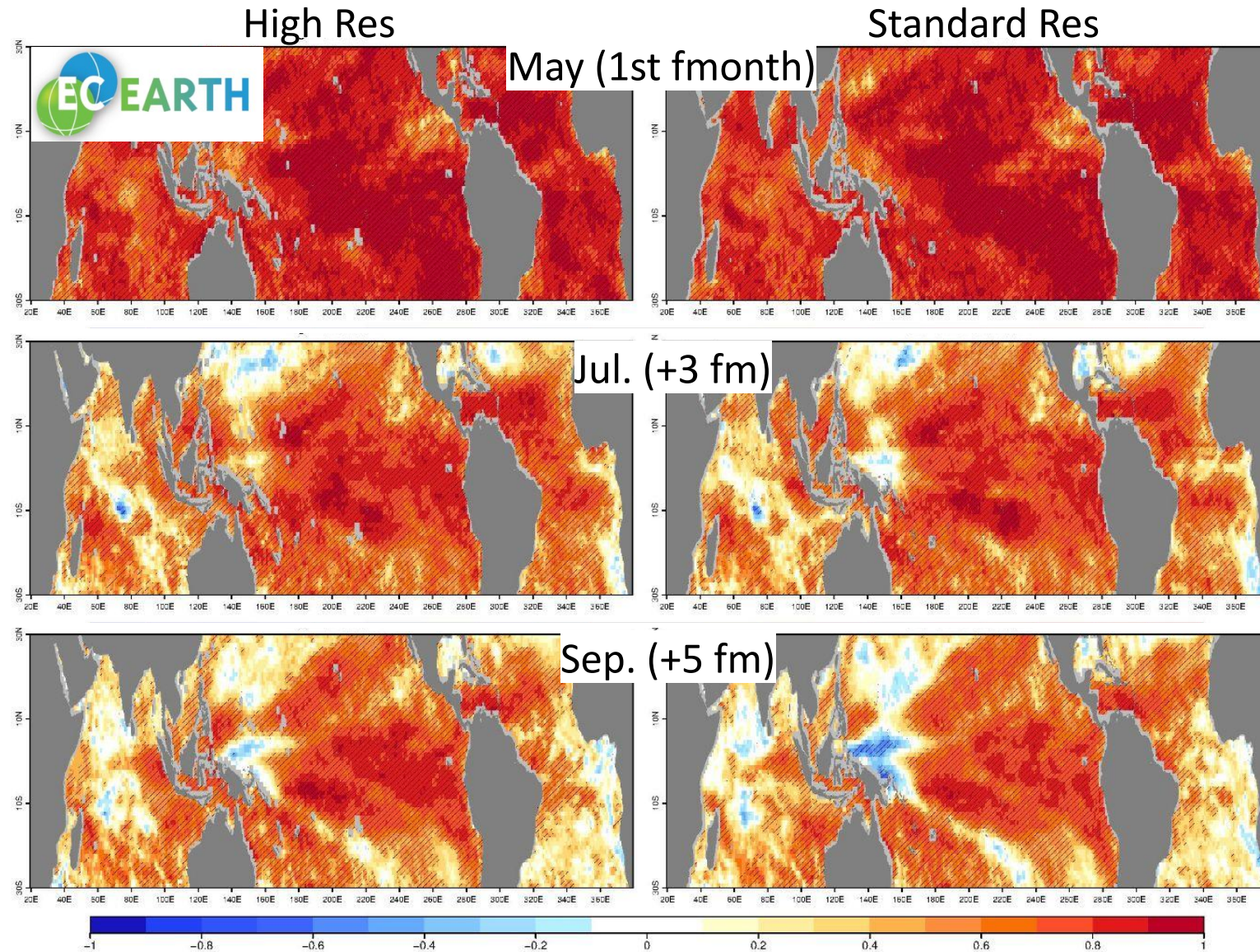
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Predictive skills in the Tropics

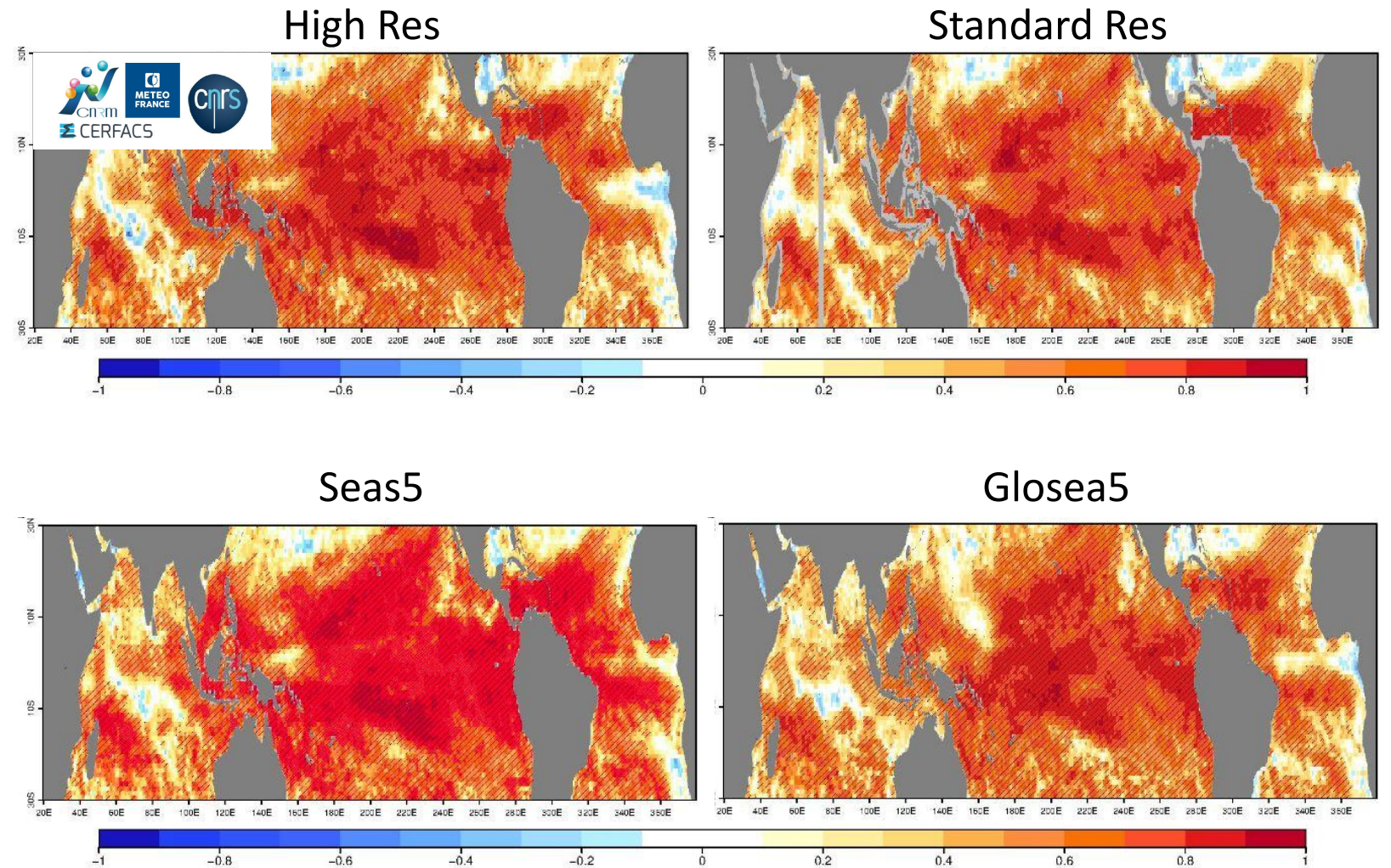
Loss of skill in the western equatorial Pacific in EC-Earth3, particularly at SR

Sea surface temperature
Reference: ERA5



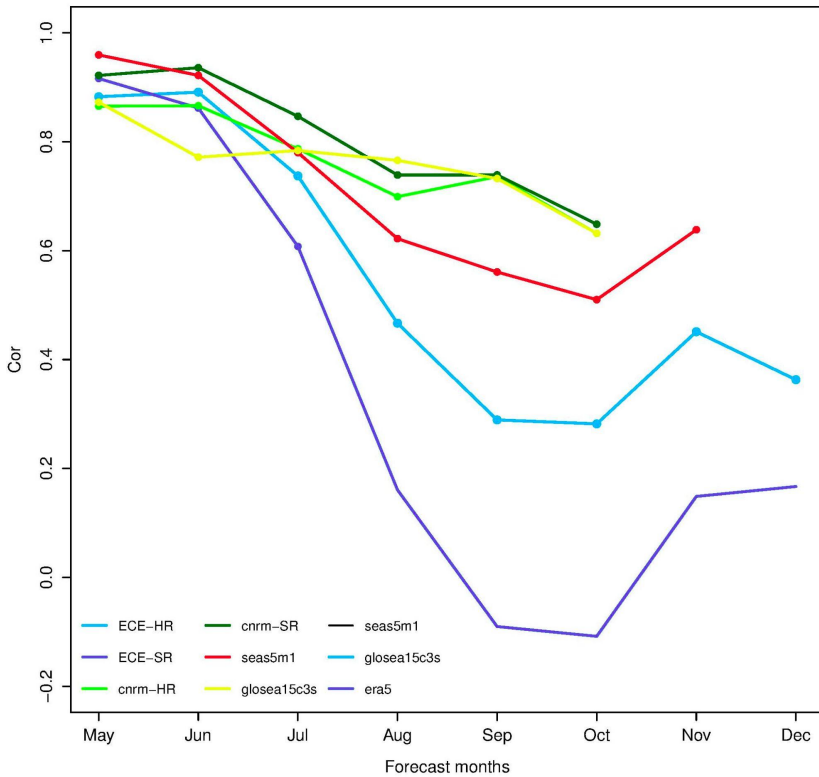
In other forecast systems

ACC maps
Sea surface temperature
July (+3 fm)
Reference: ERA5

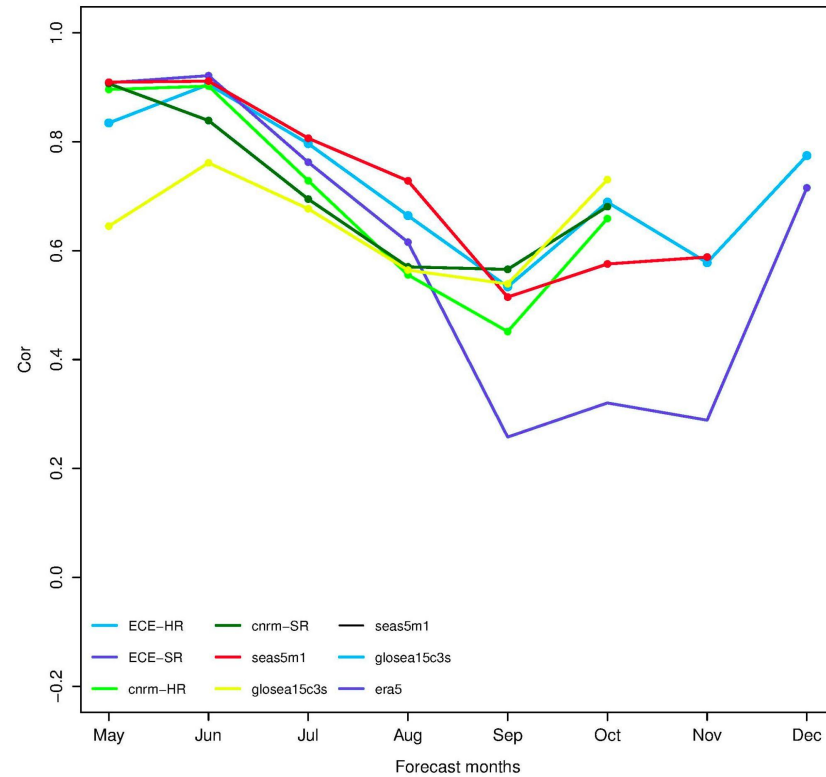


Integrated values in the Blue Hole

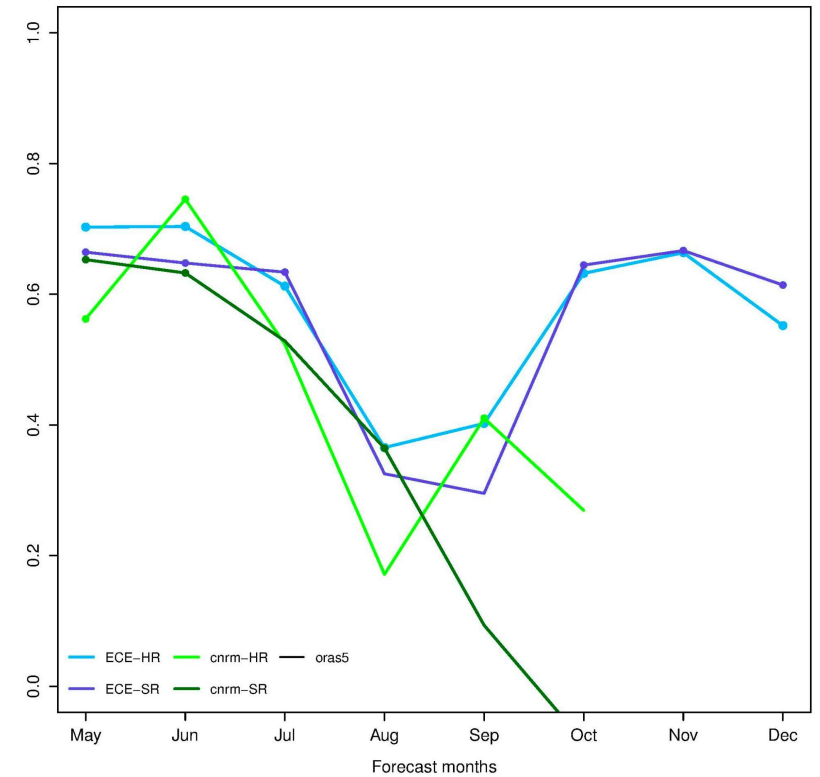
SST



TAS

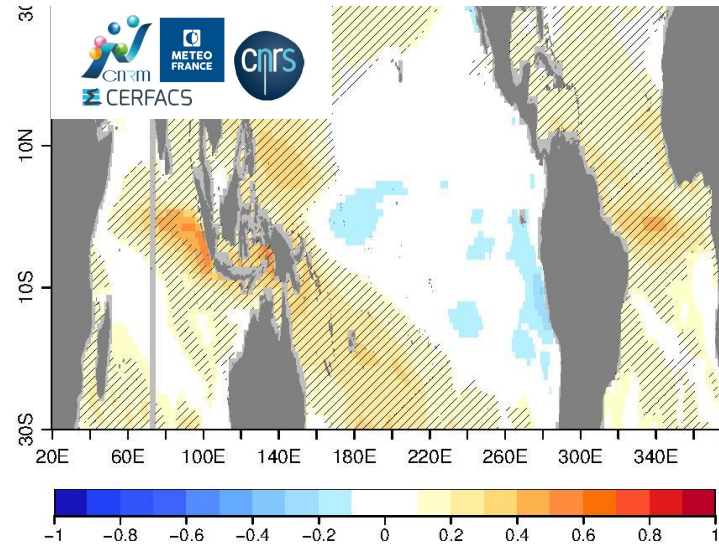
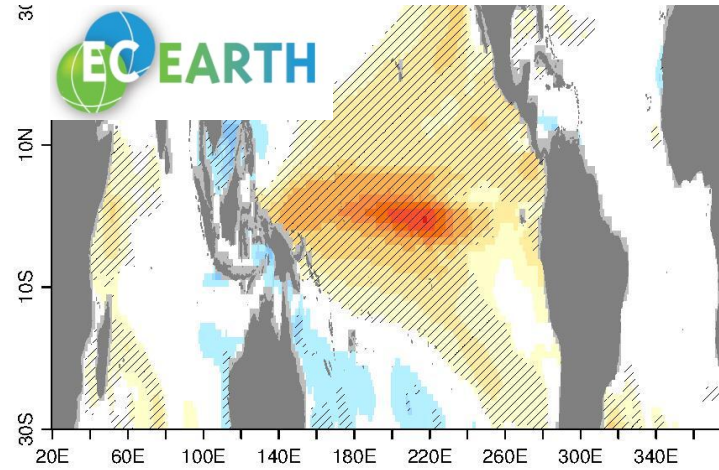
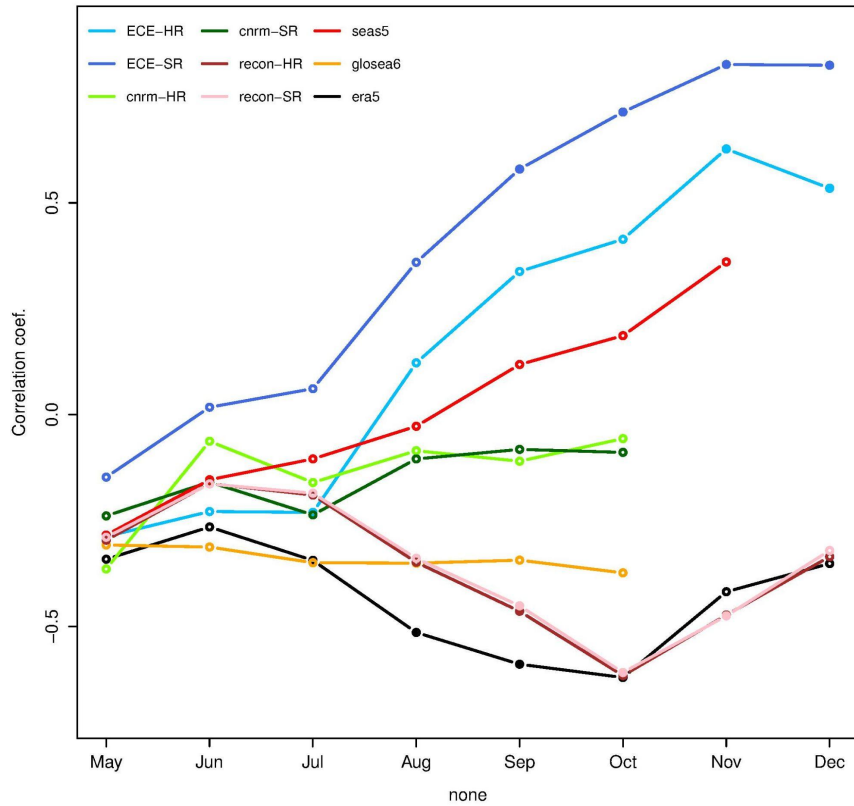


MLD

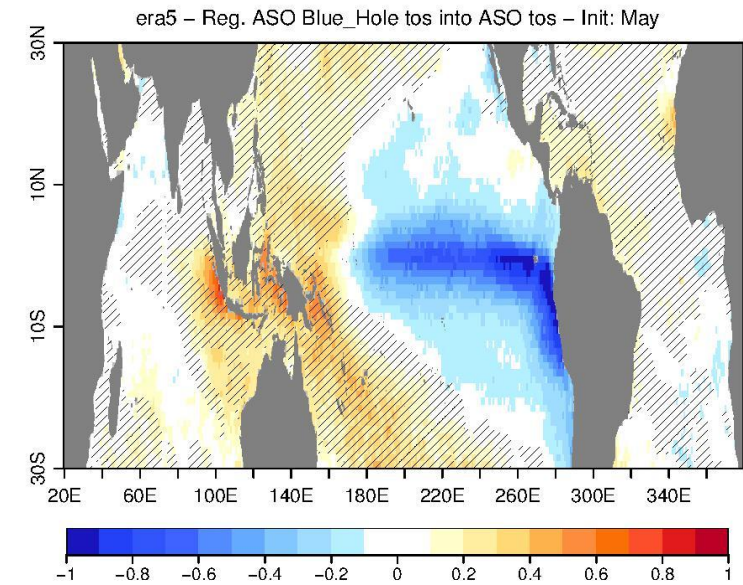


Teleconnections with Niño3 region

Correlation Blue Hole and Niño3 SSTA



Regression maps in ASO





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**Any
questions?**

**Thanks for your
attention**

Multi-year prediction systems

Standard res.

2 init. per year:
Nov.: 1960-2021
May: 1980-2021
(every yr)

20 members

3 forecast yrs

TOTAL: 6240 yrs

High res.

2 init. per year:
Nov.: 1960-2021
May: 1980-2021
(every yr)

15 members

3 forecast yrs

TOTAL: 4680 yrs