4 August; Friday
Peter Cox re-explains the long-term experimental design to the group:
Avoiding consequences of climate change from a policy perspective;
Peter;s experiment varies in a prescribed way, influencing land and ocean uptake, the land and ocean fluxes are diagnosed for the scenarios. The rate of change of co2 which is prescrib edd $dCO2/dt = F_{emissions} - F_{o\text{-}a} - F_{l\text{-}a}$. We are prescribing dCo2,/dt and the emission fluxes are diagnosed through the odean and land/atmosphere fluxes. Also, prescribed concentrations for other gasses, with models generally interactive with theem. Will need concentrations and emissions for aerosols. We also want both emissions and concentrations for these runs as well.
First experiment; prescribe the concentrations and diagnose the carbon fluxes. Don't get the feedback on the carbon: how to diagnose the feedback: if you do a linear feedback, y ou can check, in this case, we do a second run. We're interested in temperature change; policy makers are more interested in what to do to avoid them……can do a third run as well to check the prescritption of co2 for stability and to get at delta temperature.
First, if you consider your major output diagnosed emissions. How to get interactive. Run with two Co2/s one that is fixed and one co2 that the carbon cycle sees. So, the carbon cycle is seeing co2 variability.
2nd experiment: Difference between carbon cycle seeing climate change and not. Disabling the biophysical in the model tells the biophysical versus biological feedback. There will also be drivft from the physical climate system from historical – this is in the first experiment one as well. A profile for implied emissions with and without feedbacks and use to diagnose the feedback. Instead of looking at increment of co2, you're looking at increment of fluxes. In the second experiment, you save the co2 fluxes from fixed co2 to experiment.

A third run, takes the implied emissions from the second experiment without feedbacks. Calculate implied without . in experiment two, the carbon cycle responds to change in co2, but not the change in climate.

Third run to get the temperature response: diagnose fluxes without temperature change and stick the emissions back into the first experiment. This allows a consistency check with regard to emissions to asses climate, (temperature) response. Allows you to assess climate effect on carbon cycle with respect to emissions. In the model, there will be a different co2 and temperature response from the WGIII scenario in experiment one and model-consistent emissions from the second experiment. This allows for a diagnoses in temperature response.

Can run ensembles if you want (running multiple realizations for the scenarios). The cc variability will be dominated by the physical climate variability.

***For this to work, WGI and WGIII must be staggered. That iteration comes around in about half an assessment cycle. The diagnosed fluxes will largely be inconsistent with initial scenario fluxes. Can fit a reduced form model for next iteration.

The assumptions of population and agriculture will give very different land uses.

Jerry's slides:
Coordinated climate change projections experiments for AR5

1. **Near term (2005-2030)**

Higher resolution AOGCM (roughly _ to 1 degree – even higher possible)
1950-2005 coupled initialization/verification
a) Single GHG concentration scenario, at least a 10 member ensemble
simple chemistry and aerosols active, dynamic vegetation (no migration) no carbon cycle.
New IAI scenarios to be published this fall have ca 50% higher emissions. Naki recommends a consistency between long and short term runs. Median of short term scenarios tends to be higher than the median for the longer term scenarios. In long-term scenarios outcomes towards end of century are sconsidered. Short term is more trend exploration with models. Current construction of power plant trends, currency trends, etc. The Tammy, David Streets community different from what Naki is talking about (focus on air pollution, etc), but should be brought into this assessment.
Long-range transport community, AIMES a tough sell for an analogue to WGCM and providing the scenarios. We really need to evaluate this: AIMES, IGAC, AC&C. THIS IS WHAT NEXT WEEK IS ALL ABOUT!
b) three additional single member experiments with e.g., different adrosols, low, medium and high
c) possible geoengineering experiments for mitigatin on that timescale – only mitigation from geoengineering – a big effect on climate!

2. **Long term (2005-2100 and beyond)**

- Lower resolution AOGCM (roughly 2 degree)
- Pre-industrial spinup, 20th century forced experiment, natural and anthropgenic (at least 10 member ensemble)
- Two GHG and aerosol concentration scenarios supplied by WG3 (reference (e.g., A2-type), and stabilization (e.g., B1-type)), at least one ensemble member each (carbon cycle and biogeography/succession active; chemistry and aerosols prescribed) to 2100, stabilized after 2100 to 2300.

Experiment 1: ESM-type model runs wsith time speries of those specified concentrations; carbon cycle produces time-series of CO2 fluxes that are saved –this CO2 does not enter the atmosphere to change climate system response to specified concentration time series (give these fluxes to WG3 to derive mitigation policies to achieve derived emissions).
Experiment 2: fix atmosphneric Co2 for radiation code only; it's an uncoupled simulation with no climate change occuring, temperature remains about the same. Compare the implied emissions beween experiment one and two which is essentially the carbon cycle feedback on permissible emissions. (emissions consistent with a given concentrations scenario), CO2 concentrations from experiment one that only carbo the interactions are still really important, they're interpreted in a different way; impact of cc emissions on stabilization at a given level ; what to do to stabilize;
n cycle sees, save CO2 fluxes. Diagnose emissions:
CO2 concentration change = emissions – CO2 fluxes
(Derived emissions will be noisy, and WG3 will fit (invert) to smoother emission pathways)
Comparint emissions gives size of cc feedback.

Experiment 3: Implied emissions from Experiment 2 and run with full carbon cycle in Experiment 1 to get at magnitude of carbon cycle and climate feedback from a model-consistent perspective.

For AOGCM can diagnose feedback from exp 1 and 2, but if different in climate change for a given scenario, experiment 3 comes in.

Advantages:
Beauty is if you just have an AOGCM, you can still come out with a climate change, widens the participation Also get a consistent analyses across models. Another advantage is that come IPCC, chapter 10 will not have to document caveats of inputs. These are designed to be community-coordinated experiments.   There will be some complaining from WG2 about limited number of runs. Will people be willing to do something in between; on a volunteer basis, some will do more so impacts people will have a finer mesh. If had a medium scenario, wouldn't likely need experiment two. A mid-range A1B would reference back to a previous assessment. The real challenge will be how to narrow the options. High and low as core with medium as an option.