A couple of simple exploratory calculations & very preliminary results

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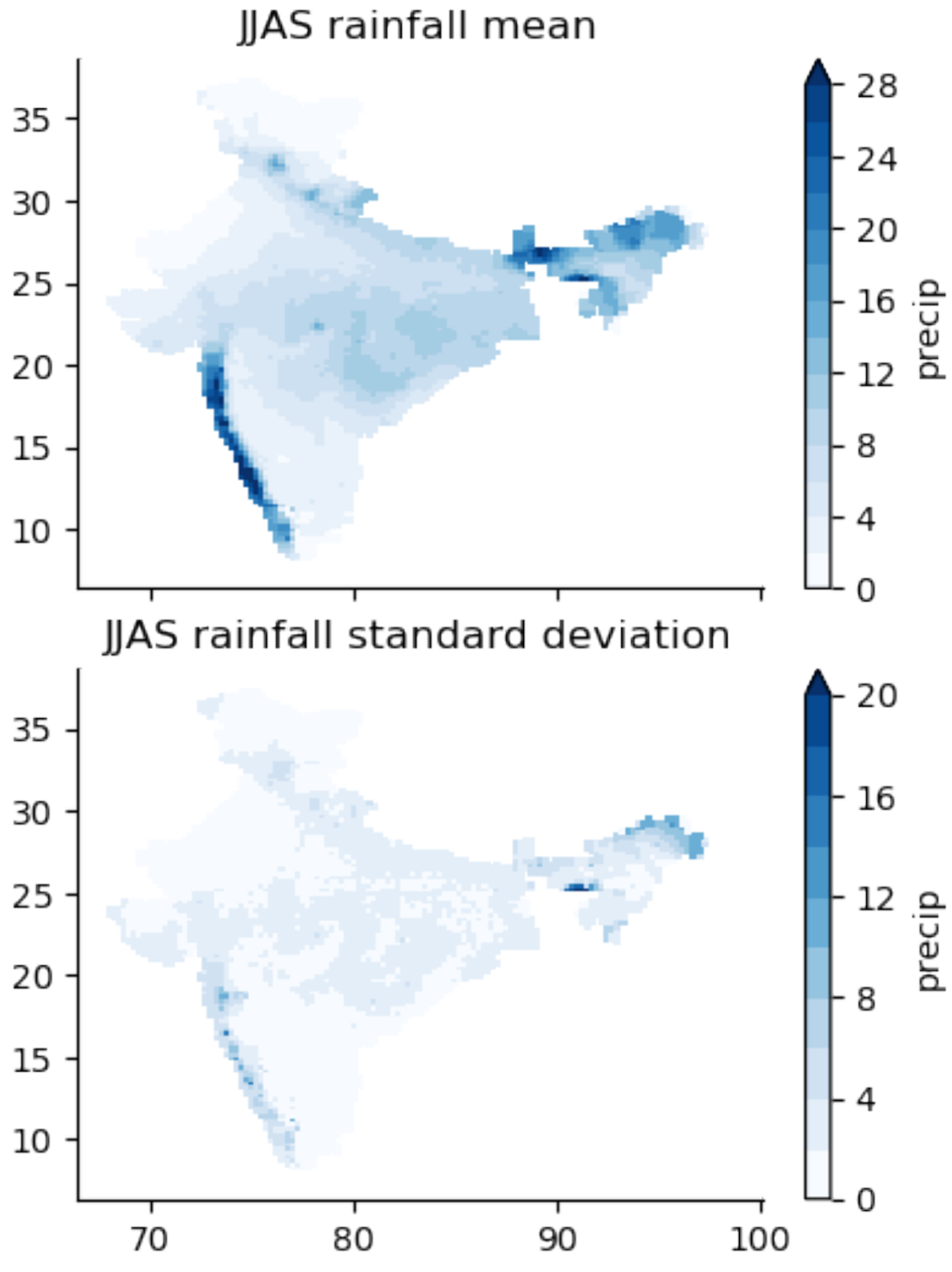
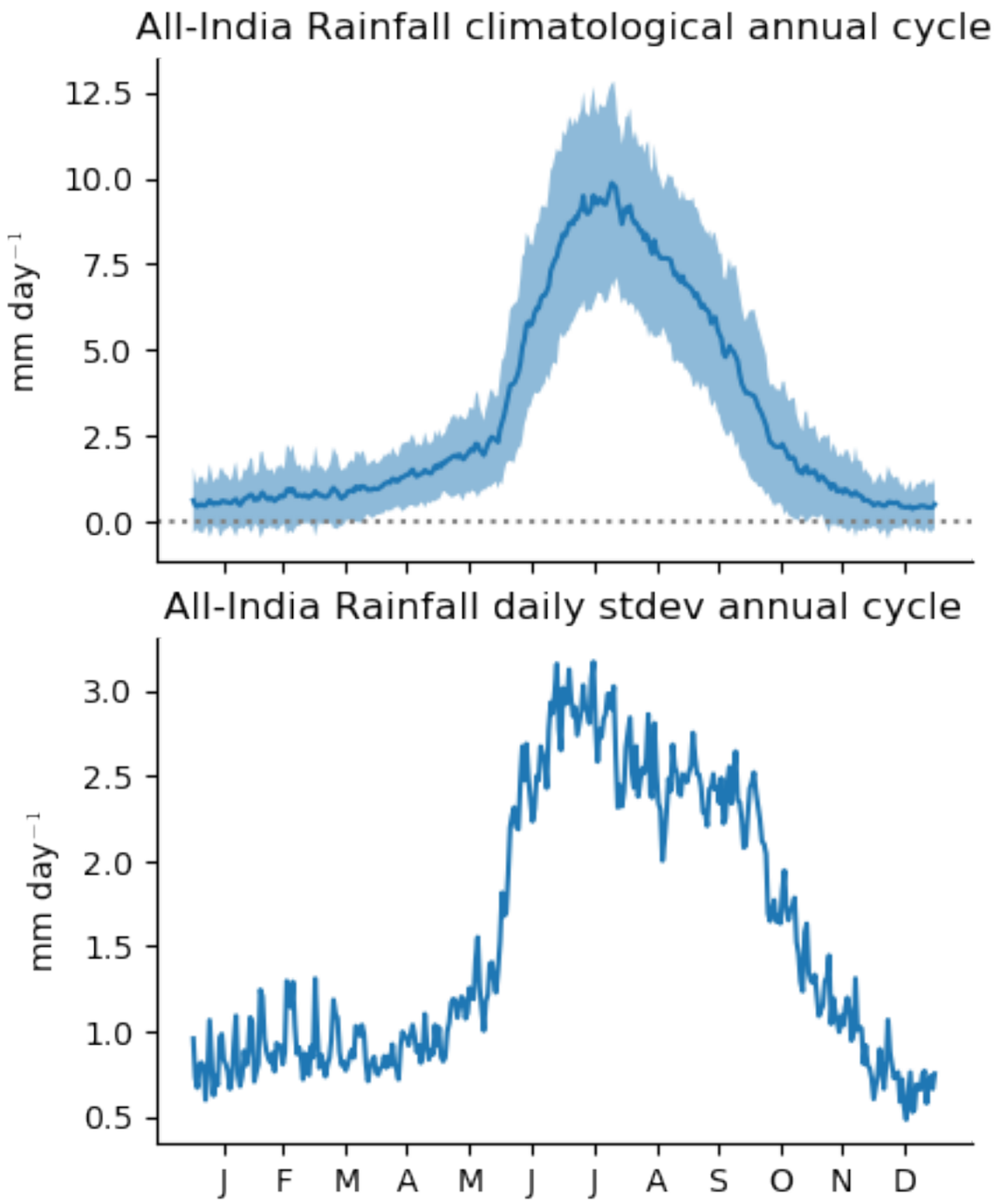
Is all-India rainfall the best target for prediction?

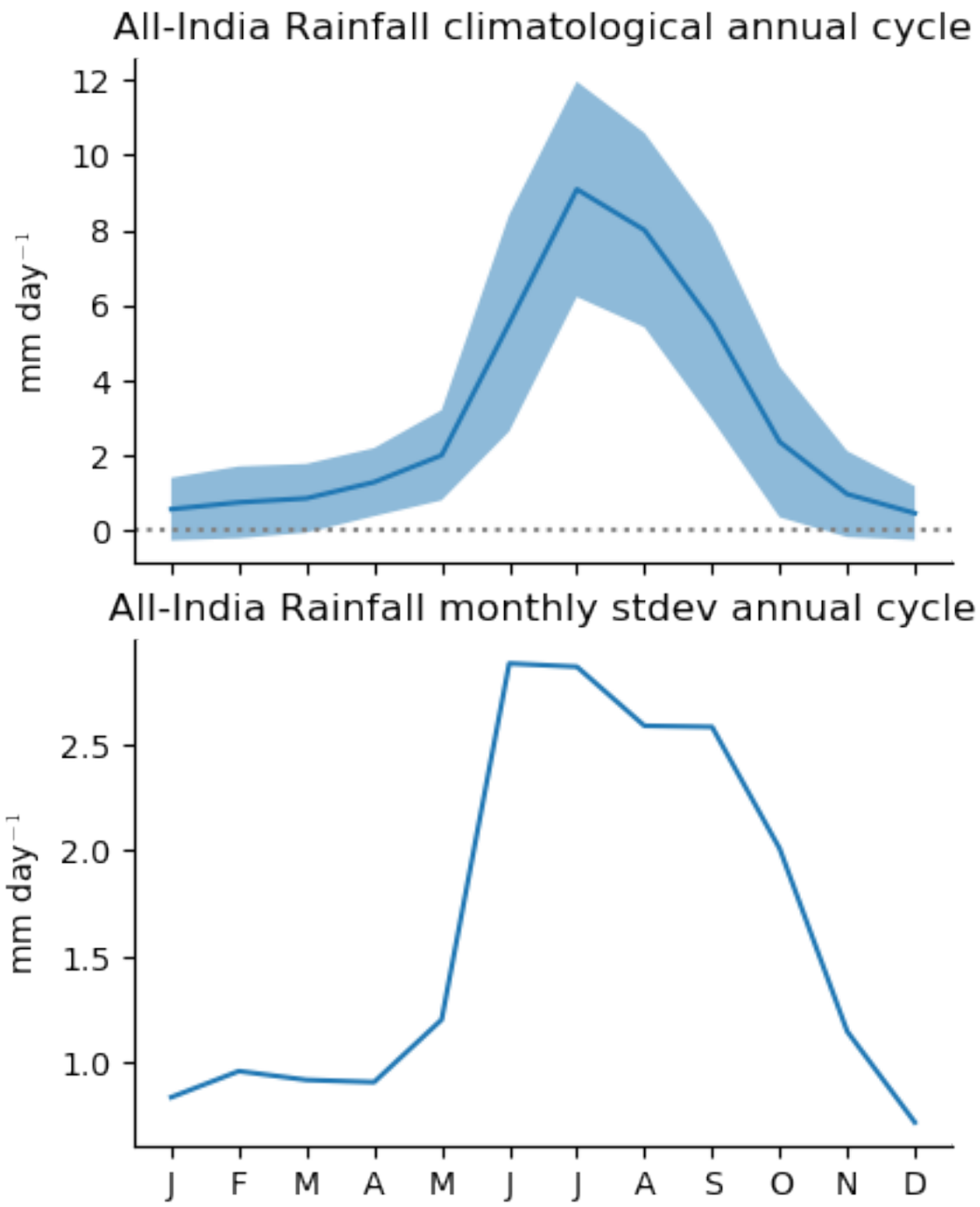
Results by Spencer Hill, Monsoon Mission postdoc @Columbia

116-yr IMD 0.25x0.25deg interpolated daily precipitation data, climatological JJAS (top) mean and (bottom) standard deviation

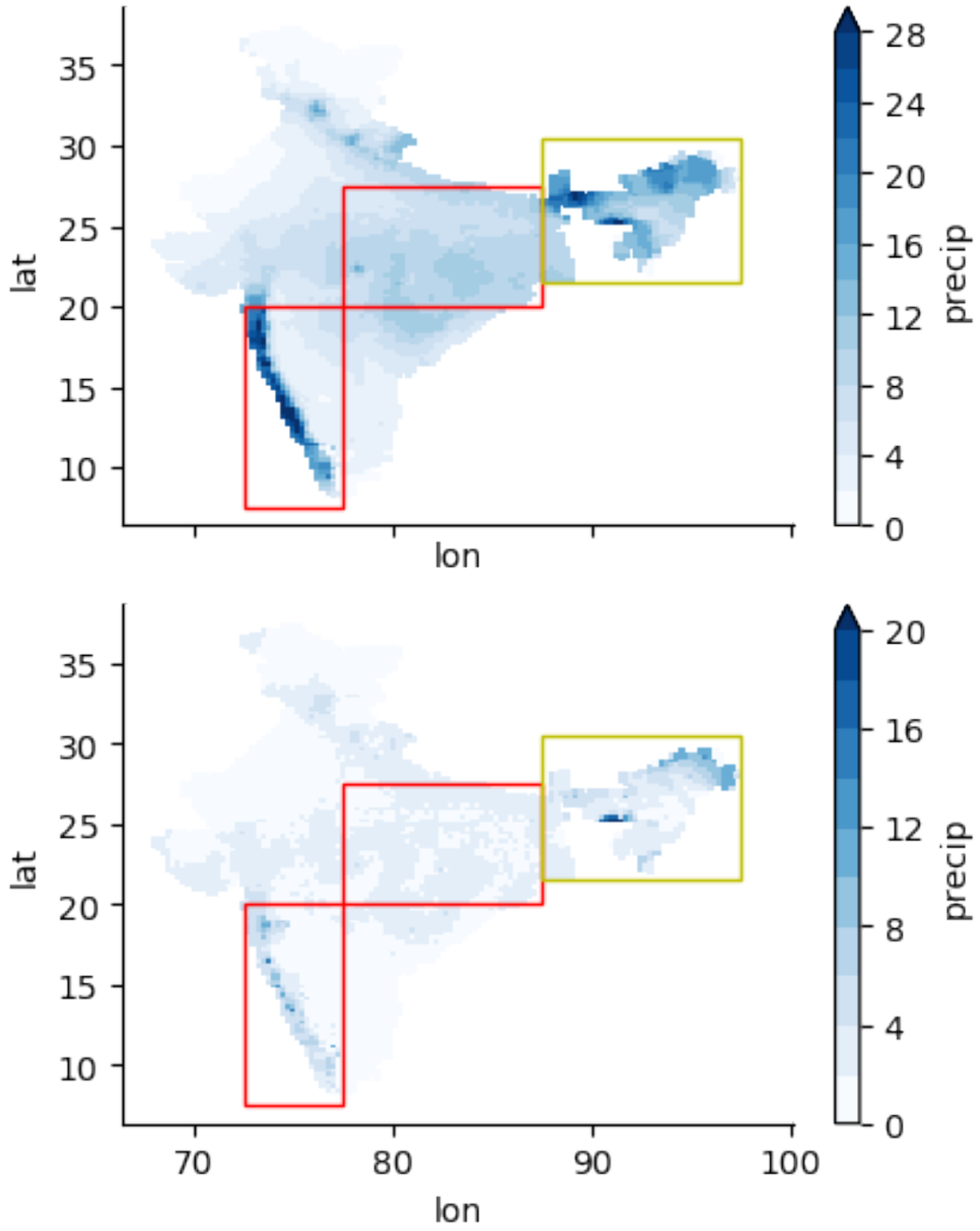


116-yr IMD 0.25x0.25deg interpolated daily (left) and monthly (right) data, climatological annual cycle of (top) mean and (bottom) standard deviation of AIR

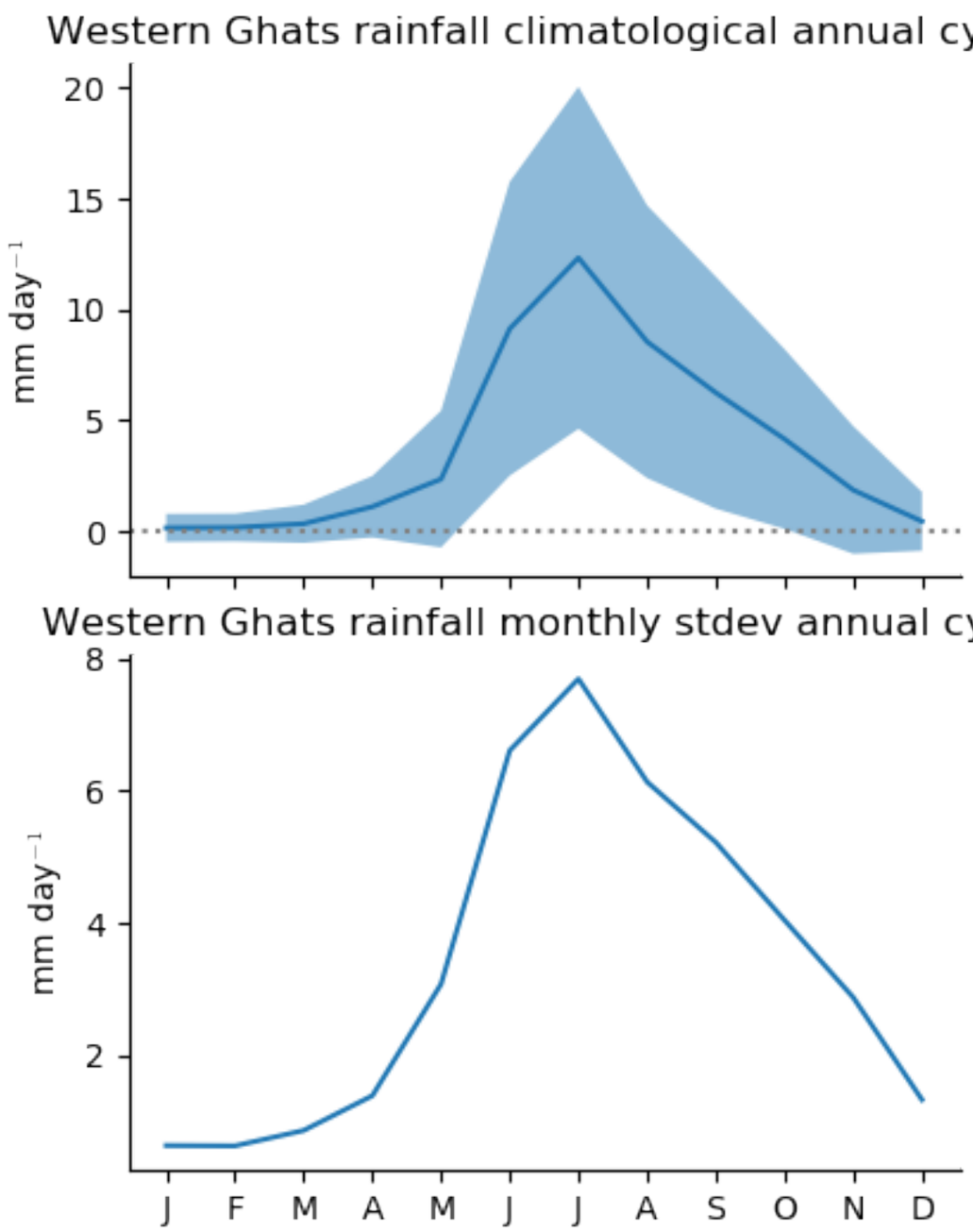


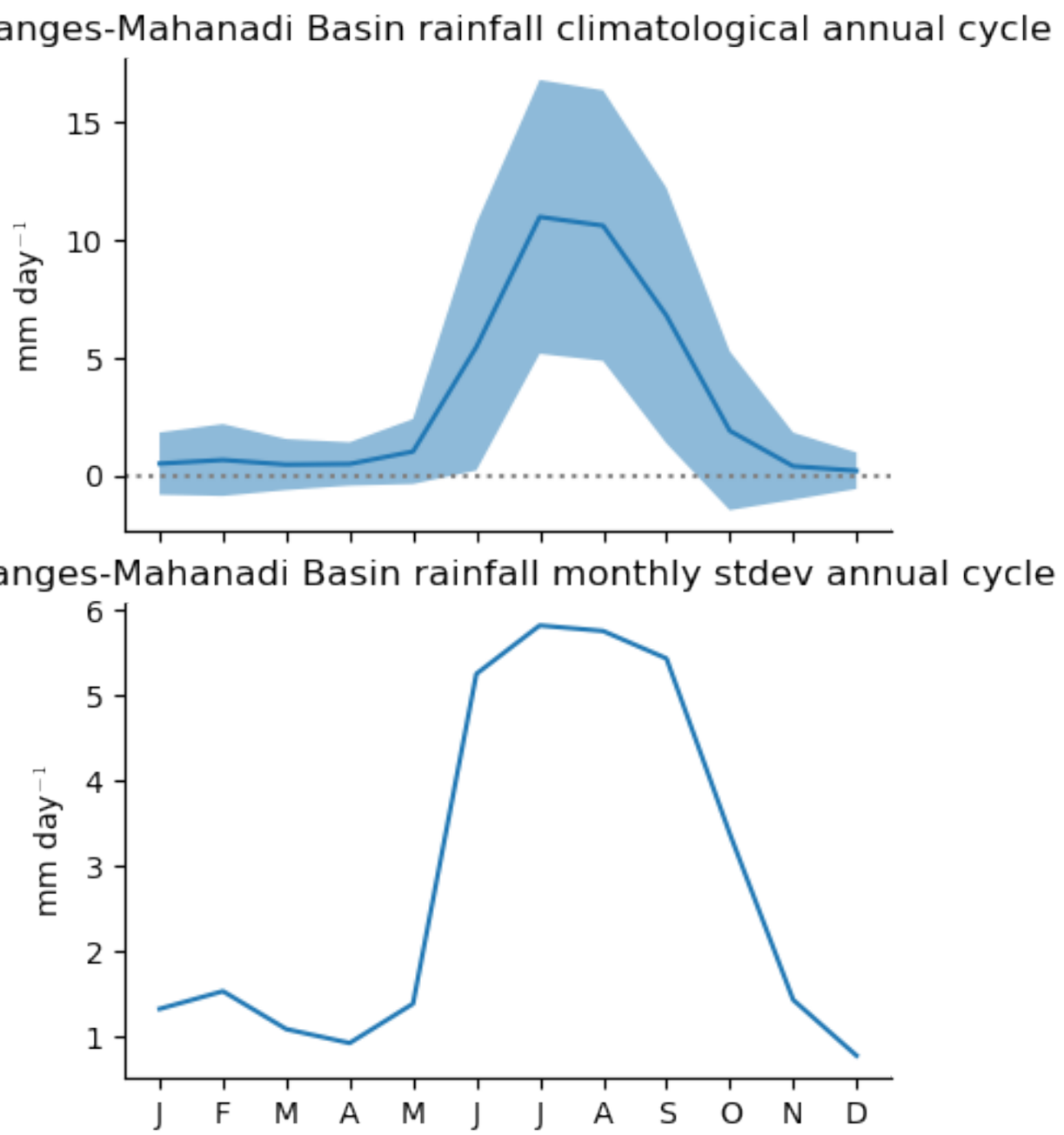


We will look separately at the two regions in red, studied by Vecchi and Harrison (2004), and a northeast India box, in yellow

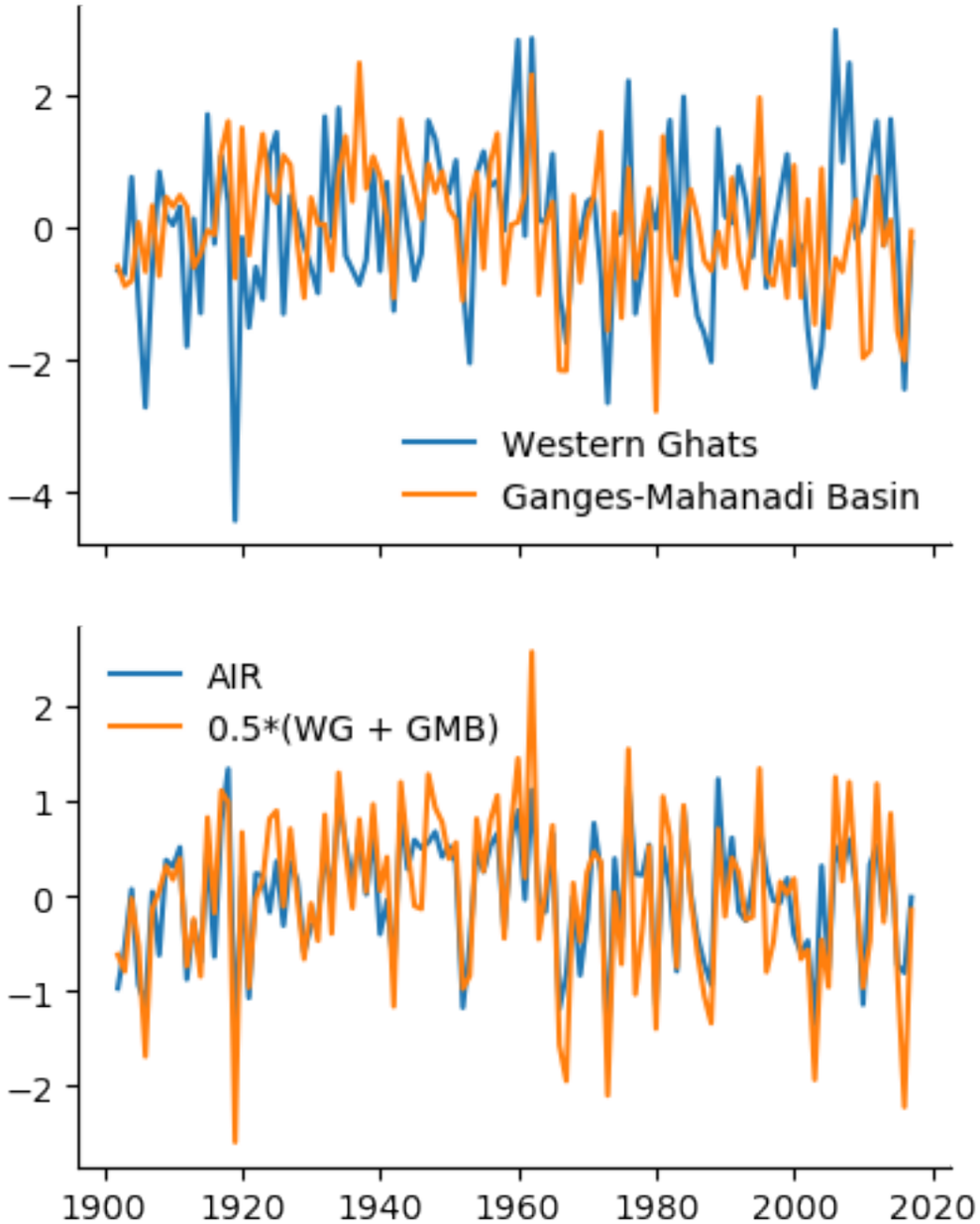


Annual cycles for for regions from *Vecchi and Harrison 2004*:
Western Ghats (72.5-77.5E, 7.5-20N) and Ganges-Mahanadi Basin (77.5-87.5E, 20-27.5N)





(Note different y-axis ranges)
Ghats w/ earlier and more abrupt monsoon onset; GMB more symmetric onset/demise



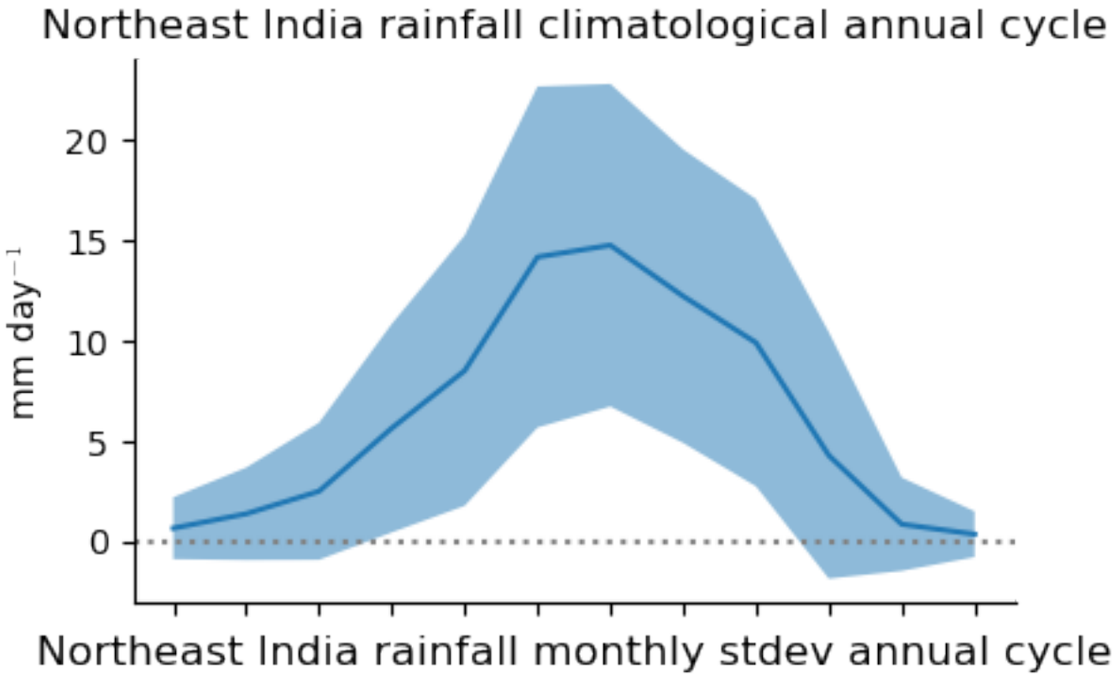
Both panels: JJAS precip yearly timeseries

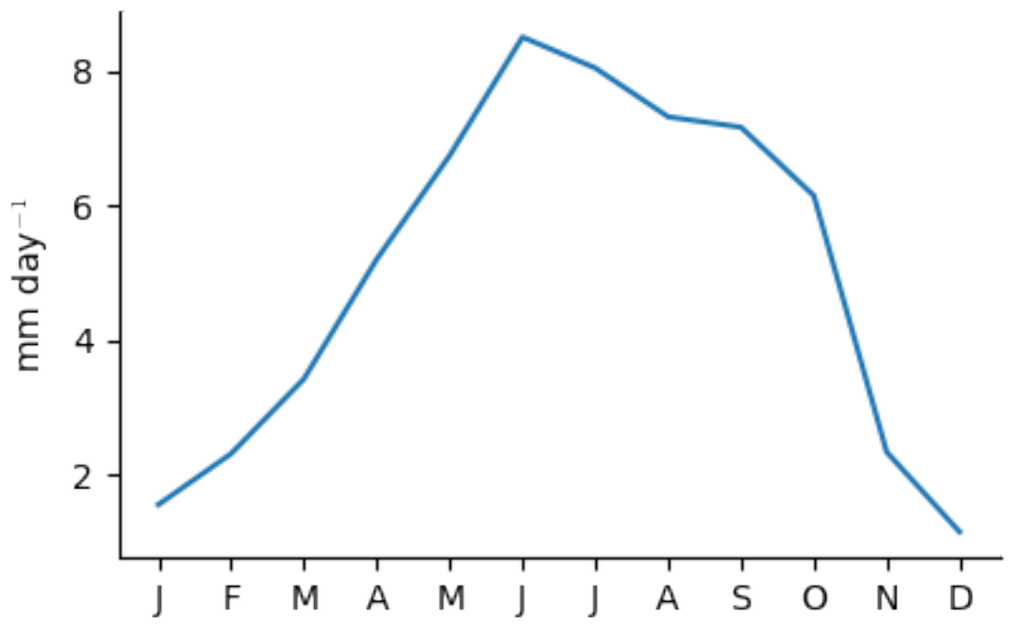
Top: Each individual VH04 region
Bottom: AIR in blue vs. average of VH04 regions in orange

Correlation b/w VH04 regions: 0.27

Correlation b/w AIR and VH04 regions average: 0.87

Very similar to VH04 reported correlations, and implies one may be better off investigating sub-regions rather than AIR





Climatological monthly mean and stdev annual cycles for NE India: 87.5-97.5E, 21.5-30.5N

Less monsoonal, more symmetric onset and demise of rainy season compared to AIR

Like Western Ghats, large interannual variability compared to AIR or Ganges-Mahanadi

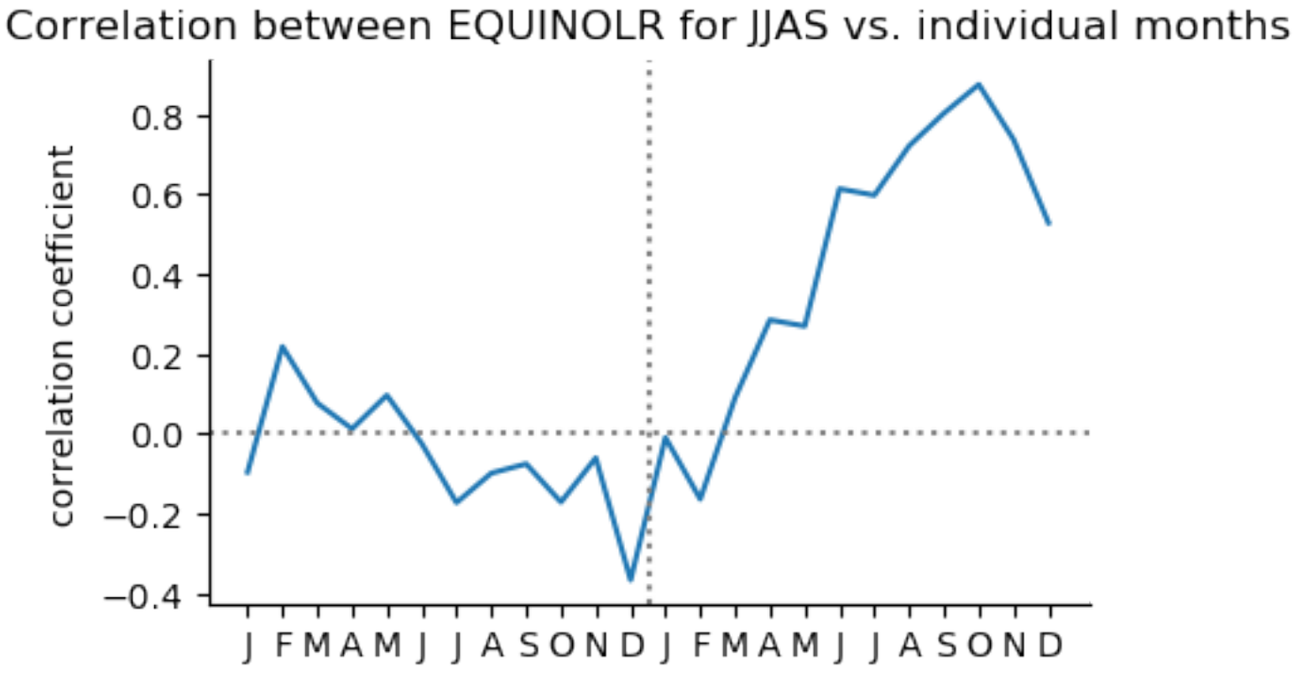
But including it w/ VH04 regions doesn't improve correlations w/ AIR:

Corr b/w NEI and WG: -0.14
Corr b/w NEI and GMB: 0.01

Corr b/w 0.5*(WG+NEI) and AIR: 0.56
Corr b/w 0.33*(WG+NEI+GMB)and AIR: 0.75

What are the right rainfall indices to predict?
Derive them from EOF analysis?
“Signal to noise” EOFs?

How predictable is EQUINOO? (Or at least, how autocorrelated)?

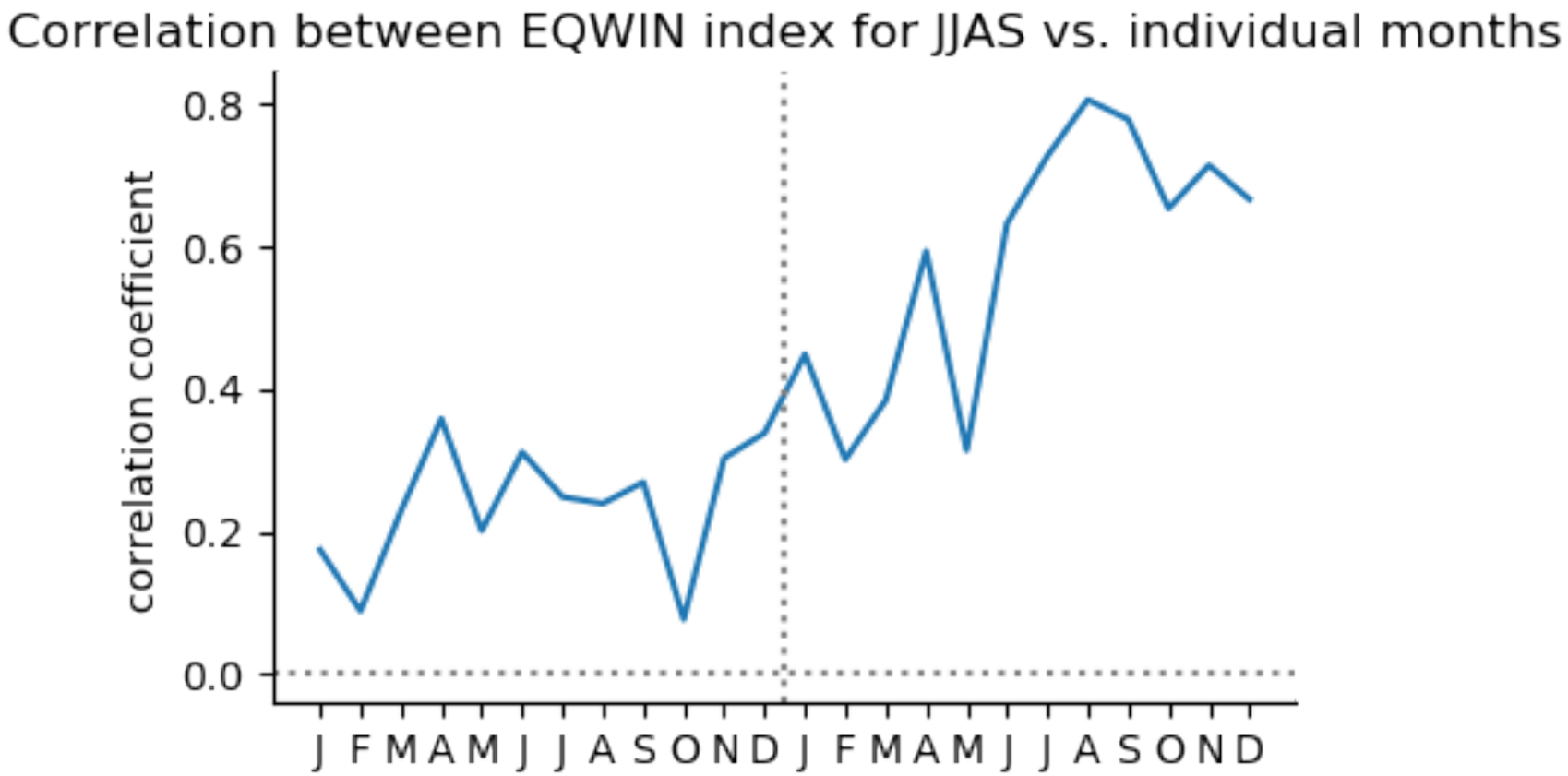


EQUINOLR index (OLR difference b/w Eastern Equatorial Indian Ocean (EEIO) region and Western Equatorial Indian Ocean (WEIO) region, c.f. Gadgil papers)

Plotted: correlation of JJAS value w/ monthly values in that year and (left of vertical dotted line) preceding year

Pretty rapid drop off toward low values; ~0.3 in April

EQWIN shows particularly low autocorrelation in May



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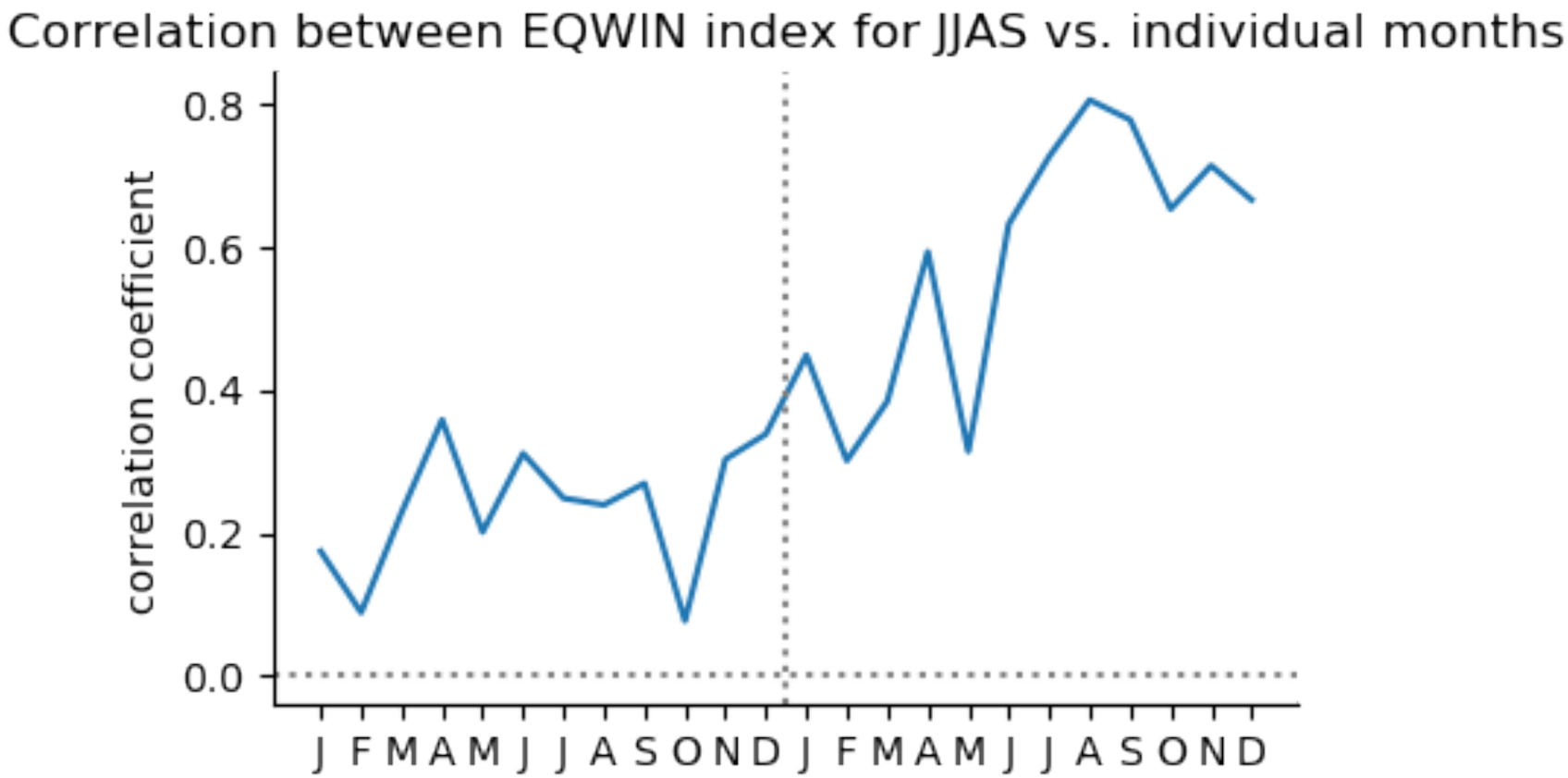
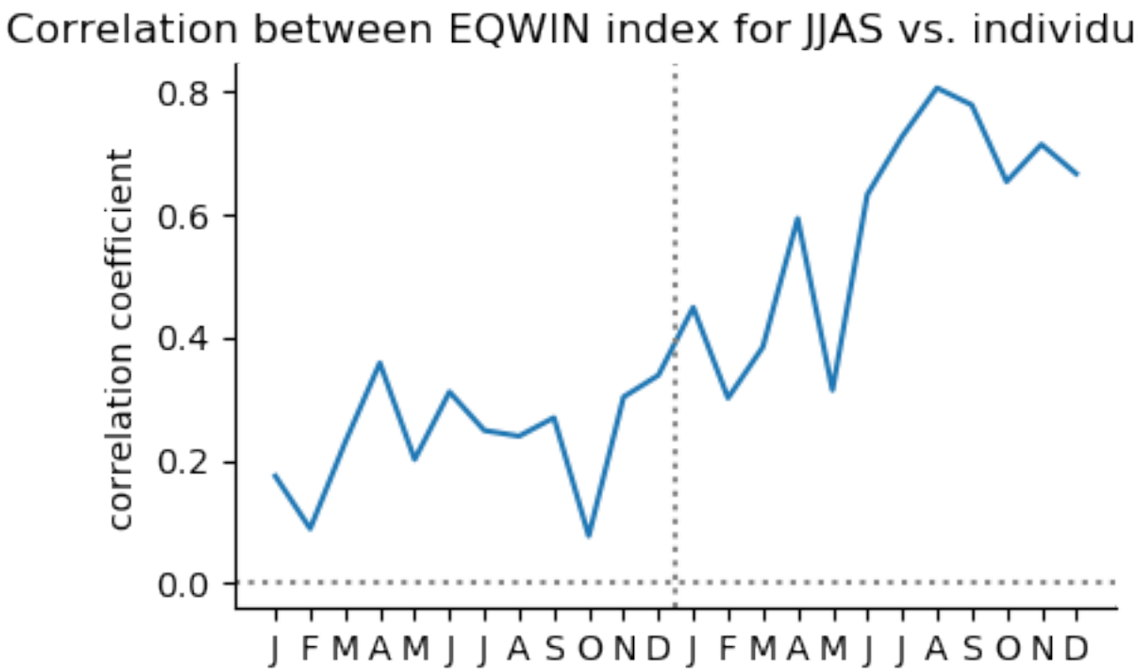
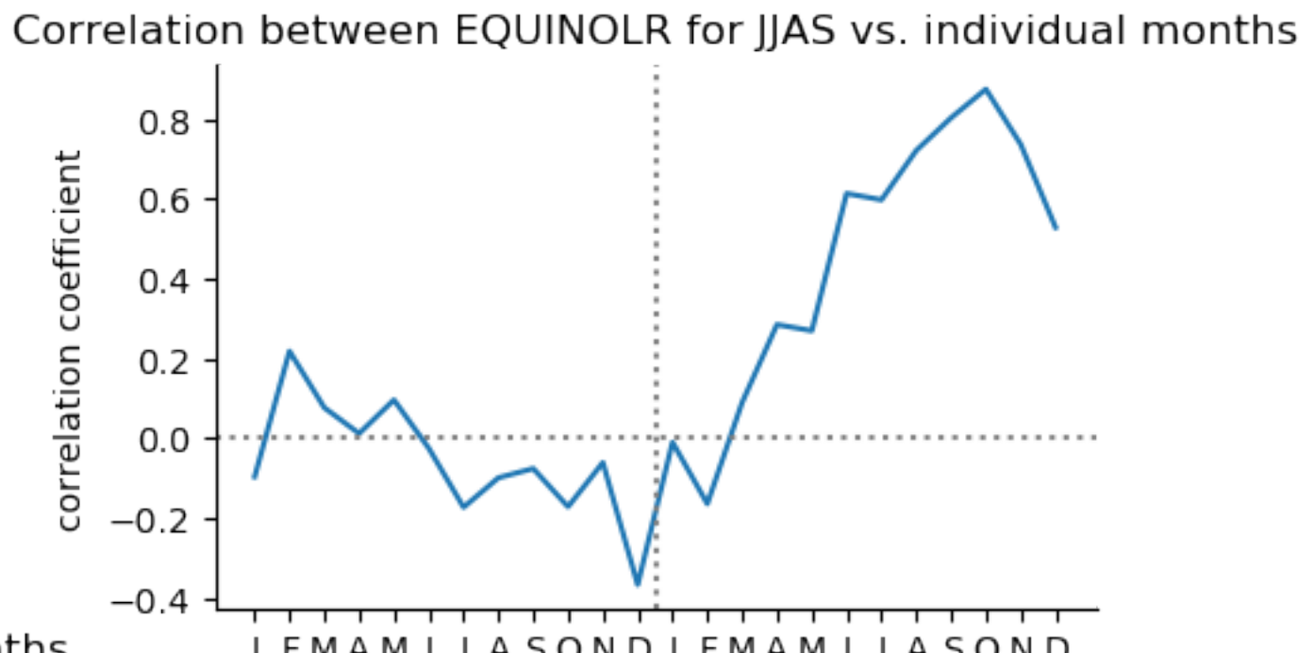


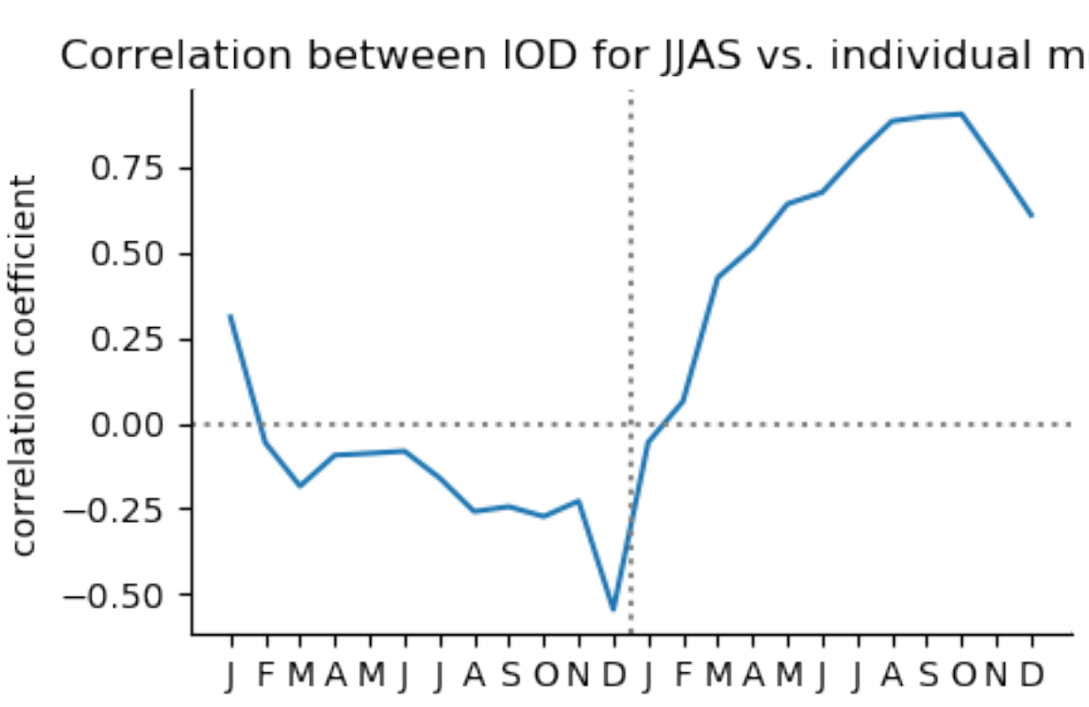
How distinct are the two flavors of El Niño in retrospective forecasts of Climate Forecast System version 2 (CFSv2)?

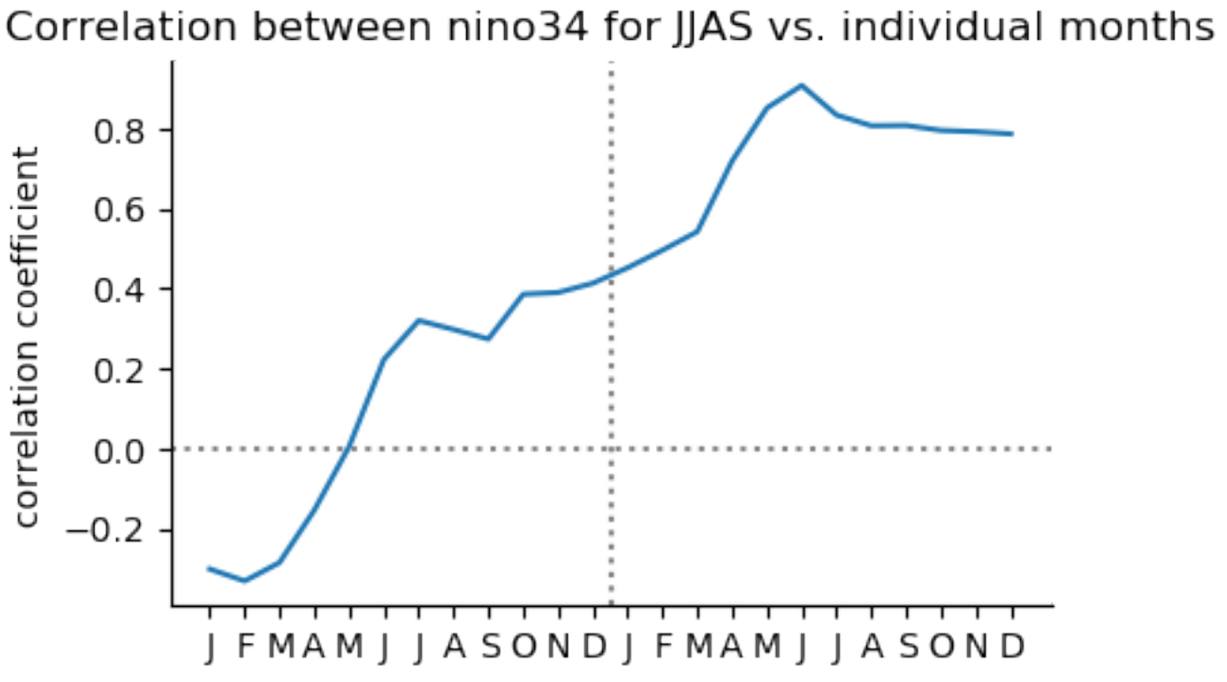
Prasanth A. Pillai[1] · Suryachandra A. Rao[1] · Gibies George[1] · D. Nagarjuna Rao[1] · S. Mahapatra[1] · M. Rajeevan[2] · Ashish Dhakate[1] · Kiran Salunke[1]

In both the models long lead hindcast has better skill for ISMR compared to short lead hindcasts and skill is decreasing from Feb IC to May IC. This is closely related to the model ability to distinguish the El Niño flavors. The



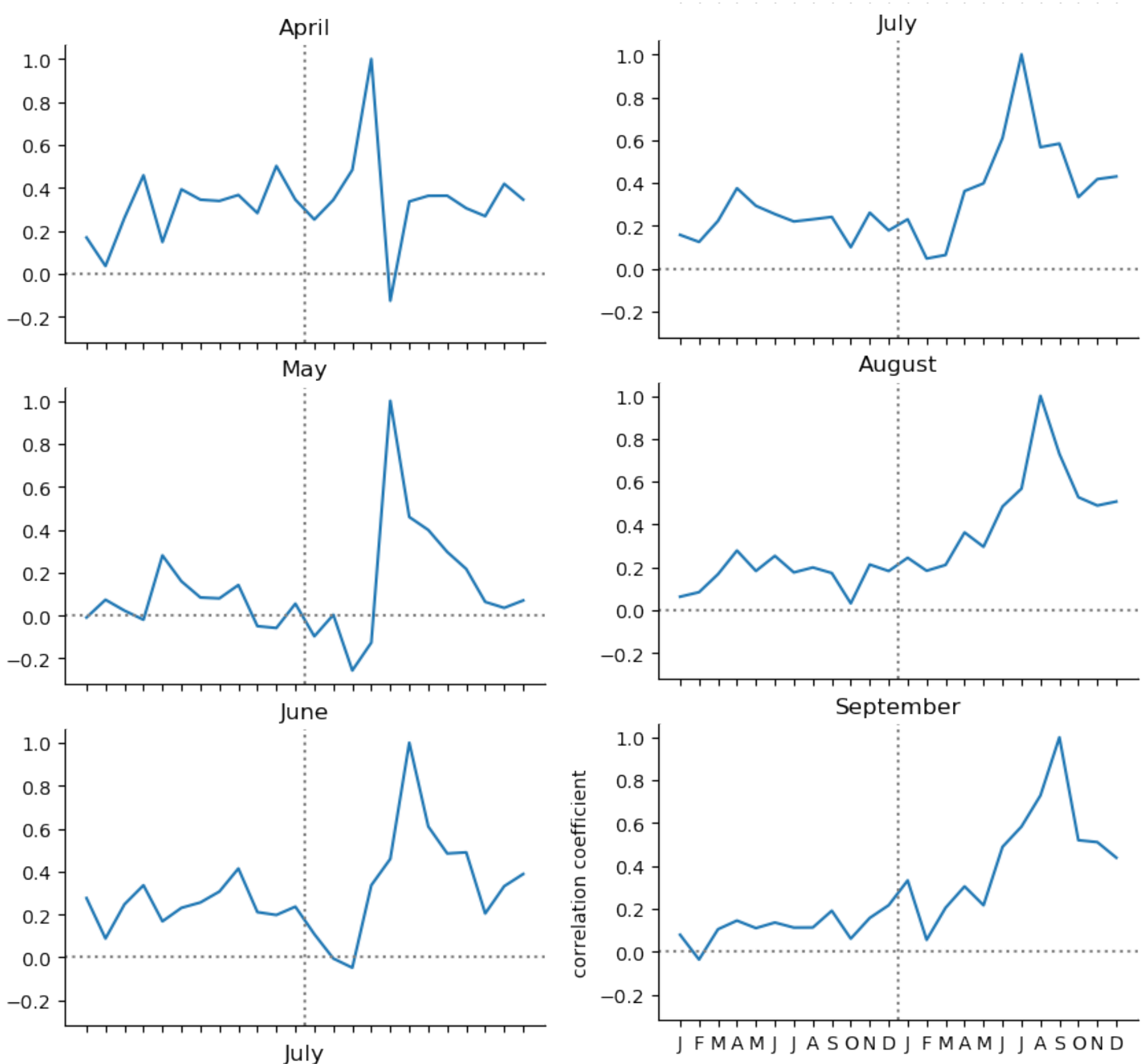






Panels: same as previous, but (clockwise from top left) EQWIN, EQUINOO, NINO3.4, IOD
EQWIN: from NCEP surface wind (following Gadgil). EQUINOLR from NOAA OLR; IOD+NINO3.4 from NOAA OI SST.

May looks anomalous in lag-correlations of EQWIN for individual months as well

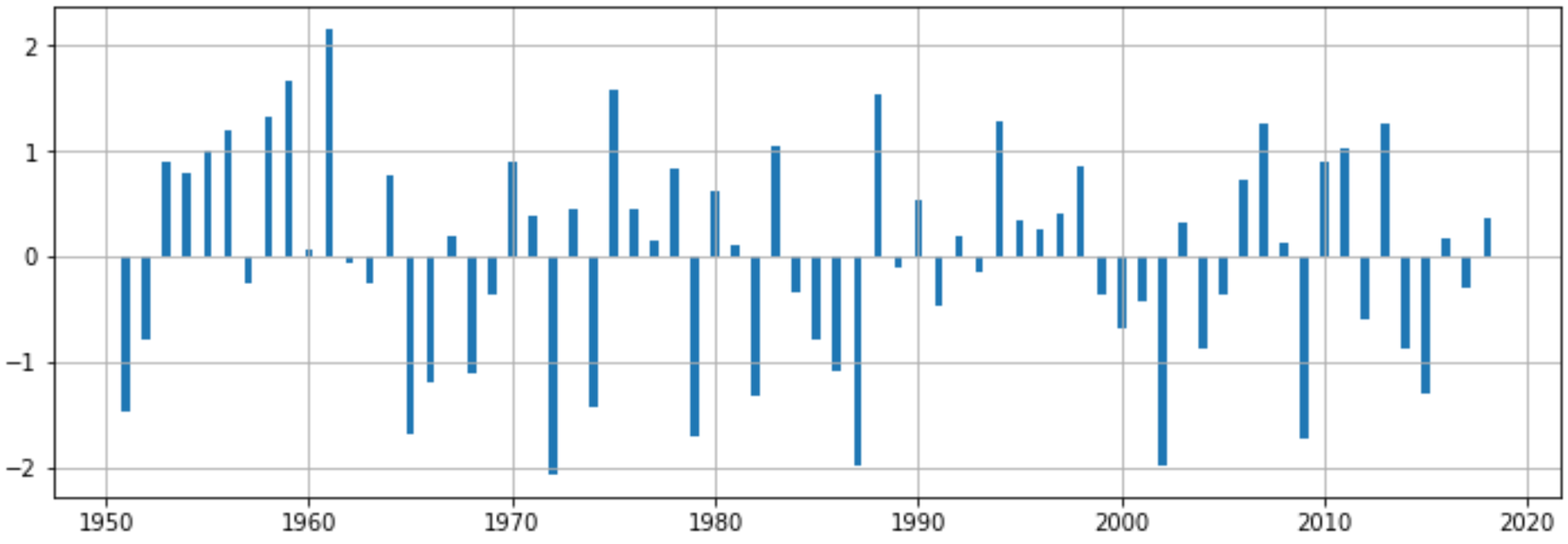


Preliminary moist static energy budget analysis

(Shuguang Wang)

- ERA-Interim data average over India
- Composites over rainy and dry years, 8 each, post-1979
- Budget residuals are ~5-8 W/m^2

Normalized India rainfall (excluding NE India) from 0.25 deg. IMD data



When we take the rainy-dry difference, advection terms (both horizontal & vertical) are larger than surface fluxes & radiation!