



Results from the 7th WMO Impact Workshop in 2020

CGMS-49-WMO-WP-23

Presented to CGMS-49 Plenary, agenda item 5

Executive summary of the WP

The seventh WMO Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction (NWP) was organized by WMO on 30 November – 3 December 2020 as a virtual event. The workshop was conducted in English.

The workshop was attended by roughly 110 participants each for the four days; the core participants (“panelists”) were the members of the Scientific Organizing Committee (SOC) and the 42 authors whose contributions had been selected for presentation, and an additional 70 interested individual attended the Workshop in listening mode.

The overall Workshop attendance included experts in data assimilation and observation impact, experts in climate change and seasonal forecasting, representatives from space agencies and from private industry, as well as managers of observing networks.

During the Workshop, the results presented were reviewed in plenary discussion sessions. Conclusions to help guide the design and evolution of components of the WIGOS for NWP were drawn.

The Sessions

1. Global forecast impact studies
2. Regional and high-resolution forecast impact studies
3. Methodologies for Observing Systems and Network Design
4. Workshop conclusion and recommendations.

The 7th NWP Workshop Report is under preparation and should be finalized in the coming weeks!

Key high-level takeaway messages 1

- It is important to exchange internationally all observations that have a demonstrated positive impact on global NWP
 - This is important not only in order to maintain high level of skill in all systems, but in order to maintain a common basis across them all for estimating the “true” atmospheric state.
 - Without such a common basis, making progress will become difficult
 - It may even become difficult to unambiguously define what progress is, if no common basis for the true atmospheric state is maintained.
- International exchange is important also for observations targeted primarily at regional prediction efforts.
 - Impacts on regional scale (limited area) forecast skill were shown to arise from a combination of direct assimilation of observations within the limited area domain and through the influence of the lateral boundary conditions provided by the global model.

Key high-level takeaway messages 2

- Observing system impact results between centers are generally consistent, although minor differences in the ranking of individual observing systems continue to be seen.
- A range of emerging new observing systems have been demonstrated to provide positive impact on NWP, including ESA's Aeolus wind lidar mission, and ground-based GPS measurements of (integrated) water vapor
- Radar data assimilation continues to offer a promising avenue for further progress. There is an urgent need for standardization of radar data products and data formats in order to support data exchange, at least at a regional level.

Main recommendations

1. Continued WMO efforts to extend coverage for aircraft data are supported;
2. WMO to work toward standardization of radar data (format, metadata, calibration, etc), at least regionally (to allow cross-boundary data exchange);
3. **WMO to finalize WIGOS regulatory material establishing the commitment to providing critical satellite data for NWP;**
4. **Space agencies to continue pursuing wind profile measurements from space;**
5. Impact experiments should be coordinated more frequently leading to the 4 years workshop, in order to optimize impacts and concentrate on areas most in need;
6. **Effort encouraged to assess complementarities/synergies between different wind measurement systems/technologies (e.g. Aeolus and AMV);**
7. Recommendation to protect sondes in remote locations which tend to be most impactful for NWP. Sharing local data globally is key for global/regional impacts;
8. **Special, concerted effort should be considered to protect the MW frequencies given their critical importance for NWP forecast skills at all scales;**
9. Establish coordinating mechanism regarding the diverse aircraft impact assessment activities;
10. Encouragement to study the potential impacts of future obs. systems (IoT, future satellite systems, ...).

To be considered by CGMS:

The following Recommendation for Plenary considerations are proposed:

1. Space agencies to continue pursuing wind profile measurements from space
2. Effort encouraged to assess complementarities/synergies between different wind measurement systems/technologies (e.g. Aeolus and AMV);
 - IWWG
3. Special, concerted effort should be considered to protect the MW frequencies given their critical importance for NWP forecast skills at all scales
 - WMO Frequency protection activities
4. There's a need to sustain impact assessment studies, also for satellite data