"Sub-seasonal to Seasonal Prediction"

PREPARATION OF AN IMPLEMENTATION PLAN

1. Background

Forecasting the day-to-day weather is primarily an atmospheric initial condition problem, although there can be an influence from ocean and land conditions. Forecasting at the seasonal to multi-annual range depends strongly on the slow-evolving component of the earth system such as the sea surface temperature. In between these two time scales is sub-seasonal variability. Forecasting for this time range has so far received much less attention than medium-range and seasonal prediction. It is considered a difficult time range since it is sufficiently long that much of the memory of the atmospheric initial conditions is lost and too short for the variability of the ocean to have a strong influence. However, recent research has indicated important potential sources of predictability for this time range such as from the Madden Julian Oscillation, stratospheric initial conditions, land/ice/snow initial conditions, sea surface temperatures… Recent improvements in computing resources and model development may help to get a better representation of these sources of sub-seasonal predictability. An example of such improvement is the substantial progress in the representation of the Madden Julian Oscillation in some models. From the end-user perspective, the sub-seasonal time scale is a very important one, because it lies between the well-established and routine use of weather forecasts in diverse areas on the one hand, and the developing use of seasonal forecasts on the other. Many management decisions, such as in agriculture, fall into the intervening sub-monthly scale, so the development of more seamless weather-to-climate forecasts promises to be of great societal value, and to augment the regions/situations where there is societally-useful forecast information.

Based on the potential for improved forecast skill at the sub-seasonal to seasonal time range, the WMO Commission of Atmospheric Sciences (CAS) requested at its 15th session (November 2009) that the Joint Scientific Committees of the World Weather Research Programme (WWRP) and the World Climate Research Programme (WCRP) and also the THORPEX international Core Steering Committee (ICSC) set up an appropriate collaborative structure to carry out an international research initiative on this time range and recommended that this initiative be coordinated with future developments in the WMO Global Framework for Climate Services.This sub-seasonal effort should be a significant contribution of the WCRP/WWRP to the Global Framework for Climate Services. The initial response to this request was to convene a joint WWRP/THORPEX/WCRP Workshop which was held at the UK Met Office (1 to 3 December 2010). The Report from the Workshop on "Sub-seasonal to Seasonal Prediction" (Met Office, Exeter 1 to 3 December 2010) has been published to the web(http://www.wmo.int/pages/prog/arep/wwrp/new/documents/recommendations_final.pdf) http://www.wcrp-climate.org/documents/CAPABILITIES-IN-SUB-SEASONAL-TO-SEASONAL PREDICTION-FINAL.pdf

The major Workshop recommendation was that a Panel/Project for Sub-seasonal prediction research should be established. Panel members should include representatives from WWRP-THORPEX, WCRP, CBS and CCl and their relevant programme bodies. The first task for the Panel should be the preparation of an Implementation Plan which is consistent with the contents of the Workshop Report and Recommendations.

As recommended by Workshop, the Implementation Plan should give high priority to:

- Sponsorship of a few international research activities
- The establishment of collaboration and co-ordination between operational centres undertaking sub-seasonal prediction to:
    - ensure, where possible, consistency between operational approaches to enable the production of data bases of operational sub-seasonal predictions to support the

application of standard verification procedures and a wide-ranging programme of research
- Facilitating the wide-spread research use of the data collected for the CHFP (and its associate projects), TIGGE and YOTC for research
- The establishment of a series of regular Workshops on sub-seasonal prediction

In a separate plan, or as part of the Implementation Plan, the WWRP/SERA Working Group and the WCRP should outline plans for a number of regional projects.

2. Preparation of an Implementation Plan

2.1 Challenges

THORPEX has been successful in establishing a data base of ensembles of operational medium-range global predictions (TIGGE) up to day 15 from which methods of post-processing model forecasts to improve prediction skill have been tested. For seasonal forecasting a similar initiative is in progress (CHFP). For the current initiative we envisage establishing a similar database but for the sub-seasonal to seasonal time range (up to 60 days). This could consist of collecting the sub-seasonal to seasonal forecasts produced by some operational centers and encouraging others to participate. This will be a challenging task since there is no consensus yet on how to produce sub-seasonal to seasonal forecasts (start dates, length of the forecasts, averaging periods, frequency of the forecasts,..). In addition, unlike medium-range forecasting for which model error is usually not dominant and a reforecast set for model bias and skill evaluation is not generally performed, this is not the case for sub-seasonal to seasonal prediction. At this time range, the bias is too large to be ignored, and a substantial set of reforecasts is necessary for each model. Therefore this new effort will have to include also collecting hindcast sets, the configuration of which can vary from one producer to another. Comparing, verifying and testing multi-model combinations from these forecasts, as well as the handling of such a massive dataset will therefore be challenging. From the end-user perspective, there will be considerable challenges to make the products of the initiative truly actionable for a wide range of decision makers, and inter-disciplinary researchers engaged in developing risk-management strategies and tools for establishing climate services. Extensive multi-model hindcast sets will also be needed to build statistical models, such as are often used to tailor climate forecasts for use in sectoral contexts on the seasonal scale. Open access to forecast data (i.e. not just graphical products) will also be needed to enable such statistical models to be actually used. In addition, user-friendly data bases are an important requirement for broad community uptake.

2.2 Establishment of a Planning Group

The Report from the Workshop was reviewed and was well received by both the WWRP/JSC and the WCRP/JSC and, in particular, the WCRP/JSC recommended that the work to prepare an Implementation Plan should be co-ordinated with “CLIVAR”.

It is therefore proposed that a small Planning Group, supported by a WMO consultant, is established to prepare an Implementation Plan for a “Sub-seasonal Prediction Research Project”. The members of the Planning Group should be drawn from the WWRP-THORPEX, WCRP, CBS and CCl communities. However, the WWRP-THORPEX and WCRP communities should take the lead in this planning process.

It would also be beneficial if those operational centres who have expressed interest in collaborating and co-ordinating their efforts on sub-seasonal prediction are asked to draw up a plan for this activity and to submit it to the Planning Group for inclusion in the overall plan.

Appointment of the co-Chairs of the Planning Group

Frédéric Vitart (ECMWF) and Andy Robertson (IRI) have agreed to co-Chair the Planning Group. Other potential members for the Panel, representing the relevant communities (weather and climate modelling community, SERA, Verification, CLIVAR, CBS, CCl, etc), are listed below.

Composition of the Planning group

With the approval of the Chairs of the WWRP/JSC and the WCRP/JSC, in addition to Frédéric Vitart (ECMWF) and Andrew Robertson (IRI), the following people are proposed to be members of the planning group:

Arun Kumar (NCEP)
Harry Hendon (CAWCR)
Yuhei Takaya (JMA)
Hai Lin (EC)
Alberto Arribas (UKMO)
June-Yi Lee (U. Hawaii)
Duane Waliser (JPL NASA)
Ben Kirtman (UM RSMAS)
Hyun-Kyung Kim (KMA)

Liaison group:

Carolina Vera (WCRP JSC Liaison)
Richard Graham (UKMO, CBS)
Jean-Pierre Ceron (Météo-France, CCL)
Barbara Brown (SERA/Verification)
Steve Woolnough (WGNE/GASS)

The role of the liaison group will be to ensure a good interaction between the planning group and other working groups.

WMO Secretariat support

The co-Chairs and the Planning Group will need secretariat support and Dr. David Anderson will provide this support.

Timetable

A first draft of this plan should be available for the next meetings of the WWRP/JSC (end March 2012) and the WCRP/JSC (June 2012). Whilst much of the work to produce the plan can be carried out by correspondence a “kick-off” meeting and one other meeting of the group is recommended. The first meeting is scheduled for 2-3 December 2011.