Servicio Meteorológico Nacional
Argentina

Joint WGNE-JWGFVR Pilot forecast verification project over South America

Ramón de Elía SMN & Nils Wedi ECMWF

WGNE/WGSIP annual meeting, November 2024

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And more participants ready to contribute...

How was it born and what it is

- Triggered by serendipity during the joint WGNE-JWGFVR meeting in November 2023 (Brazil).
- Mutual interest from representatives of WGNE, JWGFVR and WMO for targeting South American regions for forecast verification.
- Monthly on-line meetings since January 2024, with a good number of Argentinian-Brazilian scientists and forecasters, ECMWF personnel and members from WGNE and JWGFVR.
- Material is being kept in https://wgne.net/activities/on-going-activities/, under the title "***South American Regional Model Verification Pilot project: Enhancing the assessment of regional forecasts to contribute to the EW4All initiative***"

What we have been doing

Statistical verification over South America

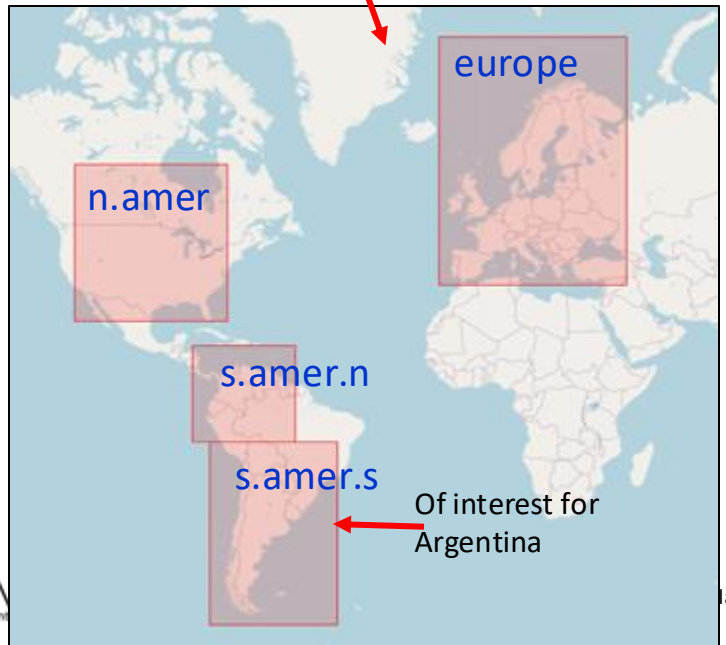
- Never done with ECMWF and barely done with other global models
- Reason? Poor observational network
- Today local forecasters use global models guided by subjective judgement of models quality

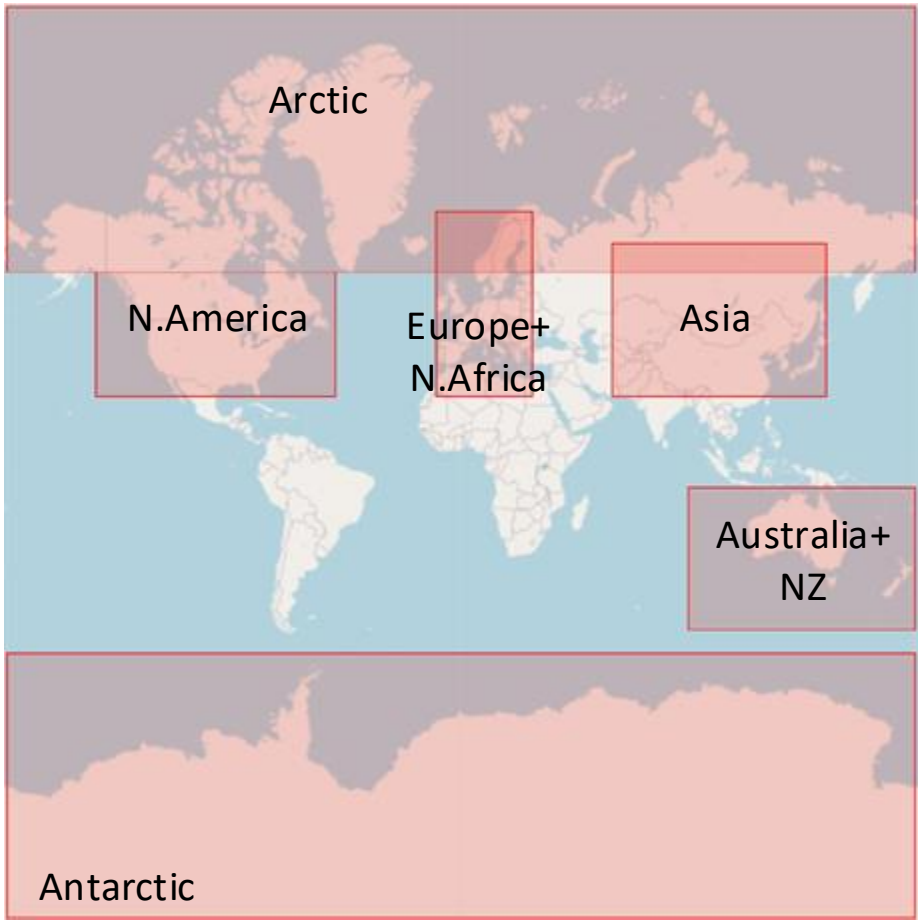
Case studies of extreme events

- HRES, DestinE, GFS, WRF-SMN, MONAN
- Different kinds of cases
  - Heat wave
  - Severe convective storm
  - Foehn (Zonda)
- Predictability, EFIs
- ECMWF *Severe Event Catalogue*
- EW4All
- Warning Value chain (HIWeather)

Statistical verification over South America

- These are the official WMO exchange verification domains
- And these are the ECMWF´s

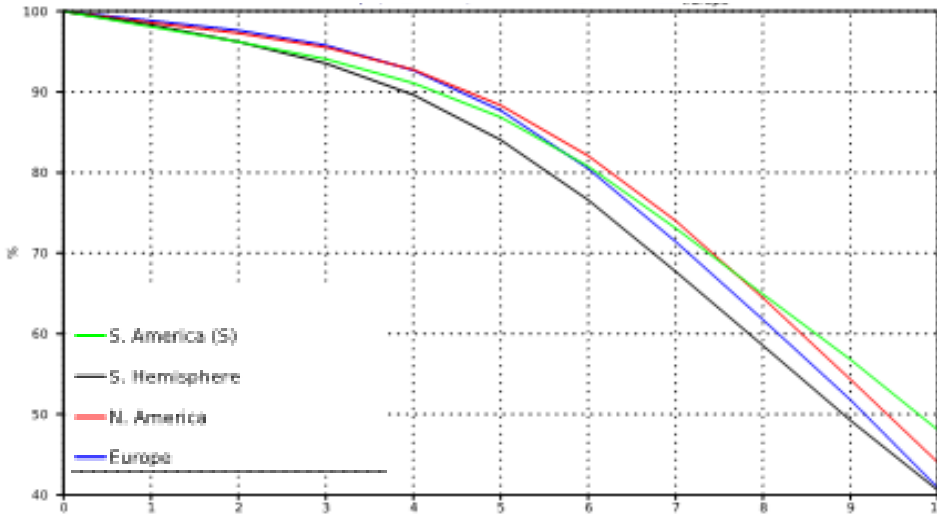




Statistical verification over southern South America

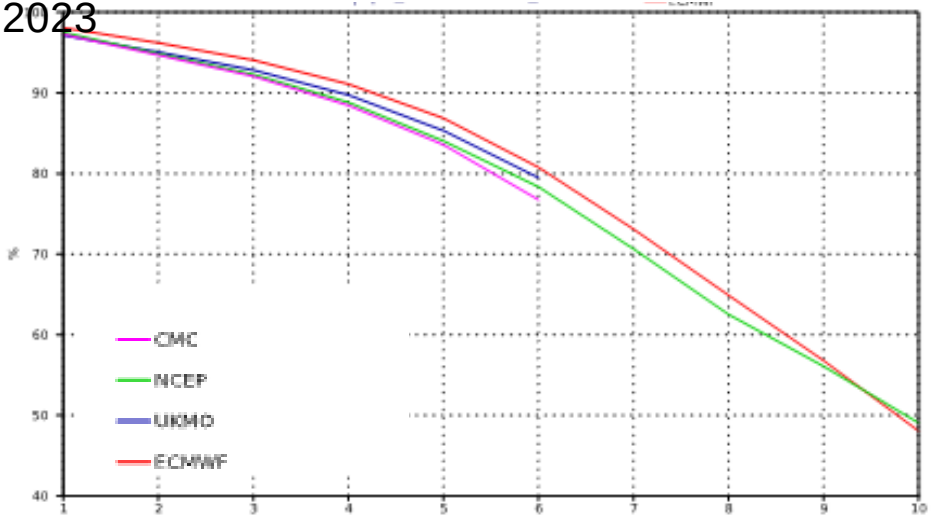
Verification against own analysis

Anomaly correlation 850-hPa Temperature 2023



Forecast day

Anomaly correlation 850-hPa Temperature 2023



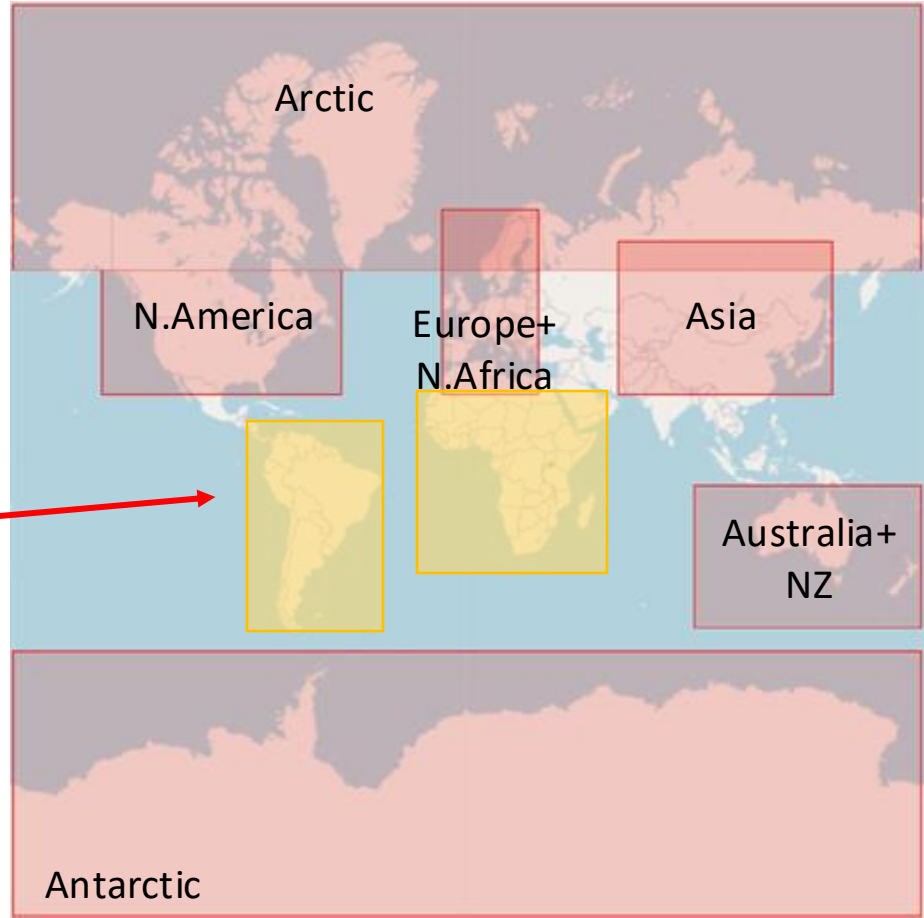
Forecast day

- Predictability comparable to other domains
- Global models show comparable skill

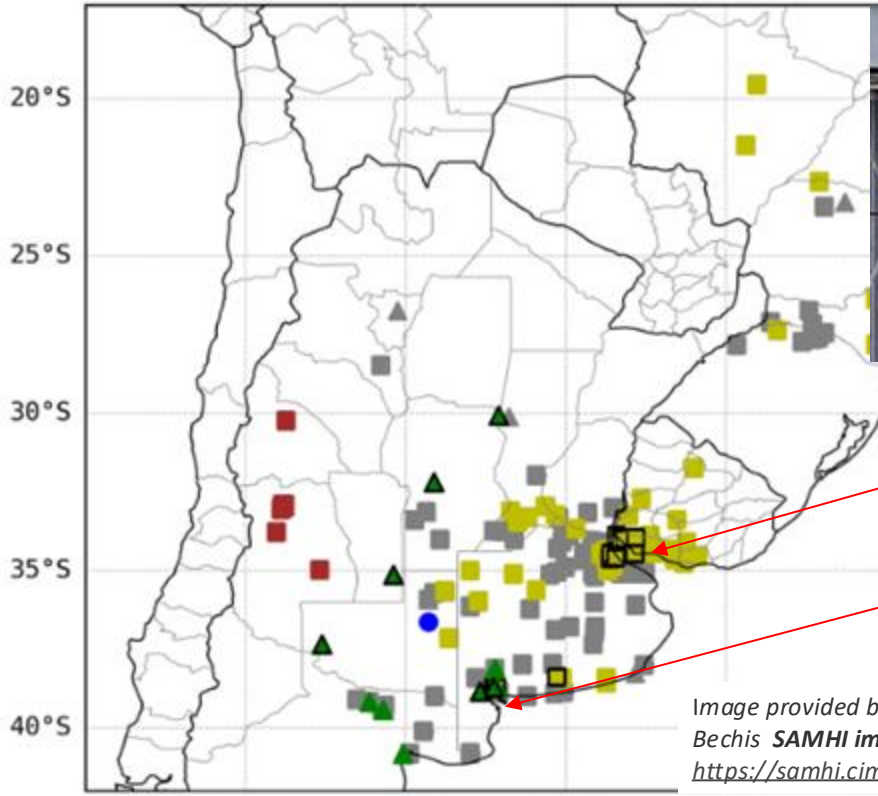
By Thomas Haiden

Statistical verification over South America

- Thanks to *Task Team on Reviewing NWP Standardized Verification (TT-NWPSV)*
- Proposition to expand the WMO official verification regions to uncovered regions of the world.
- **Soon SA will have standard verification results which will be a great advance for our region!**
- There are also tentative initiatives to facilitate verification of regional models



Convective case December 16-17, 2023



Buenos Aires, Sunday 17, 4 AM

Bahia Blanca, Saturday 16, 20 PM

Image provided by Hernán Bechis ***SAMHI impact database***
https://samhi.cima.fcen.uba.ar

wind

hail

Buenos Aires event

GEFS, no signal of intense localized wind in ensemble

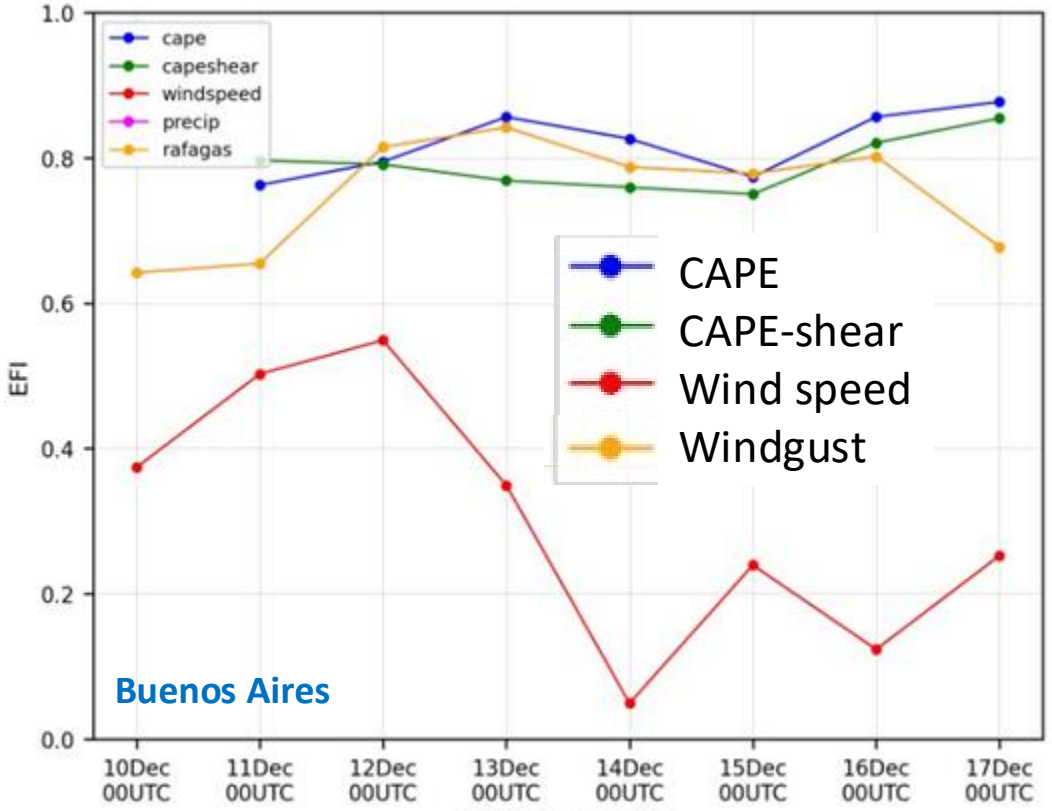
WRF/GEFS 4km, strong signal (still understimated) in some members at exact location

By Cynthia Matsudo

Evolution of ECMWF EFIs for different starting dates

- "Ingredients" are present in the EFIs many days before the event
- In the SMN we had very little experience on EFIs, this has substantially increased our capacity

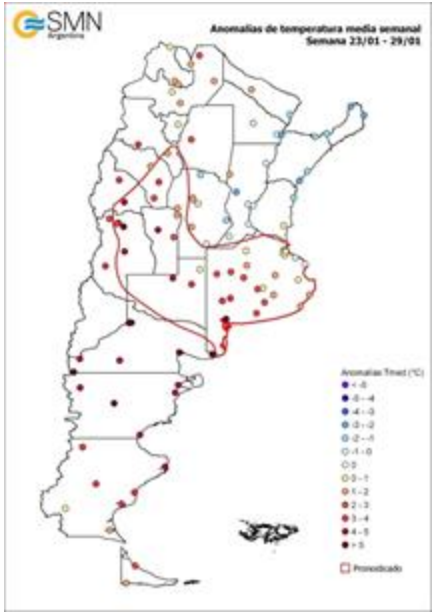
By Cynthia Matsudo

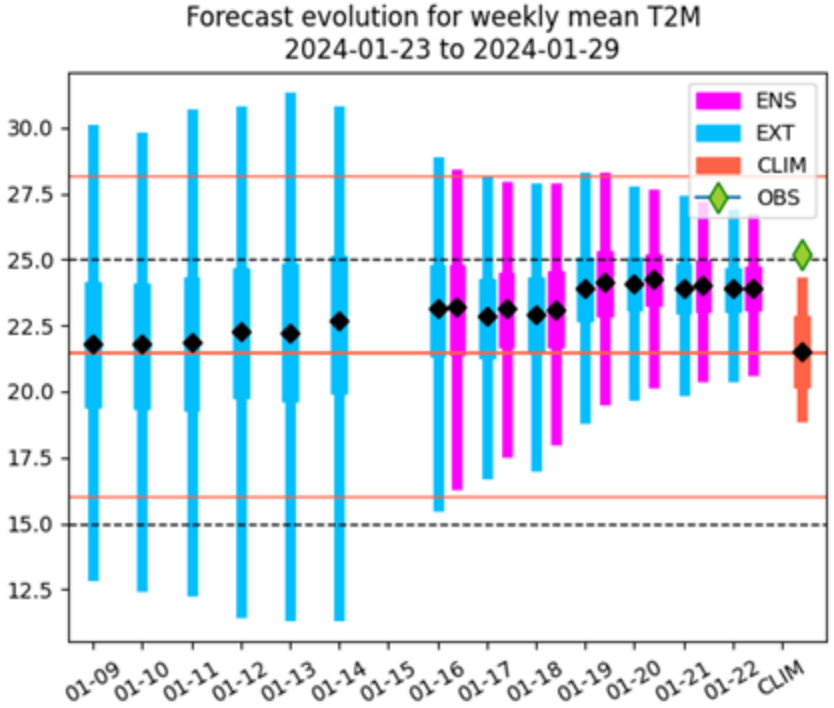


Ezeiza (near Buenos Aires): high EFI values, except for windspeed

23-day heat wave January 2024

Period:
23 to 29 January of 2024

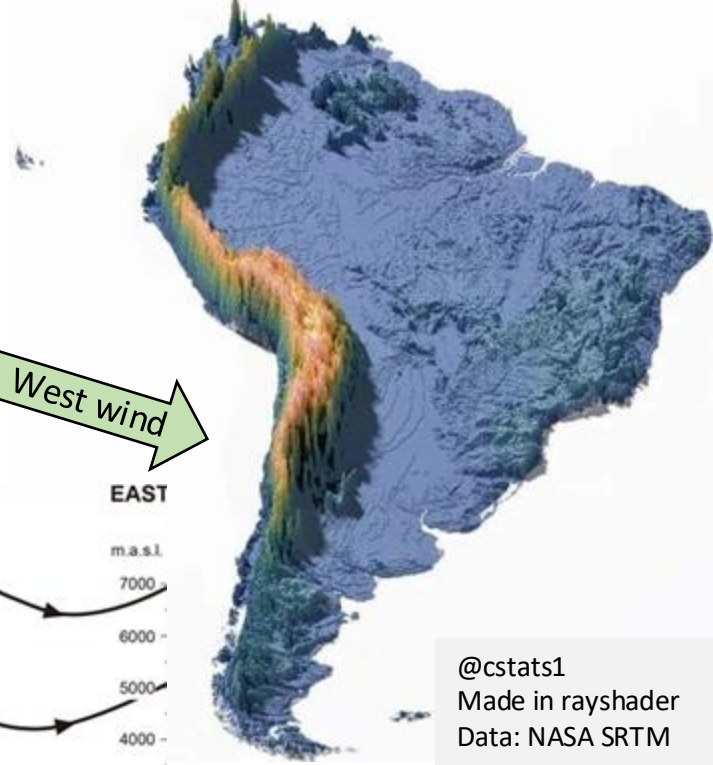




3 weeks prior, EXTENDED median similar to median clim

By Lucía Castro, Alejandro Godoy and Linus Magnusson

Zonda (Foehn) severe wind
July 21, 2023



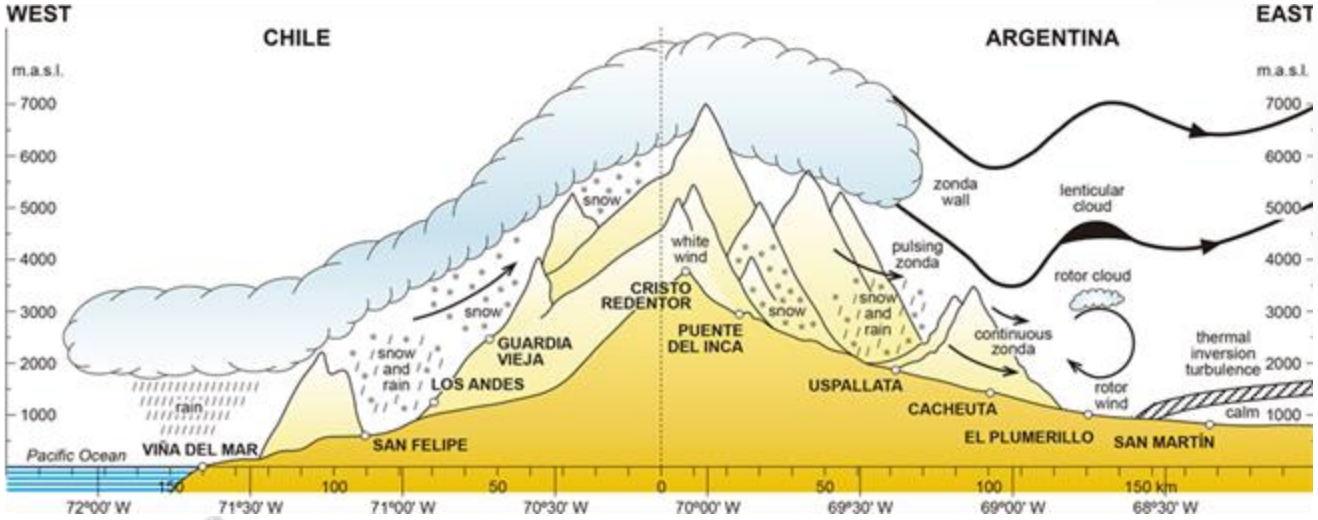
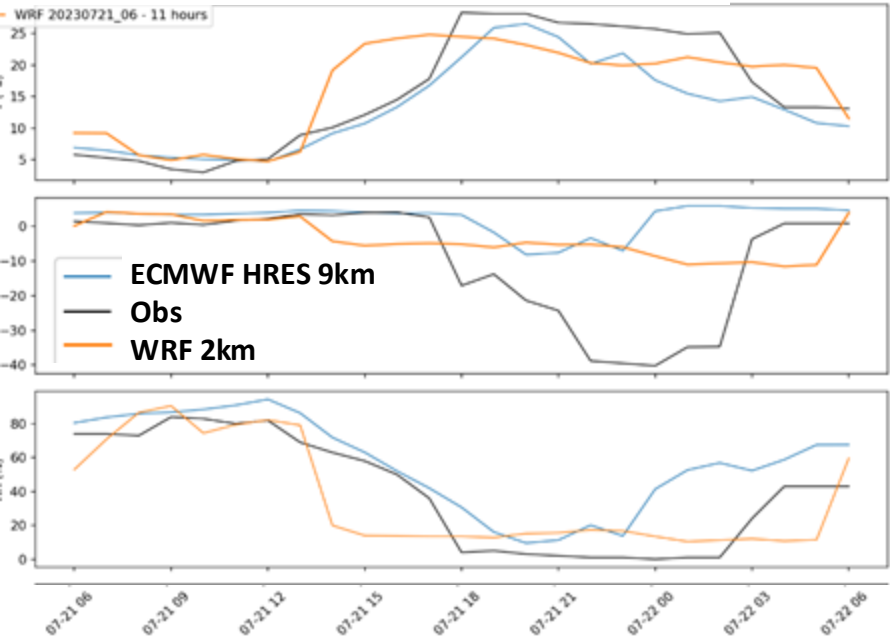


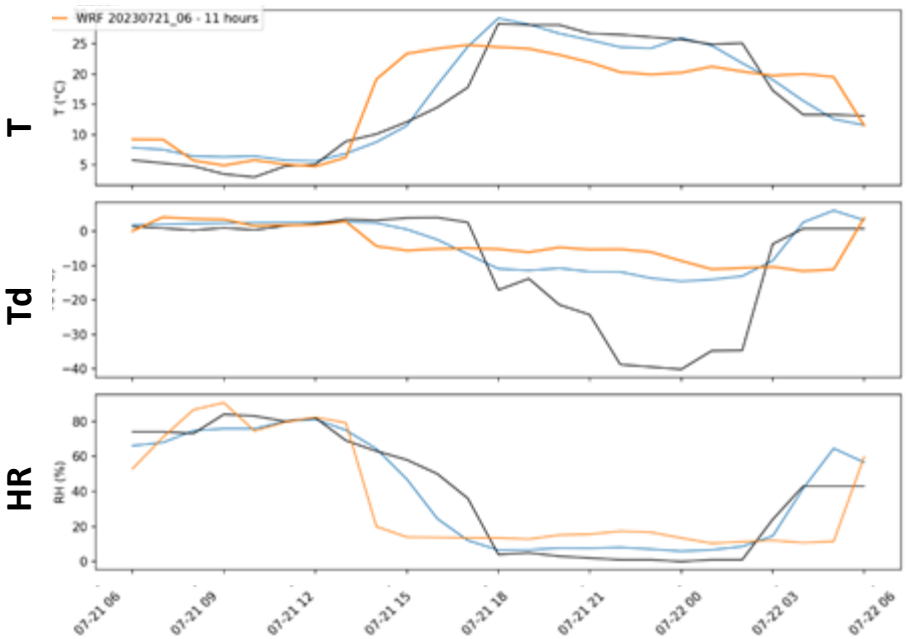
Diagram by Federico Norte

Mendoza airport July 21, 2023

41 hours forecast to the event starts



17 hours forecast to the event starts



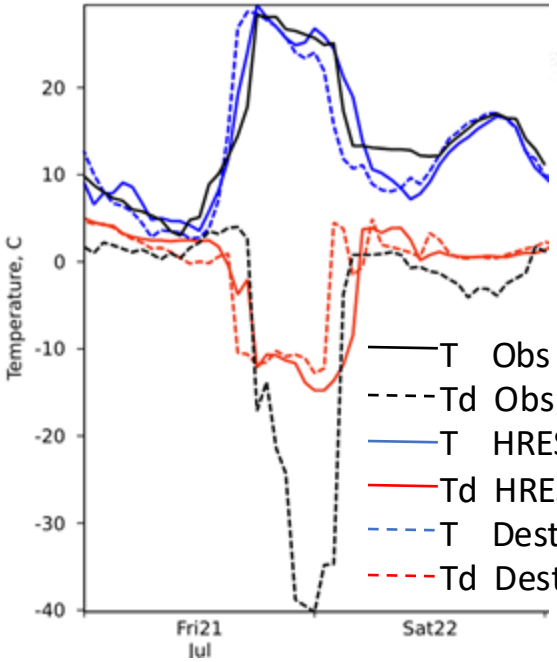
By Federico Otero

Mendoza airport and surrounding areas

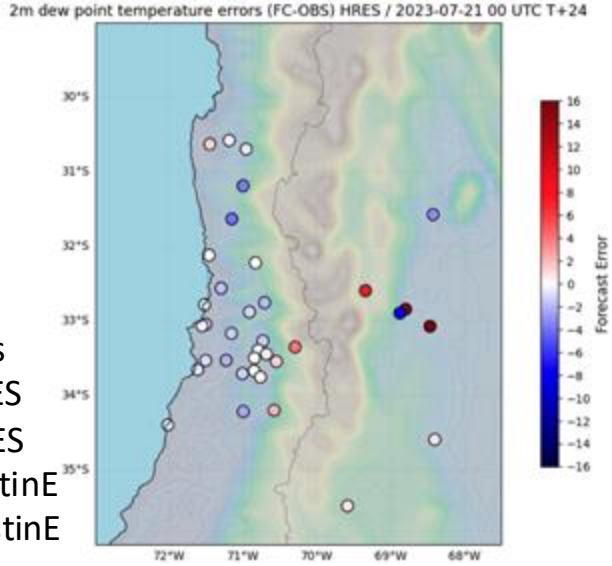
By Estibaliz Gascon

2m dew point temperature.

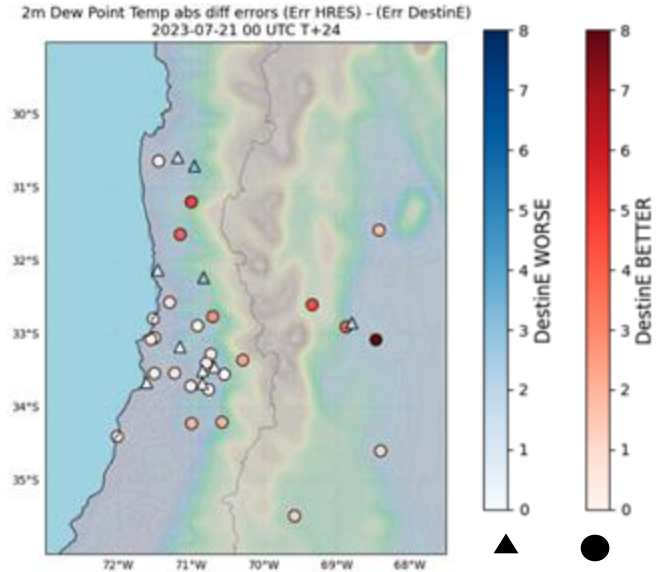
Base time 2023/07/21 00 UTC T+24h.



HRES errors (FC-OBS)



Diff abs(err HRES) - abs(err DestinE)

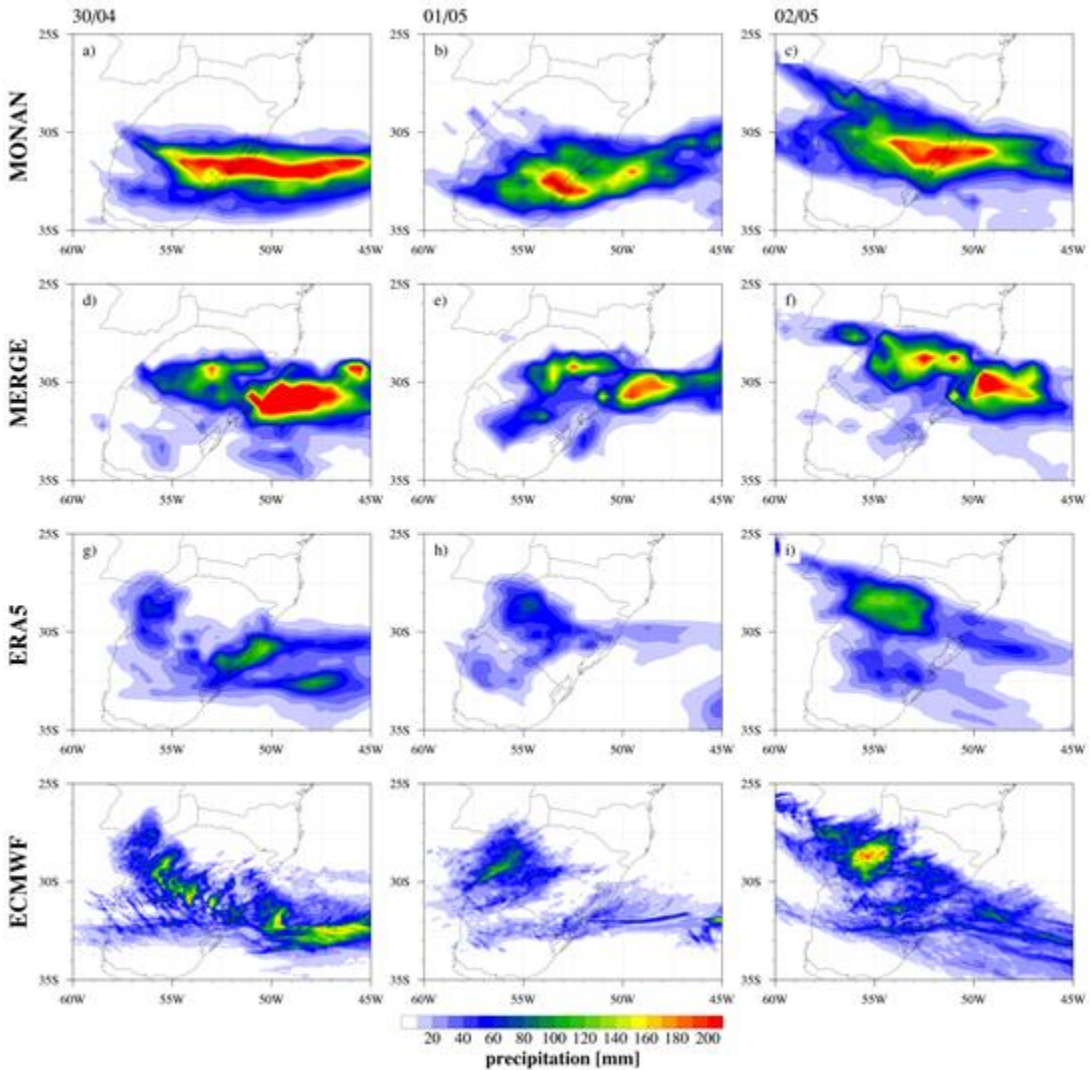


FC warmer dew points than OBS leeward, but DestinE better compared to HRES at short-range

Massive flood in Southern Brazil ,

ECMWF Severe Event Catalogue
https://confluence.ecmwf.int/display/FCST/202404+-+Rainfall+-+Brazil

Porto Alegre: 180 fatalities



24h Precipitation forecasts for total precipitation

24-hour rainfall accumulations for April 30 to May 2, 2024

Precipitation was more concentrated in the central regions of Rio Grande do Sul, particularly in the Guaíba basin

The ERA5 data showed rainfall concentrated more in the central-southern part of the state, with higher accumulations over Lagoa dos Patos and the far west of Rio Grande do Sul

The MONAN model focused rainfall primarily in the southern part of the state, but with accumulation levels consistent with observations (>200 mm), which were considerably higher than those in the ECMWF model

MERGE - combined GPM and raingauges

ECMWF – DestinE 4km resolution

By Fabio Rocha and Ariane Frassoni

Ongoing contributions from Pilot project

- A year of trust building between ECMWF and SA institutions for mutual benefit
- Development of South American expertise on ECMWF models and data base
- First results of IFS-HRES verification statistics over SA domains (ECMWF)
- Introduction to SMN of severe case studies from the perspective of predictability (as in *Severe Event Catalogue*).
- Successful absorption of EFI parameters and usage as tool for early warning
- Comparison between WRF, HRES, DestinE for small scale events
- All of above contribute to the advance of the EW4All campaign!

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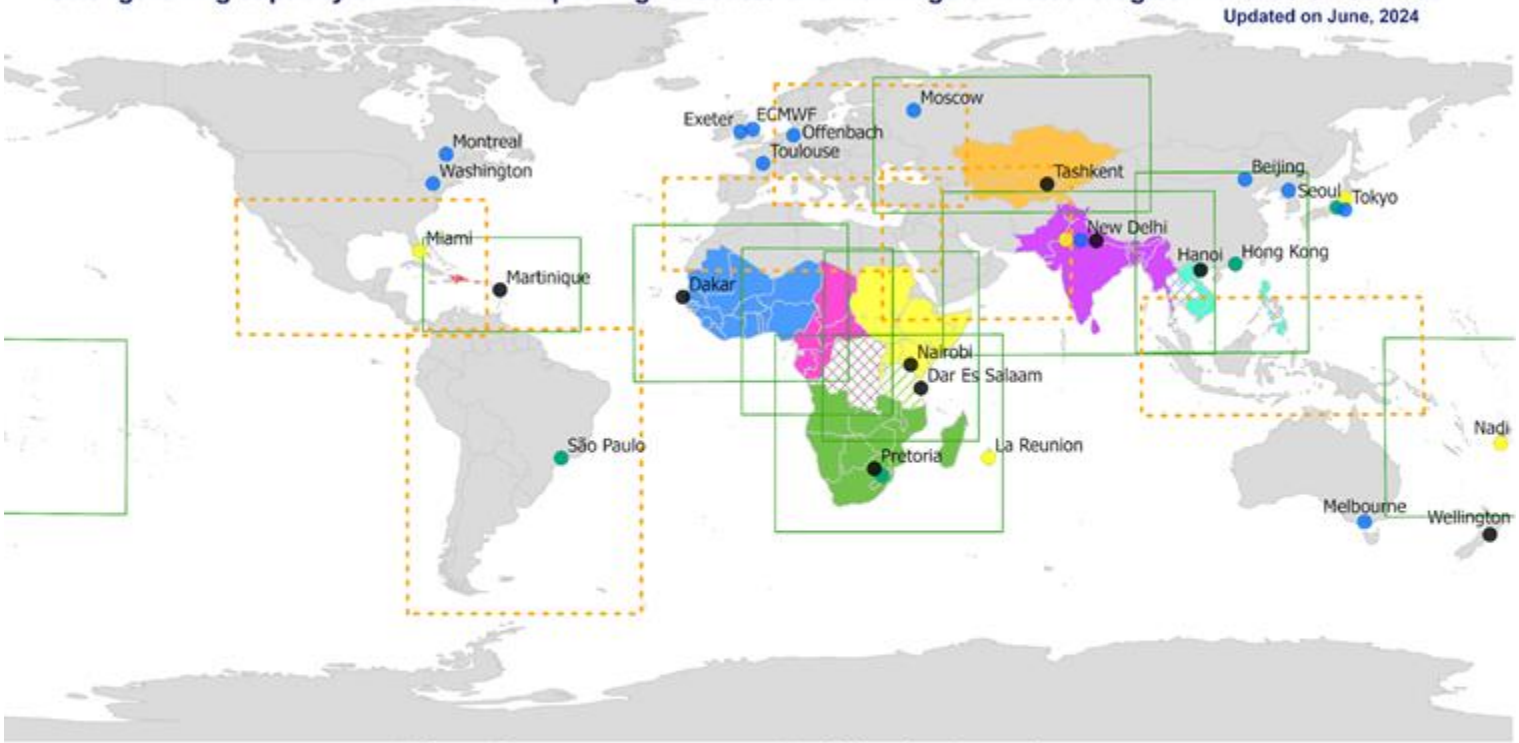
WMO Severe Weather Forecasting Programme (SWFP)

Strengthening capacity of NMHSs in improving forecasts and warnings of meteorological hazards since 2006

Updated on June, 2024



Contributing Centres

- Global Centres Incl.10 WMCs (12)
- Regional Centres Incl. 5 RSMCs SWF (9)
- RSMCs Tropical Cyclone (5)
- Nowcasting (NWC) Centres Incl. 2 RSMCs NWC (4)

Sub-regions

- Existing
- Potential future expansion as feasible subject to availability of resources

Participating Countries

- Central Africa
- Eastern Africa
- West Africa
- Southern Africa
- Southern Africa/Central Africa
- Southern Africa/Eastern Africa
- Central Asia
- South Asia
- Southeast Asia
- South Asia/Southeast Asia
- Eastern Caribbean
- South Pacific

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