

Attribution of North American Subseasonal (monthly mean) Precipitation Prediction Skill

Lantao Sun², Martin Hoerling¹, Jadwiga (Yaga) Richter³,
Andrew Hoell¹, Arun Kumar⁴, and James Hurrell²

¹ NOAA Physical Sciences Laboratory, Boulder, CO

² Department of Atmospheric Science, Colorado State University, Fort Collins, CO

³ National Center for Atmospheric Research, Boulder, CO

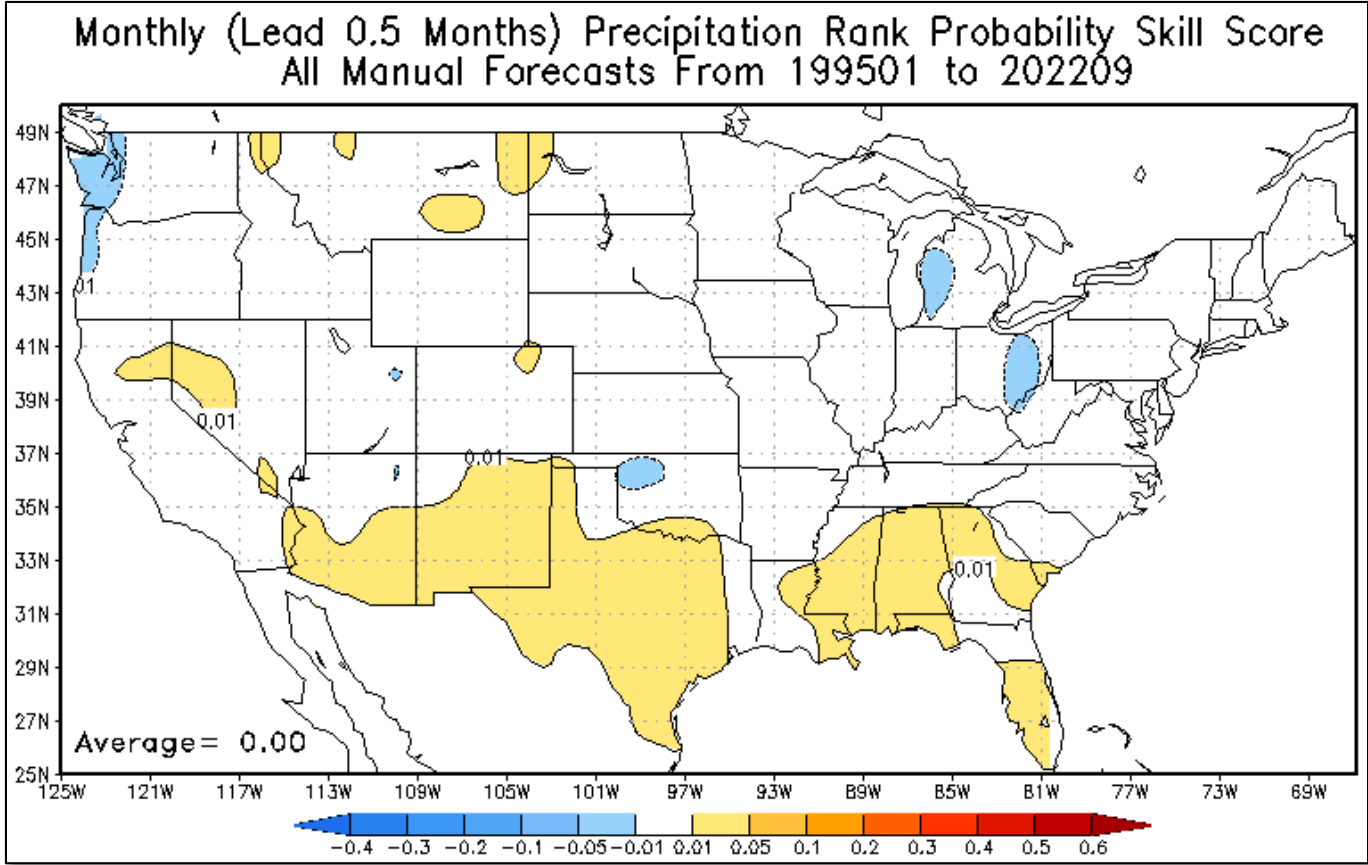
⁴ NOAA Climate Prediction Center, Silver Springs, MD

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Summary

- There is a distinct regionality and seasonality of monthly precipitation prediction skill
 - *The spatial and seasonal patterns are reproducible among 5 different initialized forecast systems.*
- Analogous spatial & seasonal patterns of monthly prediction skill occur in AMIP simulations
 - *The parallel analysis of identical initialized and AMIP models leads to a clearer attribution of skill sources.*
- Spatially & seasonally varying ENSO signals are the primary attributable monthly skill sources.

RPSS of CPC's monthly mean rainfall
forecast: 1995 – 2022; 0.5-month lead



Analysis

- North American (NA) averaged rainfall skill
- Regional/Seasonal patterns of rainfall skill over NA
- Tropical/ENSO Modulation of rainfall skill over NA
- Implications for lead-time dependence of monthly forecasts

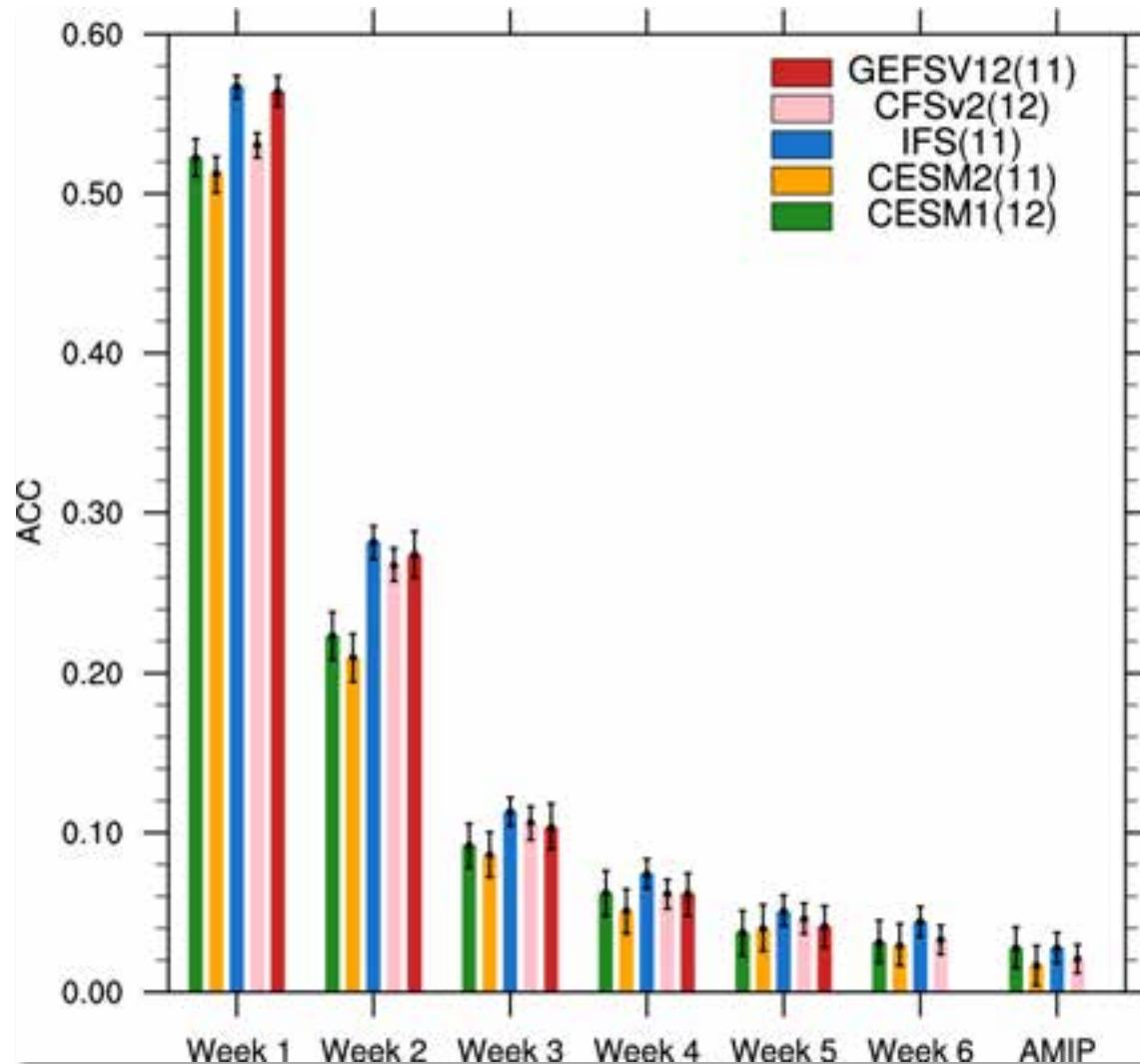
Model data

- Initialized predictions
 - ECMWF - IFS, 11 members, 1997-2016
 - NOAA - CFSv2, 12 members, 1999-2015
 - NCAR-CESM1, 12 members, 1999-2015
 - NCAR-CESM2, 12 members, 1999-2015
 - NOAA - GEFSv2, 11 members, 2000-2015
- Uninitialized AMIP simulations
 - ECMWF - IFS, 13 members, 1999-2014
 - NOAA – GFSv2, 12 members, 1999-2015
 - NCAR – CAM5, 12 members, 1999-2015
 - NCAR – CAM6, 12 members, 1999-2015

Analysis domain - North American Land Areas within 15°N – 55°N

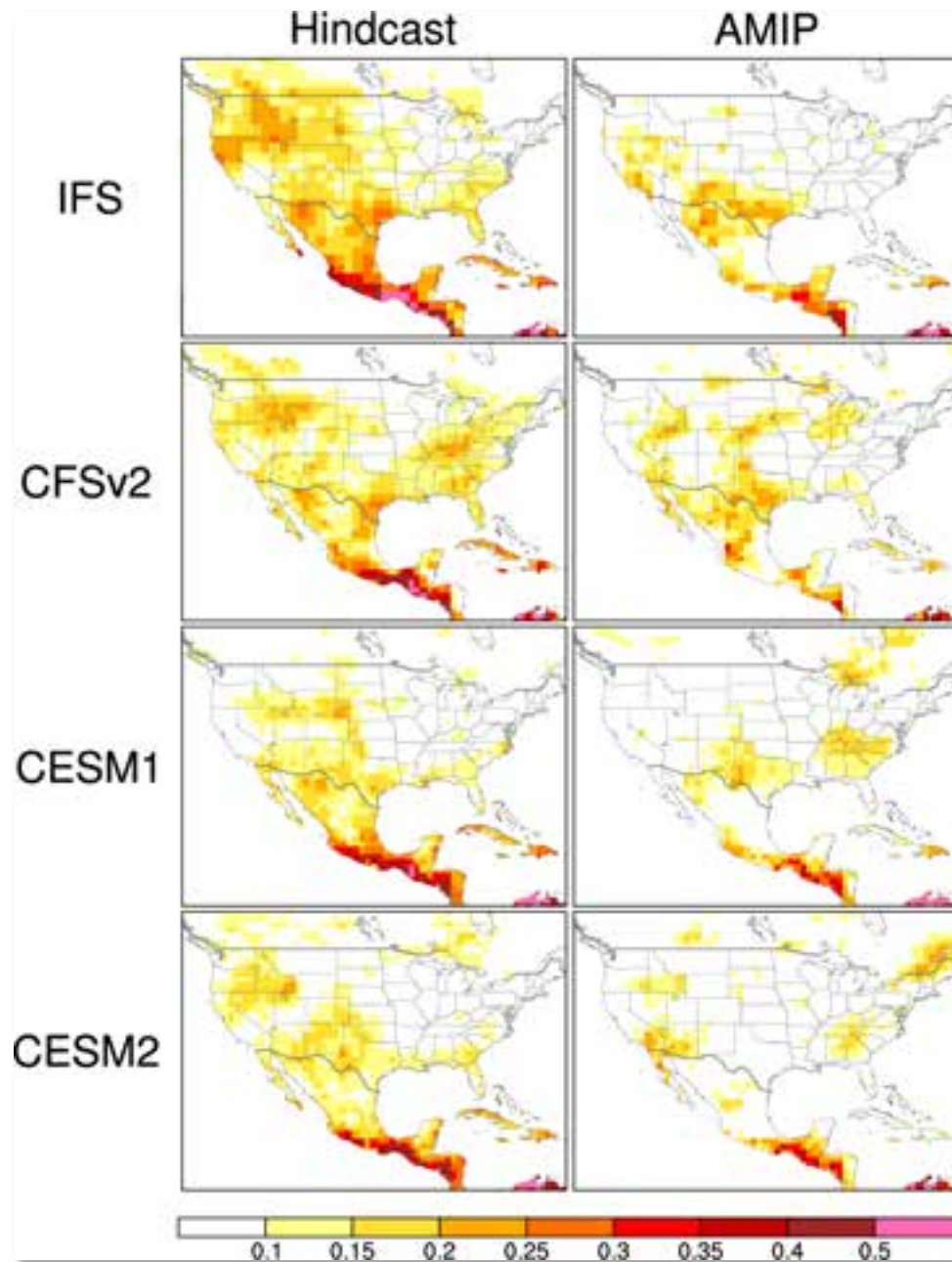
North American (NA) averaged rainfall skill

NA average of AC skill of weekly mean rainfall: 1995-2015

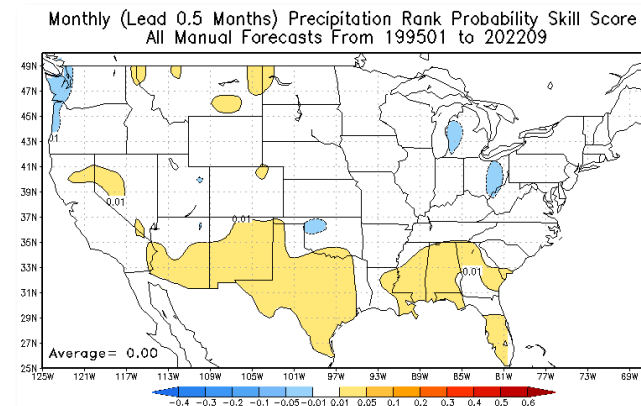


Anomaly correlation
for weekly rainfall
means

Regional/Seasonal patterns of monthly mean rainfall skill over NA

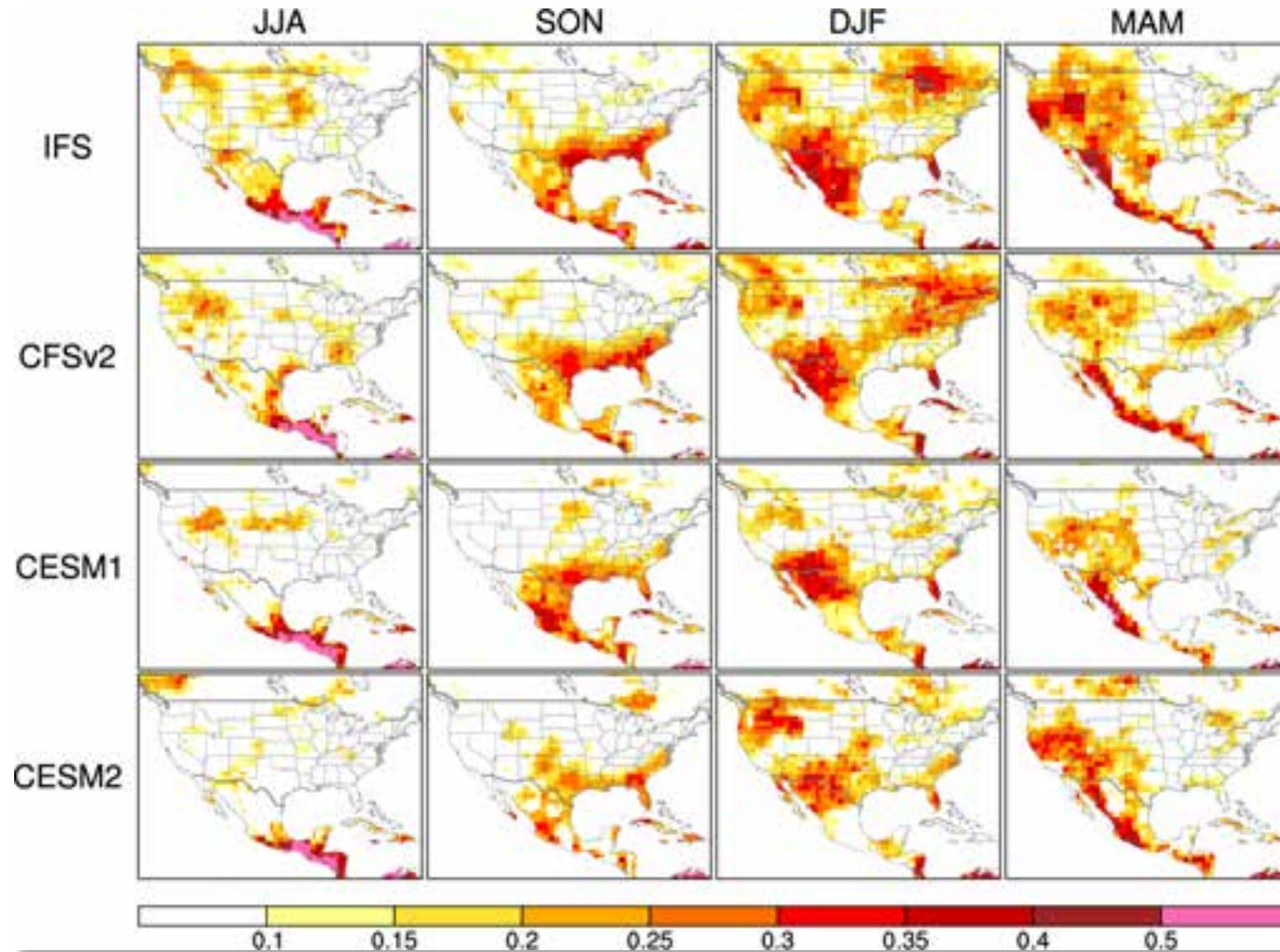


Annual mean of anomaly correlation for weeks 3-6 average (monthly) rainfall

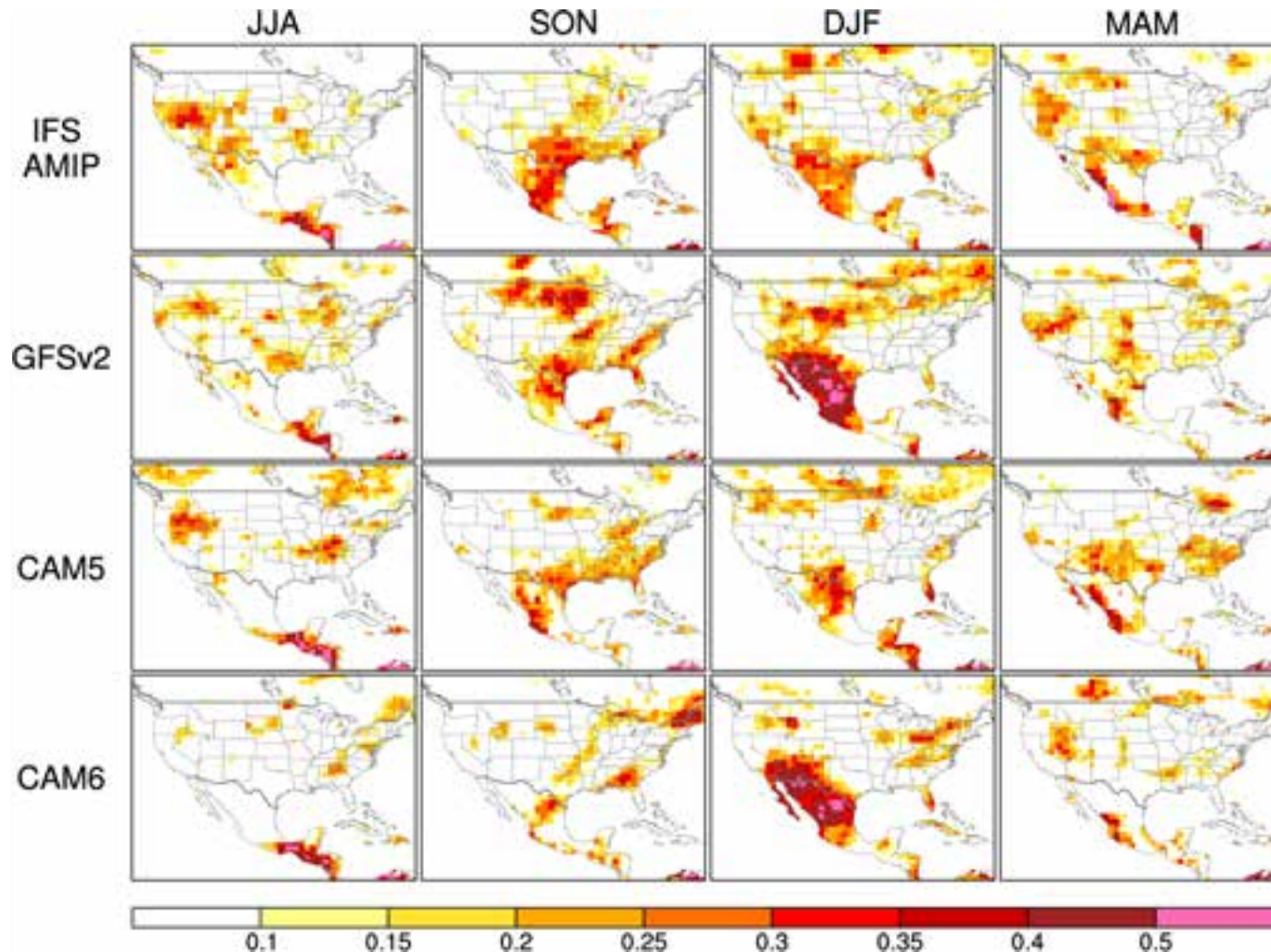


Annual mean of anomaly correlation for weeks 3-6 rainfall: Initialized predictions

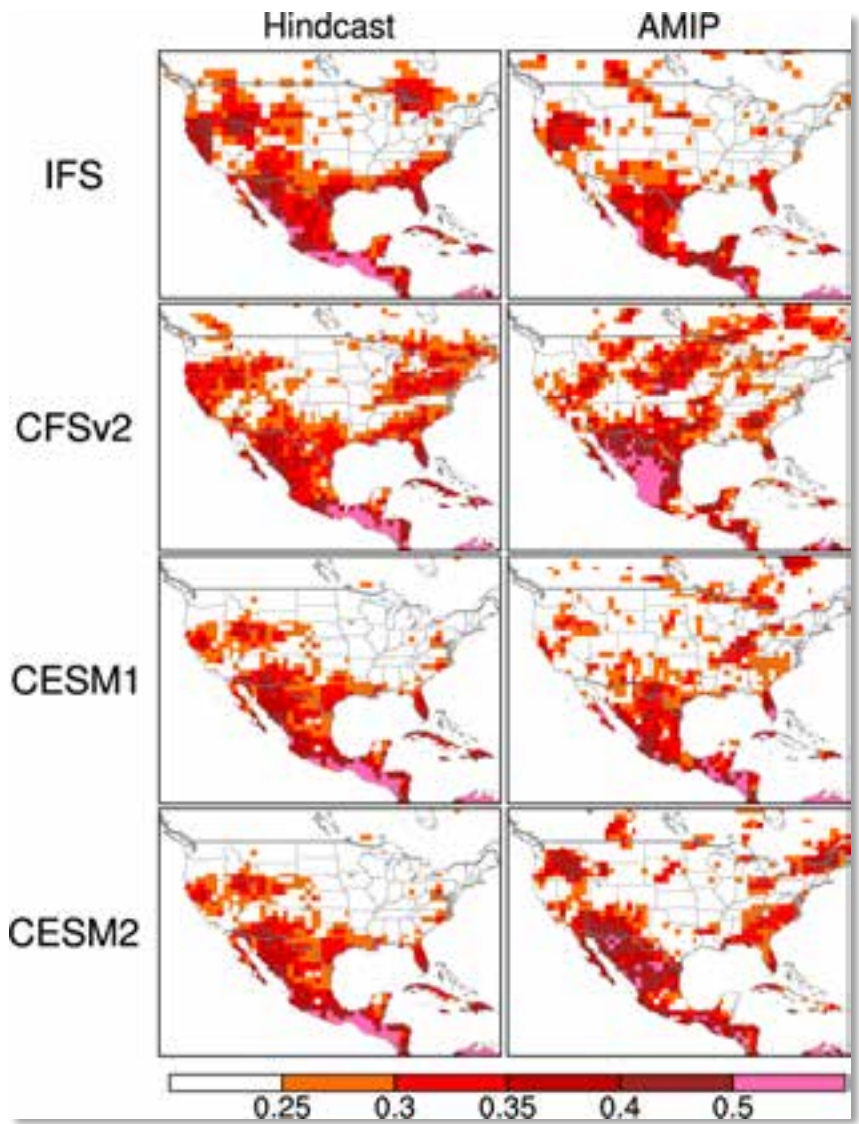
Winter and spring have higher skill



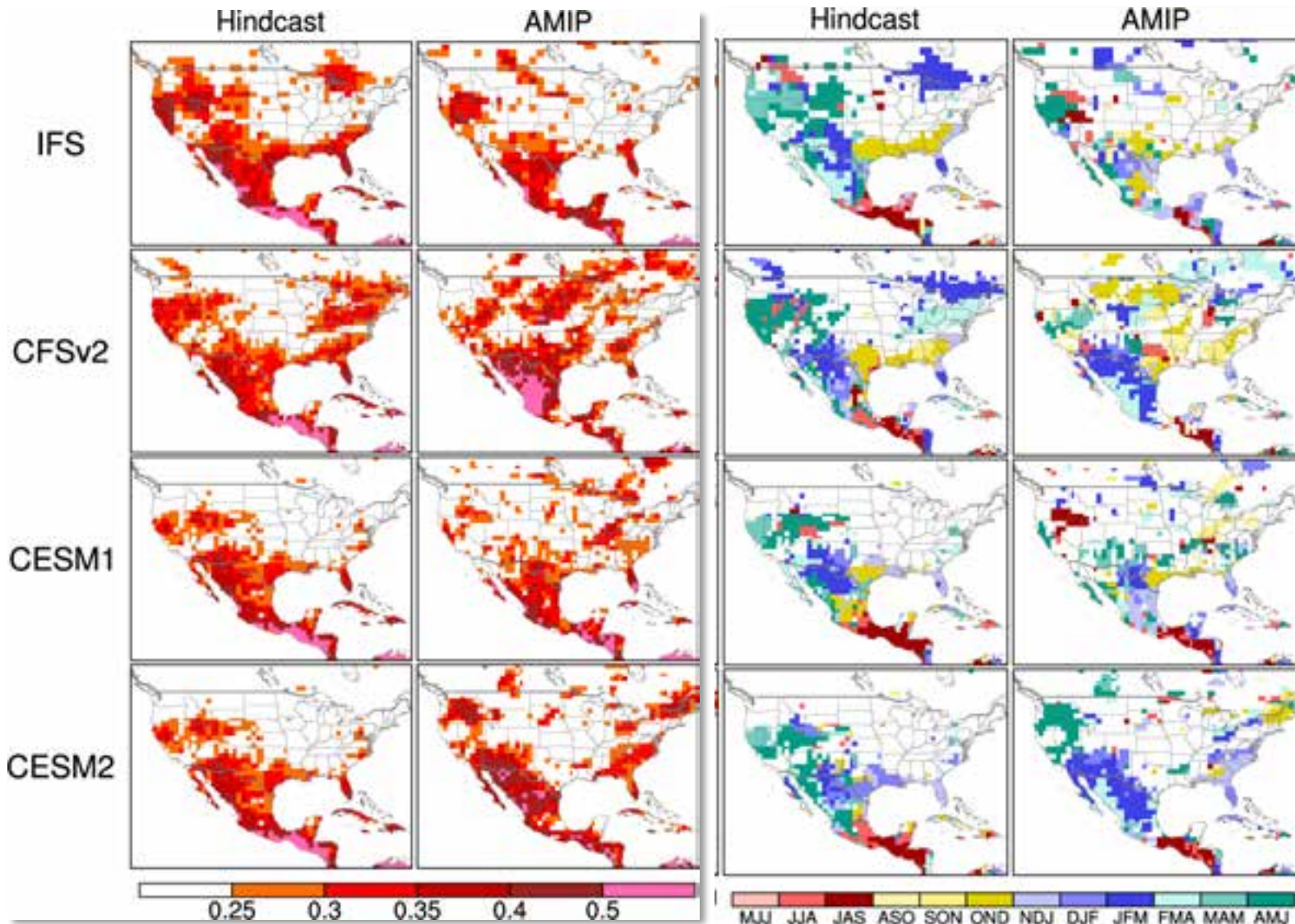
Annual mean of anomaly correlation for monthly mean rainfall: AMIP simulations



Largest value for AC in any 3-month rolling seasons



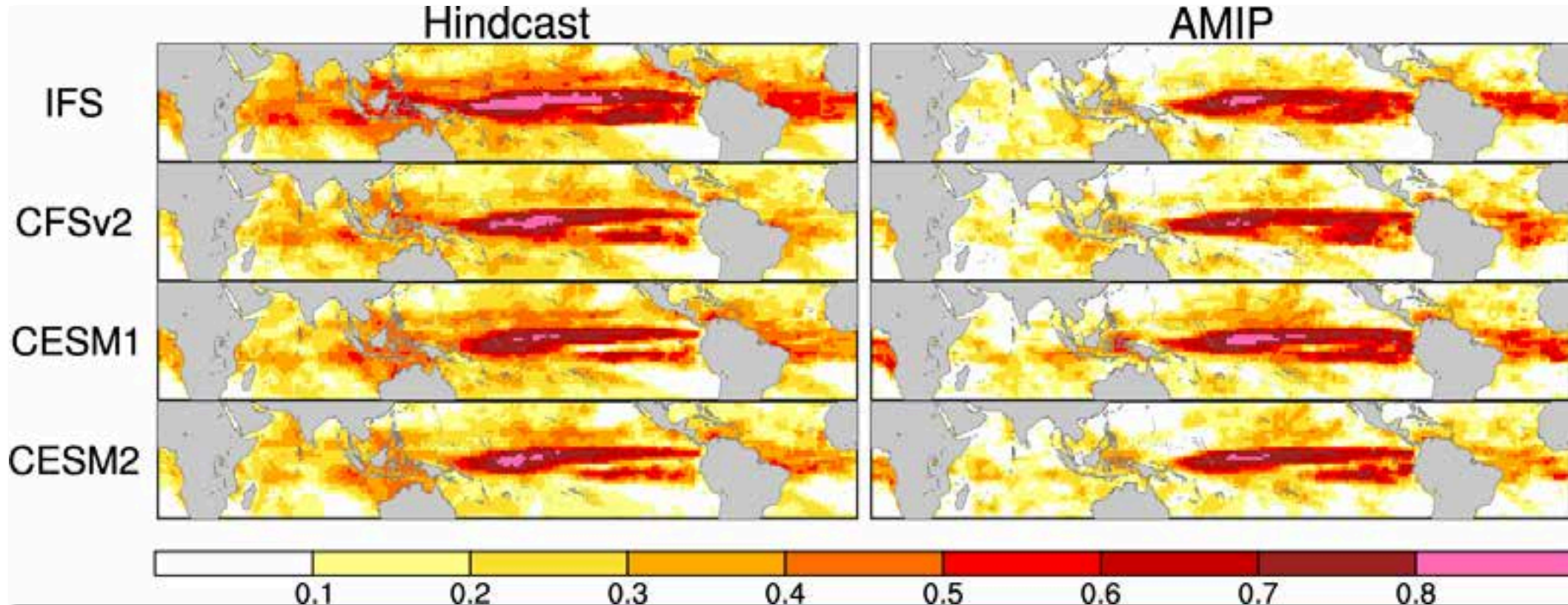
Largest value for AC in any 3-months rolling seasons



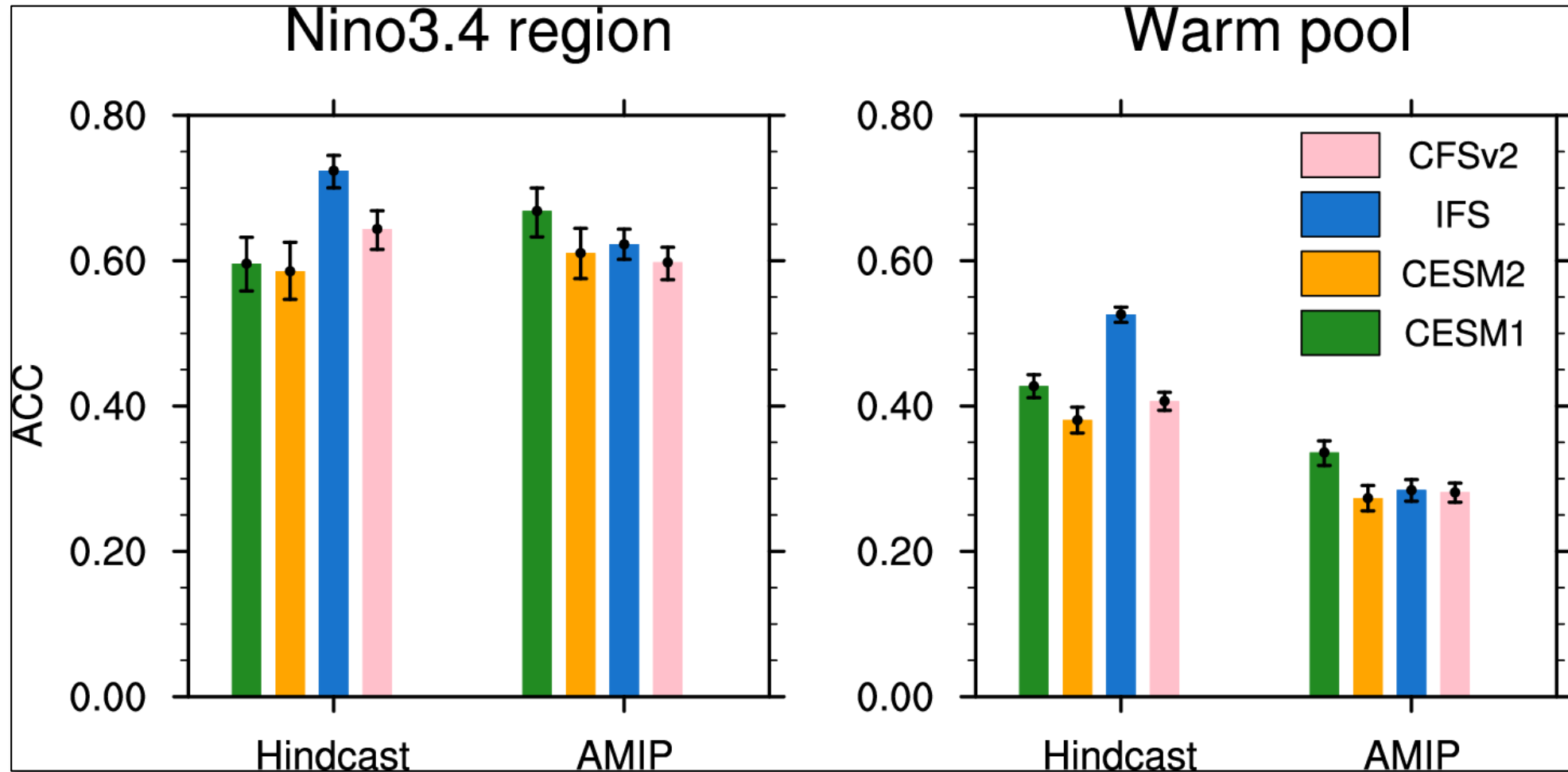
Season with the largest AC

Tropical/ENSO Modulation of rainfall skill over NA

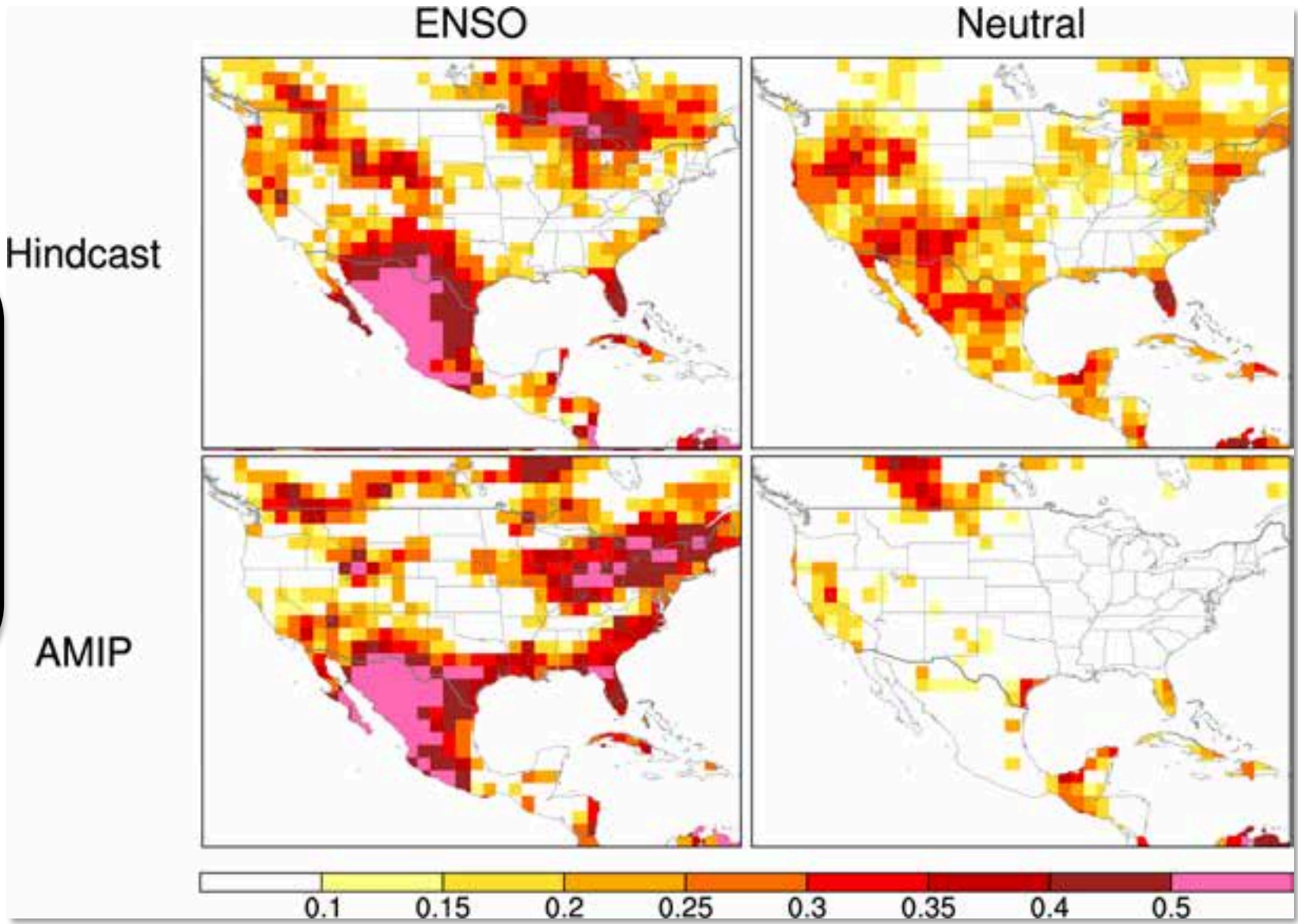
Annual mean of anomaly correlation for weeks 3-6 tropical rainfall



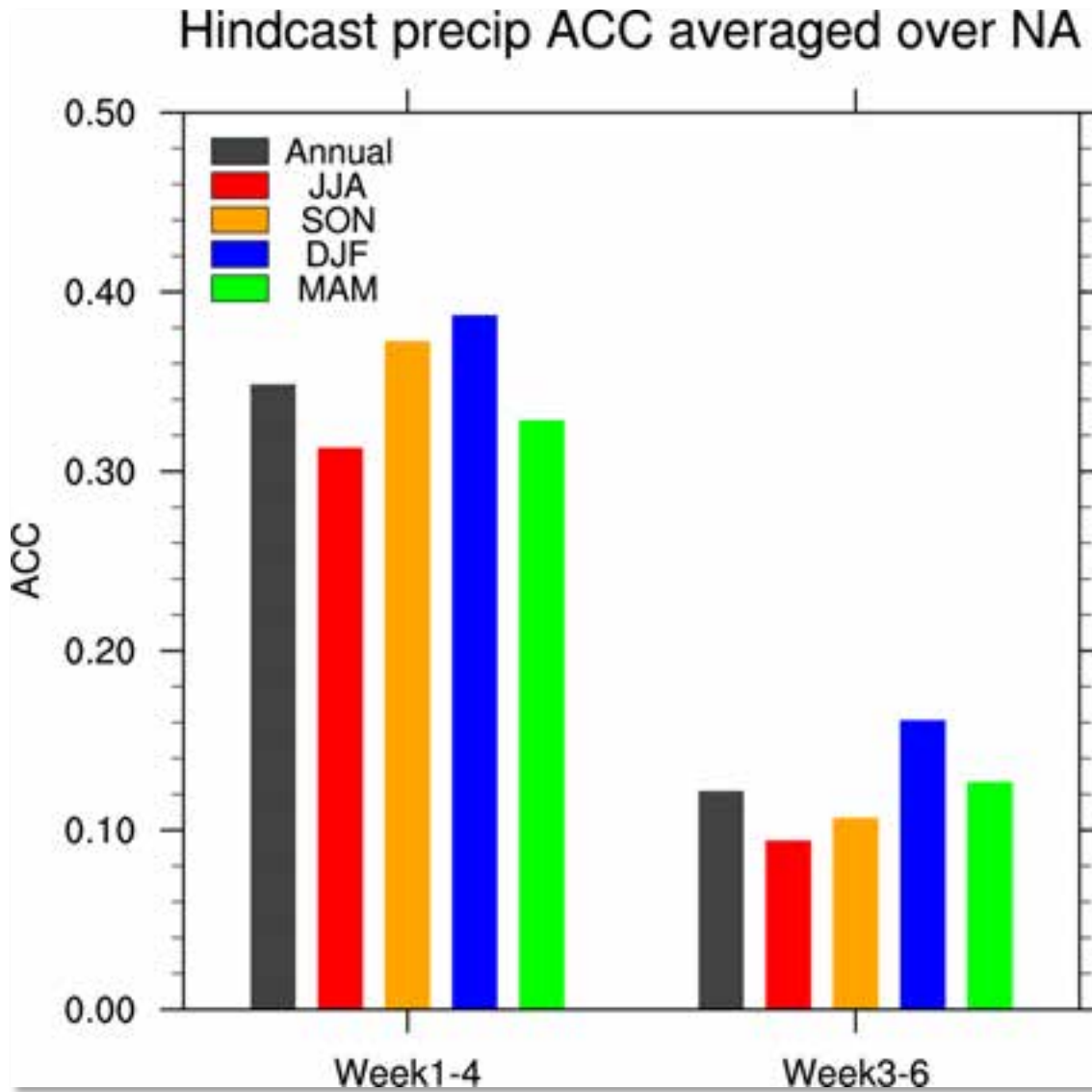
Area averaged anomaly correlation



Monthly rainfall skill during ENSO and non-ENSO years (based on equally weighted MME)



Implications for lead-time dependence of monthly forecasts



0-lead monthly forecast

0.5-month lead monthly forecast

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