

**WMO/ICSU/IOC
WORLD CLIMATE RESEARCH PROGRAMME**

**JSC-31/Doc. 2.1
(15.1.2010)**

JOINT SCIENTIFIC COMMITTEE

Item number

**THIRTY-FIRST SESSION
ANTALYA, TURKEY
15-19 FEBRUARY 2010**

WCRP Processes Theme

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DRAFT

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Version 1
18 December 2009 21:02:32

“Advancing understanding of the processes that determine our climate” is a goal of WCRP that – often tacitly – underlies most of WCRP research. Arguably, scientific understanding at its deepest level is equivalent to obtaining a “feel” for the mechanics of a *process*. “Processes” are thus ubiquitous in climate research, and the challenge for WCRP lies in identifying those processes the investigation of which requires international or even global coordination; moreover the challenge implies defining a procedure for arriving at such identification.

One attempt at classifying climate process studies distinguishes between those aiming at climate phenomena (e.g., the east-Asian monsoon), those aiming at ubiquitous, possibly small-scale processes (e.g., ocean-atmosphere gas exchange), and those aiming directly at the testing of models or parameterizations (e.g., shallow cumulus convection). While the boundaries between these classes are blurry, the classes do suggest quite different strategies.

1. Processes underlying phenomena

This type of process study will usually have a regional focus, especially in its field component. The regional implementation strategies of the Core Projects seem appropriate here. A significant challenge lies in the coordination and oversight, as has been demonstrated by the problem of unifying the “monsoons” theme within WCRP. One solution could arise from acknowledging that governance of the regional “phenomena” process studies lies solely within the Projects. An exception to this rule would have to be made for phenomena that span several Earth system domains, such as land-ocean-atmosphere or cryosphere-ocean-atmosphere.

2. Ubiquitous processes

Again, the default rule of engagement would be that the Projects are in charge. But JSC must be prepared to discuss proposals that clearly outstrip the capacity of a single Project. A case in point is SOLAS, where the entire Project is defined through one type of process. Again, care would have to be taken to cover processes spanning several Earth system domains.

3. Process studies for model testing

The distinction from Category 2 is difficult and perhaps arises more from the need to get all of WCRP involved. Arguably, observational and even modeling work on small-scale processes does not to sufficient degree feed into model development and improvement. Cases in point may be the discussion within WOCE planning 25 years ago, or Christian Jakob’s depiction of real versus ideal model improvement strategies.

Role of JSC

Generally, JSC – in contrast to the Core Projects – is called upon when coordination across a large part or all of WCRP is required. For the Processes Theme, this requirement could arise in a number of ways.

1. A fundamental issue arises from the inherent tension between the fundamental-science aspect of process studies (see above) and the increasing demands for usefulness in “practical applications of direct relevance, benefit, and values to society”. It will remain a crucial task for JSC to ensure that the fundamental-science base of WCRP remains healthy, as only this will guarantee the long-term quality of the science that WCRP can deliver to society.
2. Many process studies in the past formed the foundation for new and key climate observation networks of today, especially over the oceans. To transfer observations from the process level to that of sustained observations will continue to require WCRP efforts.
3. A particular role for JSC arises when the impetus for starting an initiative arises not so much *within* a Project or discipline but rather *without*. One example could be the above-mentioned need for observational studies supporting work on model parameterizations; another could be the current steeply-increasing demand for much greater sophistication of ice sheet models, which arguably has not arisen within the ice-sheet modeling community itself but from the pan-WCRP demand for reduced uncertainty in projections of sea level rise.
4. Considering whole classes of process studies as Core Project-internal matters greatly simplifies governance within WCRP but carries with it the risk that lack of coordination or communication leads to either duplication or avoidable omissions. Information flow thus is required, in particular on plans for processes spanning several Earth system domains.
5. JSC should consider mechanisms for jump-starting efforts or even sub-fields where the demand for results outstrips the current effort. Again, ice-sheet modeling serves as a case in point: the community seems far too small to cope with the demand for quick progress. There may well be a general lesson here. The Climate Process Teams initiated by US CLIVAR or the Fast-Track Initiatives of IGBP might serve as role models.