

Notes

Benjamin Goldman

July 8, 2021

Contents

1	[BJERKNES, 1969]	1
2	[An et al., 2017]	2
3	TODO [Boer et al., 2000]	2
4	[Cai et al., 2018]	2
5	TODO [Chen et al., 2015]	2
6	[Chen et al., 2017]	2
7	TODO [Deser et al., 2020]	2
8	TODO [Dewitte et al., 2012]	2
9	[Emile-Geay et al., 2007]	2
10	[Graham et al., 2014]	3
11	TODO [Torrence and Compo, 1998]	3

1 [BJERKNES, 1969]

- First big paper on ENSO having a big impact
- connected changes in ocean currents to Walker Circulation
- ENSO phase affects behavior of the Indian Ocean monsoon.

2 [An et al., 2017]

- Used SVD (Singular Value Decomposition) together with the Mixed Layer Heat Budget Analysis to look at which feedbacks contributed most to ENSO's variation between models
- Influence of thermocline feedback is determined by how strongly equatorial horizontal winds affect the slope of the thermocline.

3 TODO [Boer et al., 2000]

4 [Cai et al., 2018]

- Increased ENSO variance in most CMIP5 models in EP ENSO center.
- Likely caused by greenhouse gases
- Higher ocean stratification allows for stronger communication between atmospheric and oceanic temperatures.
- Used EOF analysis.

5 TODO [Chen et al., 2015]

6 [Chen et al., 2017]

- Models are disagreeing on ENSO in the future because they have different representations of the mechanics and mean state of the Pacific subtropical cell

7 TODO [Deser et al., 2020]

- Main documentation for CESM1 Single Forcing Ensemble

8 TODO [Dewitte et al., 2012]

9 [Emile-Geay et al., 2007]

- Analyzed wavelet power spectrum of ENSO variability in models forced by sunspot and orbital changes
- Orbital changes increase long-term ENSO variability

- It is possible that ENSO was the mechanic that allowed prehistoric solar/orbital changes to control the earth's climate

10 [Graham et al., 2014]

- tested how accurate the Bjerknes Stability Index is at measuring the mechanics of ENSO in a couple models
- BJ index overestimates the importance of the Thermocline feedback.
- BJ index assumes that terms should be linear when combined, but they actually aren't.

11 TODO [Torrence and Compo, 1998]

- How to use wavelets to estimate power spectrum in timeseries.
- Uses ENSO data *very niceee*
- Windowed Fourier Transform sucks butt because it is dependent on a time step parameter that can muck with the results depending on which value you choose.
- A wavelet is a short ***blirp*** of a wave with a mean of zero and finite amplitude/frequency and limited time domain.

References

- [An et al., 2017] An, S.-I., Heo, E. S., and Kim, S. T. (2017). Feedback process responsible for intermodel diversity of enso variability. *Geophysical Research Letters*, 44(9):4272–4279.
- [BJERKNES, 1969] BJERKNES, J. (1969). Atmospheric teleconnections from the equatorial pacific. *Monthly Weather Review*, 97(3):163–172.
- [Boer et al., 2000] Boer, G. J., Flato, G., and Ramsden, D. (2000). A transient climate change simulation with greenhouse gas and aerosol forcing: projected climate to the twenty-first century. *Climate Dynamics*, 16(6):427–450.
- [Cai et al., 2018] Cai, W., Wang, G., Dewitte, B., Wu, L., Santoso, A., Takahashi, K., Yang, Y., Carréric, A., and McPhaden, M. J. (2018). Increased variability of eastern pacific el niño under greenhouse warming. *Nature*, 564(7735):201–206.

- [Chen et al., 2015] Chen, L., Li, T., and Yu, Y. (2015). Causes of strengthening and weakening of ENSO amplitude under global warming in four CMIP5 models*. *Journal of Climate*, 28(8) : 3250 – 3274.
- [Chen et al., 2017] Chen, L., Li, T., Yu, Y., and Behera, S. K. (2017). A possible explanation for the divergent projection of ENSO amplitude change under global warming. *Climate Dynamics*, 49(11-12):3799–3811.
- [Deser et al., 2020] Deser, C., Phillips, A. S., Simpson, I. R., Rosenbloom, N., Coleman, D., Lehner, F., Pendergrass, A. G., DiNezio, P., and Stevenson, S. (2020). Isolating the evolving contributions of anthropogenic aerosols and greenhouse gases: A new CESM1 large ensemble community resource. *Journal of Climate*, 33(18):7835–7858.
- [Dewitte et al., 2012] Dewitte, B., Yeh, S.-W., and Thual, S. (2012). Reinterpreting the thermocline feedback in the western-central equatorial pacific and its relationship with the ENSO modulation. *Climate Dynamics*, 41(3-4):819–830.
- [Emile-Geay et al., 2007] Emile-Geay, J., Cane, M., Seager, R., Kaplan, A., and Almasi, P. (2007). El niño as a mediator of the solar influence on climate. *Paleoceanography*, 22(3):n/a–n/a.
- [Graham et al., 2014] Graham, F. S., Brown, J. N., Langlais, C., Marsland, S. J., Wittenberg, A. T., and Holbrook, N. J. (2014). Effectiveness of the bjerknes stability index in representing ocean dynamics. *Climate Dynamics*, 43(9-10):2399–2414.
- [Torrence and Compo, 1998] Torrence, C. and Compo, G. P. (1998). A practical guide to wavelet analysis. *Bulletin of the American Meteorological society*, 79(1):61–78.