

Workshop of World Meteorological Centres

Beijing, China, 26-29 March 2019

Questionnaire for World Meteorological Centres

(as of 27 February 2019)

Note: The following seven questions will be used to orient participants' discussion on:

- *Agenda III. WMCs in the context of WMO Constituent Bodies Reform, and*
- *Agenda IV. Overall coordination mechanism between WMCs and WMCs/RSMCs to support Members.*

Your answers will be distributed to all participants in advance.

I would deeply appreciate if you could send your feedback **before or on 15 March 2019**

Name of World Meteorological Centres: Met Office, United Kingdom

Agenda III

1. What areas your WMC wants to improve in near future and in the long-term by considering the functionality described in [WMO-No. 49](#)

Note: World Meteorological Centre (WMC). A centre of the GDPFS that has the primary purpose of issuing meteorological analyses and prognoses, including probabilistic information and long-range forecasts on a global scale. (WMO-NO. 49, Technical Regulations, Basic Documents No. 2, Volume I – General Meteorological Standards and Recommended Practices)

Met Office runs a comprehensive set of models and ensembles spanning all time ranges, with high resolution regional models covering the British Isles and a few other regions of the globe. All models are managed in a continuous improvement system with an approximately twice-yearly upgrade cycle.

Relocatable ensembles are occasionally run in real-time for severe tropical cyclones in a non-operational mode.

Model outputs are now being transferred to a cloud services provider offering the scope for wider distribution and access to WMO Members, subject to agreements on terms and conditions.

Met Office is currently developing a new post-processing system, named IMPROVER, which will blend multiple model and ensemble outputs in a probabilistic framework to give a single seamless forecast from nowcast to 2 weeks ahead. Output will be available on a 2km grid for the UK region and a 20km grid globally, and will be available through the Met Office's cloud-based distribution service from the second half of 2020.

IMPROVER software is open source and available for WMO Members to use for their own purposes.

2. What could be additional roles of your WMC to support the WMO Constituent Body Reform and Strategic Plan of WMO, especially Strategic Objectives 2.3

Note: Strategic Objective 2.3: Enable access and use of numerical analysis and prediction products at all temporal and spatial scales from the WMO seamless Global Data Processing and Forecast System

References:

- *Reform presentation - CBR-TF-sc,*
- *Constituent Bodies Reform - substructures and presidents and vice presidents,*
- *EC70 Strategic Plan*

Available at http://www.wmo.int/pages/prog/www/DPFS/Meetings/WMCs-Workshop_Beijing2019/Docplan.html

Use of cloud technology opens the possibility of much wider access to Met Office model outputs, including ensembles and the future IMPROVER post-processed data.

Agenda IV

3. Please provide the name of organizations that you are currently working with/worked/will work, identifying the nature of the work and your role and responsibilities.

Note: organizations can be UN agencies, NGOs, Regional entities such as RIMES and other GDPFS Centres

This could be huge. Should include:

- Unified model partnership under which we collaborate on development of the Unified Model system. Several other WMO Members also use the UM for their operational forecast production.
- Universities including through the Met Office Academic Partnership (4 UK universities).
- ECMWF
- WMO
- Several WMO Member NMHSs through WCSSP funded forecast development projects.
- SWFDP projects
- Joint RSMC operations with Meteo-France, also working with IAEA
- CAA/ICAO for aviation services and VAAC services (also with Icelandic Met Service)
- Australian Bureau of Meteorology on IMPROVER post-processing
- ...

4. In relation with question 1, what are the most difficult challenges you met and how you did overcome it, if you did.

Biggest challenge is probably managing the huge quantities of data which come out of a comprehensive global and regional NWP system including ensembles, making those data available to forecasters and users (including for example other WMO Members) in a timely fashion. It has been particularly difficult for forecaster workstation systems to keep up with the demands of increasing data volume and types. We have not fully overcome these issues, but the decoupling of data from model grids and their presentation instead on standards, and their presentation and distribution using cloud-

based technology, is aimed at addressing these issues. We are now working to exploit the data in the cloud.

5. Is there a good example of coordination mechanism between your WMC and other centres you want to share. Tell us why it is a good example of coordination mechanism.

Joint RSMC operation with Meteo-France for nuclear dispersion response, and wider coordination with all the emergency response dispersion RSMCs. Centres have a very well developed and practiced procedure for rapid coordinated response to emergencies and support for other RSMCs with model output, with regular exercises.

Support for the development of guidance in the East African SWFDP project from the Met Office Global Guidance Unit. This provided effective training and mentoring for guidance forecasters from Kenya and Tanzania which rapidly enabled them to take the lead in SWFDP guidance with the GGU stepping back to observer role.

6. As a WMC, do you have specific request to make to SIDS and LDCs to help improve your system?

Note: For instance, Ghana utilized cloud resources with Reading University for forecasting drought. They provided their observations which were assimilated in UKMO Land Surface Model to enhance quality of drought forecast.

More feedback, case studies and model forecast impact assessments is what we need coming back up the chain to help us improve what we do and support our business case for future improvements in our own computing systems and data sharing.

7. LDCs and SIDS are interested in not only chart-type products but also NWP output. To help them to develop applications (post-processing), how do you see your WMC addressing these needs?

Access to data with limited bandwidth and low capacity IT systems is a particular challenge for LDCs and SIDS to make use of frequently updated very large data volumes of NWP output. Making our data available in cloud systems gives the opportunity for LDC and SIDS centres to access the data at source using the scalable computing capacities of the cloud to run their own post-processing systems (also saving them the challenges of managing large and complex IT systems in-house.)