Climate Process Team White Papers:
Proposal for a Committee to prepare documents to guide future Climate Process Team proposals.

Proposers: Sonya Legg and Piotr Flatau, on behalf of USCLIVAR Process Studies and Model Improvement Panel.

Motivation and tasks

Climate Process Teams are a mechanism for bringing together climate model developers with observationalists, theoreticians and process modelers, with the aim of accelerating knowledge transfer of a particular process into new climate model parameterizations. The current USCLIVAR climate process teams were initially funded for 3 years beginning in 2003, and the two ocean CPTs had their funding extended for a further 2 years. As a result the current round of "pilot'' CPTs will end in fall 2008. Therefore, after consultation with the funding agencies and internal discussions, we are initiating the process of developing recommendations for new CPTs.

We have begun this process by reviewing the pilot CPTs to identify the lessons which have been learned. On this basis, as well as feedback from modeling centers, we have developed a list of criteria for new CPTs:

- Relevance: A process which is poorly represented in state-of-the-art climate models, where improved representation will lead to improved and more credible climate simulations
- Readiness: A process where recent developments from theory, process modeling and observations are ready to be transferred into climate model parameterizations.
- Focus: Narrow, well-defined focus
- Model independence: Topic of interest to multiple climate model development teams

We are now in the process of collecting input from US and international climate model developers concerning possible topics for new CPTs. We will also consult with the major US funding agencies concerned with climate modeling (NSF, NOAA, NASA and DOE) on their specific program priorities for climate model improvement.

We would like to propose the establishment of a committee of experts, consisting of a mix of observationalists, process modelers and climate model developers, to write two white papers providing recommendations for new CPTs, incorporating the feedback from model developers. While these white papers may deal separately with atmosphere and ocean topics, in order to better match with the disciplinary divisions at funding agencies such as NSF, we will encourage examination of cross-disciplinary topics by the committee. The goal of the white paper would be to consider the possible topics for new CPTs in terms of the criteria listed above: Are the topics relevant to climate? Is the knowledge base sufficiently advanced that a CPT could make real progress in parameterization development and implementation? Can the issues be narrowed down

sufficiently to provide a focused topic for a CPT? Is this process relevant to all model types? The white papers would then make recommendations as to the topics most suitable for new CPTs. A second goal of the white paper would be to provide guidance as to the organization of a successful CPT, based on the lessons learned from past CPTs. These white papers would serve as guidance both to program managers and to the PIs writing the proposals for new CPTs.

This committee would meet during the next 6 months, with the white paper to be written by the end of summer 2008. Since NSF program managers have indicated that 2009 is their preferred start date for new CPTs, we are following a timeline that would allow a call for proposals in early 2009.

Prior to the committee meeting, all members of the committee would be encouraged to (a) review the responses to requests for input from PSMIP submitted by modeling centers; (b) discuss possible topics for CPTs with their colleagues, in order to assess the level of understanding currently available from observations, theory and process models.

We reviewed replies from several US modeling groups. A partial list of suggested CPT topics includes:

Atmospheric sciences
1. Tropical convection parameterizations.
2. Radiative transfer parameterizations
3. Aerosol indirect effect parameterizations
4. Cloud microphysics parameterizations.
5. Land surface process parameterizations, including soil moisture and ice.

Ocean sciences
6. Mesoscale circulations and parameterization of their role in climate models
7. Sea ice processes
8. Equatorial ocean upwelling and mixing
9. Southern ocean ventilation and deep water formation

Although we have split this list into atmospheric and oceanic processes, we emphasize that there is a cross-disciplinary element to many of these topics, and hence we will encourage some discussion among the whole committee, rather than splitting all discussion into two groups.

These topics as written are certainly too broad for any CPT, and one of the goals of the white paper committee will be to evaluate whether specific focused processes can be identified within these broad headings. Some examples of such specific processes for topic 1 include: incorporation of convective vertical velocity distributions for improving representation of cloud-aerosol interactions and scavenging; incorporation of mesoscale processes in convective parameterizations; closure and triggers for cumulus parameterizations.

Publications and outreach

The main product of this committee would be two white papers. These white papers would be made available to the community through the USCLIVAR website, the websites of the agencies involved in funding the new CPTs, and also emailed to model development groups, and to a comprehensive list of investigators and program managers.

Reporting

This committee would meet once, during the next 6 months, and its appointment would only last one year. Its sole reporting task will be the publication of the white papers.

Leadership and membership

We propose that Sonya Legg and Piotr Flatau should lead the oceanic and atmospheric subcommittees. We propose a membership totaling 16 people, 8 atmospheric researchers and 8 oceanographic researchers. The numbers need to be sufficiently large that representatives from the major modeling centers, important academic model development groups, and observational, process modeling and theoretical experts in the processes suggested for CPTs can all be included. Committee members with expertise which crosses the atmosphere-ocean boundary will also be encouraged, so that topics such as air-sea interaction are not neglected.

Resources requested

Resources will be required for one 2-day meeting of all 16 committee members. Following the meeting, communication will be by email and teleconference.