CHFP update

WGSIP-24
27-29 March 2023
Reading, UK

WCRP
World Climate Research Programme

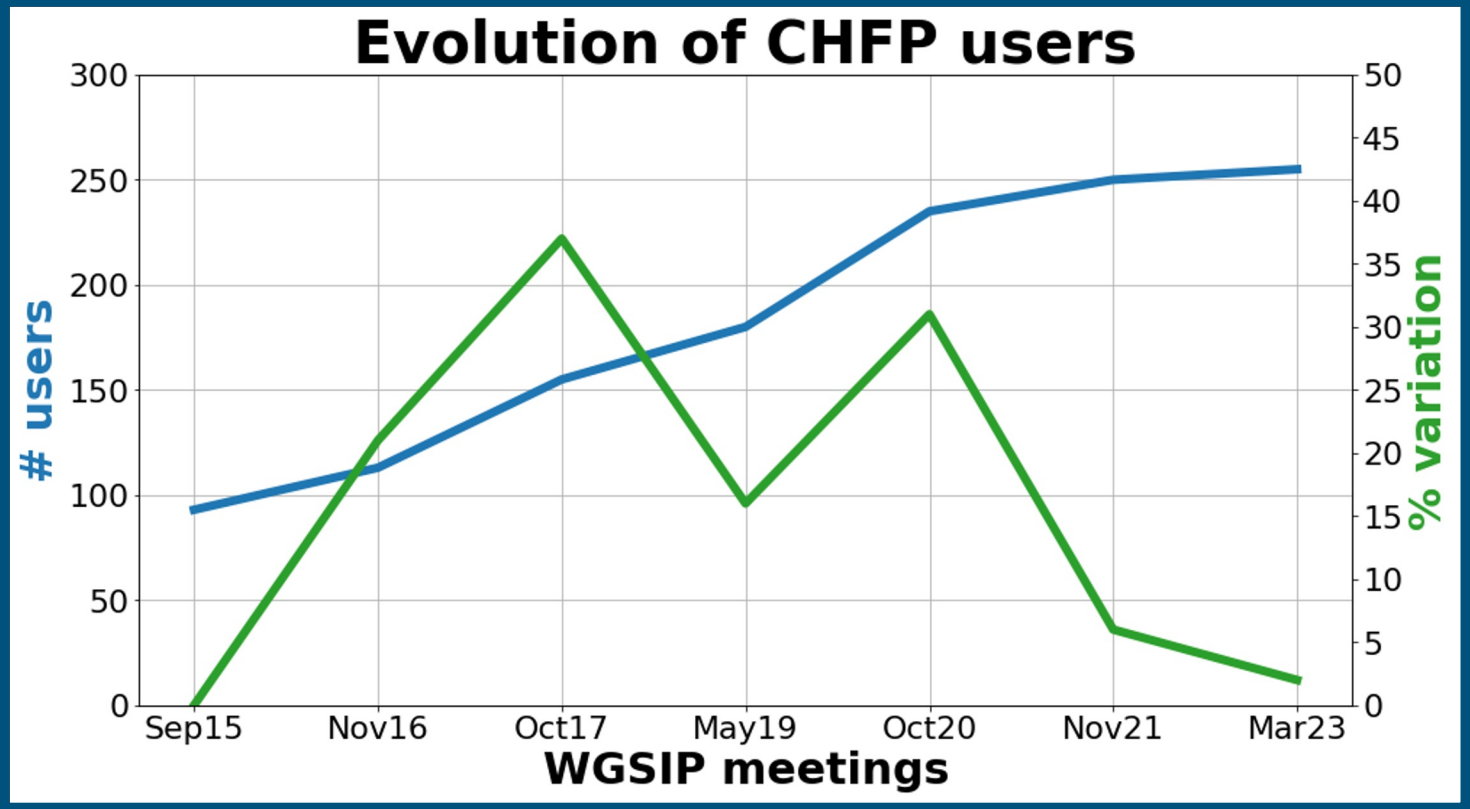
CIMA
CONICET
UBA

Evolution in CHFP usage since WGSIP-23

During the last 18 months there has been little activity regarding CHFP, with a decline in the number of registered users, files exchanged and papers published acknowledging the database.

From February to June 2022, a major tech issue at CIMA put CHFP offline. No comments/complaints were received during this time period.

Evolution in CHFP usage since WGSIP-23



Evolution in CHFP usage since WGSIP-23

Some ideas for brainstorming:

- future of CHFP
- it seems that novel datasets developed in the last years under different programmes (e.g., COPERNICUS, …) have become more widely advertised and used
- IT people in charge of CHFP at CIMA is retiring by the end of 2023

Publications using CHFP data

- Hindcast data continues to be used, despite getting “old”:

Jain S., and A. A Scaife, 2022: How extreme could the near term evolution of the Indian Summer Monsoon rainfall be? *Environ. Res. Lett.*, **17** 034009. https://doi.org/10.1088/1748-9326/ac4655

Pillai, P. A., S. A. Rao, A. Srivastava, D. A. Ramu, M. Pradhan, and R. S. Das, 2021: Impact of the tropical Pacific SST biases on the simulation and prediction of Indian summer monsoon rainfall in CFSv2, ECMWF-System4, and NMME models. *Climate Dyn.*, 56, 1699–1715, https://doi.org/10.1007/s00382-020-05555-1.

Saurral RI, Merryfield WJ, Tolstykh MA, Lee W-S, Doblas-Reyes FJ, García-Serrano J, Massonnet F, Meehl GA, Teng H (2021) A dataset for intercomparing the transient behavior of dynamical model-based subseasonal to decadal climate predictions. J Adv Model Earth Syst. https://doi.org/10.1029/2021MS002570

Nikolaev, A.; Richter, I.; and Sadowski, P. 2020. Deep learning for climate models of the Atlantic ocean. In Proceedings of the AAAI Spring Symposium - Combining Artificial Intelligence and Machine Learning with Physical Sciences: Palo Alto, CA, USA: MLPS https://par.nsf.gov/servlets/purl/10273992

+ 13 earlier publications

- 46 citations of Tompkins et al. (2017)
- However, there are multiple barriers to keeping CHFP relevant:
  - Difficult to persuade centres to provide tailored data with every system update
  - Emergence of other hindcast data sources (e.g. NMME, C3S)
  - Sustainability at CIMA

→ is there a way forward, or is it time to retire CHFP?

A possible way forward

Background

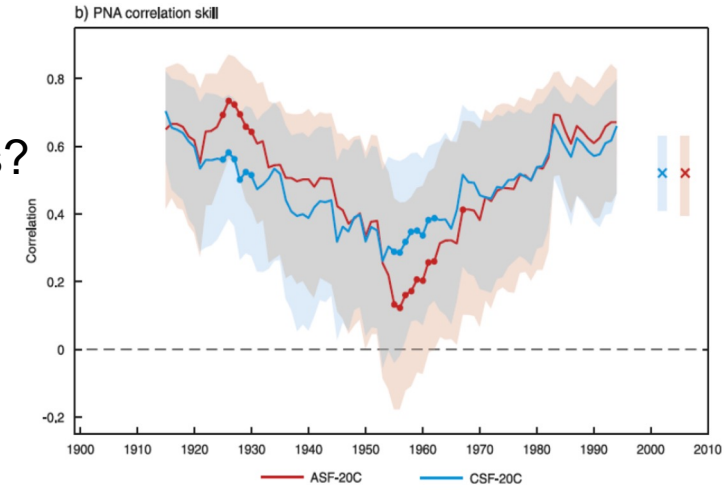
Recognizing the need to reduce model biases, a TPOS 2020 recommendation was for development of a community effort to document model biases and to quantify how S2IP prediction systems may be improving with time - TPOS 2020 Final Report

Proposal

- **Archive WMO LC-LRFMME hindcast data from current and retired systems** in the CHFP database
- Monthly values for temp, precip, SST… from Feb/May/Aug/Nov (or all initial months?)
- CCCma could set up "pipeline" to convert to formatted NetCDF
- New systems from consenting GPCs could continuously be added

Analysis

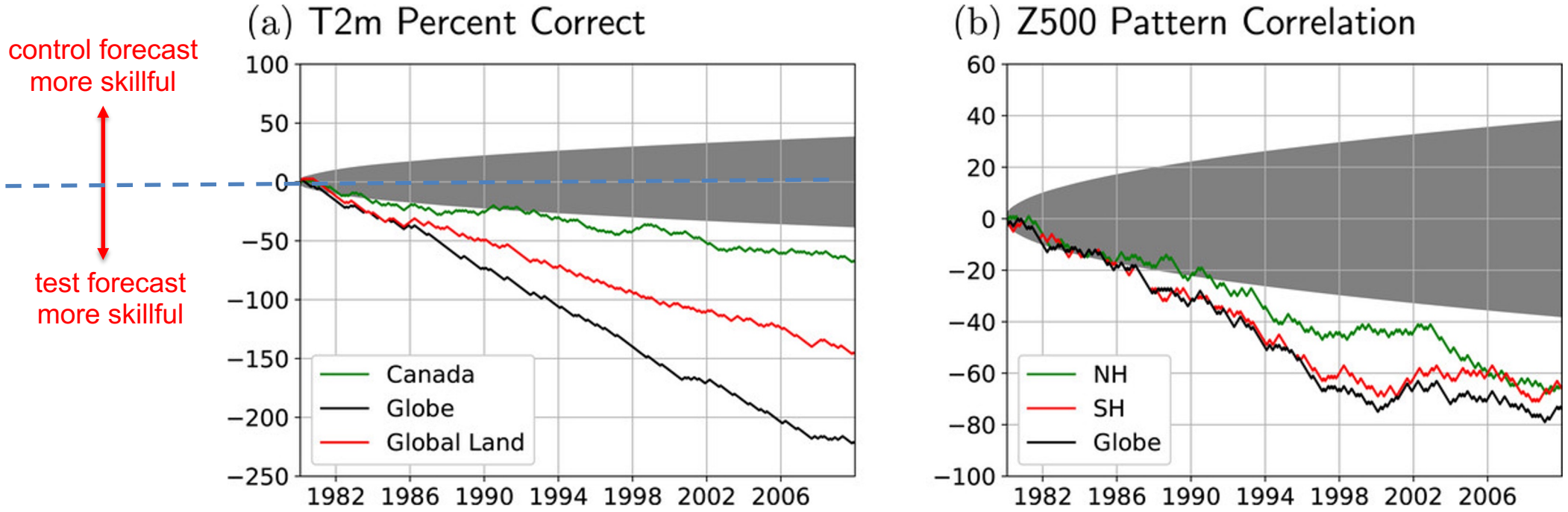
- How to compare skill for systems having different hindcast epochs and lengths?
- Need to control for variations in predictability, different hindcast lengths, etc.
- Possible benchmark: ECMWF CSF-20C*, verification acainst ERA-20C →



*Weisheimer et al. BAMS 2020

A possible way forward (2)

- Possible approach for assessing relative skill of two systems: method of DelSole and Tippett, “Forecast Comparison Based on Random Walks”, *MWR* 2016, https://doi.org/10.1175/MWR-D-15-0218.1



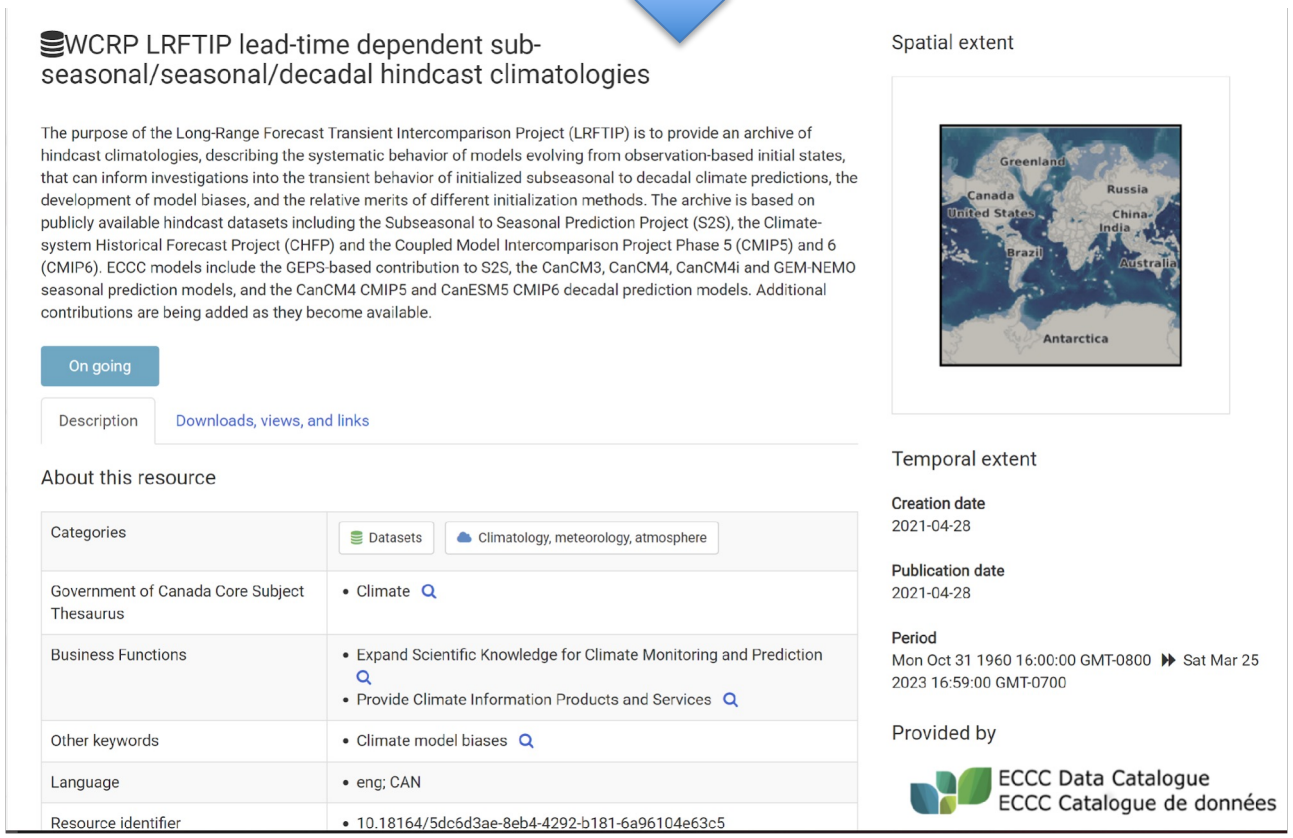
Lin et al., WAF (2020): control=CanSIPSv1, test=CanSIPSv2

- TPOS-type assessment would have control=CSF-20C, test=GPC hindcast
- Could compare Random Walk Skill Scores of Risby et al. *Nature Comm.* (2021) against common benchmark
- (However CSF-20C ends in 2010, no prospect for updating)

A possible way forward (3)

- If CIMA cannot sustain CHFP database then it *might* be possible to migrate to ECCC Open Data
- This is how LRFTIP data is served, for example
- Data DOI in Saurral et al.:

https://doi.org/10.18164/5dc6d3ae-8eb4-4292-b181-6a96104e63c5



WCRP LRFTIP lead-time dependent sub-seasonal/seasonal/decadal hindcast climatologies

The purpose of the Long-Range Forecast Transient Intercomparison Project (LRFTIP) is to provide an archive of hindcast climatologies, describing the systematic behavior of models evolving from observation-based initial states, that can inform investigations into the transient behavior of initialized subseasonal to decadal climate predictions, the development of model biases, and the relative merits of different initialization methods. The archive is based on publicly available hindcast datasets including the Subseasonal to Seasonal Prediction Project (S2S), the Climate-system Historical Forecast Project (CHFP) and the Coupled Model Intercomparison Project Phase 5 (CMIP5) and 6 (CMIP6). ECCC models include the GEPS-based contribution to S2S, the CanCM3, CanCM4, CanCM4i and GEM-NEMO seasonal prediction models, and the CanCM4 CMIP5 and CanESM5 CMIP6 decadal prediction models. Additional contributions are being added as they become available.

On going

Description | Downloads, views, and links

About this resource

Categories	Datasets; Climatology, meteorology, atmosphere
Government of Canada Core Subject Thesaurus	• Climate
Business Functions	• Expand Scientific Knowledge for Climate Monitoring and Prediction • Provide Climate Information Products and Services
Other keywords	• Climate model biases
Language	• eng; CAN
Resource identifier	• 10.18164/5dc6d3ae-8eb4-4292-b181-6a96104e63c5

Spatial extent

Temporal extent

Creation date
2021-04-28

Publication date
2021-04-28

Period
Mon Oct 31 1960 16:00:00 GMT-0800 ⏩ Sat Mar 25 2023 16:59:00 GMT-0700

Provided by

ECCC Data Catalogue
ECCC Catalogue de données

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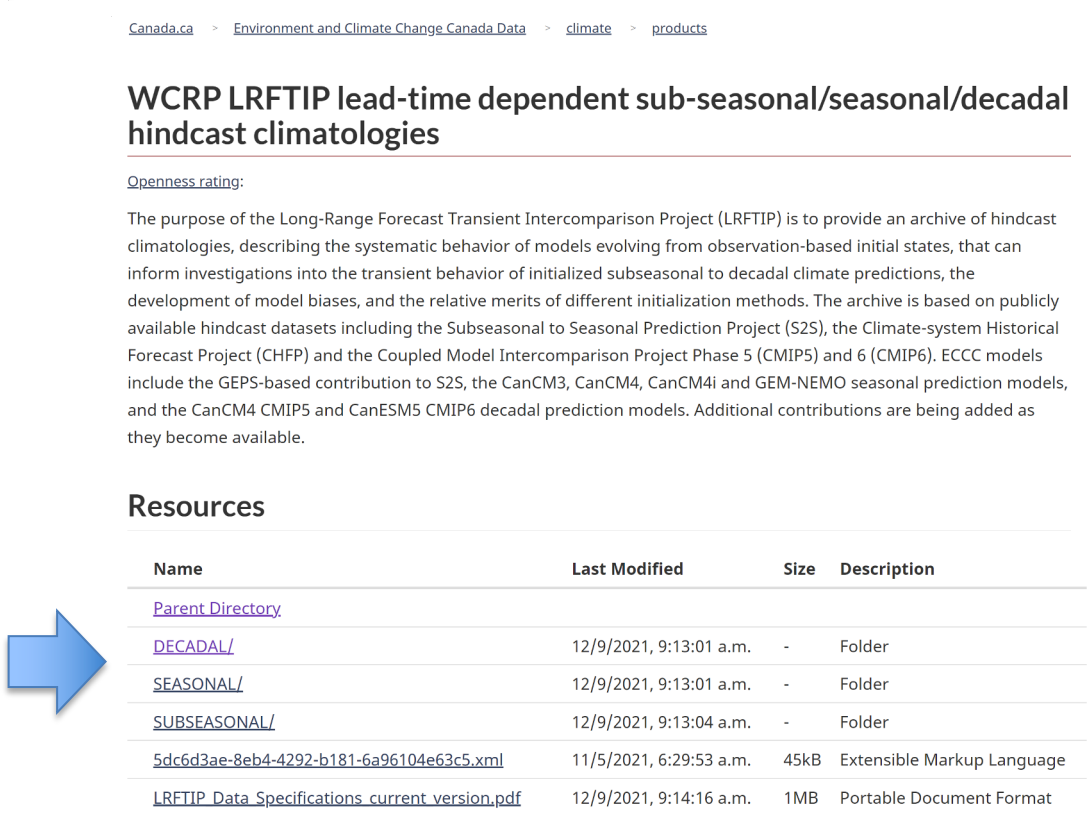
Research Article | Open Access

A Data Set for Intercomparing the Transient Behavior of Dynamical Model-Based Subseasonal to Decadal Climate Predictions

Ramiro I. Saurral, William J. Merryfield, Mikhail A. Tolstykh, Woo-Sung Lee, Francisco J. Doblas-Reyes, Javier García-Serrano, François Massonnet, Gerald A. Meehl, Haiyan Teng,



Canada.ca > Environment and Climate Change Canada Data > climate > products

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Openness rating:

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Resources

Name	Last Modified	Size	Description
Parent Directory			
DECADAL/	12/9/2021, 9:13:01 a.m.	-	Folder
SEASONAL/	12/9/2021, 9:13:01 a.m.	-	Folder
SUBSEASONAL/	12/9/2021, 9:13:04 a.m.	-	Folder
5dc6d3ae-8eb4-4292-b181-6a96104e63c5.xml	11/5/2021, 6:29:53 a.m.	45kB	Extensible Markup Language
LRFTIP_Data_Specifications_current_version.pdf	12/9/2021, 9:14:16 a.m.	1MB	Portable Document Format

WMO aspects and additional considerations

- WMO is in the process of making its seasonal prediction data open
- Hindcast data currenty downloadable from LC-LRFMME with password access, but a check indicates ~30-40% of data files appear to be missing
- Expert team on operational climate prediction systems (ET-OPCS) open to CHFP archiving and investigating possible data availability issue, but prefers for open data process to complete first.
- Additional considerations include
  - ECCC archiving will require administrative approval
  - Not clear how to handle skill comparisons for hindcasts extending beyond 2010

Extra slides

Long Range Forecast Transient Intercomparison Project

- Objective is to facilitate intercomparisons of shock/drift/bias following initialization
- Database of pre-computed hindcast + similarly formatted observed climatologies (daily, monthly, annual)
- Currently 6 subseasonal, 20 seasonal, 16 decadal systems from S2S, CHFP, DCPP

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First published: 25 August 2021 | https://doi.org/10.1029/2021MS002570

Table 1. Current List of Model Names and Number of Atmospheric (ATM) and Oceanic (OCE) Variables With Daily Data From Subseasonal Hindcasts

Model	ATM daily	OCE daily
ECCC-S2S	7–9	1–1
ECMWF-S2S	7–11	1–1
JMA-S2S	2–2	1–1
Météo-France S2S	7–11	1–1
NCEP-S2S	7–11	1–1
UKMO-S2S	4–6	1–1

Note. The number of variables in the reference or analysis data set (in the hindcast climatology) are indicated in first place (second place).

Figure 2 Open in figure viewer | PowerPoint

Zonal mean of total cloud cover (TCC) in sub-seasonal hindcasts initialized in May for each S2S prediction model on days 1–7 of the predictions (colors) and their respective ERA-Interim reference data sets for day 1 (dashed black line). Values in %.

Data access: https://doi.org/10.18164/5dc6d3ae-8eb4-4292-b181-6a96104e63c5

Long Range Forecast Transient Intercomparison Project

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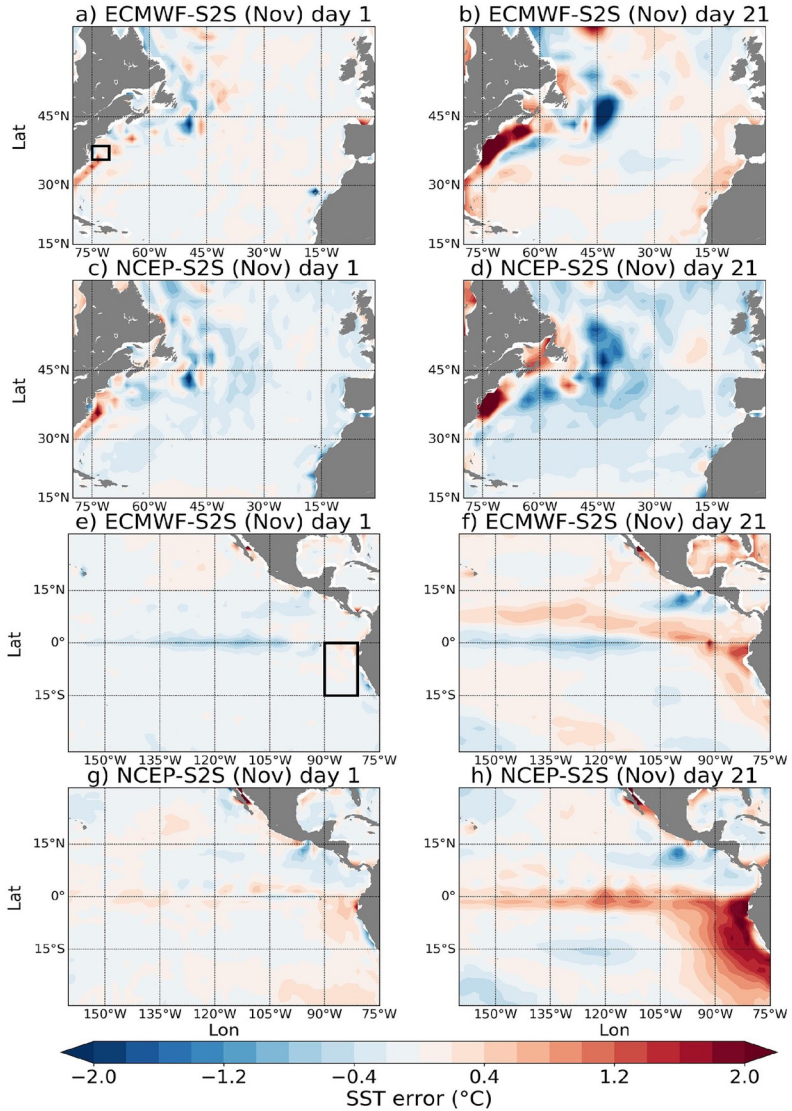

WMO