Dynamic Seasonal Rainfall Forecasts over Central America: A Comparative Evaluation of C3S and NMME

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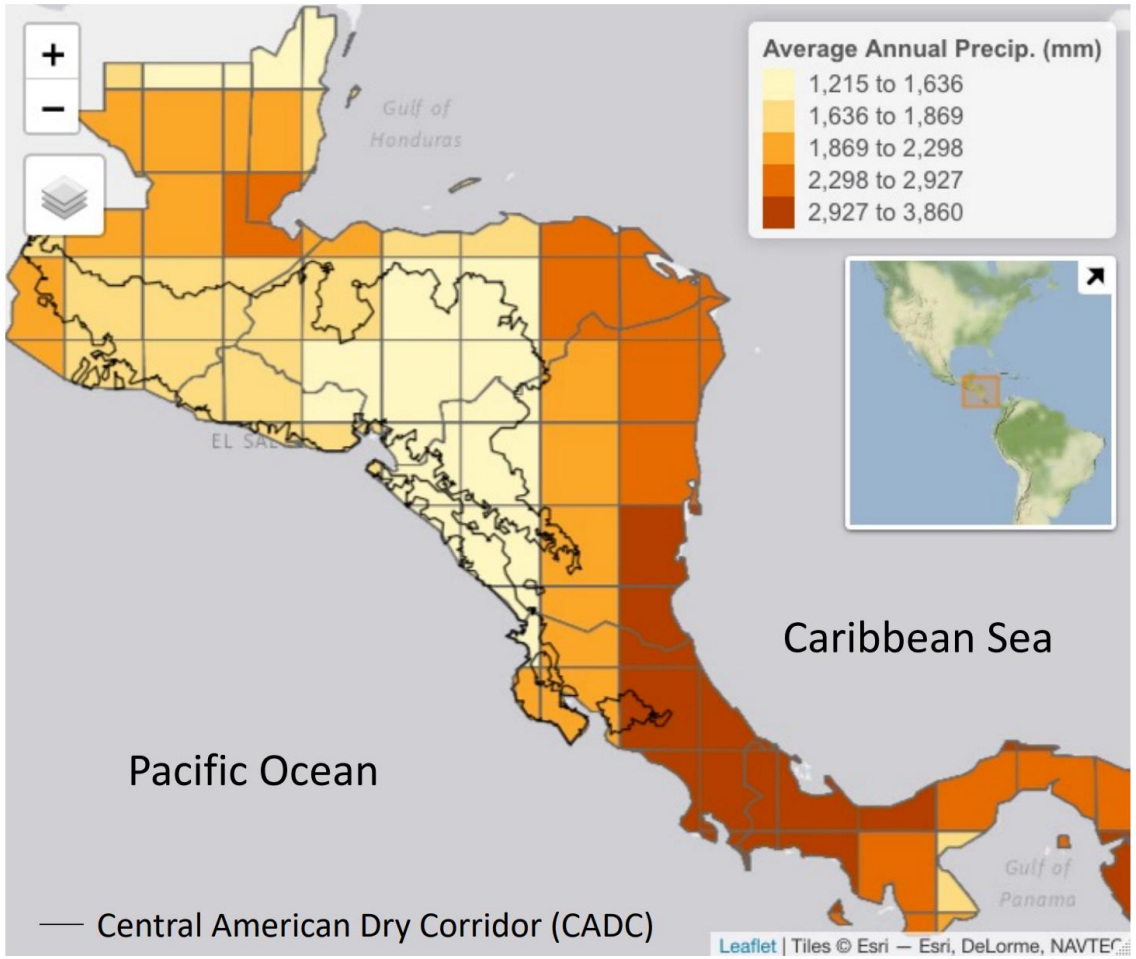
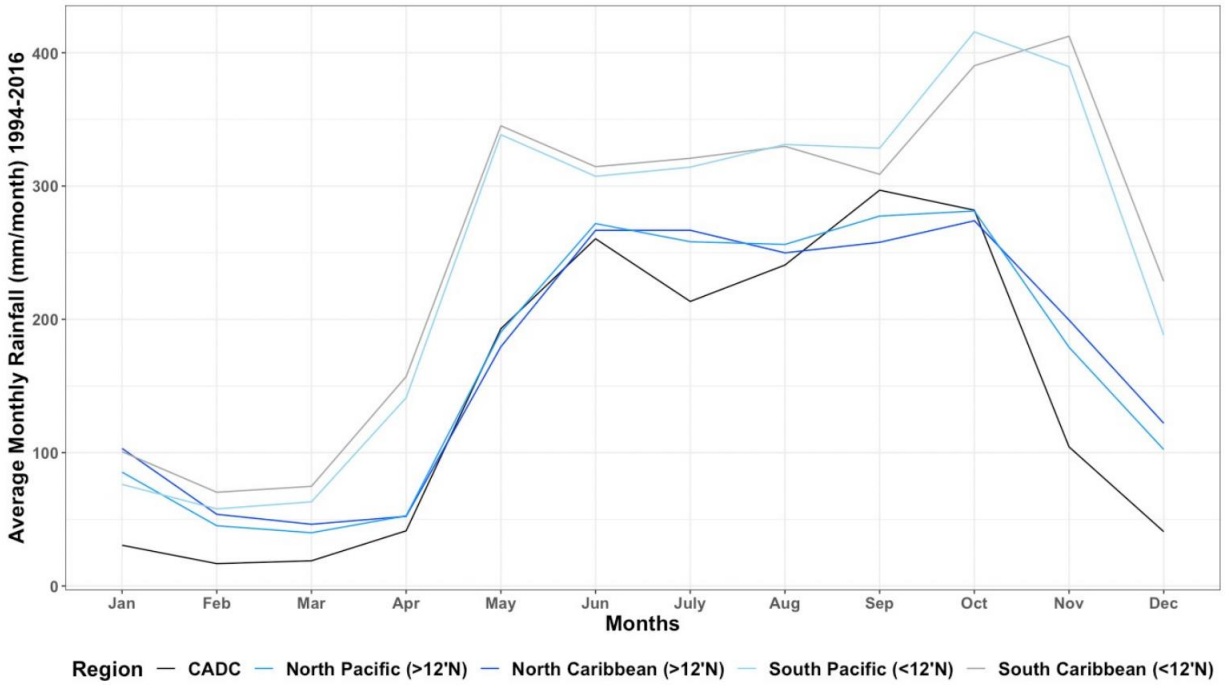
Seasonal Forecasting Possibilities and Needs in Central America





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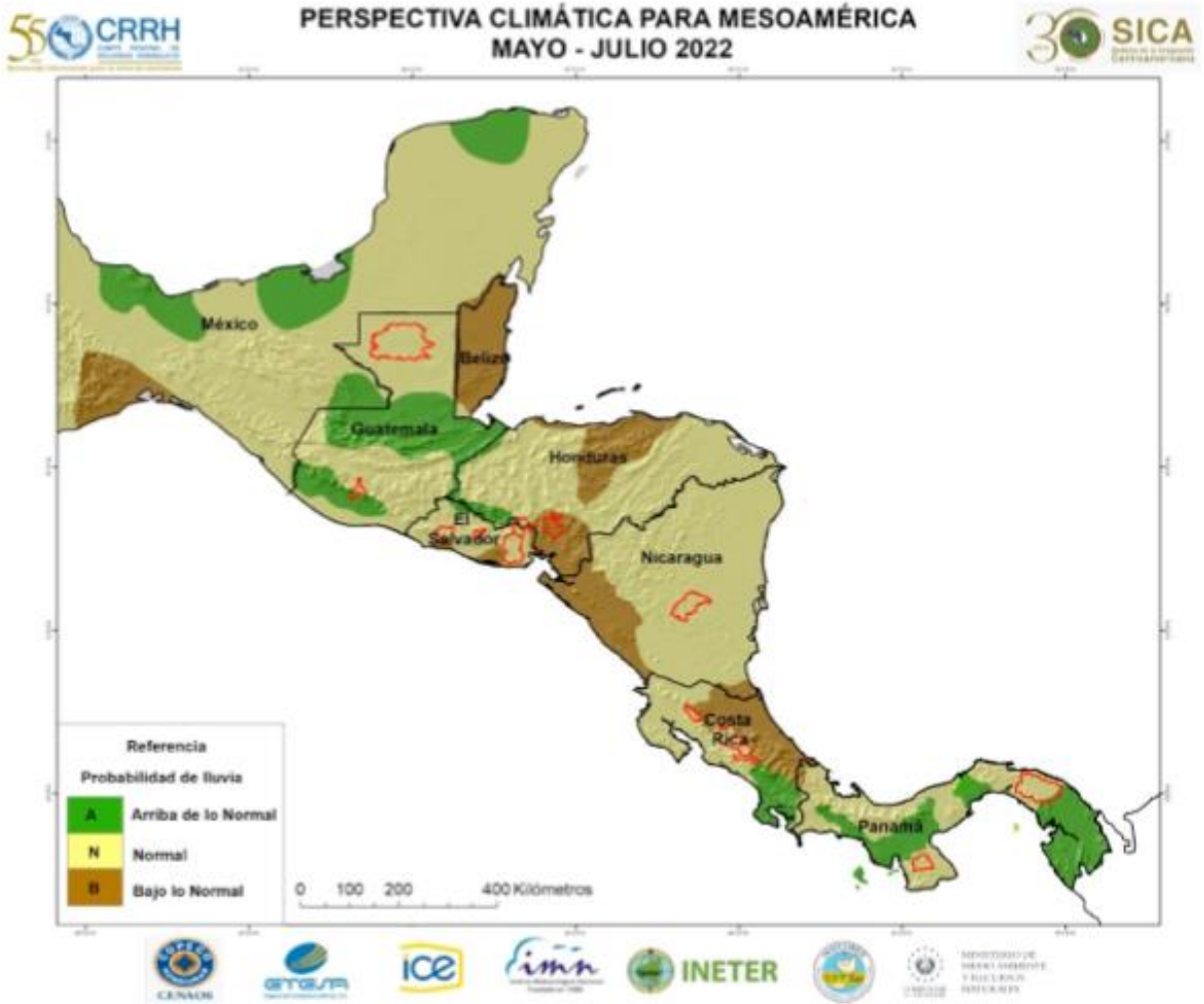
Research Aims

- **Continue** progress from **SEAS5 evaluation over CADC -** Kowal et al. 2021
- **Compare skill of seasonal rainfall forecasts** from two dynamic forecasting ensembles:
  - Copernicus Climate Change Service **(C3S)** and
  - North American Multi Model Ensemble **(NMME)**
- **Focus** on **skill of 3-month mean seasonal forecasts** like those produced by Central America Climate Outlook Forum (CA-COF) **for operational applications**



Central American Climate Outlook Forum Seasonal Rainfall Outlook (April 2022)

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Approach / Methods

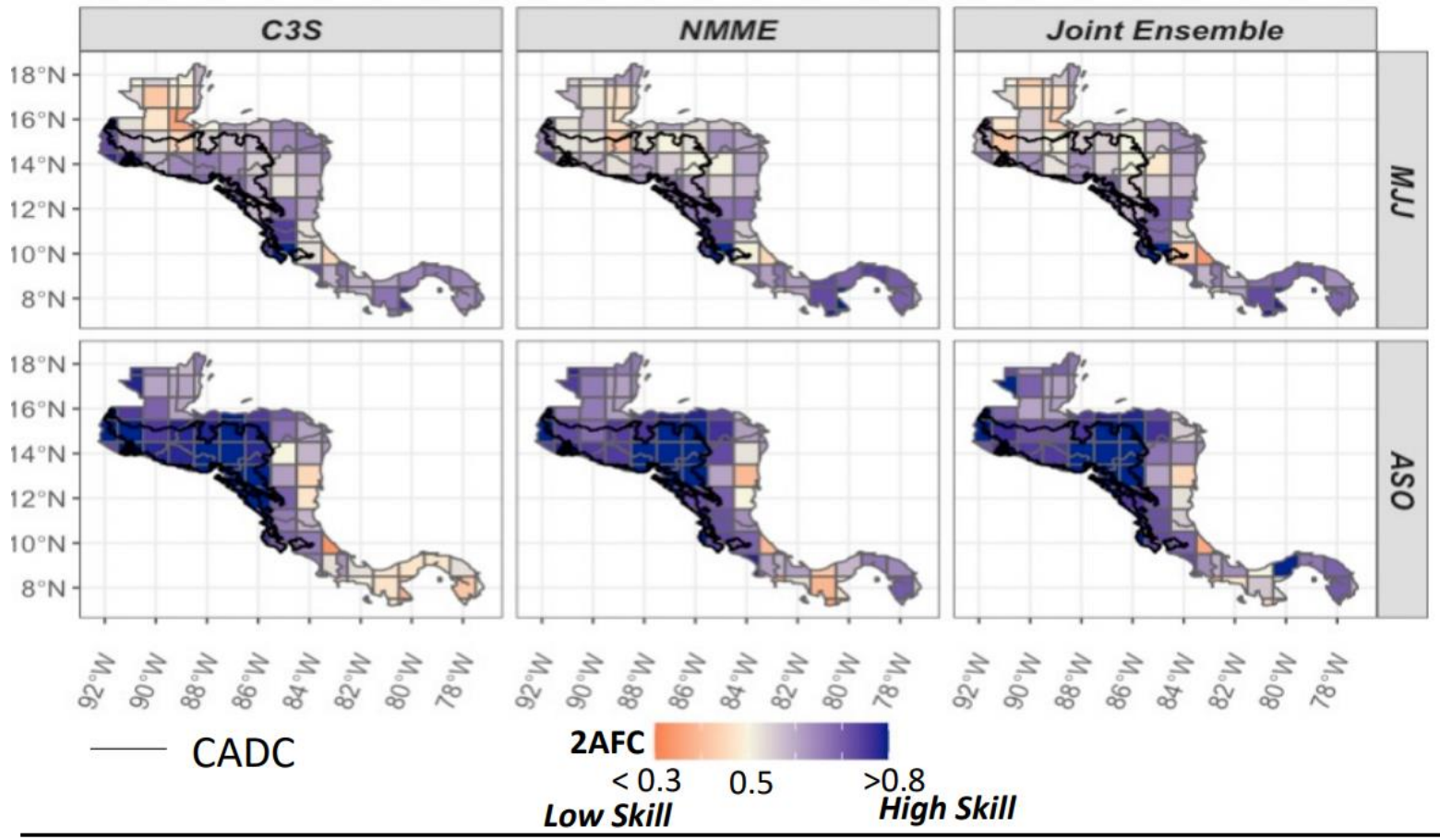
NMME		
Contributing Center	**Model**	**Hindcast Members**
NCAR COLA / RSMAS	**CCSM4**	10
NASA GMAO	**GEOSS2S**	4
ECCC	**GEM5-NEMO**	10
	CanCM4i – IC3	10
NOAA NCEP	**CFSv2**	24
GFDL	**SPEAR**	15
Total Members: 73		

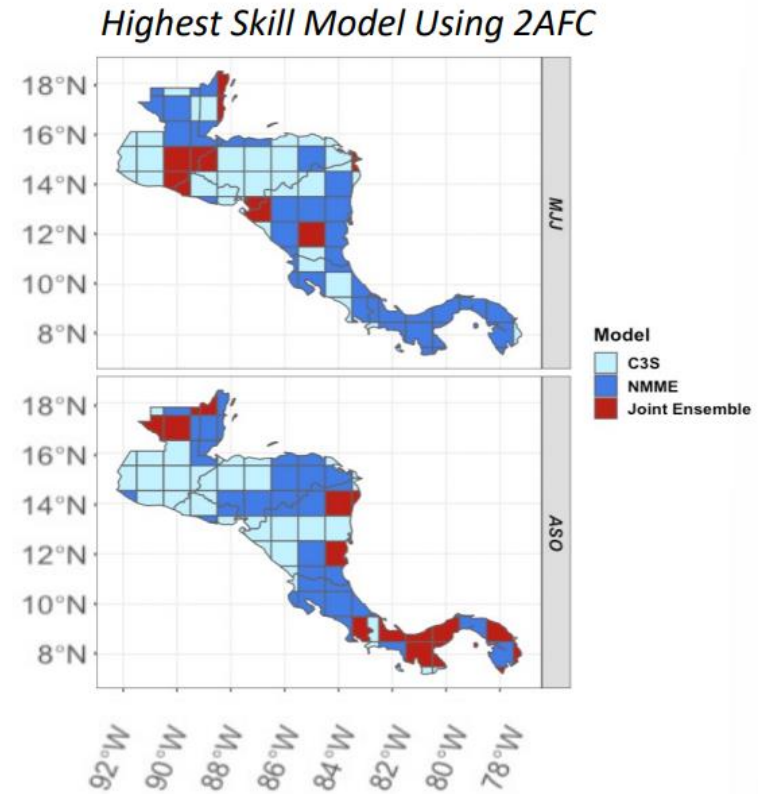
C3S		
Contributing Center	**Model**	**Hindcast Members**
ECMWF	**SEAS5**	25
UKMO	**Glosea6** (Glosea5 in Feb)	28
DWD	**System 21**	30
CMCC	**System 35**	40
Meteo France	**System 7**	12
Total Members: 135		

COMPARISON CHARACTERISTICS FOR INITIAL RESULTS

- ***FORECAST TYPE:*** 3-month seasonal tercile forecast
- ***LEAD TIME:*** Initialized one-month prior
- ***TIME PERIOD:*** Hindcasts 1994-2016
- ***REFERENCE:*** CHIRPS monthly rainfall
- ***METRICS:***
  - 2 Alternative Forced Choice (discrimination score)
  - Heidke (skill score relative to a random forecast)

Initial Results Highlights – Tercile Forecast Skill by Ensemble





- **Ensemble choice does not have large effect normal rainfall skill** using raw mean hindcasts
- **Seasonal variation** (lower skill in MJJ – early wet season)
- **Geographic variation** (high skill in CADC in ASO – late wet season)

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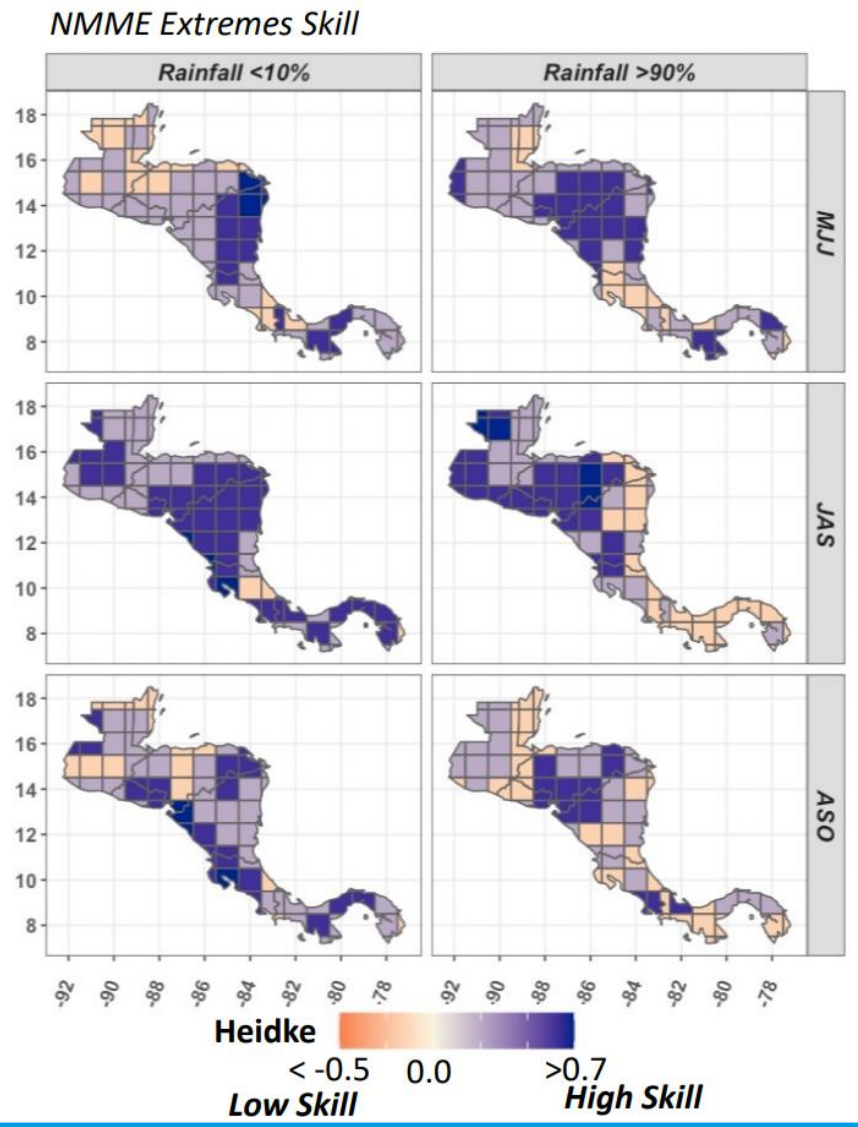
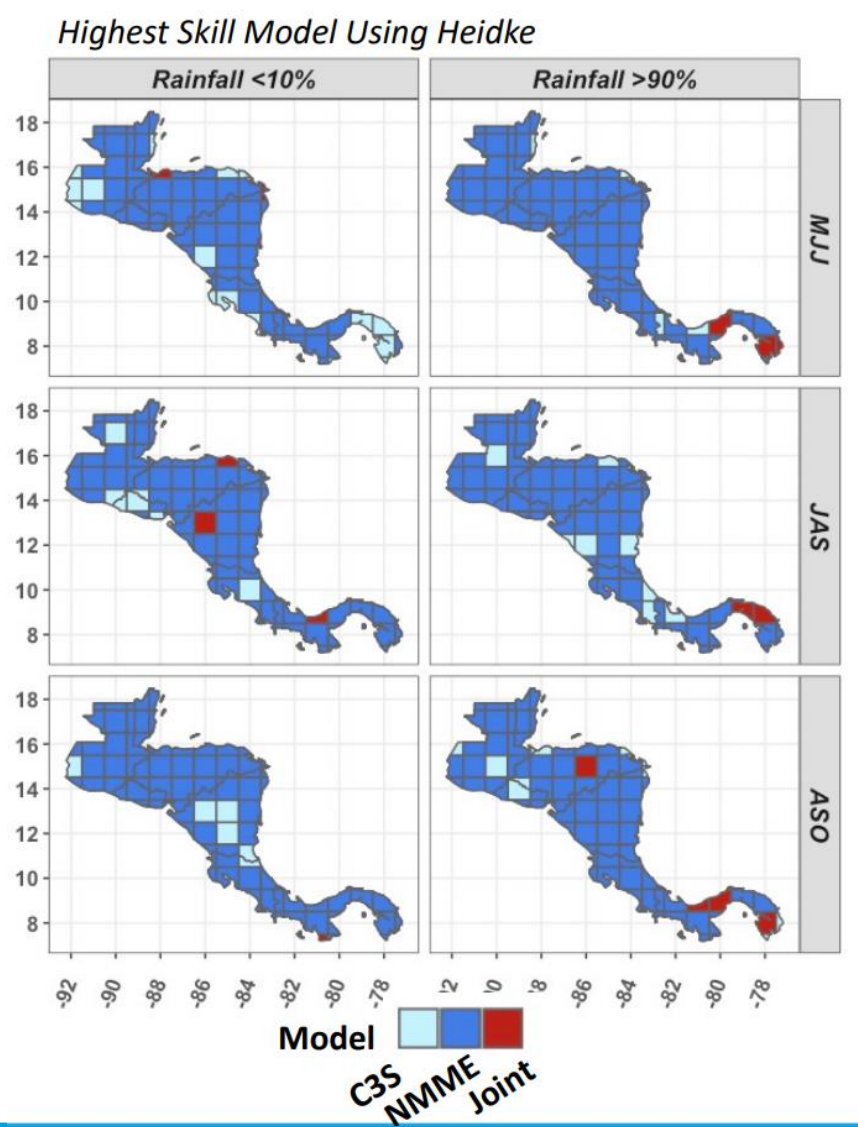
Initial Results Highlights – Extremes Forecast Skill by Ensemble





- **Ensemble choice matters more for extremes –** NMME almost always highest skill score for both low and high precip. extremes
- **Geographic variation not as consistent for extremes**

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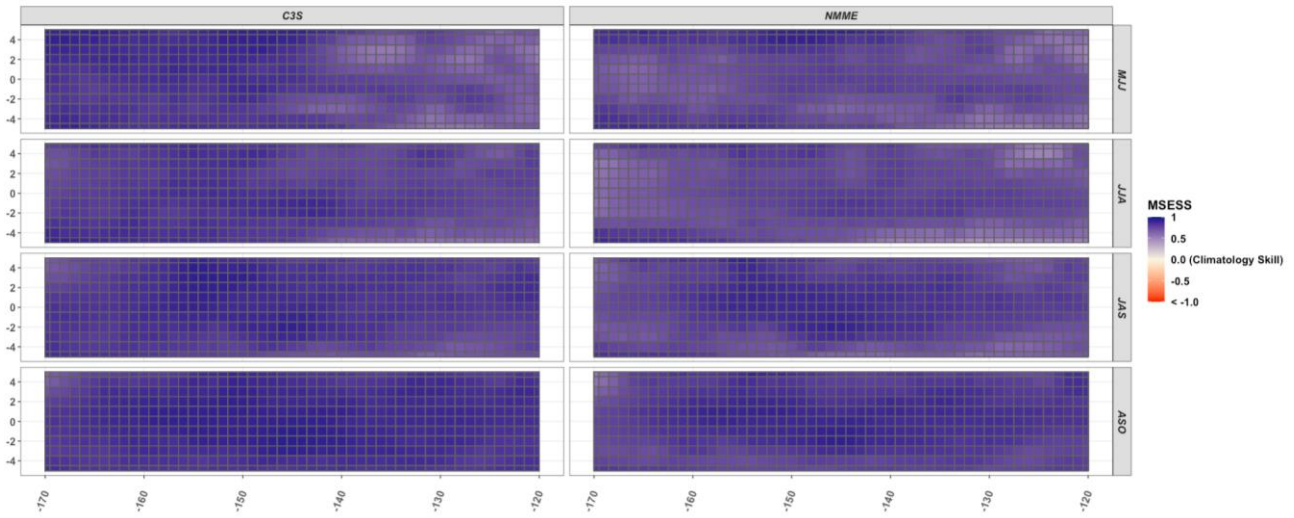
Next Steps / Outstanding Questions

- **Understanding why skill varies**
- **Comparing hybrid** indirect forecast skill **against direct rainfall forecasts**
- **Exploring where to predict SST**, possibly identifying more locations with strong teleconnections



Both ensembles showcase high skill for predicting SST over the Niño 3.4 region

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Thank You!

Please feel free to reach out to continue the discussion:
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