Discussion of: Probabilistic climate predictions in the presence of model error

by Hargreaves et al.

Discussant:
KLAUS KELLER
Department of Geosciences, Penn State
kkeller@geosc.psu.edu

Aspen Global Change Institute
Meeting on Abrupt Climate Change
July 9-15, 2005

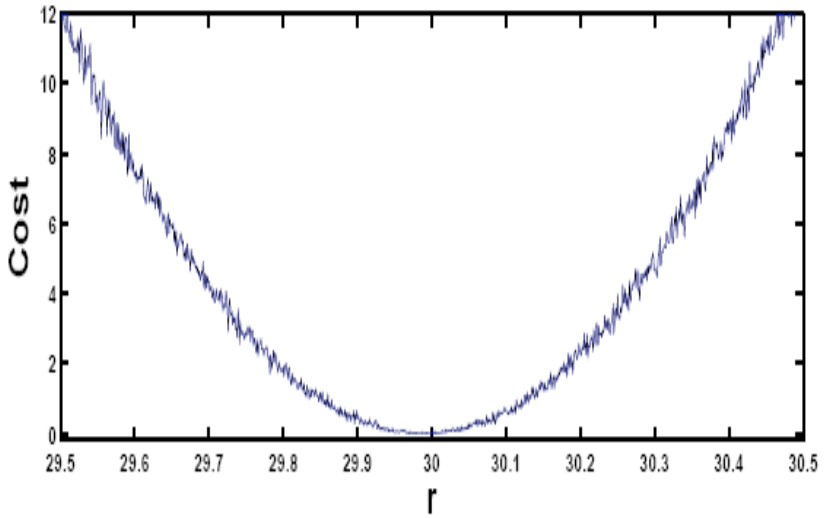
Three Questions

What are the potential biases introduced by the choices regarding the

- Assimilation method,
- Representation of observational constraints, and the
- Physical model?

Choice of Assimilation Method

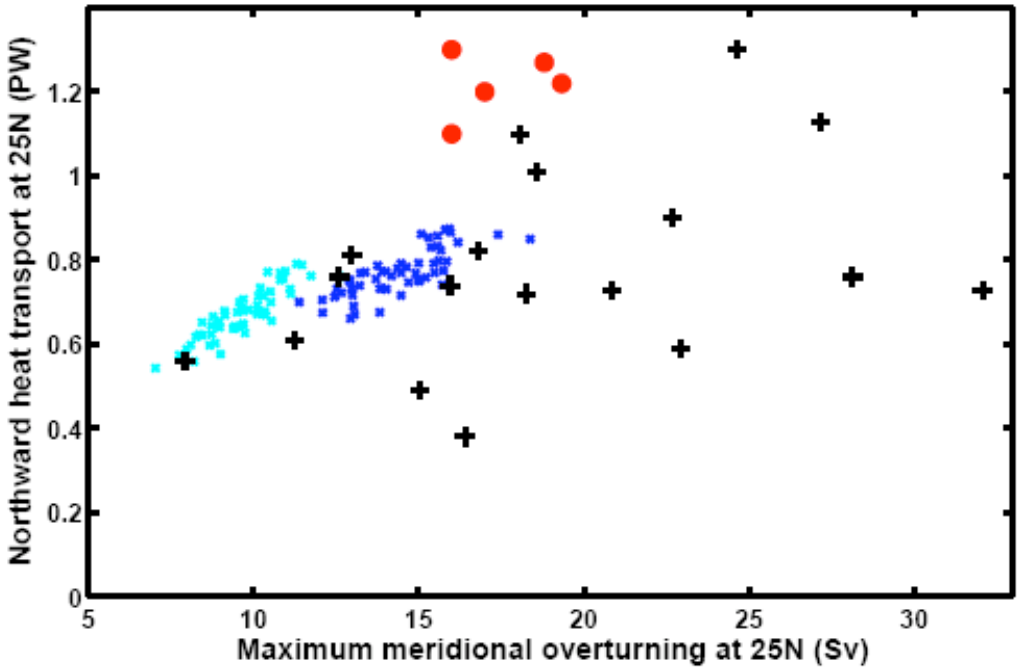
- "I second Carl" (thanks to Rob for teaching me his wisdom)
- The Ensemble Kalman Filter assumes Gaussian probability density functions.
  - Mildly nonconvex systems with few parameters can be handled reasonably well in some limited cases (Annan and Hargreaves, 2004).
  - Is the problem at hand indeed convex? (in other words, are the underlying pdfs unimodal?)



Annan and Hargreaves, 2004

Handling of observational constraints

- Does averaging the climatology (*e.g.*, 1945-1998, *cf.* Hargreaves *et al*, 2004) neglect important parts of the information relevant for the transient response?
- What is the probability density function of the MOC data constraints?
- How does neglecting the observed spatio-temporal autocorrelations affect the inversion results?

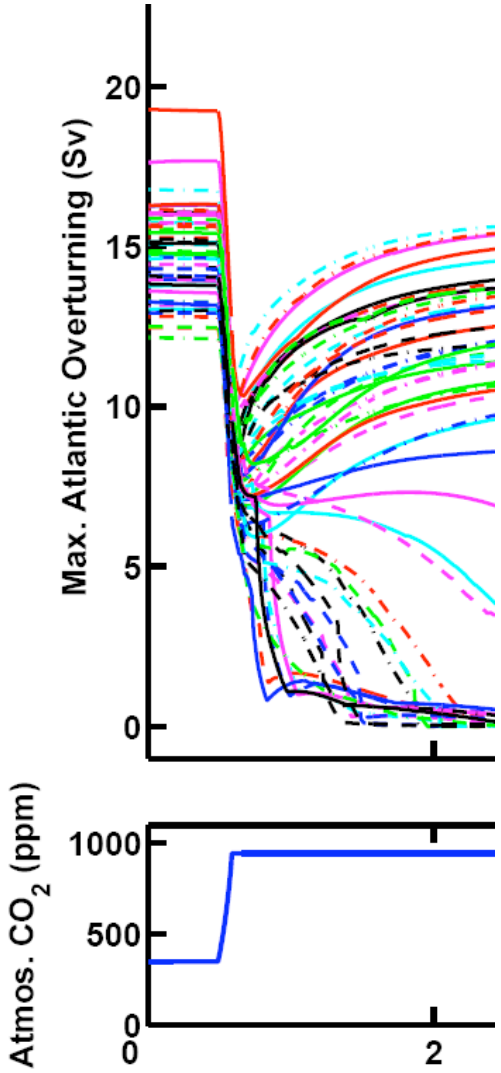


Hargreaves *et al* (2004)

Choice of the physical model

The MOC model shows virtually no interannual variability.

- What are the effects on the threshold crossing properties?
- How would interannual variability affect the assimilation and prediction problem?



Hargreaves *et al* (2004)