

Despite the large scatter between the various models, the multimodel average sea ice extent is in good agreement with the observations, meaning that there is apparently no systematic bias in the models. On the other hand, the models generally tend to overestimate the variability of the ice extent compared to observations.

Over the 20th century, the multimodel average simulates a stronger warming around the peninsula compared to other regions, which is in qualitative agreement with observations.

The simulated strength of the ACC varies a lot between the different models, ranging from less than 50 Sv to more than 200 Sv. Various factors could explain those large inter-model differences. In particular, the strength of the westerly wind over

Drake Passage and the salinity gradient across the ACC seem to play a dominant role.

The large variability in the Southern Ocean region on interannual to interdecadal time scales poses problems in the assessment of the quality of model simulations and in the finding of robust signals. Longer time series of surface temperature and sea ice extent, for instance, would be particularly helpful in this context, enabling better estimates of the observed interdecadal variability and trends over the 20th century and allowing us to better check model performance.

**Reference:**

Rignot, E. J., Fast Recession of a West Antarctic Glacier *Science*, July 1998: Vol. 281. no. 5376, pp. 549 - 551

## Report of the second session of the CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices

**A. Caltabiano, F. Zwiers and A. Klein-Tank, on behalf of the panel and meeting attendees.**

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The Expert Team on Climate Change Detection and Indices (ETCCDI) is a joint panel co-sponsored by the World Meteorological Organisation (WMO) Commission for Climatology (CCI), CLIVAR, and more recently, by the Joint Commission for Oceanography and Marine Meteorology (JCOMM). It has recently had its membership reviewed in order to accommodate members from each of the sponsors. The new members are Francis Zwiers (Environment Canada, co-chair), Albert Klein-Tank (KNMI, The Netherlands, co-chair), Phil Jones (UEA, UK), David Karoly (University of Oklahoma, USA), Gabriele Hegerl (Duke University, USA), Blair Trewin (BoM, Australia), Xuebin Zhang (Environment Canada), Brad Garanganga (DMC, Zimbabwe), Chris Folland (MetOffice, UK), Elizabeth Kent (NOCS, UK), Val Swail (Environment Canada) and Scott Woodruff (NOAA, USA)

The panel met for its second session in the picturesque Canadian town of Niagara-on-the-Lake, on 14-16 November 2006. In addition to panelists, other invited experts who also attended the meeting and greatly contributed to the discussions that took place were Matthew Palmer (Met Office, UK), Tom Peterson (NCDC/NOAA, USA), Xiaolan Wang (Environment Canada) and Lucy Vincent (Environment Canada). Panel co-chair and host, Francis Zwiers opened the meeting welcoming all the participants and made a review of the work developed by the previous Expert Team which was co-sponsored by CCI and CLIVAR only. It was very successful in contributing to the WCRP cross-cutting topic on Anthropogenic Climate Change, through the sponsorship and organisation of regional workshops held in Jamaica, Morocco, South Africa, Brazil, Turkey, Guatemala and India. Participants helped in analysing changes in extremes, and produced a number of published peer-reviewed papers on climate change. Further to these papers, the data assembled during these workshops were helpful in filling gaps in the global datasets, and have been used in a global extremes indices paper, which was done in time to contribute to IPCC AR4. In a number of studies, the global indices data have also been compared to GCM simulations. Moreover, the workshops had an important component as a capacity building mechanism. One of the main outcomes of the ET in preparation for the workshops was the development of a user-friendly software package with user guide written in English and Spanish.

Representatives of the three sponsors of the ETCCDI gave presentations highlighting their perspective on the ET and contributions for a successful development of a work plan for the next three years. Tom Peterson and Omar Baddour gave

a presentation on CCI background and WMO programmes with a focus on climate. This included an overview of the structural organisation and planned activities. Nico Caltabiano presented an overview of CLIVAR structure and the "CLIVAR Road Map", as planned during the 14th Session of the CLIVAR Scientific Steering Group (SSG) in Buenos Aires, April 2006. The presentation focused on the aspects of the Road Map that are relevant to the ET, with contributions to the understanding of Anthropogenic Climate Change (ACC), and to ocean observations and the CLIVAR legacy. Val Swail and Scott Woodruff presented the structural organisation of JCOMM, and the contribution that can be made toward ocean indices based on surface and sub-surface variables.

The ET played an important role in the IPCC Fourth Assessment by developing and further understanding indices of climate change, by producing indices with greater geographical coverage than previously available and engaging in their analysis. With JCOMM as a new co-sponsor, the ET had extensive discussion to explore the best approaches to developing ocean and surface marine indices that would be complementary to the terrestrial indices that it has focussed on previously. Chris Folland presented a review of worldwide indices and how they might be best presented to the community. The considerations he identified included: (1) Indices should be primarily based on observed data. However this may include reanalyses where it is judged the science allows this; (2) Wherever possible, indices should have estimates of uncertainty attached to them; (3) Indices, with uncertainties, should be based on more than one recognised data set where possible; and, (4) given an emphasis on Climate Change Detection or even the time scales of seasonal to decadal prediction, selected model predictions of such indices could be usefully displayed side by side with the observed counterparts. Elisabeth Kent led a discussion on surface marine datasets and indices. She indicated that while the inhomogeneity of marine meteorological data is a recognized problem, in situ data products are well advanced in the development of uncertainty estimates. There are still several questions to be addressed as how one can extend the range of marine meteorological indices and to what extent they can be calculated similarly to indices over land. It was agreed that the ET JCOMM representatives would consult extensively with other JCOMM experts and develop a plan to address these issues. Other contributions to the discussion relating to marine and oceanic indices were made by Matthew Palmer, who presented Hadley Centre's subsurface ocean analyses, and Nico Caltabiano, who discussed OOPC's State of the Ocean Climate report, a compilation of ocean climate indices which have been

calculated using observational analyses.

Several institutional and organisational partners to the development of the ET plans have been identified. The Asia-Pacific Network (APN) for Global Change Research and the European Climate Assessment & Dataset Project (ECA&D) are two of them. APN has given strong emphasis in capacity building initiatives in the region, and plans to further develop these activities in collaboration with the ET. ECA&D has participants from 42 countries throughout Europe and the Mediterranean. The ECA&D website presents indices for monitoring and analysing changes in climate extremes, as well as the daily datasets needed to calculate these indices. The ET will certainly benefit from the expertise developed by the project in its plans to further use daily data to calculate indices. The final part of the meeting was used for discussion on the further development of the R-based indices software (Xuebin Zhang),

which was used in the workshops organised previously, and new methods, algorithms and software to be used for Climate Data Homogenization (Xiaolan Wang). These discussions were very welcome in the production of the ET workplan. The workplan contains new ideas for future workshops, which will update the earlier results and serve as inspiration for continued data rescue and digitization. The ET discussed the possibility to follow some of the thematic APN workshops, which have dealt with metadata and data management. It has already received requests to have workshops that focus on data homogeneity. Final decisions on themes and venues have yet to be decided based on funding opportunities. The workplan and a full meeting report will be available soon. The panel would also like to thank Environment Canada, CCI, WCRP and USCLIVAR for the support provided for the realisation of this meeting.

### Report of the second session of the Global Synthesis and Observations Panel

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With sunny days and the beautiful views of La Jolla beaches, the Global Synthesis and Observations Panel (GSOP) had its second session at the Scripps Institution of Oceanography on 8-9 December 2006. The meeting had a very good attendance, with panel members, several invited participants, as well as representatives from funding agencies. Panel co-chair Dean Roemmich opened the meeting and charged the panel to focus the discussions on how to demonstrate the value of the existing observing system to society. With levels of funding not rising and with an evolving observing system, it is key to identify which pieces of the observing system will continue to be developed. GSOP is not the only group concerned with the present status of the observing system, but it has a strong voice for needs of climate research since it works towards achieving CLIVAR goals. The meeting was structured in four parts: (1) reports of recent meetings relevant to GSOP, (2) science talks related to global CLIVAR science questions, (3) a review of CLIVAR datasets and data centres, and (4) reports on the status of the observing system on the ocean basins.

Detlef Stammer, GSOP co-chair, presented the outcomes of the 14th session of the CLIVAR Scientific Steering Group, held in Buenos Aires, April 2006, and also the structure of the CLIVAR Road Map. Specifically for GSOP, it seems that one of the key aspects would be helping with the availability of long-term, good quality climate datasets. However, this is a certainly a big task, which might require extra funding to be successful. Therefore, it should be focused first of all on identifying the major gaps in the available datasets for CLIVAR synthesis needs. Detlef Stammer also reported on the second meeting of the WCRP Observation and Assimilation Panel (WOAP). Previously to that meeting, a matrix on data management with information on data policy, metadata, web sites was prepared by T. Koike, with input from GSOP on CLIVAR's data management. This has highlighted the issue on general data management within WCRP. All existing efforts were developed independently, however there is a perception that it needs to be homogenized to ensure synergies. A WCRP task group on data management is being set up by WOAP, with one representative from each of WCRP projects. It will review the status and management of observational data and model output archives, including web sites within WCRP and make recommendations for WCRP-wide overarching structure, site contents and data policy. GSOP, as the panel responsible for such issues within CLIVAR, will nominate CLIVAR's representative

to this task force. Another issue discussed at that meeting was on the reprocessing of global datasets to produce high quality reference datasets. As part of the Global Synthesis Evaluation Framework activity led by GSOP (in association with GODAE), CLIVAR is focussed around the concept and goal of "ocean reanalysis" products that synthesize all available ocean satellite and in situ observations by merging them with ocean models using assimilation techniques. Ocean reference datasets and their error fields are required as input for the synthesis efforts, but also to help evaluate the skill, usefulness and limitations of various synthesis and modeling approaches.

Albert Fischer, Ocean Observations Panel for Climate (OOPC)'s Technical Officer, reported on the OOPC's Eleventh Session, held in Tokyo in May 2006. OOPC is planning several international workshops in some areas where there is scope for expert meetings. One of the identified areas is a workshop on ocean sensors, with focus on emerging technologies for autonomous biogeochemical and ecosystems monitoring. Also, a review of the strategy for XBT observations (frequently-repeated and high-density sections) might be necessary in light of Argo. The outcomes of the WCRP/COPES Sea Level Workshop, held in Paris, June 2006, was shown by Stan Wilson, co-chair of the workshop's steering committee. He showed that results presented at the workshop indicate that since 1992, sea level is raising at a rate of 3 mm/yr based on tide gauges and satellite altimeters, compared to a rate of 2 mm/yr over the previous century and based on tide gauges alone. There are still some uncertainties and the workshop participants have made strong recommendations for the completion of a sustained, systematic observing system, for sea level studies.

Masao Fukasawa, co-chair of the organising committee for the International Repeat Hydrography Workshop, held in Japan, November 2005, presented the recommendations made by the participants. One of the objectives of the workshop was to review the post-WOCE global ship-based hydrography activities. The workshop participants felt that the Repeat Hydrography Program network needs to be sustainable. Therefore, they identified the need to establish a International Repeat Hydrography and Carbon (IRHC) Advisory Group, which would be co-sponsored by the International Ocean Carbon Coordination Project (IOCCP), CLIVAR-GSOP, and SOLAS/IMBER Joint Carbon Coordination Group. Names have been identified to take part in this advisory group and the