Teleconnection of ENSO associated with Precipitation over Iran

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Outline

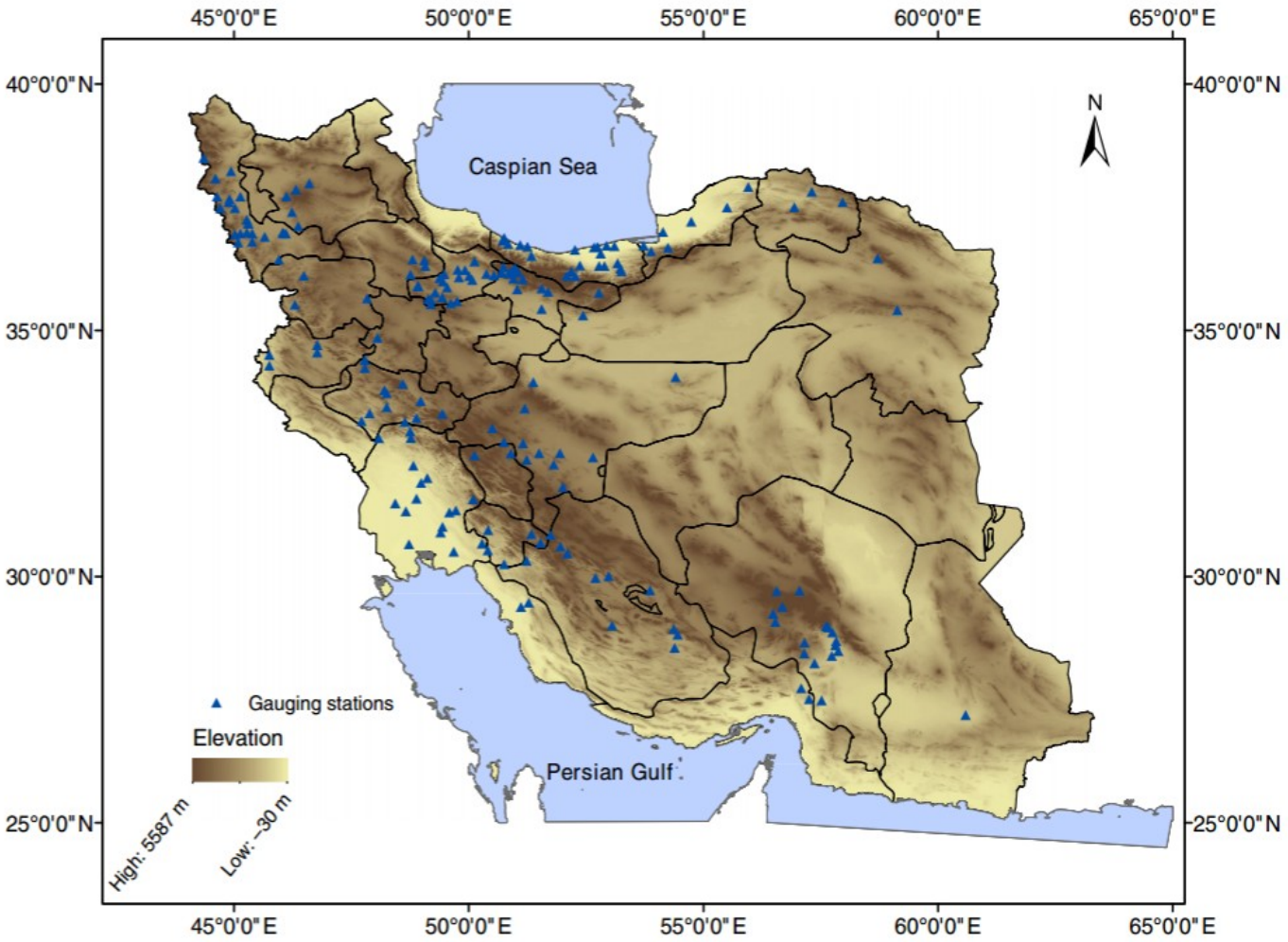
An introduction over Iran’s climatology

Motivation

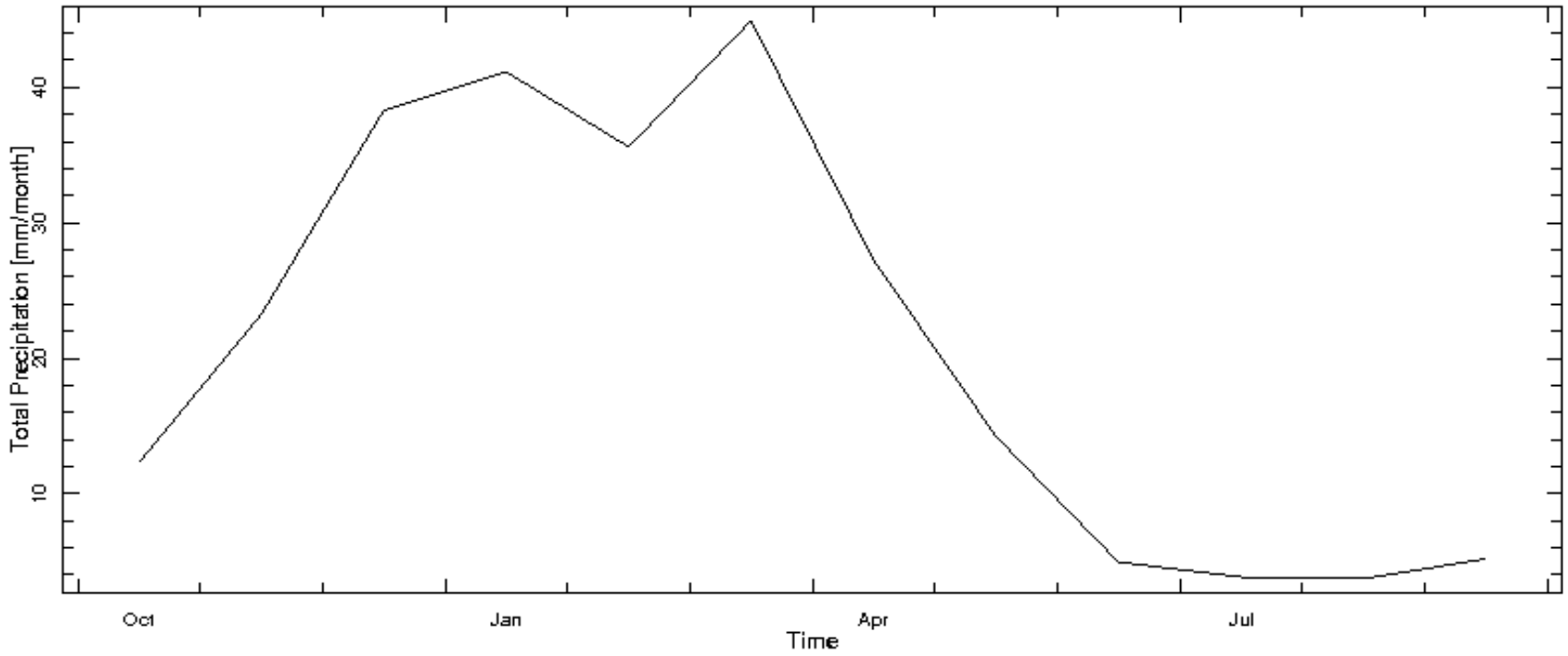
Experiment Design: SPEEDY model
Experiments

Conclusion

Digital Elevation Map of IRAN

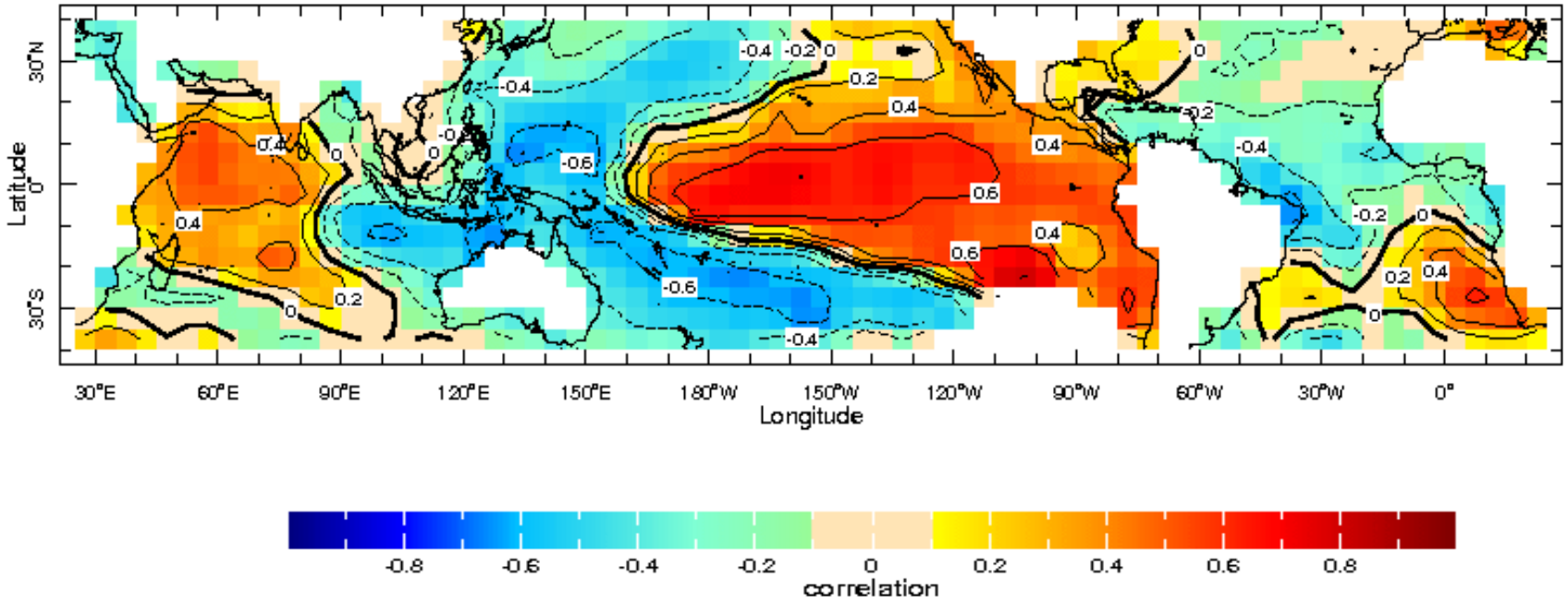


Annual Cycle of Precipitation



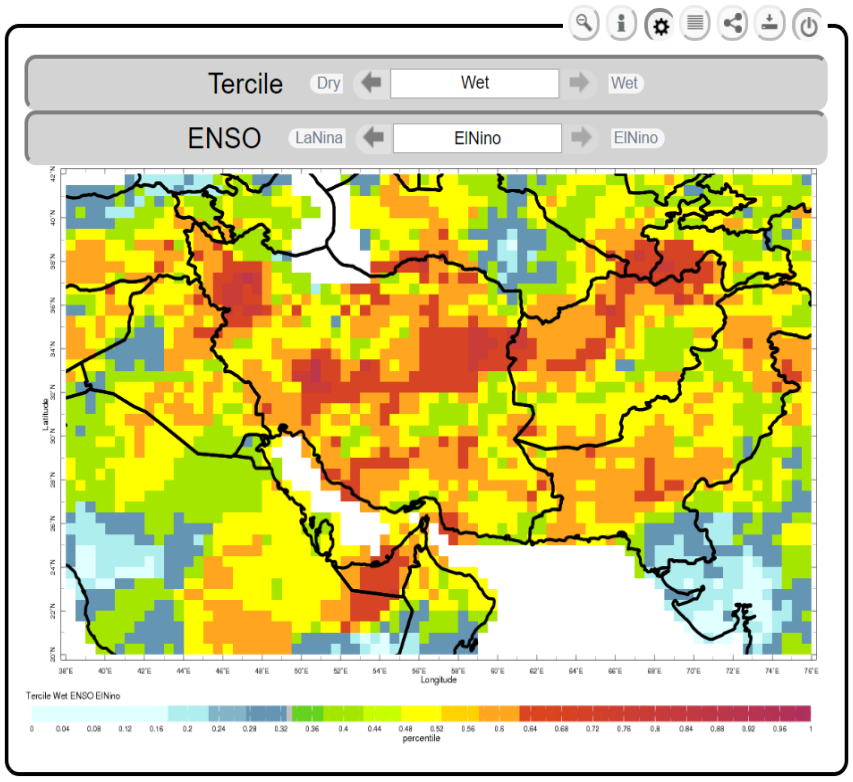
Areal average of precipitation over Iran (GPCC-1982-2013)

Iran’s Precipitation Correlated to SST

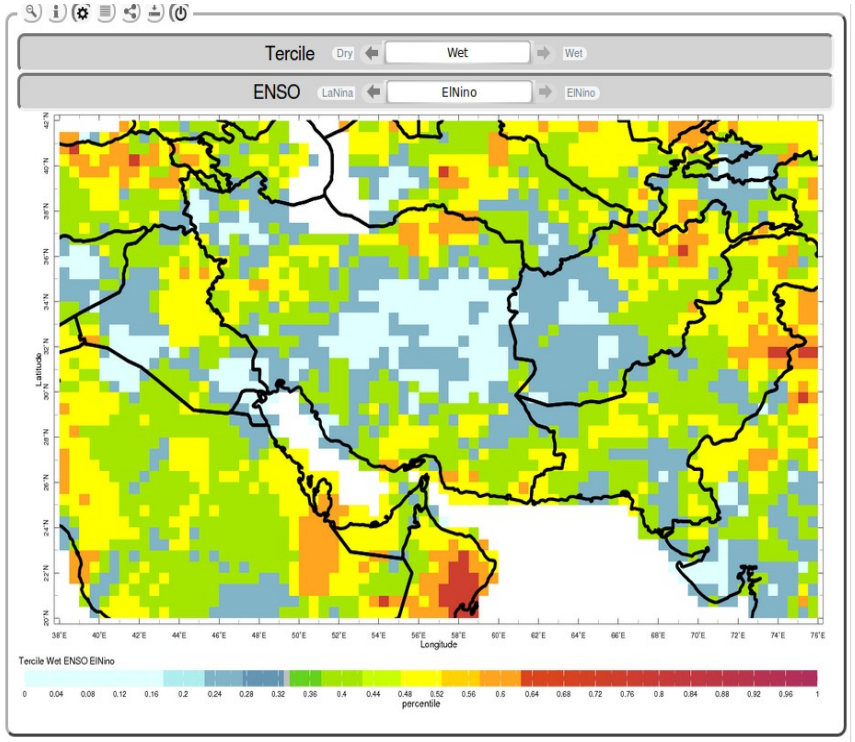


Correlation map between Iran’s observed OND precipitation (GPCC) and averaged observed OND SST/Kaplan from 1982-2010

Precipitation Anomalies associated with El-nino (OND) and (JFM)

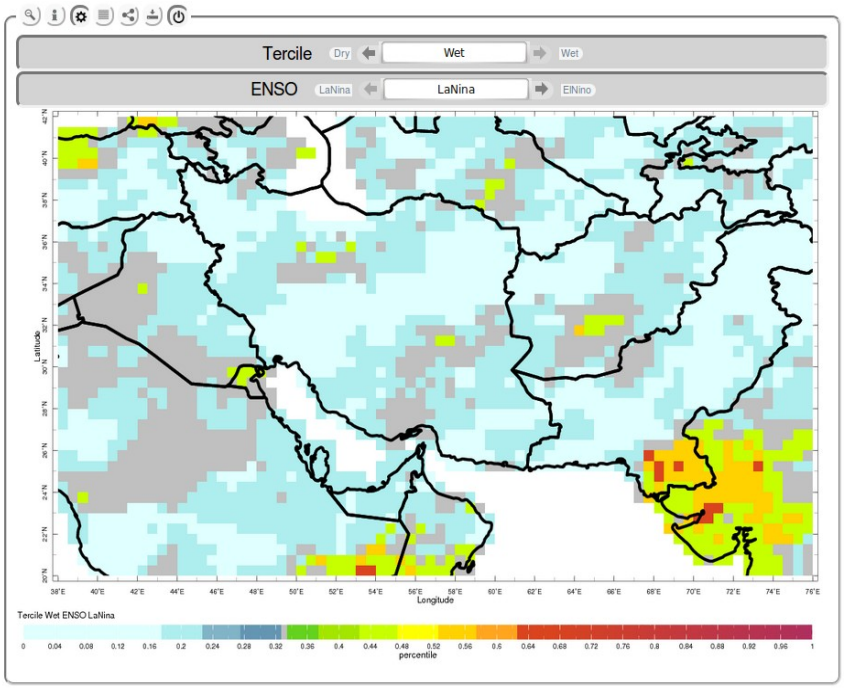


OND

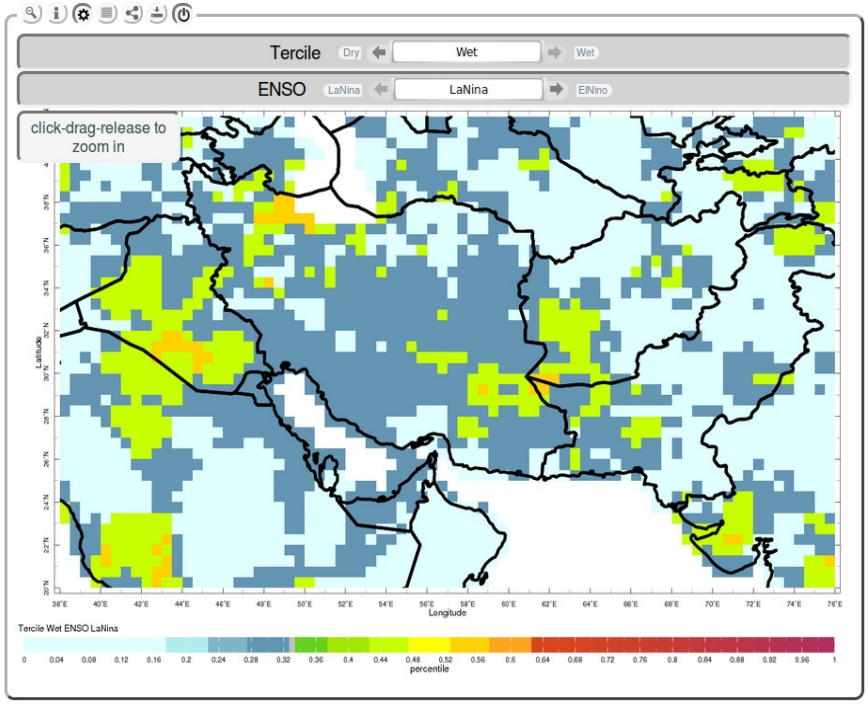


JFM

Precipitation Anomalies associated with La Nina (OND) and (JFM)



OND



JFM

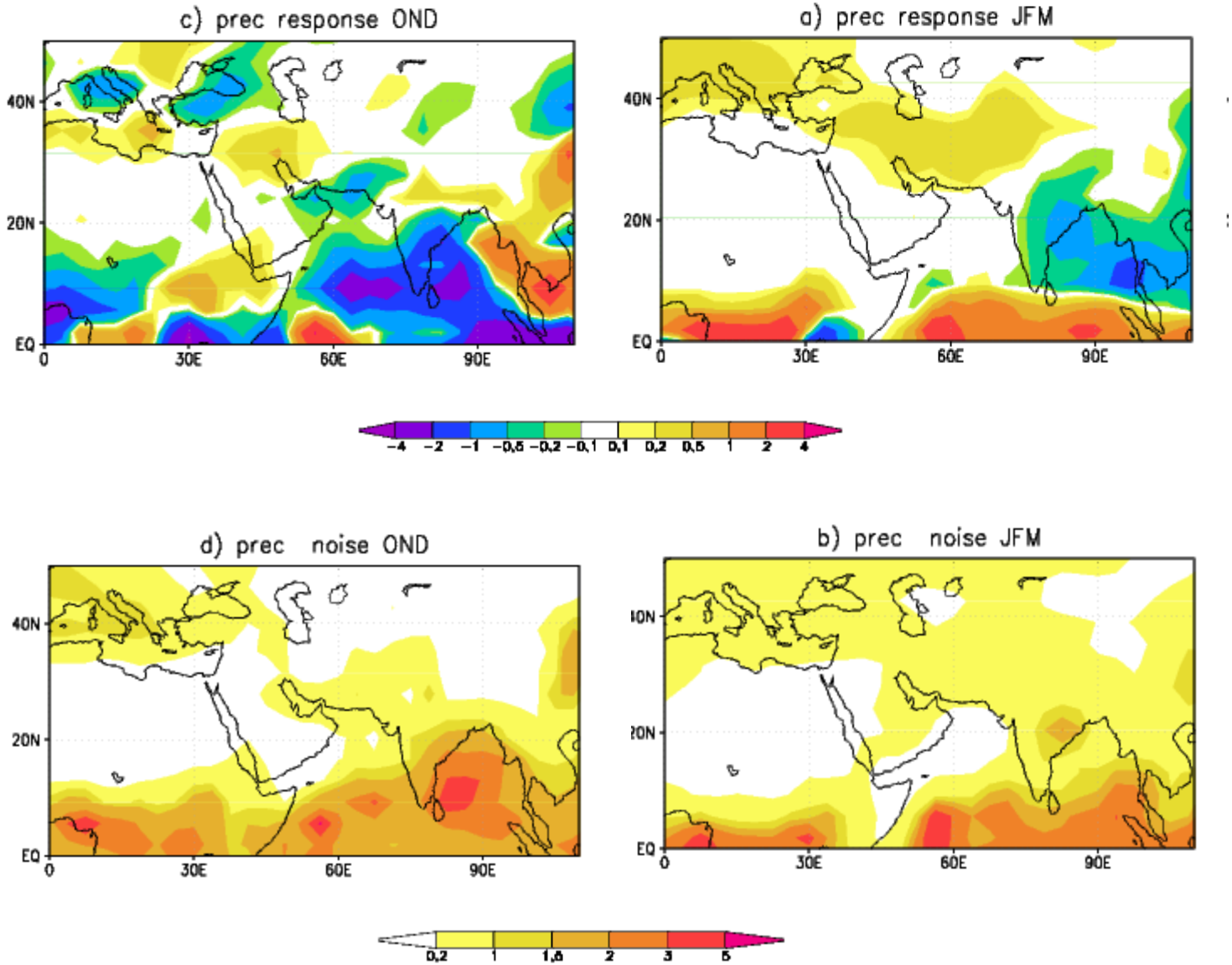
SPEEDY Experiment Set up

- ✓100 member ensemble (1911-2010)
- ✓Taking a look at (OND) and (DJF) seasons

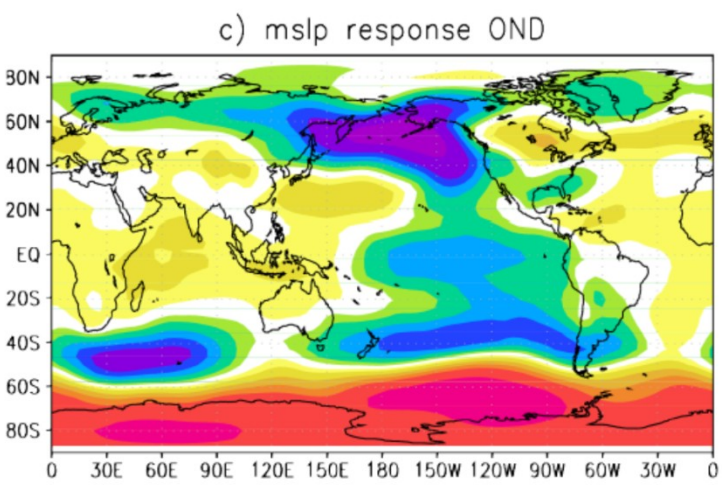
Exp (1): SST in the pacific perturbed with El nino signal

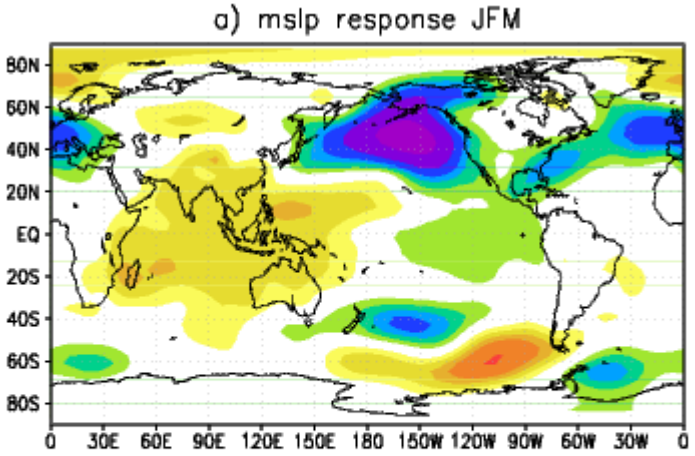
Exp (2): SST in the pacific perturbed with La nina signal

OND **JFM**



El nino - La nina


c) mslp response OND
80N
60N
40N
20N
EQ
20S
40S
60S
80S
0 30E 60E 90E 120E 150E 180 150W 120W 90W 60W 30W 0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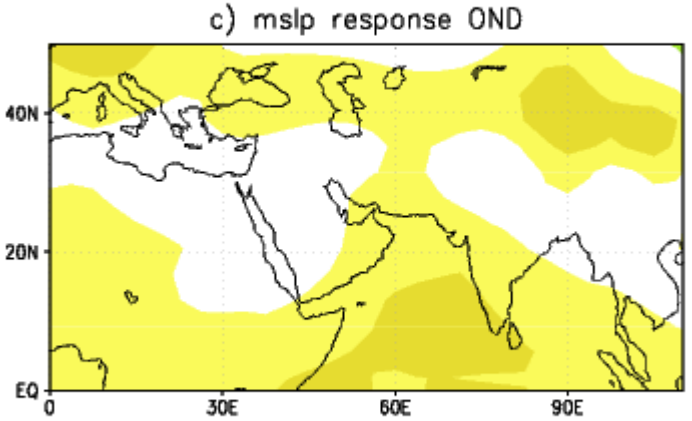
-5 -3 -2 -1,5 -1 -0,5 0,5 1 1,5 2 3 5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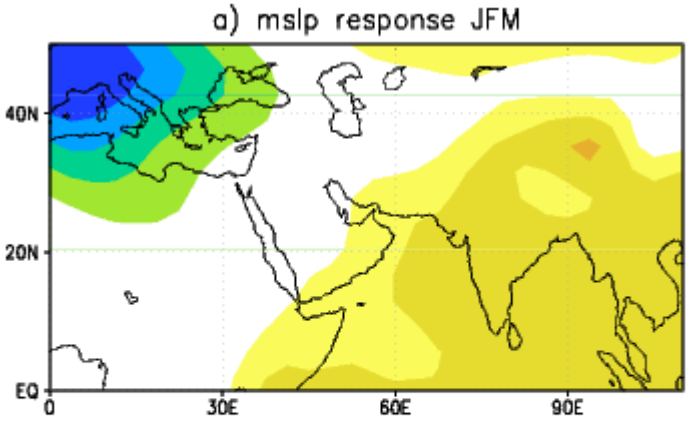
0 30E 60E 90E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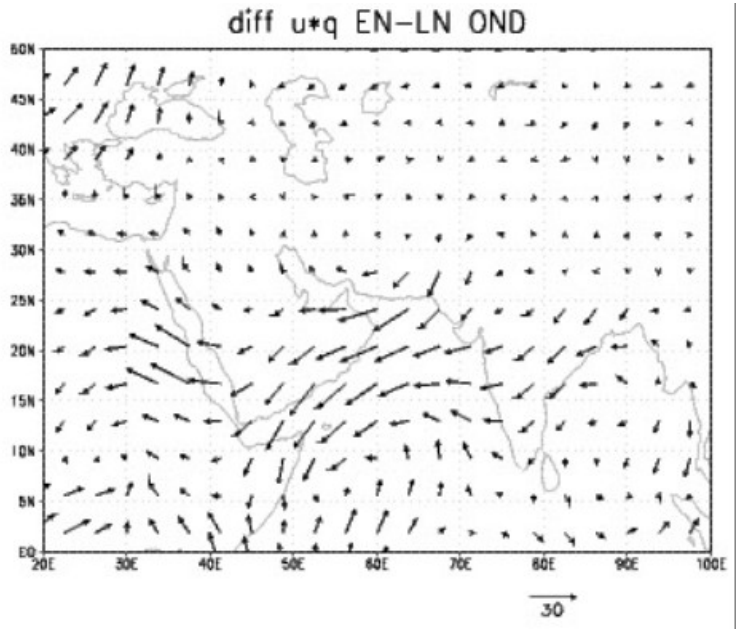
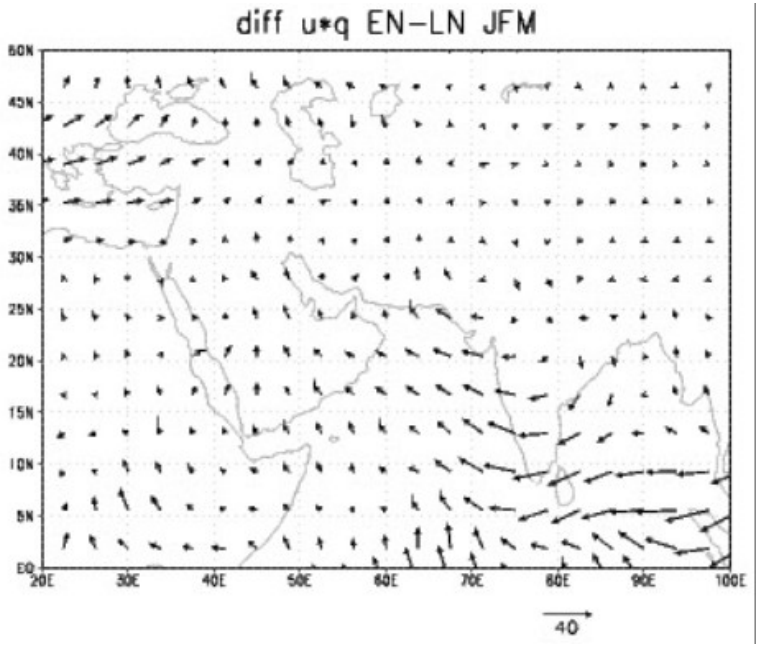
-5 -3 -2 -1,5 -1 -0,5 0,5 1 1,5 2 3 5

Moisture Transport anomaly





Conclusion

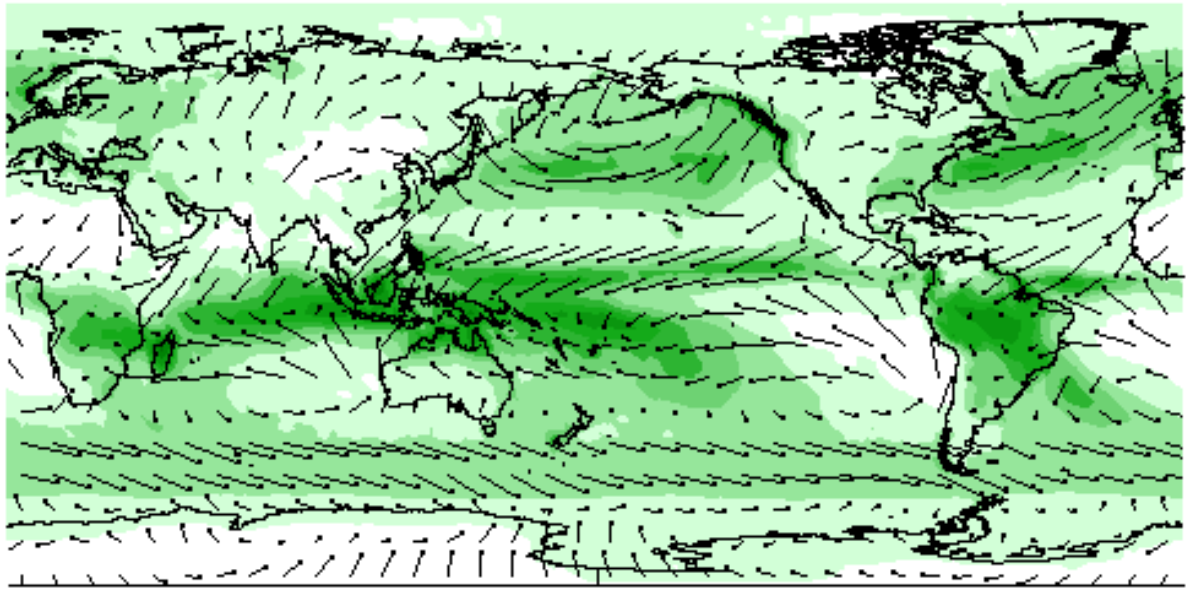
- SPEEDY shows wet conditions over Iran connected to El Nino in JFM and dipole like structure with mainly negative anomaly in OND
- JFM response Probably due to anomalous advection of moisture from the Indian Ocean connected to regional features of the Circulation response
- Caveat: Seasonality of the response does not agree with observations
- Signal is relatively small compared to noise
- Our model set up did not consider non-linearity between El Nino and La Nina

ENSO Probabilistic Precipitation Anomalies

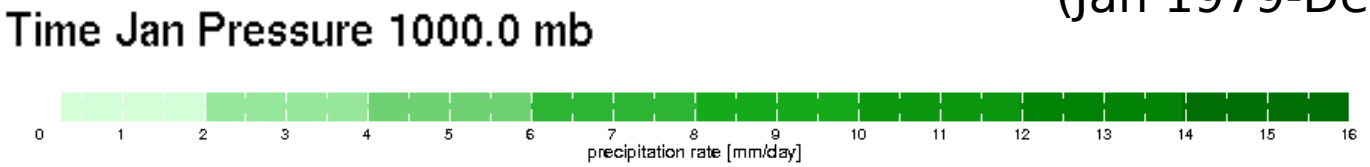
- Following Mason and Goddard (2001) methodology

- The numbers of times that the observed precipitation anomalies during ENSO event years were in each tercile were tabulated for each grid point based on GPCC dataset

On the understanding physical Mechanisms: Seasonal Cycle of Rainfall



(Jan 1979-Dec 2007)



Gridded Rainfall Dataset- GPCP U and V Pressure Level (NCEP/NCAR 40 year Reanalysis Data)