



Servicio  
Meteorológico  
Nacional  
Argentina

# ACCURACY ASSESSMENT OF WEEKLY ACUMULATED PRECIPITATION OF THE NCEP-GFS MODEL IN LA PLATA BASIN

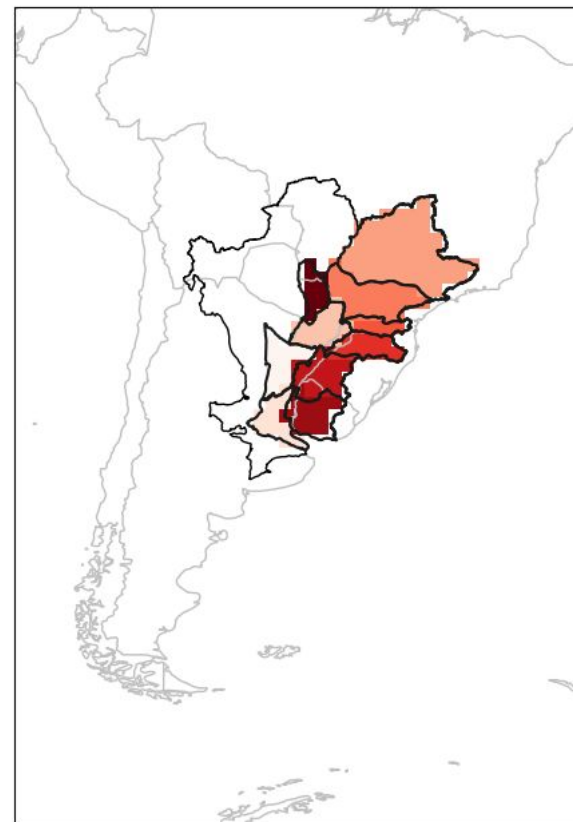
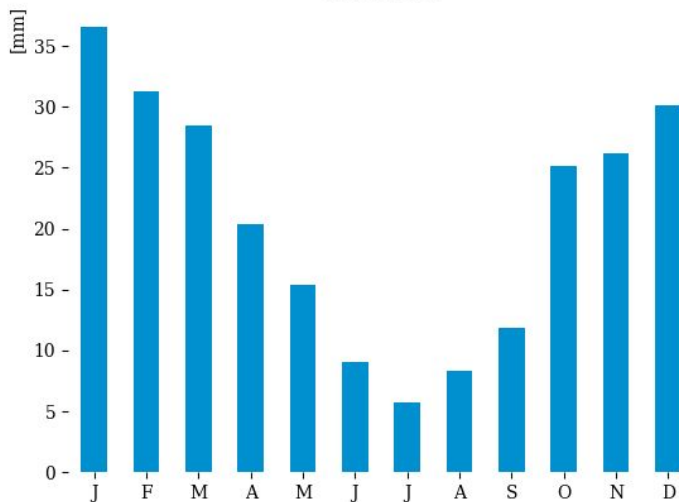
*S2S Community Workshop: Toward Minimizing Early Model Biases  
and Errors in S2S Predictions*

**Lucía M. Castro**

# La Plata Basin

- Includes five countries
- Has more than 100 million inhabitants
- Its two main rivers, Paraná and Uruguay, have 150 dams
- Southeastern South America (SESA) has predictability for longer leadtimes (Klingeman, 2021; Castro, 2023)

Weekly accumulated Precipitation La Plata Basin  
2016-2022



[www.smn.gov.ar](http://www.smn.gov.ar)



# DATA

## Period

Period: 2016 to 2022

Lead: 2 week (S2)

Seasons: DJF, MAM, JJA, SON  
~ 540 forecasts per season

Variable: Weekly accum. PP

## GFS

Init.: 00Z (daily)

Grid: 0.5° x 0.5°

Members: 30 Pert. + 1 Cont.

Hindcast: 2000-2019 (for  
climatology)

## CHIRPS

Domain.: 50°N to 50°S

Grid: 0.05° x 0.05°

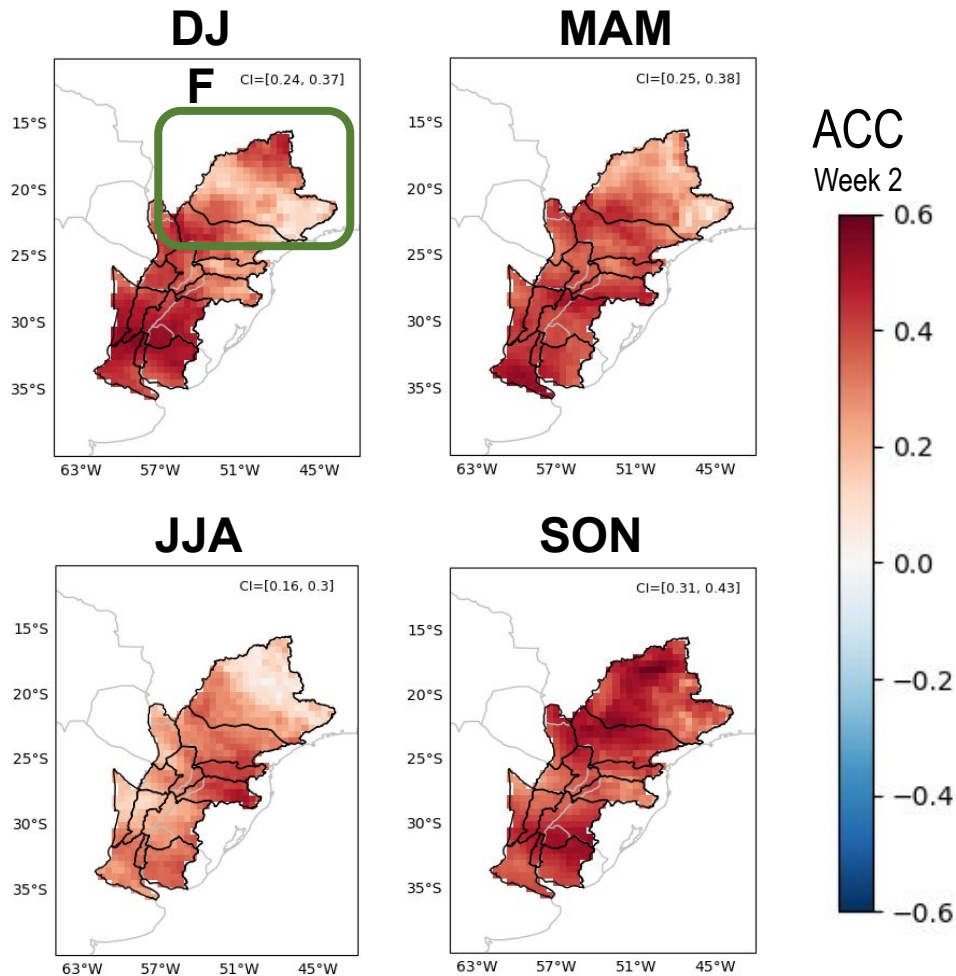
Climatology: 2000-2019

## Deterministic

BIAS, RMSE, ACC,  
Ratio of Std. Deviations

## Categorical

POD, FAR, ETS,  
Frequency BIAS

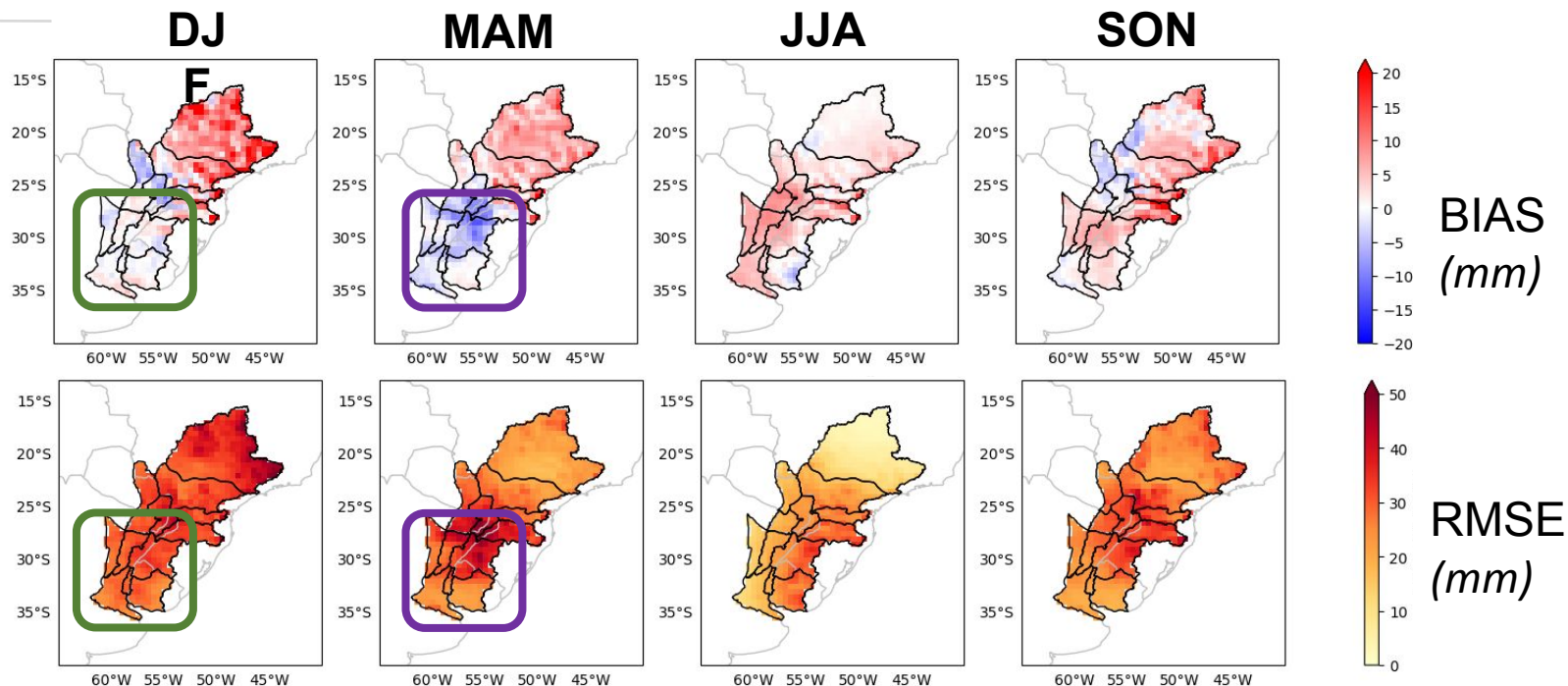


# ACC

Anomaly Correlation Coefficient

In wetter seasons (DJF, SON) ACC is **HIGHER** in and **LOWEST** in the dry season (JJA)

During DJF, north of 22°S the ACC is low (20-25%). Beginning of the Paraná River.



## BIAS



North of 25°S PP is **overestimated** year around  
(max in DJF 20mm)

South of 25°S PP is **underestimated** during MAM  
and near zero in DJF

## RMSE

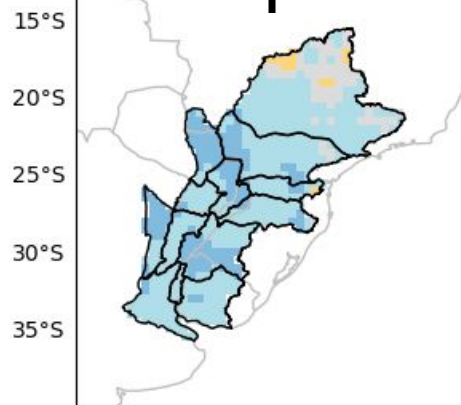
+ **Max** in wet season (DJF)  
- **Min** in dry season (JJA)

During MAM RMSE is high in the center of  
the basin, associated with underestimation

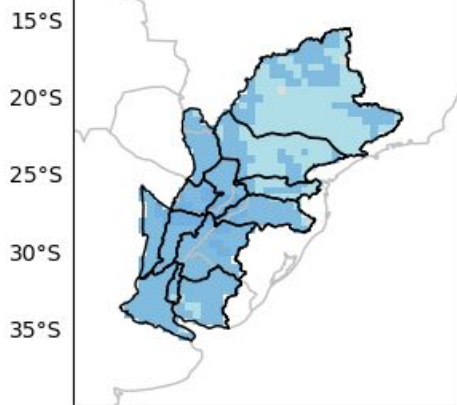
DJ

MAM

F



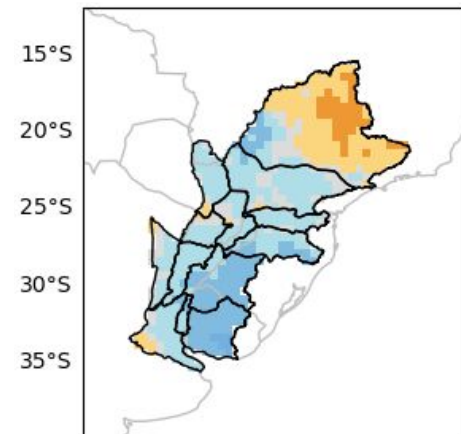
60°W 55°W 50°W 45°W



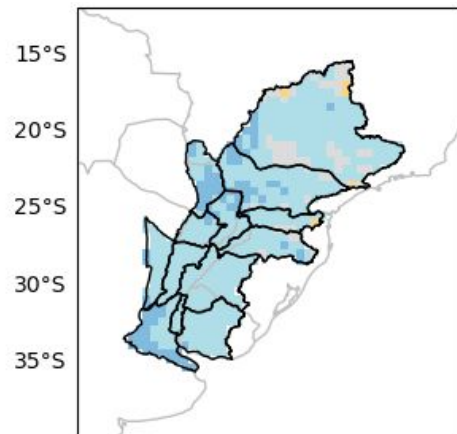
60°W 55°W 50°W 45°W

JJA

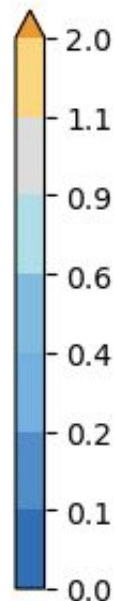
SON



60°W 55°W 50°W 45°W



60°W 55°W 50°W 45°W

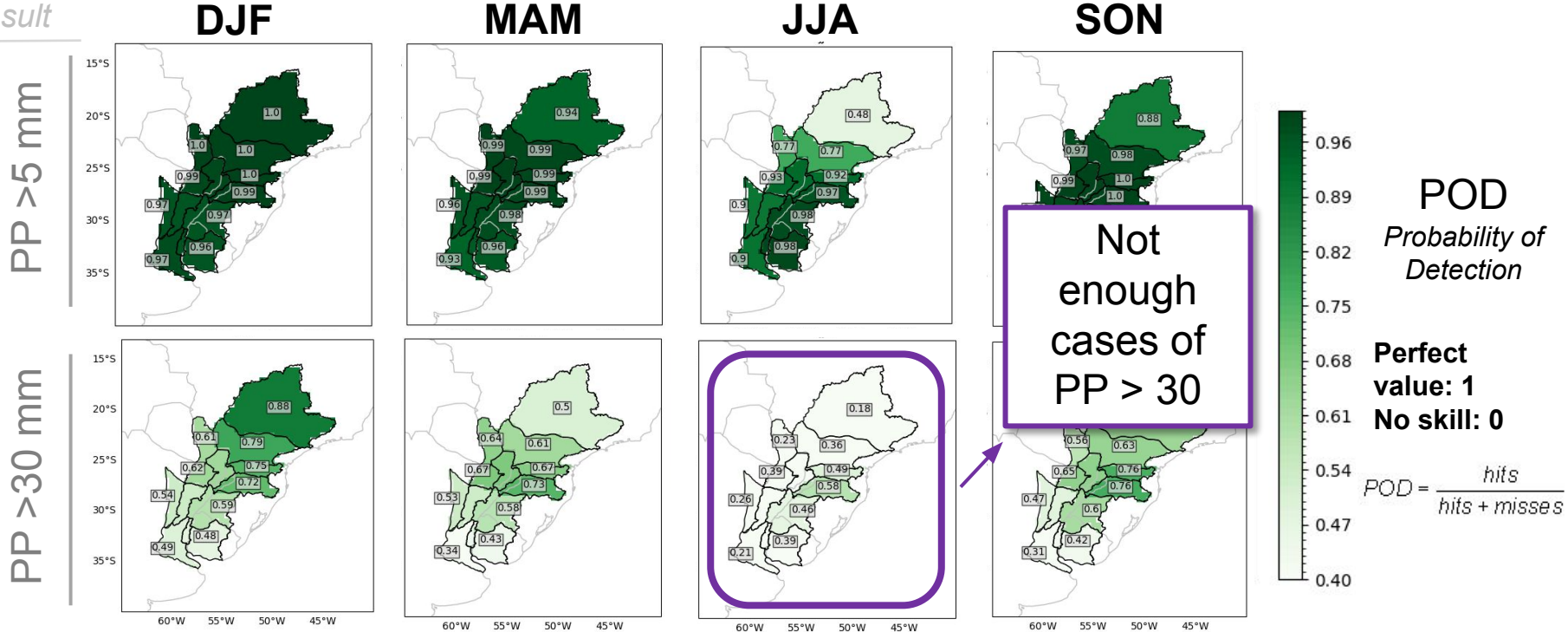


## Ratio of standard deviation

$\frac{SD_{fcst}}{SD_{obs}} > 1$  fcst  $\uparrow$  **overestimates** variability  
 $\frac{SD_{fcst}}{SD_{obs}} < 1$  fcst  $\downarrow$  **underestimates** variability

**Underestimated** variability all year,  
higher in MAM

**Overestimated** variability during JJA  
in the north of the La Plata Basin



## POD



PP > 5 mm: POD near perfect value from Sep. to May

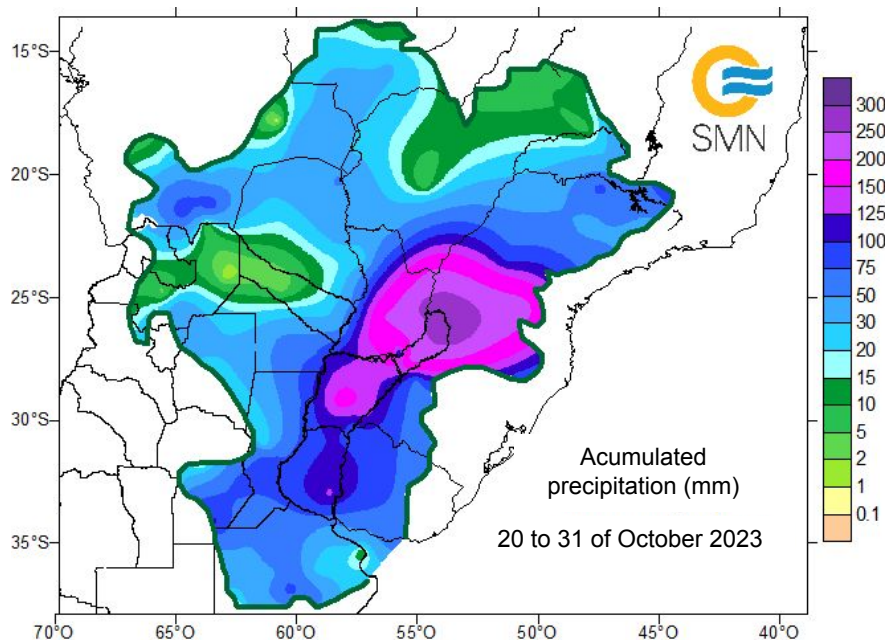
PP > 30mm: POD above 50% in the north of the basin from Sep to May

More false alarms than misses, specially in MAM and JJA

During MAM RMSE is high in the center of the basin, associated with underestimation

# Case study: Heavy Precipitation

From 27/10 to 2/11 of 2023



More than 150  
mm/week

Lost of walkway  
in Iguazú falls



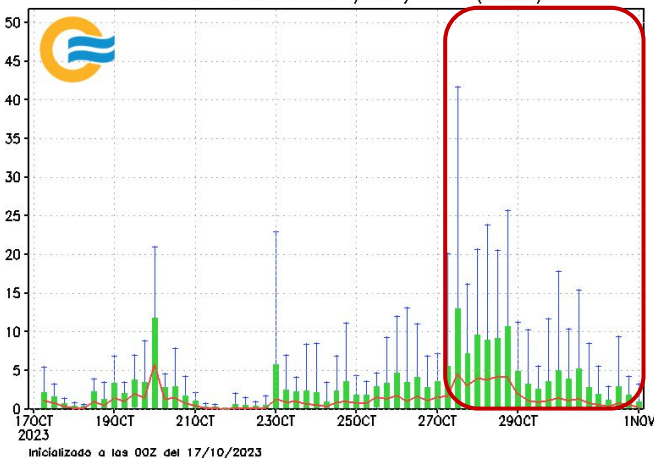
(2023, October 30). 'Cedieron las pasarelas de Cataratas del Iguazú'. *Noticias Neuquén*. [URL](#)



# Federal Hydric Counsel Report

Event: 27/10 to 2/11 of 2023

13 'Cuenca del Rio Parana: Tramo Misionero Paraguayo'  
PP media de la cuenca c/6hr y desv. (barras)

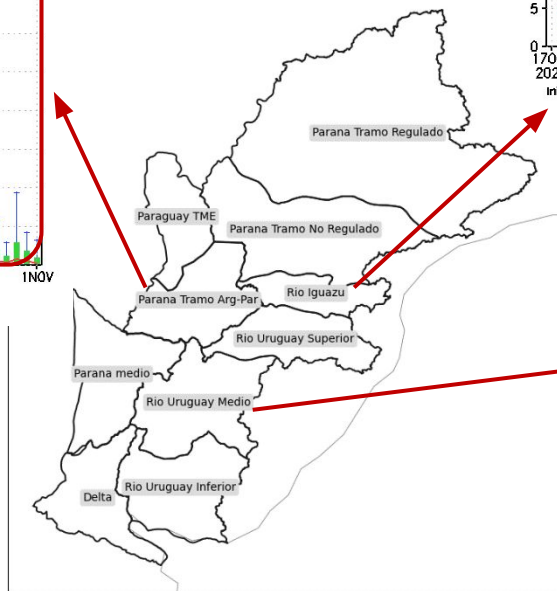


### Reference

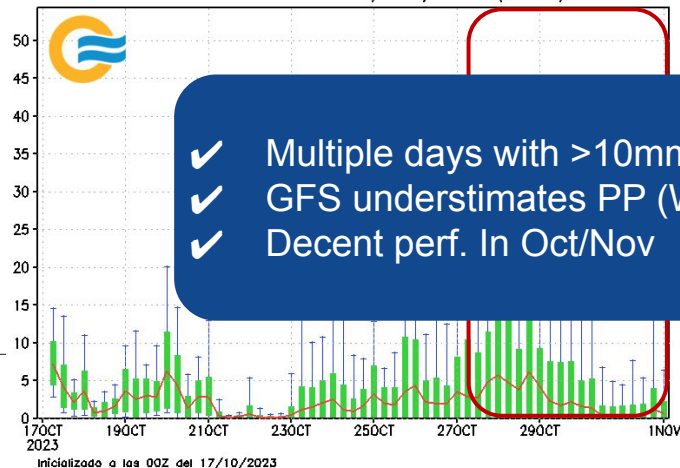
- Ens. Mean
- █ St. Deviation
- | Max/Min value

Issued: 17  
October

~10 days before the event

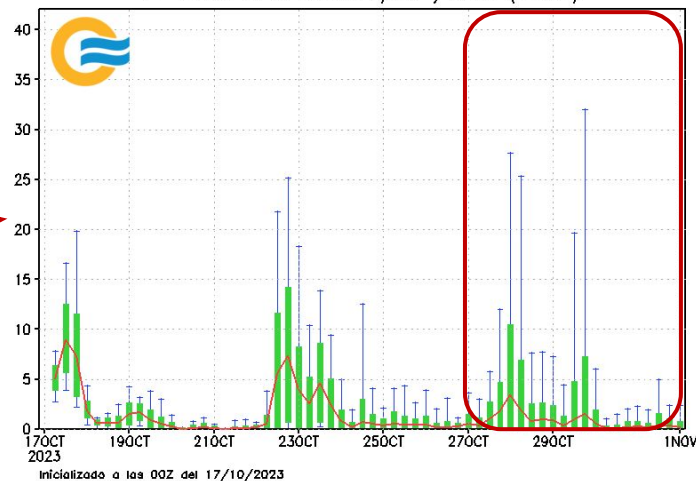


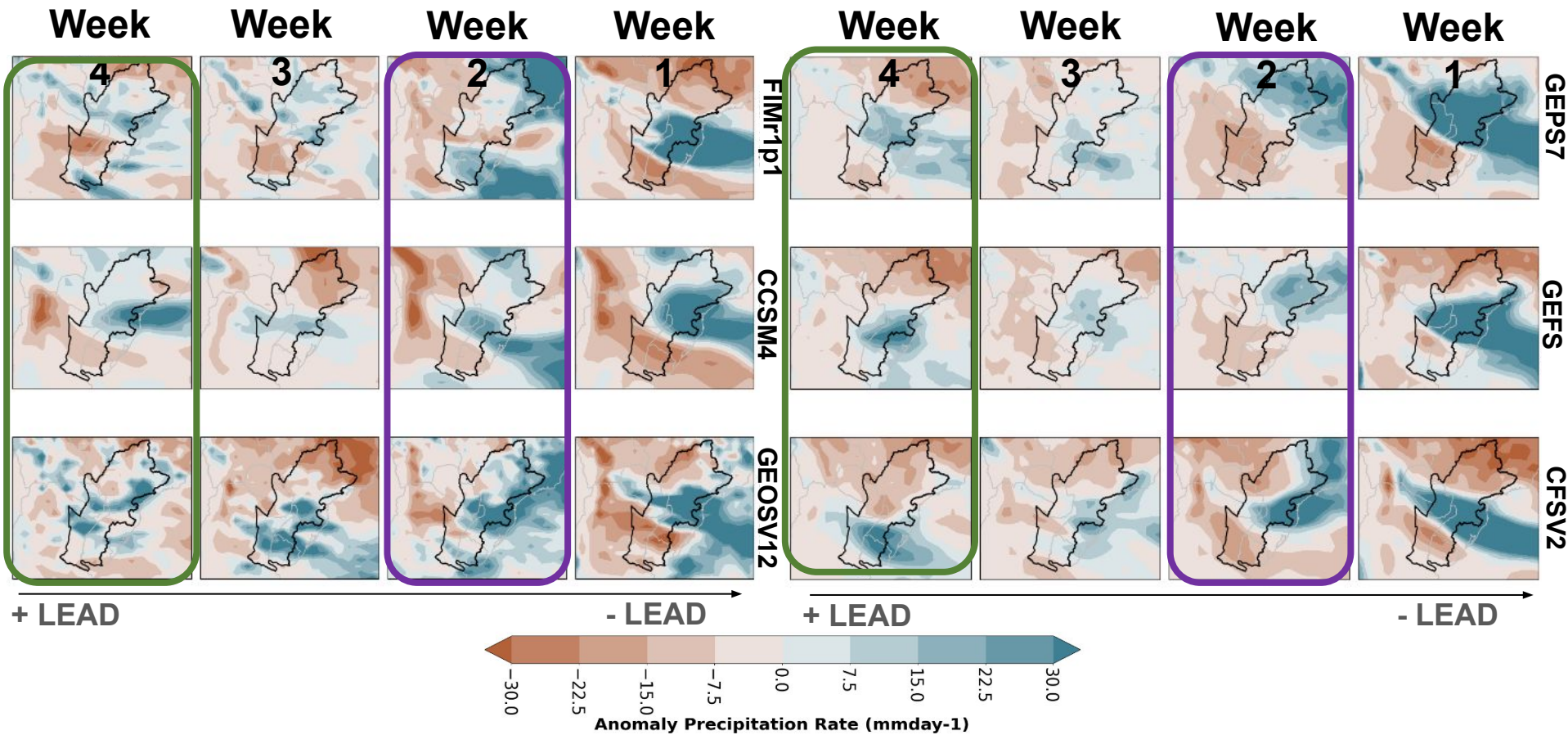
17 'Cuenca del Rio Iguazu'  
PP media de la cuenca c/6hr y desv. (barras)



- ✓ Multiple days with >10mm
- ✓ GFS underestimates PP (W2)
- ✓ Decent perf. In Oct/Nov

22 'Cuenca del Rio Uruguay: Tramo Medio'  
PP media de la cuenca c/6hr y desv. (barras)





It was observed that **4 of 6 models** predicted precipitation anomalies of 30mm even **four weeks** in advance in the south of the basin



# ASSESSMENT

GFS shows **good** performance of 2 week forecasts for PP from **September to May**, specially for low thresholds

Operational GFS tends to ↓ **understatimate PP** with a lead of 2 weeks in La Plata Basin

# OUTCOME

The anticipated outlook of this event users take concrete actions for **risk reduction**.

# NEXT STEPS

Analog study for others basins in Argentina (Atuel, Juramento)

Including SubC models operationally





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Año de la Defensa de la Vida, la Libertad y la Propiedad