CMIP5 results

- Attribution results robust for multimodel, but not always for individual (ghg, other anthropogenic, natural) => need large ensembles for robustness
Detectable signals in precipitation

Emerging signal in average precipitation: detectable for annual averages and DJF averages for most datasets, for JJA averages according to only one dataset (Z).

Grey shading indicates latitude bands within which >75% of simulations yield positive or negative trends, consistently with observations.
Only reproduced by very few models.
Large uncertainty in external forcings, exp. historical/current aerosol loadings, and in the effects of ENSO when using formal model based attribution framework; simple time series analyses seem to explain it better (removing the ENSO signal eliminates it).
Continue to produce sizeable ensembles of 1850-present.

In addition, focus on the “now” period, say 1970-2030, with many initial condition members by the modeling centers that can afford it.

Extend historical up to 2020 (forcings do not matter much unless one does something radical, and that would allow to compare to latest observations available). RCPs should then start at 2020 with homogenized first few years.

Start even earlier than 1850 if possible (or simply make last millennium and historical better mesh).

Need greater clarity from individual models on exactly which forcings are included in which runs.
Single Forcings

Good to have initial condition ensembles so think carefully about trade-off between type of experiment prioritized and ensemble size

Good to have GHG-only (or Aerosol-only), NAT/Solar-only by as many models as possible (by the same token it is useless to allow a handful of modeling centers to submit miscellaneous single forcings – we need to address model uncertainty)

Aerosol effects are still a big unknown and difficult to explore on the basis of CMIP5 because of the heterogeneity of the treatment by different models, and because of the mixing with other forcings. Aerosols-only runs are needed, best if produced by as many models as possible, as opposed to GHG-only since in the latter case aerosol forcing would have to be derived as a difference between ALL and GHG and being aerosol forcings noisier than GHGs...one counterpoint to that though is that to apply the ASK approach GHG-only is needed the most.

Run single forcings into future as well. As for the present, extend them to 2020.
General comments

Design of the experiment would be helped by a more reasoned/deliberate specification of the tier system. Analysis of CMIP5 could inform that but we are not there yet:

How many models, how many ensemble members, what type of single forcing/combination experiments are required from many models, which types are sufficiently explored by a smaller set. These questions are still in need of answers but we have not had the time to fully explore CMIP5 for those.

As a preliminary assessment however, model uncertainty contribution to D&A results based on CMIP5 appears larger than previously thought. So, many models contributing GHG-only or Aerosols-only should be a priority, even if with small IV ensemble size.
Recommended Experiments (in order of priority)

- ALL (of course) including aerosols, ozone, land-use
- NAT-only as highest priority with IC ensemble
- GHG-only
- Aerosols-only
- GHG+Ozone+Land Use
- Solar-only (or VOLC-only)