February 4, 2008: Null hypothesis: the climate has memory

- Data Exercise 1 discussion – what's in the MBH records?
- Deterministic vs. stochastic components of climate variability
- What is a “red noise” hypothesis? Why is it reasonable for the study of decadal climate variability?
• What is the observed decadal-timescale variability?

• Is there any relation between the decadally-filtered two reconstructed series? Why/why not?

• What are possible sources of the correlation?

• How would you go about separating these influences on the correlation?
Filter design

Is the filter shape familiar?
• What did the filter do? Did it match your expectations?
Filtering results

- What did the filter do? Did it match your expectations?
Filter effects

harmonics: 1

http://en.wikipedia.org/wiki/Gibbs_phenomenon
Is there support for Schubert et al. (2004) in the Mann et al. (2000) reconstructions?

What did the filter do? Did it match your expectations?
Is there support for Schubert et al. (2004) in the Mann et al. (2000) reconstructions?

• What are the possible reasons for correlation (r=0.8) between these series? How would you distinguish them?
Stochastic vs. deterministic mechanisms: What's the difference?
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Stochastic vs. deterministic mechanisms: What are the implications?

Huybers and Curry, Nature 441 (2006) doi:10.1038/nature04745
Summary

- It's hard to say if the Mann et al. (2000) results support the Schubert et al. (2004) results; input proxy data are common to both reconstructions and are limited in the tropics. What would you require for testing this hypothesis?
- Since the climate (atmosphere, ocean, land, vegetation, ice ...) and its proxies contain integrative processes leading to low frequency variations, purely dec-cen deterministic mechanisms must be tested against a null hypothesis of stochastic red noise.
References


