Who am I?

* I am a slash:
  * a physics/math nerd,
  * a professor of meteorology/climate dynamics,
  * a pragmatist/realist,
  * and a biker/hiker/outdoor dad.
What are my goals?

* For this workshop?
* For this talk?
* For my research?
* For my planet?
What is this talk about?

- Introducing uncertainty language
- Introducing uncertainty to physical climate issues
- Introduction on how to communicate across groups
What are Types of Uncertainty?

- structural/parametric
- epistemic/aleatoric
- deterministic/stochastic
- Quantifiable/Non-quantifiable
Components of the climate/earth system

- Atmosphere/Ocean/Land/Ice
- Physics/Chemistry/Biology/Enviro(?)
- Physical & Human
Climate Model History

Components/Complexity
Climate Model History

Components/Complexity

Mid-1970s

CO₂

Rain
Climate Model History

Components/Complexity

Mid-1980s

Clouds

Land Surface

Prescribed Ice

Monday, August 6, 12
Climate Model History

Components/Complexity
Climate Model History

AR4

Chemistry

Interactive Vegetation

Components/Complexity
Sources of Uncertainty

- Observational uncertainty (measurements)
- Model uncertainty (representation)
- Statistical Uncertainty (i.e., random?)
- Chaotic Uncertainty (internal/natural/unforced variability)
Scale dependence

- Global to Local
- Large-scale to micro-physics
- Century to daily
All data: Surface Temperature (2008)

http://data.giss.nasa.gov/
Uncertainty in communication

- IPCC Guidance notes on Uncertainty Language:

- Confidence levels v. Significance levels

- Example from MIT Integrated Global System Model.
Uncertainty in Global Climate Response in 2100

Global-mean, Decadal-mean, Surface Air Temperature
Based on Sokolov et al. (2009); Webster et al. (2011)