WMO Data Conference, 16-19 November 2020
Summary and key points

(Session Chairs and Rapporteurs)

The WMO Data Conference was convened with the broad aim to develop a common understanding across all relevant sectors of society of the roles, requirements and arrangements for international exchange of observations and other data for monitoring and prediction of the Earth System. The Conference built on the inclusive approach articulated in the Geneva Declaration (Cg-18, 2019), and aimed specifically to engage a broad community in the discussions around reviewing WMO's data policy. In the lead-up to the event, a series of well-attended workshops explored the four main Conference themes and brought forth important stakeholder perspectives. The Conference was organized into four sessions aligned with these themes, each consisting of a set of presentations followed by an open Q&A and panel discussion and complemented by an on-line poster session. *For a full list of presentations and posters, see program here*. The event was attended by over 1000 participants from the public and private sector, the research community and other stakeholders.

Opening segment

The Conference was opened by Prof. Gerhard Adrian, WMO President, and Prof. Petteri Taalas, WMO Secretary General, who reminded the audience that the global exchange of data for weather, climate and hydrological monitoring and prediction was among the main reasons for the establishment of the WMO and now, 70 years later, remains one of its fundamental tasks. Prof. John Zillman, former President of WMO, gave an overview of the history of data sharing in meteorology, from the early beginnings of our understanding of atmospheric dynamics, up to the adoption of Resolution 40 in 1995. He closed by endorsing the current development of a unified overarching WMO data policy. As background for the discussion, the WMO Secretariat then introduced the main elements of the new WMO data policy that is currently being developed.

Session 1: The changing landscape of weather, water and climate data

The session was chaired by Michel Jean, Canada, and was opened by Dr. Sue Barrell, Australia, who introduced the main messages from the seven preparatory Workshops leading up to the Data Conference. The subsequent presentations triggered a lively discussion, both in session and in the online chat forum of the virtual platform. Key points brought up during the discussion include:

- Strong support was expressed for the development of a unified WMO data policy that includes all Earth-system domains and disciplines;
- Data policy should enable; it is not an end in itself and must not be a barrier to collaboration;
- Clarity around roles and expectations for various sectors is important; this allows Members to plan, the research sector to engage, and the private sector to develop its business plans;
- Stakeholders from all sectors and from all parts of the global community depend on output from global models for the development and delivery of critical services; this can only work if data (both observations and model output) are exchanged globally;

- Technology will help define the possible solution space for the implementation of policy; as such technology can inform, but will not prescribe, policy decisions.

Session 2: Business models and data policy issues

The session was chaired by Dr. Kevin Petty, IBM, and Dr. Michael Staudinger, Austria, introduced the main messages extracted from the preparatory workshops. Key points made during the discussion in this session include:

- It is essential to maintain the principle of free and unrestricted sharing of data; there are significant risks to the collective global prediction and monitoring capabilities of all WMO Members if this principle is allowed to erode;
- Free and unrestricted exchange of data is an important policy goal, but challenges remain to be met before this can be universally implemented; WMO distinction between "essential" and "additional" data and the respective practices associated with them is therefore important;
- The lack of alignment across WMO Members of respective national policies for international exchange of Earth system data has the potential to limit our capabilities to monitor and predict our environment; outreach and advocacy from WMO's side regarding the benefits of free and unrestricted exchange of data is requested;
- Restrictive national practices for domestic exchange of Earth system data may also limit the implementation and hence the benefits of broader WMO initiatives such as WIGOS and GDPFS; guidance from WMO can play an important role also here;
- There is no single, unified private sector view on WMO data policy; some companies base their business on free and open access to data, others see this as potentially limiting their opportunities to market data; private sector is unanimous in requesting clarity from WMO;
- WMO is encouraged to analyze and communicate to its Members the implications of various possible data exchange paradigms; scope should include development of guidance regarding exchange of data purchased from commercial providers, e.g. in order to improve our understanding of the value proposition of "observations as a service".

Session 3: Filling the gaps in global data coverage

The session was chaired by Michael Staudinger, Austria. Dr. Erik Andersson, European Commission, and Daouda Konaté, Cote d'Ivoire, opened the Session by providing an overview of the main messages from the preparatory Workshops. Key points made during this session include:

- Broad support for initiatives such as GBON and SOFF, with encouragement to see these expand beyond the initial focus on observations for NWP into other Earth-system domains;
- Strong support from developing countries and SIDS for GBON to help close the observations gap in these regions and thus contribute to the development of numerical weather and climate forecasting products, and for using the SOFF to provide the necessary financial support;
- Translation of NWP observing system assessment methodology into other disciplines strongly encouraged; this will help provide a solid basis for future policy and regulatory material;
- Satellite data are critical for model performance and are far more important today than they were when Res. 40 was adopted; the concept of essential satellite data needs to be matured in collaboration with the satellite operators and reflected in WMO policy and regulations;
- Quid pro quo is an essential element of WMO data policy; exchange of observations by all Members is important, but also return flow of model products enabled by the observations;
- Public-Private Sector engagement is important and will open new opportunities along the Earth system monitoring and prediction value chain; however, in order

to maximize the mutual benefits of this, policies, legislation and business models still need to further develop and mutually adapt; no "one size fits all" business model or collaboration mechanism has been identified so far.

Session 4: Data exchange for Earth System Monitoring and Prediction

The session was chaired by Dr. Gilbert Brunet, Australia, and it was opened by Dr. David Legler, United States, who provided an overview of the conclusions from preparatory the preparatory Workshop leading up to the Data Conference. Key points from this session include:

- Full, free and open data access will help optimize product quality and maximize societal impact;
- Education, training and support are required to ensure effective interpretation and application of model products;
- There is a wide range of reasons for current (insufficient) state of data exchange in some regions, including policy, financial and technical difficulties; all must be addressed;
- WMO plays an essential role in coordinating and promoting data sharing at all levels; special effort is needed to integrate communities outside the traditional WMO domains in order to realize full potential of Earth System monitoring and prediction;
- It is important to address gaps in Earth system observations through increased engagement between NMHSs and partnering communities, and to showcase the mutual benefits of this;
- Observing impact studies using numerical models should continue and are encouraged to expand in scope to help guide investment in observing systems aimed at improving prediction quality at all spatial scales and time ranges.

Closing Session

The session included all Session Chairs and was chaired by Michel Jean, Canada, who opened the session with the following statement: "We live in a time of brilliant technologies and the rhythm of innovation is increasing at an unprecedented pace. We are flooded by earth observations; social media provides access to contextual information and unprecedented dissemination mechanisms and high-performance computing platforms allow us to tackle previously unsolvable problems. It is only a matter of time before the fusion of weather, big data technologies and business applications go mainstream and change the way people and businesses view weather and water data, and experience the force-multiplying effects it will have on improving life and weather sensitive business decisions. Not only is this forcing us to rethink our business models, our recruitment and training strategies and our partnership strategies at the national level, it will also have a fundamental impact on the global meteorological enterprise." Key points raised in the final session, some of which were common to several of the previous sessions, were:

- The fact that free and open access to Earth system data has been shown to maximize the overall economic impact of these data was recognized as a main driver for data policy developments in WMO and elsewhere;
- Free and open data policies are becoming increasingly common, but they may not be applicable everywhere or for everyone in the short term, e.g. due to conflicting national policies, or commercial interests;
- In order to maximize the benefits of updating WMO's data policy, it is critical that WMO prioritize effective communication, education and training, and other outreach;
- Strong endorsement from the Conference of the current WMO development of a unified data policy that clearly articulates obligations and expectations, and of continuing the distinction between "essential" (free and unrestricted) and "additional" data (may be subject to conditions);
- Strong recommendation to WMO to develop and publicize a comprehensive analysis of economic and societal impact of data exchange as underpinning of its data policy.