The impact of domain size and resolution on PRECIS model outputs over the Caribbean

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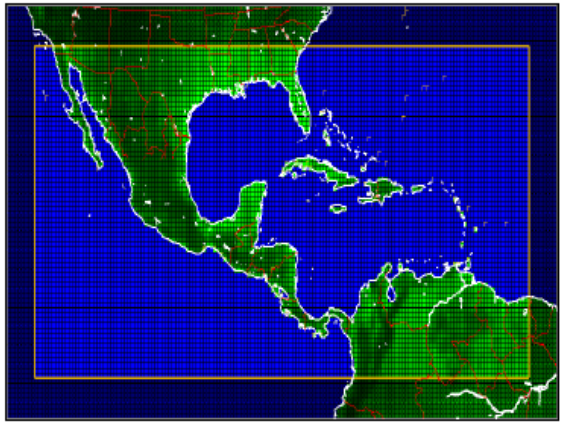
MOTIVATION AND FOCUS

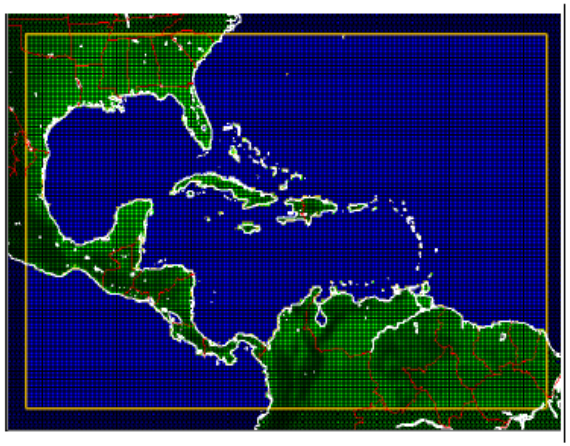
Our motivation is to evaluate the impact of domain size and the overall PRECIS skill to simulating relevant climate features in the Caribbean. Filling the gap in CORDEX process within the Caribbean.

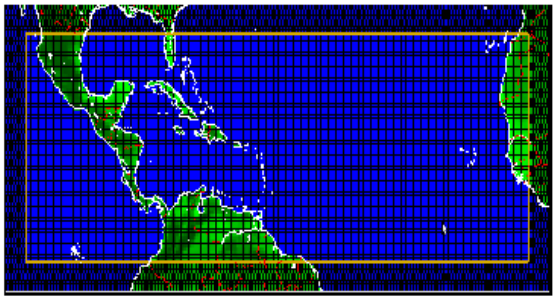
1. Precipitation Patterns. Particularly wet season
2. Rainfall annual cycle and Mid-Summer Drought
3. Caribbean Low-Level Jet

We will just to address the domain size

EXPERIMENTS & OBSERVATIONS



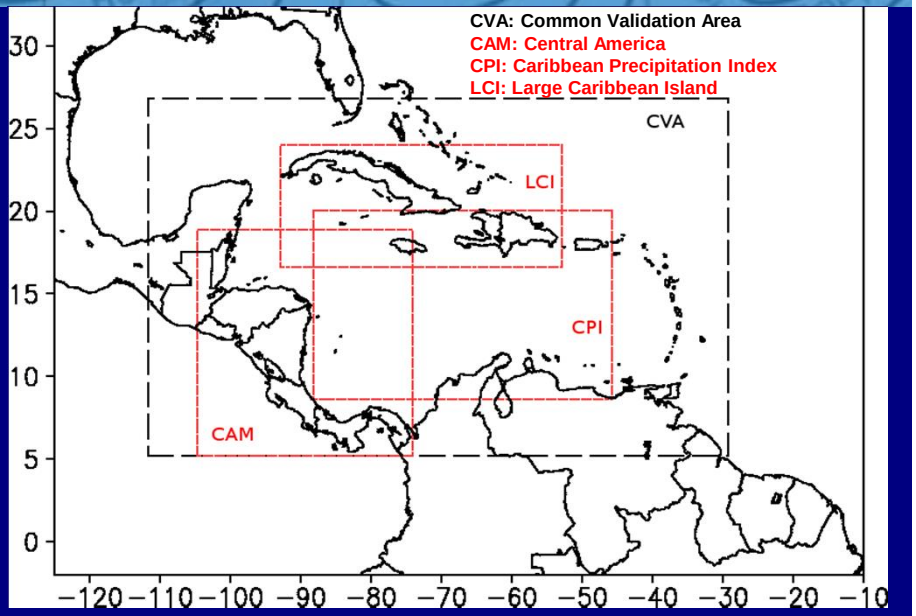




D1: The first PRECIS results. Centella et al (2008), Campbell et al (2010), Taylor et al (2013)

D2: The smaller and more centered on the Caribbean. Thinking on 25km resolution

D3. To explicitly include the circulation associated with EW and TS

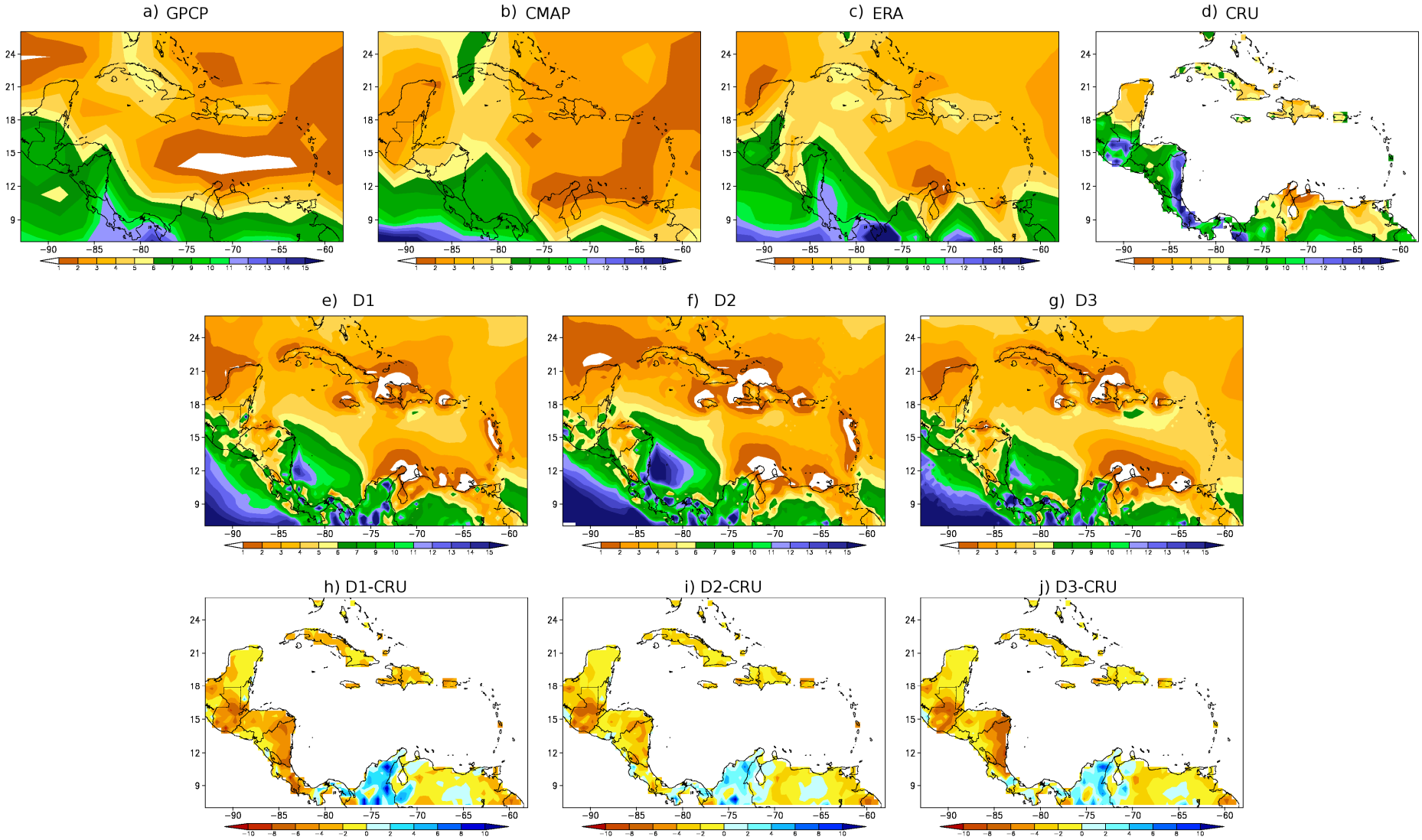


Reference Datasets

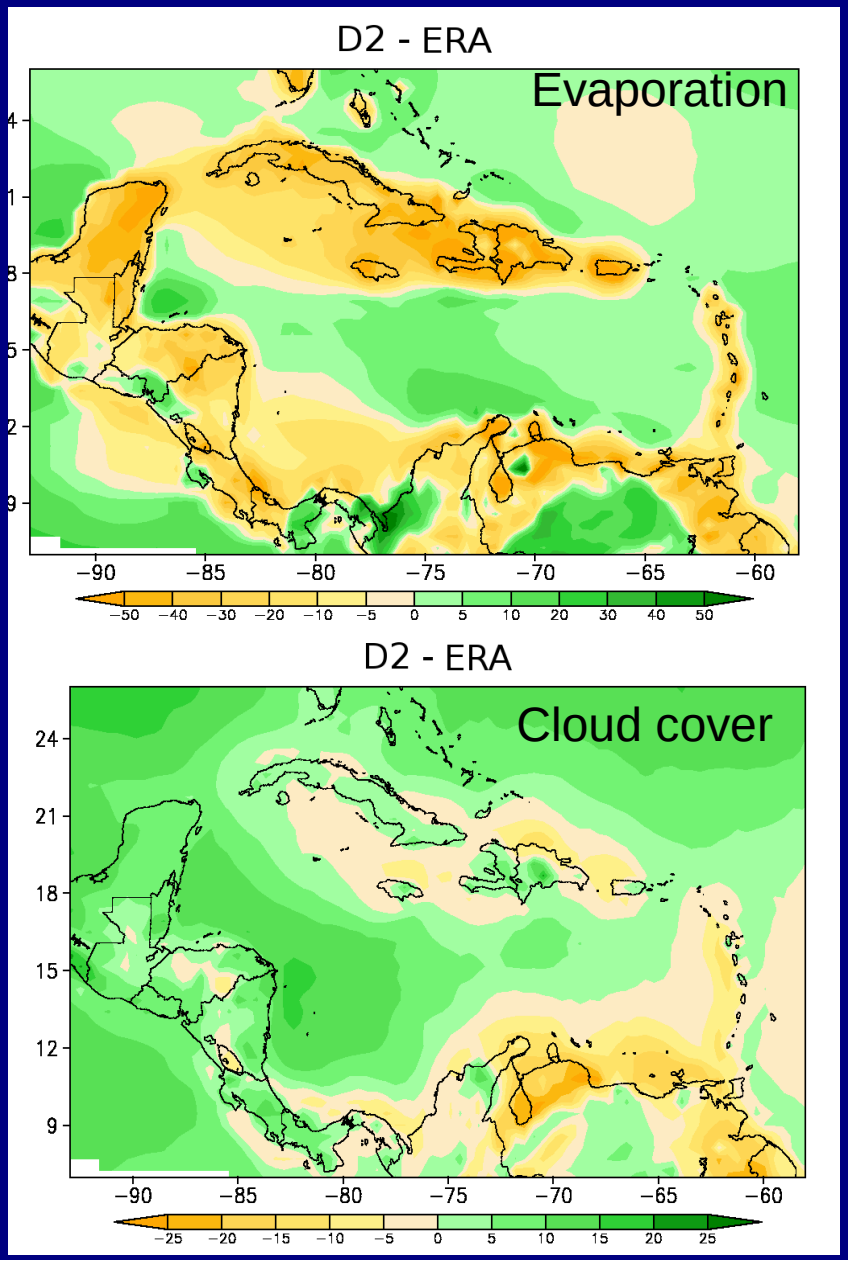
GPCP 2.5° Monthly & **GPCP_D1** 1° Daily
CMAP
VASclimO (GPCP, land only at 0.5°)
CRU_TS3.1
UDEL
ISCCP (cloud cover)
North America Reanalysis (**NARR**)
ERA Interim (also used as LBC)

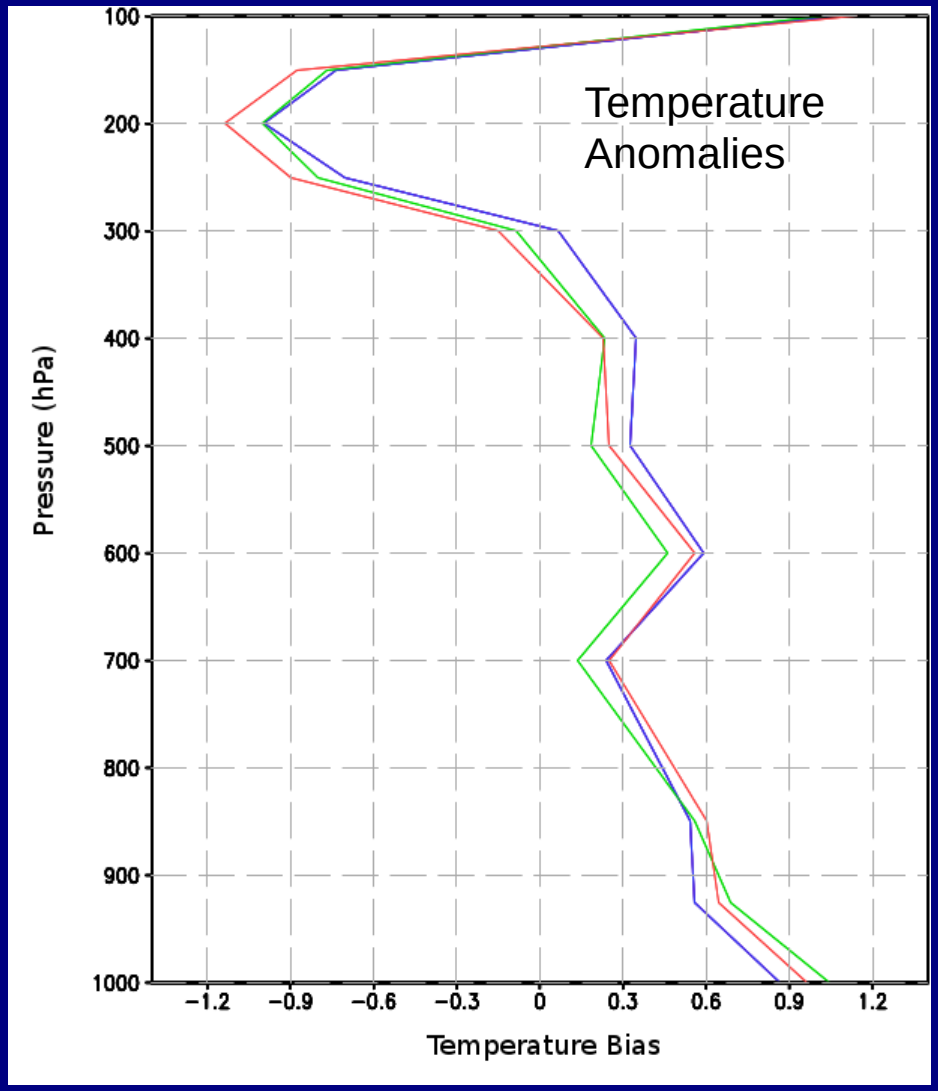
TIME FRAME 1991-1999

EWS Multi-annual seasonal patterns



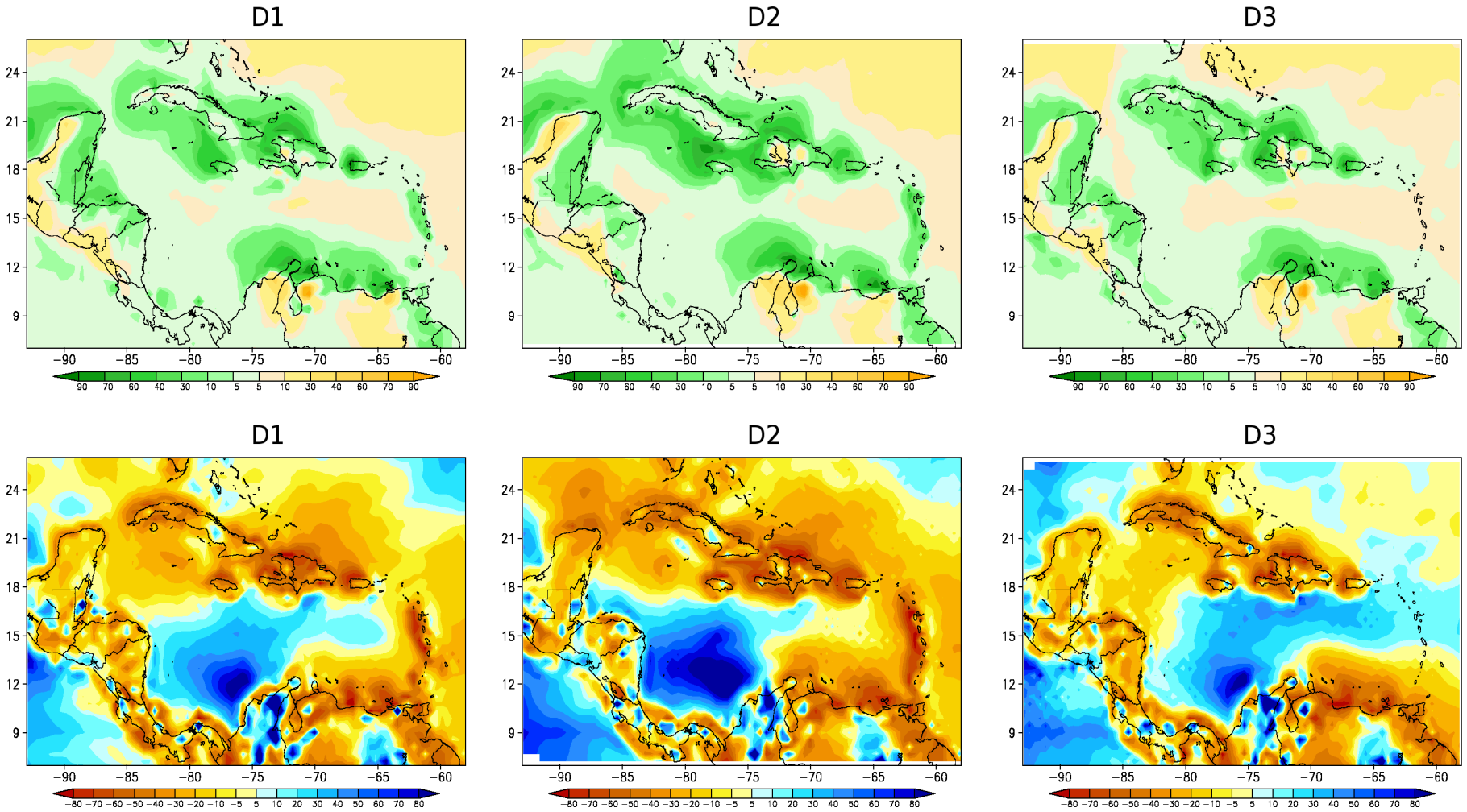
EWS Evaporation, Cloud Cover & Temperature





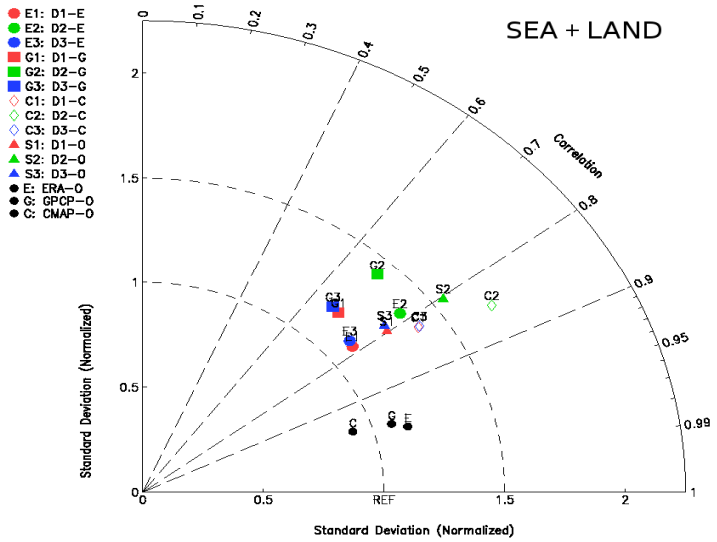
EWS Rainfall frequency and intensity

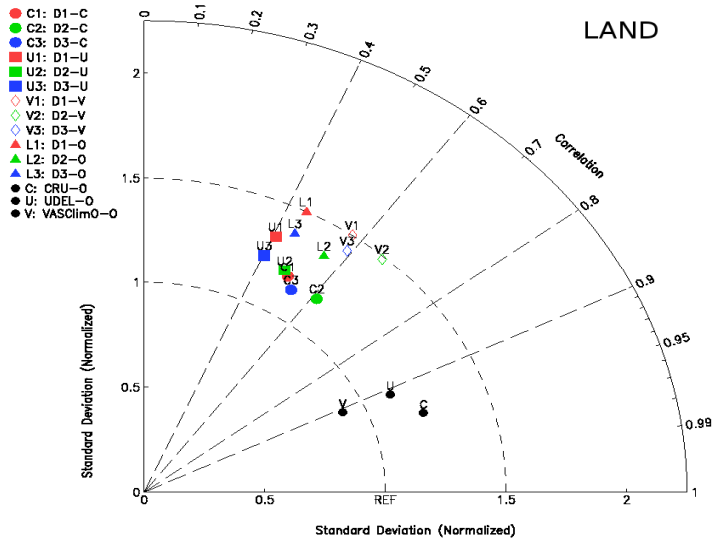
Frequency (top row) and Intensity (bottom row)



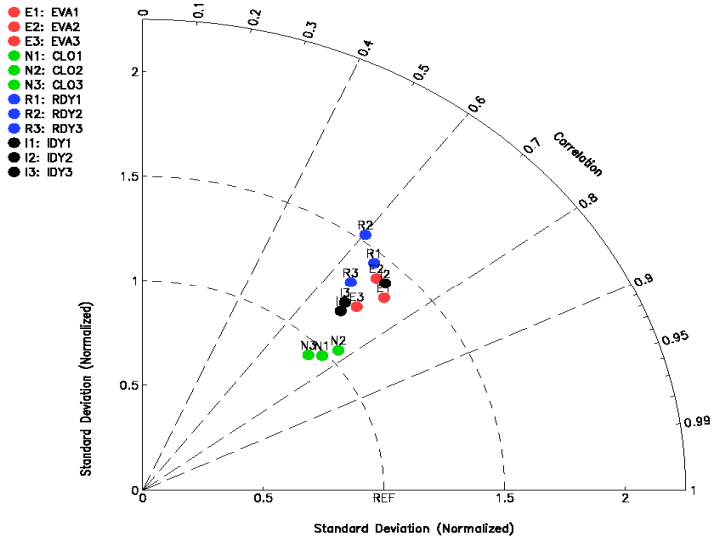
Summarizing (EWS spatial patterns)

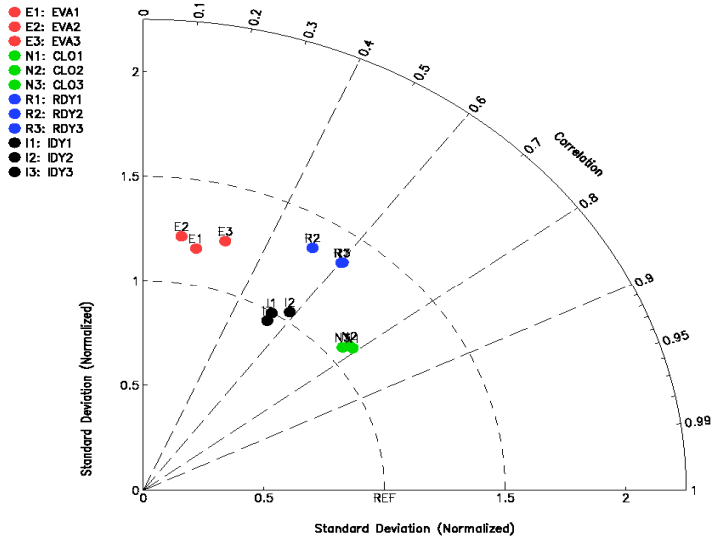
Precipitation



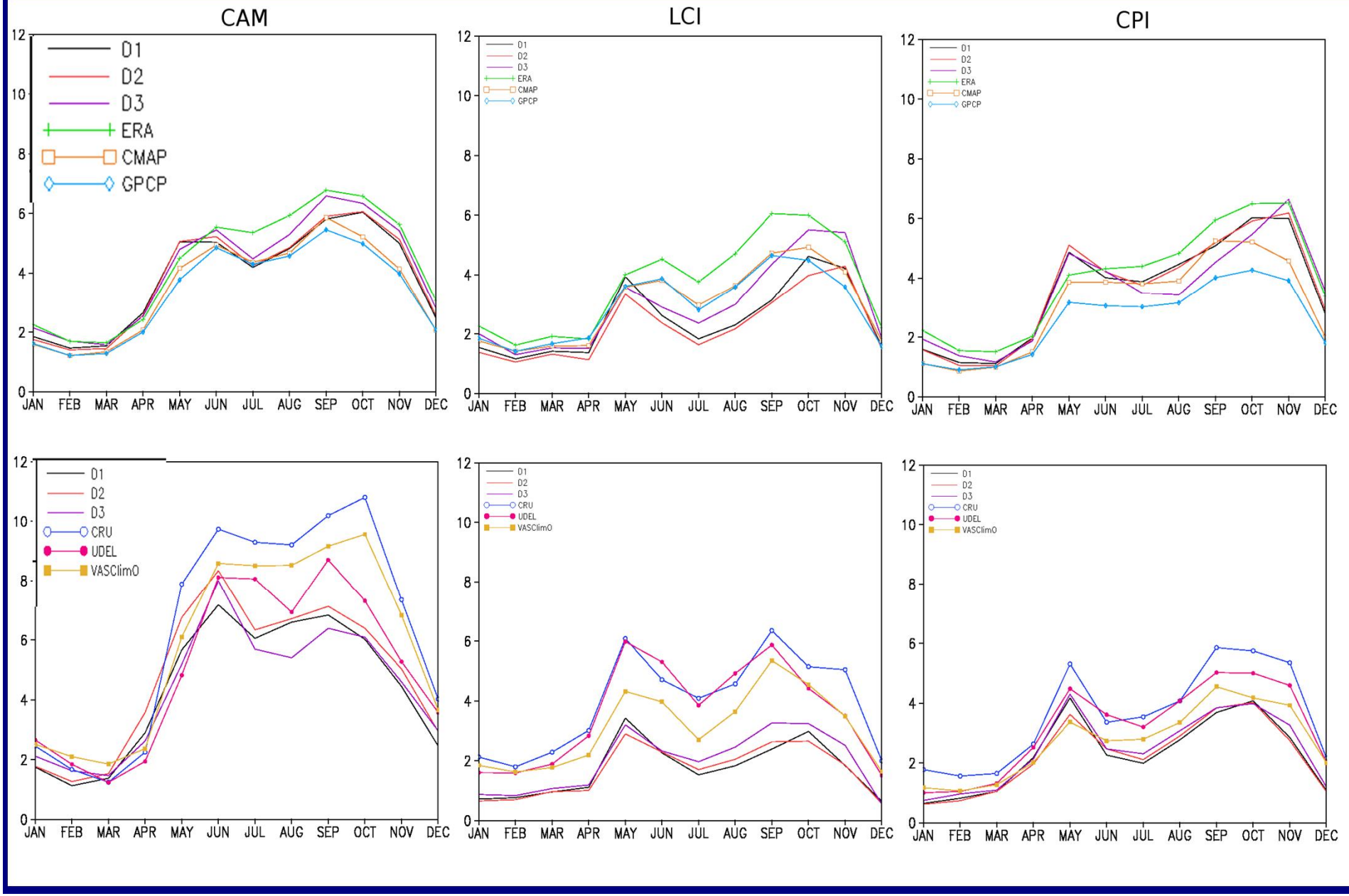


Cloud cover, evaporation, rainfall freq & intensity

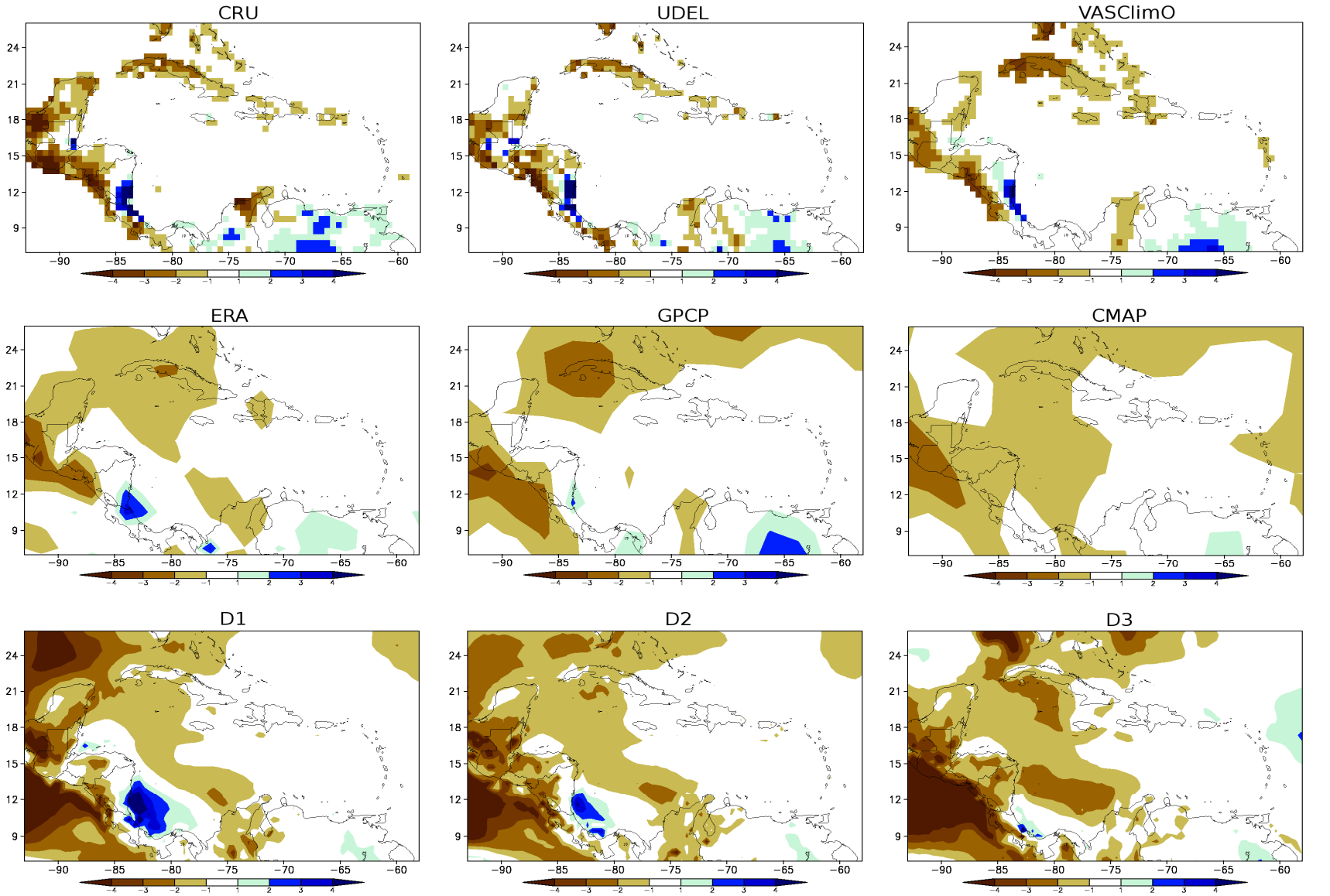




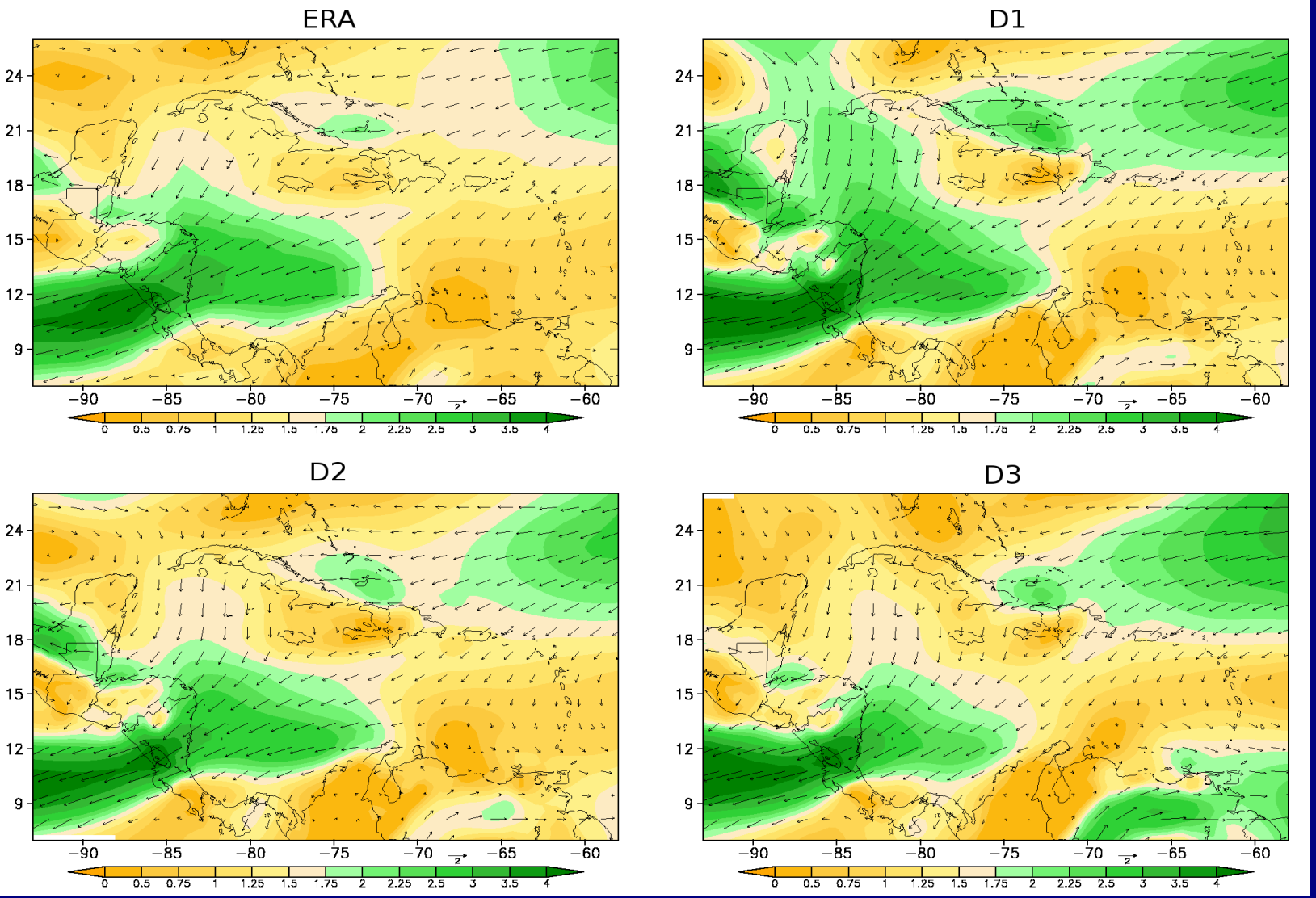
Rainfall annual cycle



MSD Rainfall Patterns
Brow (blue) Ÿ Presence (absence)

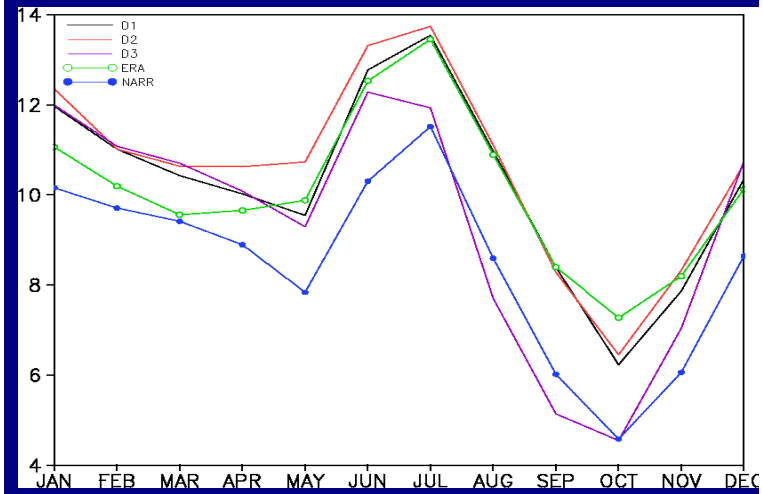


MSD Low-level wind patterns

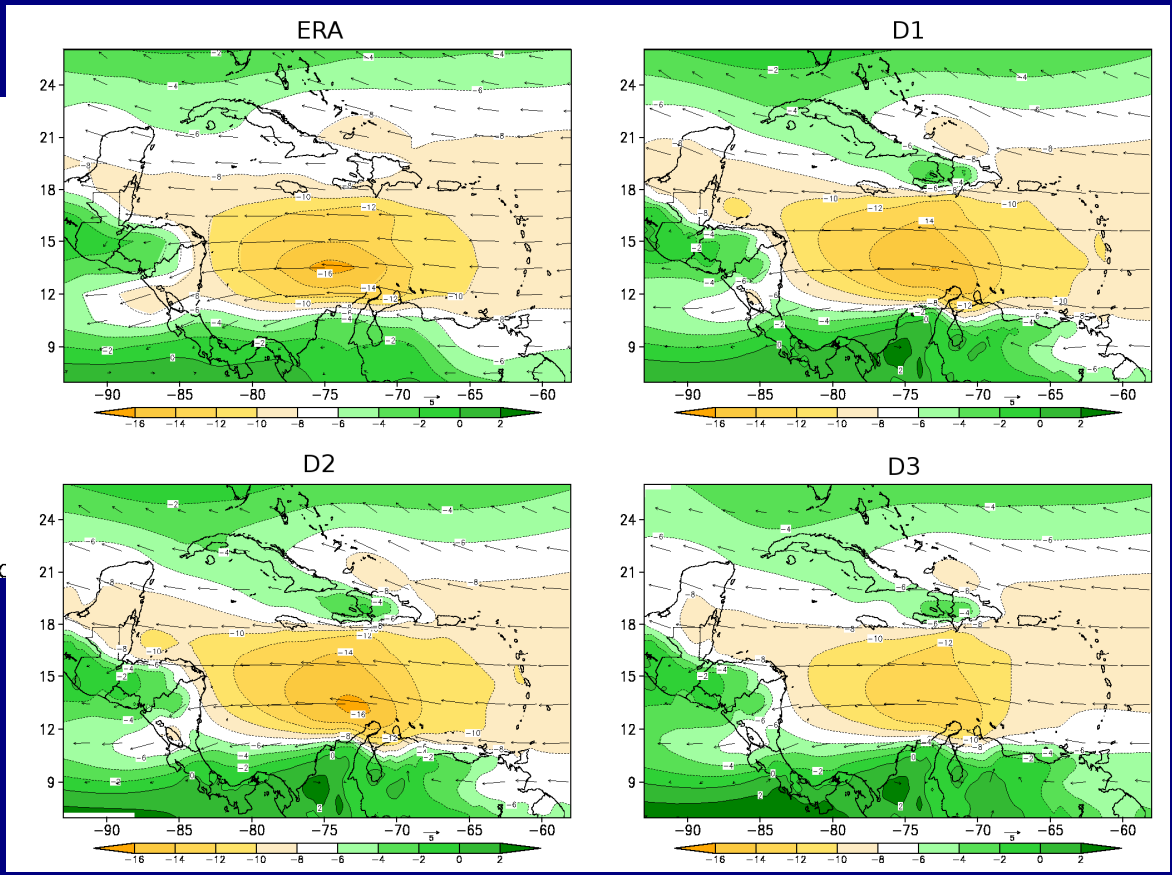


CLLJ index and zonal wind

CLLJ index annual cycle

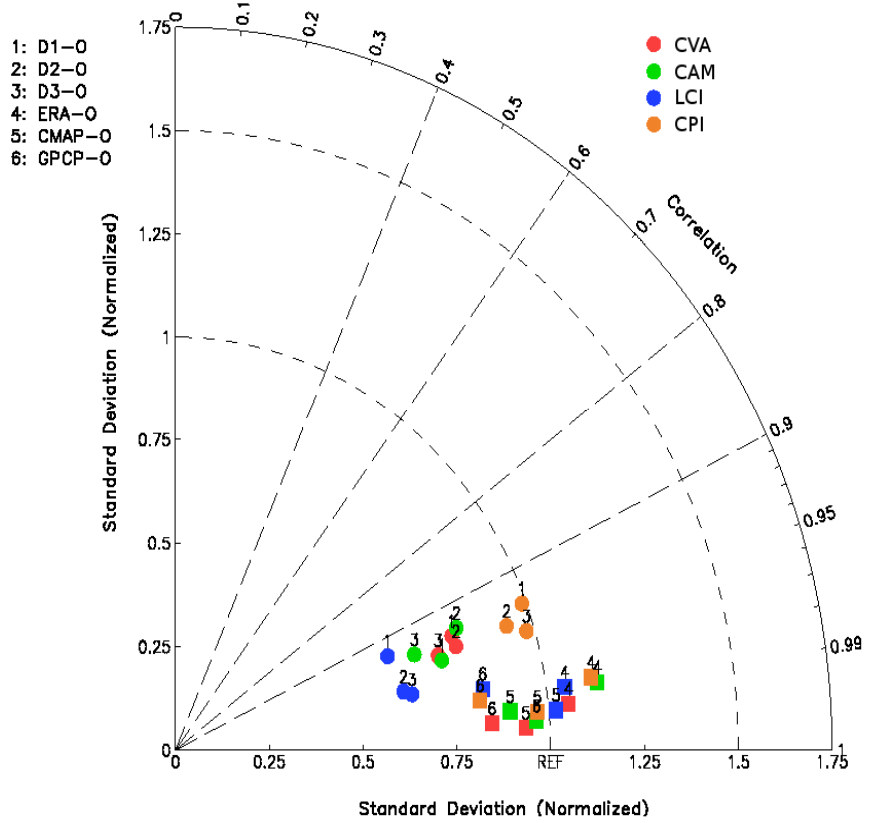


July 925 hPa zonal wind and vectors

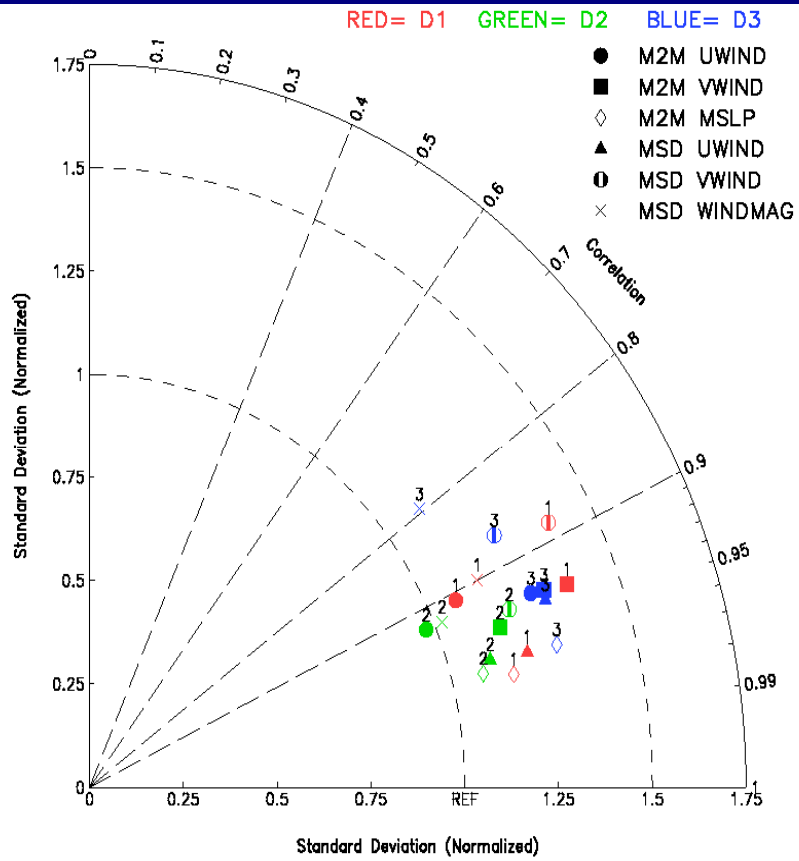


Summarizing

Rainfall annual cycle (land only)



NASH and low-level wind



SUMMARY AND CONCLUSIONS I

1. PRECIS produces a systematic dry bias over land areas which is larger over the Largest Caribbean Islands. The bias is related with a weaker hydrological cycle (reduced moisture fluxes, lower soil moisture content). Land-Surface scheme deficiencies?

2. There are clear differences in the skill of PRECIS simulating the rainfall patterns over land and land-sea points.

3 The rainfall annual cycle is well simulated including the timing of MSD. However the MSD rainfall spatial pattern is not so well represented despite the MSD low-level circulation pattern is well reproduced.

SUMMARY AND CONCLUSIONS II

4. Despite the differences we saw between the configurations the overall analysis of the surface variables over land and the atmospheric circulation features, suggests that there are not significant different between them. Further more, there are not improvements when the domain was extended further to east.

5. There is a clear variation of RCM's skill associated with the different reference datasets considered. This is related with the high observational uncertainty within the Caribbean region.