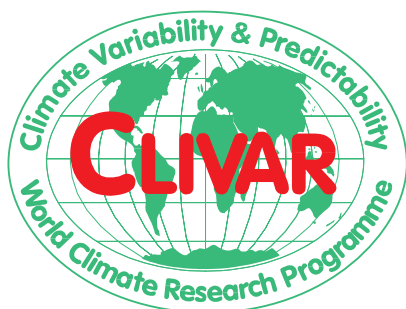


WCRP REPORT

World Climate Research Programme



Project Report

14th Session of the CLIVAR Working Group on Seasonal to Interannual Prediction

12-14 September 2011 Trieste, Italy

December 2011

ICPO Publication Series No. 170
WCRP Informal Report No: 34/2011

CLIVAR is a component of the World Climate Research Programme (WCRP). WCRP is sponsored by the World Meteorological Organisation, the International Council for Science and the Intergovernmental Oceanographic Commission of UNESCO. The scientific planning and development of CLIVAR is under the guidance of the JSC Scientific Steering Group for CLIVAR assisted by the CLIVAR International Project Office. The Joint Scientific Committee (JSC) is the main body of WMO-ICSU-IOC formulating overall WCRP scientific concepts.

Bibliographic Citation

INTERNATIONAL CLIVAR PROJECT OFFICE, 2010:
Variability of the American Monsoon Panel. International CLIVAR
Publication Series No.170 (not peer reviewed).

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Action items from WGSIP 14

1. Recommend to WCRP as a Grand Challenge: Monthly to decadal predictions, (A. Scaife, B. Kirtman and A. Pirani)
2. Correct WGSIP page of CLIVAR website to access CIMA server (A. Pirani)
3. Publicity and workshop planning for CHFP at next meeting and assess/communicate to wider community by January 2012 (A. Scaife, B. Kirtman, All)
4. Include links to observations and basic figures showing hindcasts for display on CHFP web site (C. Saulo, F. Doblas-Reyes)
5. Provide protocols for soil moisture data for CHFP (S. Seneviratne, H. Douville)
6. Eliminate distinction between CHFP and SHFP sets on CIMA server (C. Saulo, A. Scaife, F. Doblas-Reyes)
7. Contact USNMME groups for hindcasts to submit to CIMA server (B. Kirtman, D. DeWitt)
8. Contact WMO GPCs to submit HINDCASTS to CIMA server (A. Kumar, F. Doblas-Reyes for script)
9. Work with CIMA to assess ability to adapt to CMIP5 CMOR protocol (C. Saulo, F. Doblas-Reyes)
10. Change WCRP decadal prediction web site to indicate WGSIP role. (G. Boer, A. Pirani)
11. WGSIP recommends for submission to CMIP5 of decadal prediction raw fields plus anomalies for surface variables. (G. Boer)
12. WGSIP to endorse KMA offer to serve as lead center for monthly forecast dissemination and recommends members to submit monthly forecasts when requested (A. Kumar, B. Kirtman, T. Yasuda, D. DeWitt, G. Boer, A. Scaife, O. Alves)
13. CIMA link from CHFP and WGSIP to WMO Lead center for seasonal forecast data (C. Saulo, A. Pirani)
14. Investigate which APCC centres' hindcast data may be included in the CHFP database (B. Kirtman)
15. Develop a standard acknowledgement for the CHFP database to be displayed on the CHFP website (S. Behera)
16. WGSIP to promote dynamical forecast information at RCOF meetings (D. DeWitt, W. Landman, A. Morse)

1. Introduction

The 14th Session of the CLIVAR Working Group on Seasonal to Interannual Prediction (WGSIP) was held on 12-14 September 2011, in Trieste, Italy hosted by the Abdus Salam International Center for Theoretical Physics (ICTP). The meeting took place simultaneously with the ICTP Summer School on Climate Impacts Modelling for Developing Countries: Water, Agriculture and Health and the 1st Session of Quantifying Weather and Climate Impacts on Health in Developing Countries (QWECI). Talks on seasonal to decadal predictions were given to the students of the summer school during the morning of 14 September. WGSIP and QWECI held a joint meeting on 14 September on Sectorial Seasonal to Decadal Prediction in Africa. Summer school participants also attended this session. Presentations are available on:

<http://www.clivar.org/organization/wgsip/wgsip14/wgsip14.php>

During introductory presentations results from JSC-32 and SSG-18 were discussed. Specific Grand Challenges were not defined at either meeting. WGSIP participants agreed that developing the capability to predict climate on subseasonal to decadal timescales was of sufficient importance to society to serve as a Grand Challenge.

ACTION Recommend to WCRP as a Grand Challenge: Monthly To Decadal Prediction (A. Scaife, B. Kirtman and A. Pirani)

The main topics for discussion following introductory remarks were: Climate-system Historical Forecast Project (CHFP); Decadal Prediction; Review of Regional Activities; Ocean Observing System; Links to TIGGE, Extended Range Forecasts and Verification and Applications and Climate Services; and WGSIP Business. The major issues resulting from the participant presentations that were discussed during these sessions and the resulting action items are now summarized. See Appendix I for the list of meeting participants and Appendix II for the agenda.

2. Climate-system Historical Forecast Project (CHFP)

The CHFP is an international, multi-model hindcast experiment incorporating all physical elements of the climate system designed to test the hypothesis that maximum predictability has not been reached yet by seasonal forecast systems. The objectives of the CHFP are directed at understanding and improving real time seasonal prediction capability and are given on the CHFP web site,

www.clivar.org/organization/wgsip/chfp/chfp.php.

CHFP progress hinges on making the model data generated by various organizations for the program available to the widest community in an easily accessible format. The Centro de Investigaciones del Mar y la Atmosfera (CIMA), Argentina provides the server for CHFP data. Model results from CHFP runs have already been submitted to CIMA. Initial spin-up problems have been identified and corrected.

ACTION Correct WGSIP page of CLIVAR website to access CIMA Server (problem identified and corrected).

CHFP effectiveness will be enhanced by maximum submission of appropriate data to CIMA. This objective can be achieved by widespread advertising of CHFP, acknowledgment of CHFP data when used and contacts with groups running hindcasts encouraging submission of results to CIMA.

- ACTION Publicity and workshop planning for CHFP at next meeting and assess/communicate to wider community by January 2012 (A. Scaife, B. Kirtman, All).
- ACTION Change WCRP decadal prediction web site to indicate WGSIP role (G. Boer, A. Pirani).
- ACTION Develop a standard acknowledgment for the CHFP Database to be displayed on the CHFP website (S Behera).
- ACTION WGSIP to promote dynamical forecast information at RCOF meetings (D. DeWitt, W. Landman, A. Morse)
- ACTION Contact USANMME groups for hindcasts to submit to CIMA server (C. Saulo, F. Doblas-Reyes).
- ACTION Investigate which APCC center's hindcast data may be included in the CHFP database (B. Kirtman).
- ACTION Contact WMO GPCs to submit HINDCASTS to CIMA Sever (C. Saulo, F. Doblas-Reyes for scripts)

CIMA has developed an effective server for CHFP data. However the value of establishing links to other data, adding additional data and revisiting established formats and protocols were recognized as methods to improve the utility of the CIMA server to users.

- ACTION Include links to observations and basic figures showing hindcasts for display on CHHFP web site (C. Saulo, F. Doblas-Reyes).
- ACTION Provide protocols for soil moisture data for CHFP (S. Seneviratne, H. Douville).
- ACTION Eliminate distinction between CHFP and SHFP sets on CIMA server (C. Saulo, A. Scaife, F. Doblas-Reyes).
- ACTION Work with CIMA to assess ability to adapt to CMIP5 CMOR Proposal (C. Saulo, F. Doblas-Reyes).

Finally, with respect to CHFP, the value of having access to forecasts as well as hindcasts to CHFP scientists in developing seasonal to decadal predictions was acknowledged and resulted in the following action items.

- ACTION WGSIP recommends for submission to CMIP5 of decadal prediction raw fields plus anomalies for surface variables (G. Boer).
- ACTION WGSIP to endorse KMA offer to serve as lead center for monthly forecast dissemination and recommends members to submit monthly forecasts when requested (A. Kumar, B. Kirtman, T. Yasuda, D. DeWitt, G. Boer, A. Scaife, O. Alves).
- ACTION CIMA link from CHFP and WGSIP to WMO Lead Center for seasonal forecast data (C. Saulo, A. Scaife).

3. CHFP Sub-Projects

WGSIP are now running three sub projects to the CHFP to address each of the target science areas identified in the 2007 Meeting of the Task Force on Seasonal Prediction in Barcelona: sea-ice, stratosphere and land surface. We heard updates on these activities and associated science results from international experts on each. Early results from a WGSIP coordinated experiment on the effects of interannual variability of Arctic Sea Ice were discussed (A. Scaife, on behalf of D. Peterson) as well as a scientific summary of current knowledge on Arctic sea ice effects (C. Deser). We also had an update on the stratosphere resolving models that have submitted data to CHFP database at CIMA (A. Scaife) and a scientific summary of current knowledge of the effects of soil moisture (S. Seneviratne) with special attention to the GLACE experiments with which WGSIP is associated.

4. Decadal Prediction

SSG-18 addressed the issue of including decadal predictability in the WGSIP mandate. Action item 12 stated “Explore possibility of including decadal variability in WGSIP’s scope as one of the activities of the Decadal Predictability Task Force”. As indicated by the title of this section, the talks listed in the agenda, Appendix 2, and listing decadal predictions in action item, 1 WGSIP has begun to address decadal prediction issues. Meeting participants agreed that this WGSIP activity should have more visibility and recommended that the project involvement in decadal problems be noted on the WCRP web page.

ACTION Recommend to WCRP as a Grand Challenge: Monthly
 To Decadal Prediction (A. Scaife, B. Kirtman and A. Pirani)

ACTION Change WCRP decadal prediction web site to indicate
 WGSIP role (G. Boer, A. Pirani).

The issue of what decadal variables to save and make accessible for CMIP5 was discussed. It was decided to provide only 4 variables with monthly resolution; near surface air temperature, surface temperature, precipitation, and sea level pressure. The difficulty of storing 3- and 6-hourly data was recognized. A general consensus was reached indicating that those investigators desiring such resolution are to be advised to contact the modelling center. There was also a consensus that observations should not be stored. This will be fed back to the Decadal Climate Prediction Panel.

ACTION WGSIP recommends for submission to CMIP5, decadal
 prediction raw fields plus anomalies for surface variables

At WGSIP13, a request for exchange of decadal forecasts was made. Global annual mean temperature was the variable selected for exchange. A. Scaife and D. Smith (UKMO) have established a site for storing such data and have contacted most of the groups doing decadal predictions. Five modelling centers have already provided simulations initialized in 2010 and more plan to contribute. WGSIP participants agreed that statistical models should be included in this data set.

The science of decadal variability was also discussed. A. Scaife presented results that indicate that regional decadal variability is more strongly affected by variability in solar irradiance than by the total amount of solar input. This hinges on recent satellite data but offers the exciting possibility of seasonal to decadal predictions of regional winter climate in the extratropics. R. Farneti described the effects of energy transfer in coupled systems on decadal variability. His results support the Bjerknes compensation mechanism. That is, if radiation at the top of the atmosphere remains the same and ocean energy transport changes, atmospheric energy transport must experience compensating changes.

4. Reviews of Regional Activities

Reviews of regional SI activities were given. Activities at the South African Weather Service, the Japanese Meteorological Agency, the Indian Ocean Forecast Center and the Indian Institute of Tropical Meteorology were given. Emphasis of several of these groups was on the ENSO effects on regional climate. However, demonstrating the difficulty in forecasting at time scales greater than weather were the findings that: Atlantic SST was correlated with convection in the North Pacific and Indian Ocean; potential teleconnections exist between the tropical and subpolar Atlantic; that multi-model ensemble forecasts in South African seasonal forecasts only are successful during ENSO events and not during neutral conditions; and monsoons are difficult to simulate..

5. Ocean Observing System

Comparing operational systems demonstrates the clear relation between ENSO and the Indian Ocean Dipole (IOD). If ENSO could be predicted with more accuracy, improvements in the forecasts of the IOD would be expected. However, although a new assimilation scheme improved ENSO forecasts, IOD forecasts were not improved. The importance of having accurate and extensive salinity observations was stressed as salinity errors project onto temperature fields. Similarly obtaining a balance between SST and surface fluxes was needed to provide confidence in reanalyses. Although expensive, the use of OSEs was viewed as a valuable tool to provide measures of the impact of observations on predictions.

6. Links to TIGGE Extended Range Forecasts and Verification

A summary of a meeting in Exeter, UK directed at reviewing capabilities in subseasonal to seasonal prediction was given. The meeting resulted in a list of recommendations and generators of monthly forecasts. The question of how to organize WGSIP activities with respect to dissemination of monthly forecasts resulted in the following action item.

ACTION WGSIP to endorse KMA offer to serve as lead center for monthly forecast dissemination and recommends members to submit monthly forecasts when requested.

The problem for monthly/seasonal prediction biases being as large as the forecast signal precludes the use of observationally derived climatologies to compute anomalies was raised. This discussion was followed by a presentation on how to assess the quality of long-range forecasts. The Joint Working Group on Forecast Verification Research of the WWRP and WGNE is addressing this issue. The next meeting of the WG will be attended by O. Alves to represent WGSIP issues including SI forecasting and the CHFP.

7. Applications and Climate Services

As a precursor to the joint WGSIP-QWECI session, a presentation on QWECI was given. The use of DEMETER was described with an emphasis on how to bias correct DEMETER results. DEMETER results are slightly better than ERA-40 with respect to temperature and precipitation but probably not statistically significant better. A problem with forecasting diseases such as malaria is the absence of biological persistence.

The absence at present of interactions between WGSIP and RCOFs was raised. Willem Landman gave an example of how loss of confidence in numerical model interannual forecasts can occur as a result of the effect of ENSO on droughts in individual cases. He

argued however that the RCOF consensus forecast could have been greatly improved for South Africa at least by paying more attention to the dynamical forecast output. This was strongly endorsed by WGSIP, which encouraged all the members to play a stronger role at RCOF meetings. Improved confidence could also be realized by more frequent seasonal forecasts and performing shorter than seasonal predictions.

8. WGSIP Business.

At the Business meeting, the location and time of WGSIP15 meeting were given as Hamburg, Germany, September 2012. The meeting will be for 3 days and a joint session will be convened with WGCM. One last piece of business addressed was a letter received from a NOAA Program Manager posing some questions on the status of SI research. A response to these questions will be drafted.

9. ITCP Summer School and Joint WGSIP-QWECI Meeting

The remainder of the last day of the meeting was devoted to a joint Summer School, QWECI, WGSIP session. The presentations given were directed at providing information on:

- State of the Art of SI forecasting (A. Scaife), for Africa (D. DeWitt) and for South Africa (W. Landman);
- An introduction to decadal climate forecasting (F. Doblas Reyes and J. Garcia-Serrano);
- Climate change and health (D. Taylor);
- Model biases (A. Tompkins and L. Feudale) and new modelling systems (F. Molteni);
- and Regional downscaling for QWECI regions of interest (G. Terea Diro and A. Tompkins).

The talks satisfied two objectives of having the joint workshop. They provided the students with an excellent summary of the status of seasonal to decadal forecasting. In particular, they highlighted the many problems remaining to be solved, problems that students and early career scientists could consider addressing. Similarly, they also provided WGSIP and QWECI investigators with status reports on their co-participants research and in addition, potential areas of collaborative research.

APPENDIX I LIST OF PARTICIPANTS

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APPENDIX II AGENDA

14th Session of the Working Group on Seasonal to Interannual Prediction

Agenda

DAY 1 - Monday 12 September

Start of WGSIP Session

Action Items and Recommendations from 12th Session of WGSIP 2009 and key topics of discussion for this meeting - B. Kirtman, A. Scaife
WCRP/CLIVAR Reports - B. Molinari
WGSIP contribution to AR5 - B. Kirtman, A. Scaife

Climate-system Historical Forecast Project (CHFP)

Overview and status of results - B. Kirtman
Archive at CIMA - C. Saulo
Evolution of CHFP data archival and distribution - F. Doblas-Reyes
Cryosphere- HFP - D. Peterson (A. Scaife)
Seasonal atmospheric response to Arctic sea ice loss: mechanisms and outstanding issues - C. Deser
Stratospheric-HFP - A. Scaife
GLACE-2 and soil moisture memory characteristics - S. Seneviratne
Nudging as a diagnostic tool for a better understanding of seasonal variability and predictability - H. Douville

Decadal Prediction

CMIP5 Decadal Prediction - G. Boer
Real-time Decadal Forecast Exchange - A. Scaife
USCLIVAR Decadal Predictability Working Group (DPWG) Report - A. Kumar
Role of solar variability in surface climate prediction - Katja Matthes, A. Scaife
Energy transport in the coupled system: Variability and compensation at different timescales - R. Farneti

DAY 2 - Tuesday 13 September

Review of Regional Activities (10 minutes)

Multi-model ensemble forecasts in S. Africa - W. Landman
Seasonal prediction at MRI - T. Yasuda
Indian Ocean Prediction - S. Behera
Update from the Indian Institute of Tropical Meteorology - S. Rao
Others
Monsoon teleconnections between Africa and India - F. Kucharski

Ocean Observing System

Ocean observations, data assimilation systems, impact on seasonal and decadal prediction - O. Alves

Variability of heat transport in the North Pacific using the latest ECMWF ocean re-analysis made with the new 3D-var system (NEMOVAR) (and interactions with the CLIVAR Pacific Implementation Panel) - F. Molteni

Links to TIGGE, Extended Range Forecasts and Verification

Development of operational 1-90 prediction capability and interaction with TIGGE
Monthly Prediction and Verification - A. Kumar
Global Producing Centers (GPCs) and Extended Forecasts - A. Kumar
Long Range Forecast Verification - F. Doblas-Reyes
The Climate Modelling User Group (CMUG) of ESA's Climate Change Initiative - P. van der Linden

Applications and Climate Services

Status report on use of and need for research data in seasonal applications - A. Morse
WGSIP Interaction with the WMO Regional Climate Outlook Fora (RCOFs) - W. Landman
Consideration of Large-scale irrigation in regional hydroclimate models - S. Sorooshian

Reception hosted by ICTP joint with QWECI and ICTP Summer School lecturers at the San Giusto Castle. A bus will take people to and from the hotels.

DAY 3 - Wednesday 14 September

WGSIP Business

WGSIP contribution to AR5
WCRP and CLIVAR evolution
Action Items
Membership
Next meeting

ICTP Summer School on Climate impacts modelling for developing countries: Water, Agriculture and Health - WGSIP Invited Talks

State of the art of seasonal to decadal Prediction - A. Scaife
IRI Sectoral Activities and Associated Climate Research in Africa - D. DeWitt
Operational Seasonal Forecast System Development in South Africa - W. Landman

Joint WGSIP-QWECI meeting: Sectorial Seasonal to Decadal Prediction in Africa

Decadal climate forecasting: an introduction and an illustration for West Africa - F. Doblas Reyes and J. García-Serrano
Climate change and health in the developing world - D. Taylor
Systematic rainfall biases in ECMWF system 3 seasonal forecasting system over West Africa - A. Tompkins and L. Feudale
The NEW ECMWF system 4 seasonal forecasting system - F. Molteni
REGCM downscaled seasonal forecasts: A case study from Eastern Africa and preliminary results for QWeCI target regions - G. Tefera Diro and A. Tompkins