

## Sub-project activities (1-2 pages)

### Research to Operations (R2O) and S2S forecast and verification products development

Last updated: 19 March 2020

#### 1. Scientific and Operational Objectives

- Pursue research for testing and developing methodologies for calibration, multi-model combination, verification and generation of forecast products.
- Coordinate with the relevant WMO technical commissions to define the standards and protocols for operational implementation and exchange of S2S forecasts such that by the end of the Phase II of the S2S, the infrastructure related to the data exchange to support research can be transitioned into the operational domain. Such coordination will be done through the Inter-Programme Expert Team on Operational Predictions from Sub-seasonal to Longer time Scales (IPET-OPSLs). The goal will be to finalize the transition by the end of Phase II of S2S so that newly designated WMO Lead Centre(s) for Sub-Seasonal Forecast Multi-Model Ensemble (LCs-SSFMME) can obtain the S2S forecasts directly from newly designated WMO Global Producing Centers for Sub-seasonal Forecasts (GPCs-SSF) and develop the capability for delivering S2S forecasts and reforecasts, independently of the S2S research database developed in Phase I of the S2S project. This data exchange is envisioned to follow the paradigm of what is currently done for the seasonal forecast exchange among Global Producing Centers for Long-range Forecasts (GPCs-LRF).

#### 2. Proposed Activities for 2019-2023 (S2S Phase 2)

- Promote the development and intercomparison of different methodologies for forecast calibration, multi-model combination, verification, and forecast formats (e.g. probability of threshold exceedance). This will build on the work of the current (Phase I) S2S Verification and Products sub-project.
- Develop a set of recommendations for operational centres to homogenize their real time and re-forecast set-ups to facilitate S2S forecast calibration, multi-model combination and verification. Great progress has been made in S2S Phase I to harmonize the S2S real-time forecasts issued by the 11 S2S partners. All of them issue now a real-time forecast every Thursday. However, there is still no convergence between the partners on how to produce re-forecasts. The re-forecasts in the S2S database are following very different protocols, which makes model intercomparison and multi-model combination very challenging. A key outcome of this activity will be to propose a protocol for S2S re-forecasts. The NOAA SubX project which is already using a common re-forecast set-up, will be an important resource to help define this protocol.

- Work with IPET-OPSLs to: (a) develop standards to define criteria for the designation of GPCs for Sub-seasonal Forecasts (GPCs-SSF) and Lead Center(s) for Sub-seasonal Forecast Multi-Model Ensemble (LCs-SSFMME), including forecasts and verification products; and (b) establish standards for data exchange and delivery of sub-seasonal hindcasts and real-time forecasts to the WMO LCs-SSFMME in support of the objectives of the Global Framework for Climate Services (GFSC), Regional Climate Centres (RCCs), National Meteorological and Hydrological Services (NMHSs) and Severe Weather Forecast Demonstration Projects (SWFDPs). The deliverables will be the formalization of the designation criteria for GPCs-SSF and LCs-SSFMME and data exchange standards in the WMO (Global Data Processing and Forecasting System) GDPFS manual.

### 3. Proposed Activities for 2020 (including timeline and deliverables)

- Develop designation criteria for Global Producing Centres for Subseasonal Forecasts (GPCs-SSF) and Lead Center(s) for Sub-seasonal Forecast Multi-Model Ensemble (LCs-SSFMME): February 2020
- Recommend verification scores for sub-seasonal forecasts to be computed and disseminated by GPCs-SSF and LCs-SSFMME: February 2020
- Disseminate via a wiki page the work performed by the S2S research community on calibration, multi-model combination, verification and forecast products generation, including software tools, web portals and publications: December 2020

The establishment of operational sub-seasonal GPCs (and associated LCs) will be an important legacy of the S2S project and the R2O, verification and products sub-project is supposed to contribute to this effort.

### 4. Resources

So far no external resources have been granted to support the activities of this sub-project.

### 5. Linkages with WCRP/WWRP WGs & projects

On the operational side, this sub-project has linkages with Inter-Programme Expert Team on Operational Predictions from Sub-seasonal to Longer-Time Scale (IPET-OPSLs), a WMO joint team of the Commission for Basic Systems (CBS) and the Commission for Climatology (CCI).

On the research side this sub-project has linkages with the Joint Working Group on Forecast Verification Research (JWGFVR), a WMO joint working group of the Working Group on Numerical Experimentation (WGNE) and the World Weather Research Programme (WWRP).