

The impact of Northern Hemisphere midlatitude variability on tropical teleconnections

Cristiana Stan & Erik Swenson

George Mason University

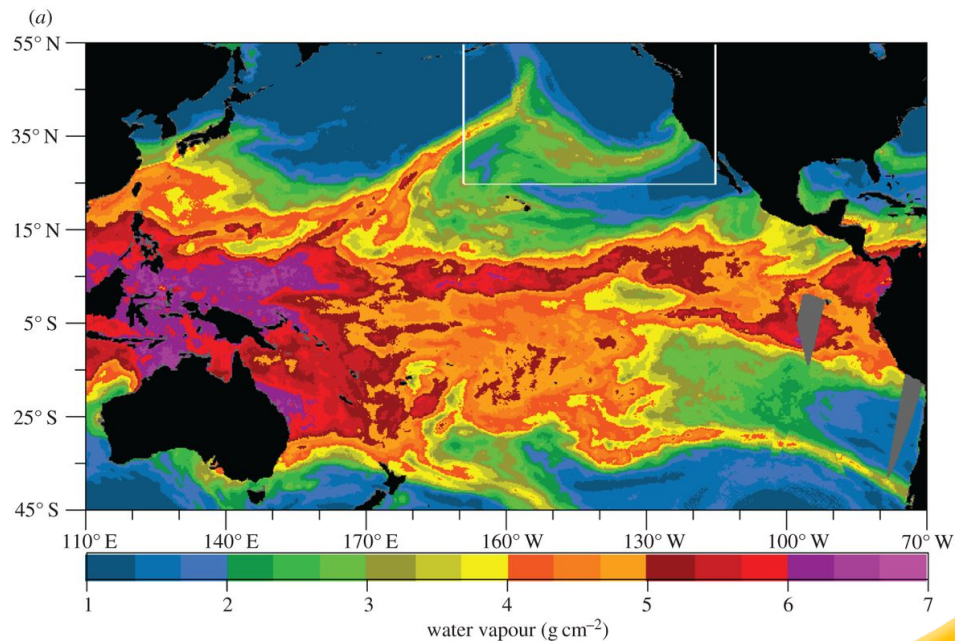
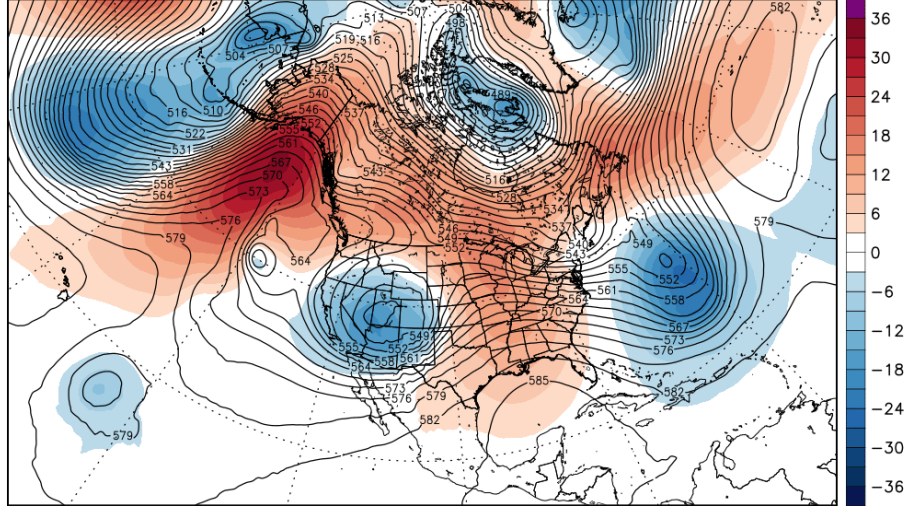


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Objective

Evaluate the impact of high-frequency variability of NH mid-latitudes on the Atmospheric Rivers reaching the US West Coast

ECMWF 500mb Geopotential Height & Anomaly (dam) (based on CFSR 1981–2010 Climatology)
Init: 12z Jan 12 2015 Forecast Hour: [240] valid at 12z Thu, Jan 22 2015 Levi Cowan | tropicaltidbits.com



Brian S. Cheng et al. Proc. R. Soc. B 2016;283:20161462



Methods

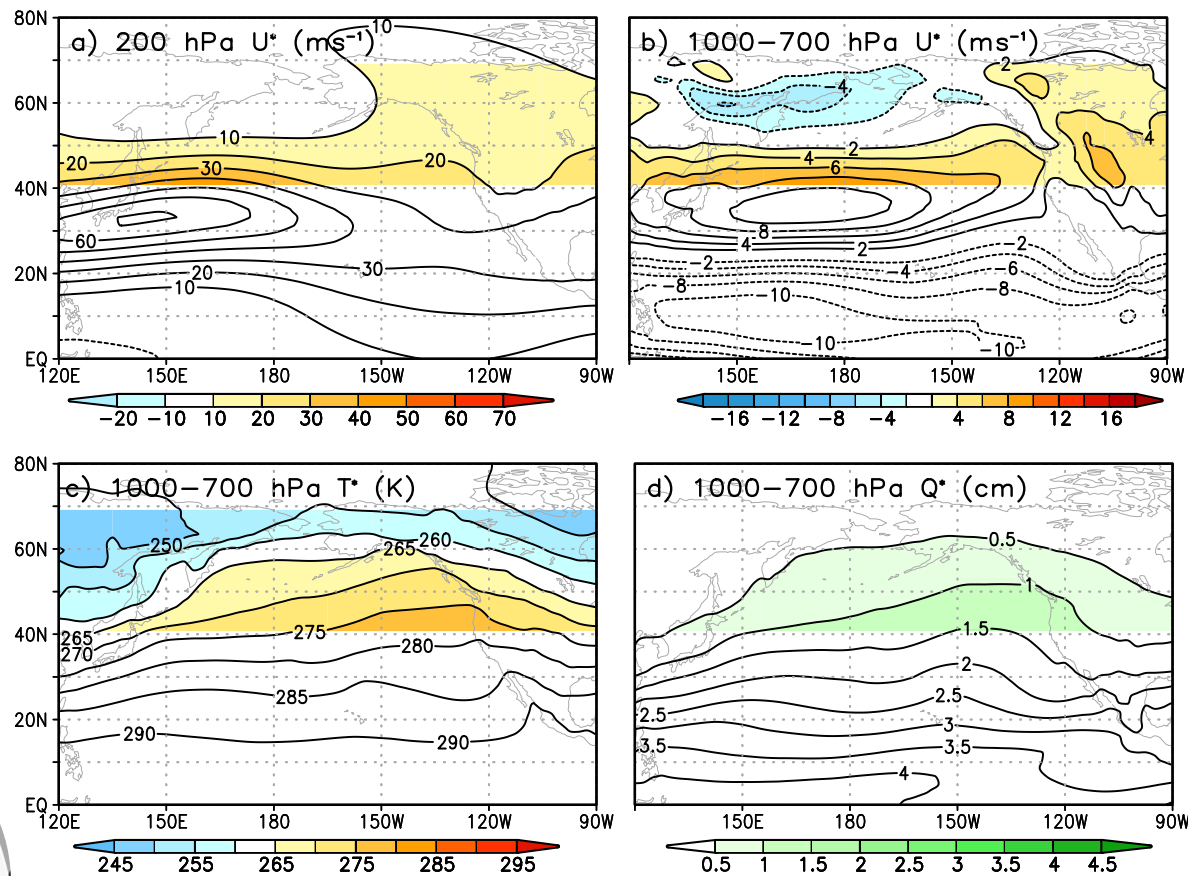
- A case study of AR events occurring during mid-winter 2014/2015
- Ensemble of re-forecasts using the super-parametrized CAM (SPCAM4)
 - ICs: 01-01, 01-08, 01-15, 01-22, 01-29, 02-05, 02-12, 02-19, 02-26
 - 5 ensemble members for each IC
 - 4 weeks long
- Ensemble of sensitivity experiments (*Clim*)
 - Relax* U, V, T, and moisture in mid-latitude band ($40^{\circ} - 70^{\circ}$ N) to climatological values from 100-year SPCCSM4 simulation
 - Use a relaxation time of $\tau = 12$ hours
 - Outside boundaries of relaxation region ($40^{\circ} - 70^{\circ}$ N), relaxation decays exponentially with $\sigma = 5^{\circ}$



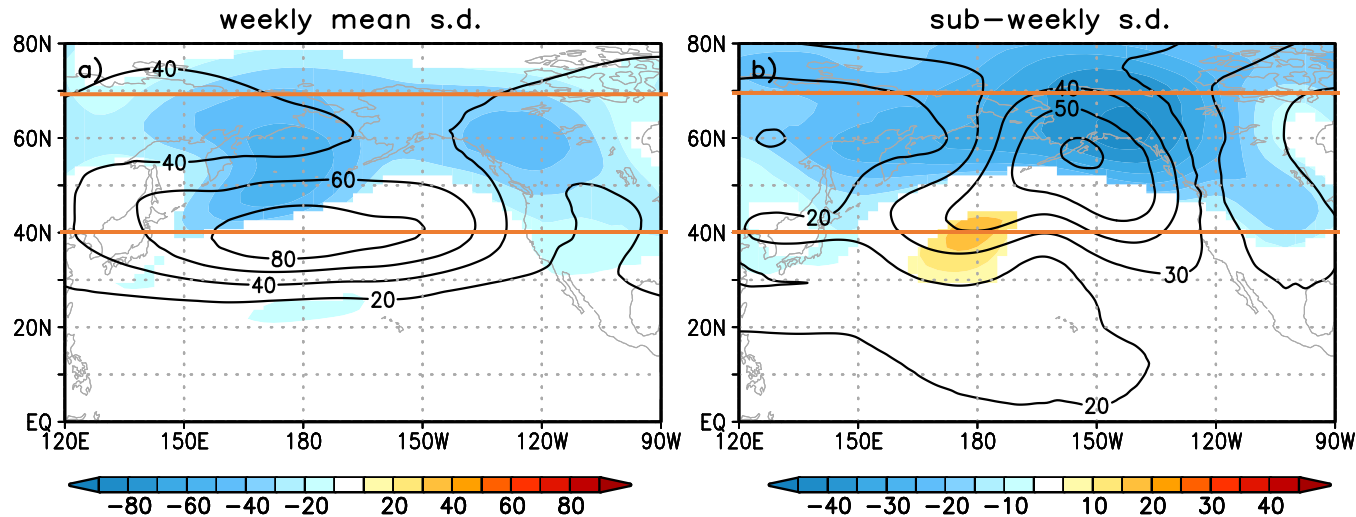
* Acknowledgment: Patrick Callaghan for relaxation code

Seasonal Mean of Relaxation Target

Clim target



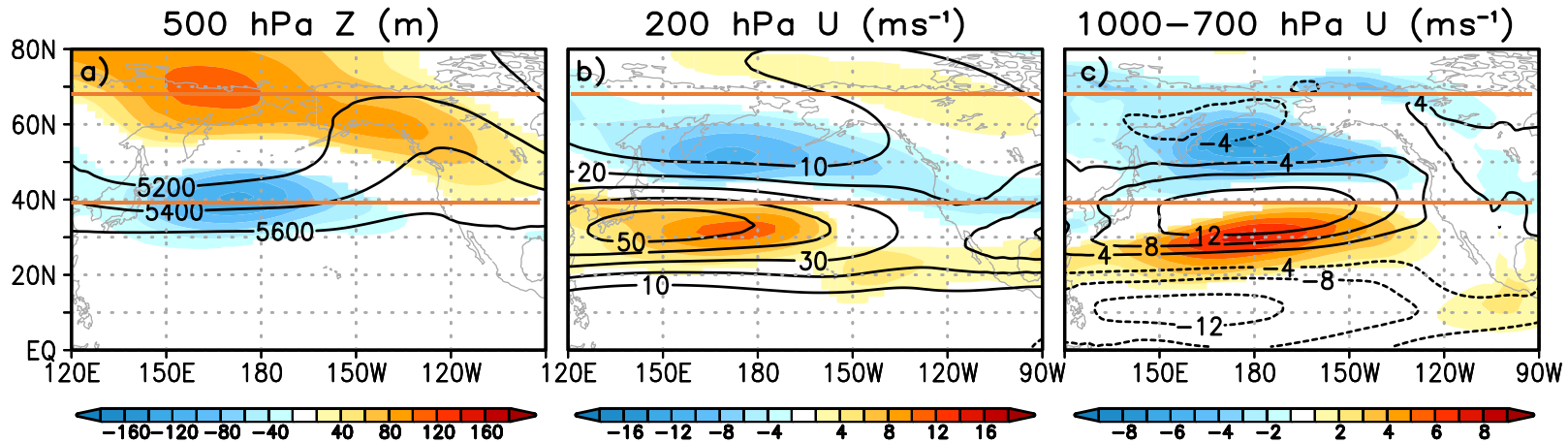
Impact of Relaxation on circulation (Z500) Variability



Weakly and sub-weekly variability in *Clim* is smaller than in *Control*



Impact of Relaxation on Mean Circulation



In *Clim*:

Higher heights poleward of 60N and deepening of the Pacific trough
Strengthening of the jet along its core at 200 hPa and lower levels

