The 7th WMO Workshop on the Impact of Various Observing Systems on NWP
Seoul, Republic of Korea
12-15 May 2020

1st Announcement

The 7th WMO Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction will be organized by WMO and will be hosted by the Korea Meteorological Administration in Seoul, Republic of Korea, 12-15 May 2020. Participation from all the major NWP centres active in the area of impact studies is expected. The workshop will be conducted in English. Similar to the previous six workshops, it is planned to produce a workshop report, which will be published as a WMO Technical Report and will include the presentations submitted by the participants.

The previous six workshops in this series took place in Geneva (April 1997), Toulouse (March 2000), Alpbach (March 2004), Geneva (May 2008), Sedona (May 2012) and Shanghai (May 2016). Results from observing system experiments (OSEs), with both global and regional aspects, were presented. Conclusions were drawn concerning the contributions of the various components of the observing system to forecast skill at short and medium range. Workshop proceedings for the first four workshops were published as WMO World Weather Watch Technical Reports TD No. 868, 1034, 1228, 1450. The report on the 5th workshop was published as WIGOS[1] (WMO Integrated Global Observing System) Technical Report No. 2012-1 with presentations made available on the WMO website[2]. The final report with presentations on the 6th workshop was published on the WMO website[3], too. Since then, some significant changes and developments have affected the global observing system, and additional effort has been devoted to meso-scale data assimilation systems. There has also been a continued trend toward using techniques other than OSEs to document data impact, such as adjoint- and ensemble-based forecast sensitivity observation impact (FSOI and EFSOI), and estimates of analysis uncertainty.

A Scientific Organizing Committee for the event has been established, consisting of:

- Sid Boukabara, NOAA, Chair,
- SeiYoung Park, KMA, Co-chair,
- Erik Andersson, ECMWF,
- John Eyre, Met Office,
- Tom Auligne, UCAR,
- Jianxia Guo, CMA,
- Lars Peter Riishojgaard, WMO Secretariat.

1 WIGOS is the overarching framework for all WMO observing systems and for WMO contributions to co-sponsored observing systems in support of all WMO Programmes and activities. Currently the component systems are the Global Observing System (GOS), the WMO Hydrological Observing System (WHOS) and the observing components of the Global Atmosphere Watch (GAW) and the Global Cryosphere Watch (GCW).

2 https://www.wmo.int/pages/prog/www/OSY/Reports/NWP-5_Sedona2012.html

3 http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/NWP-6_May2016_Shanghai/WMO6-Impact-workshop_Shanghai-May2016.html

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Participation in the Workshop is by invitation only, and interested participants are invited to request an invitation from WMO by emailing the organizers as detailed below. Those interested in presenting at the Workshop are invited to submit a short abstract outlining their intended contribution along with their request for invitation. Contributions to the workshop may fall within any of the general topics outlined above, or they may address one or several of the specific studies and science questions listed in the attachment.

During the Workshop, the results presented will be reviewed in plenary discussion sessions and a consensus view will be formed where possible. Conclusions to help guide the design and evolution of components of the WIGOS for NWP will be drawn. This extends from short to medium and longer range forecasting. The impact of various observing systems on climate analysis is also considered within scope of the Workshop.

The workshop is expected to include the following sessions:

Session 1: Global forecast impact studies

Session 2: Regional and high resolution forecast impact studies

Session 3: Specific scientific areas (including network design)

Session 4: Workshop discussions and conclusions.

In order to receive an invitation to participate in the workshop and/or submit an abstract to the event, write to the scientific organizing committee (SOC) contacts by email: Dr Lars Peter Riishojgaard, WMO Secretariat (lriishojgaard@wmo.int) and SeiYoung Park, KMA (sypark0@korea.kr), with a copy to Igor Zahumensky (izahumensky@wmo.int) by 15 November 2019.

WMO expects to have limited financial resources available to support participation. An early indication of the need for financial support should be submitted to SOC via email to the addresses given above. These requests will be considered by the SOC and WMO. Priority will be given to support participants from developing countries.

A Local Organizing Committee will be responsible for the local arrangements, including accommodation. The LOC will provide information about all relevant aspects of the local arrangements (venue, access, local transportation, climate, etc.). This information will be included in the 2nd Circular to be distributed in the end of 2019 and will also be posted on:

http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings.html

The following table represents the list of scientific questions that the workshop will attempt to answer.

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Proposed topics for NWP impact studies relevant to the evolution of global observing systems

Short name: Full name	*Science question*
Surface-based	
S1. AMDAR: Coverage of AMDAR	Encourage studies of impact assessment of AMDAR and MODE-S in data-sparse regions. Examples include for instance (1) trade space studies between additional vertical profiles over land versus en route data over the oceans, and (2) increasing measurements over poles versus tropics. Provide general guidance for AMDAR extension priorities
S2. Radar: Radar observations	What are the impacts of current radar observations, particularly radar polarization, but also wind profiles, radial winds and reflectivity?
S3. PBL: Observations of the PBL for regional and high-resolution NWP	What should be the focus of improvements for observations of the planetary boundary layer (PBL) in support of regional and high-resolution NWP? Which variables and what space-time resolution?
S4. HighElev: High elevation surface observing stations	Estimate the actual and potential impacts of high elevation meteorological data from the high mountain regions, for example using OSSE, OSE or FSOI, on appropriate environmental models.
Space-based	
S5. SatLand: Satellite sounding over land and ice	What is the impact of new developments in the assimilation of radiance data over land, snow and sea ice?
S6. Sounders: Impact of multiple satellite sounders	What benefits are found when data from more than one passive sounder are available from satellites in complementary orbits?
S7. AMVs: Atmospheric Motion Vectors	Which AMV characteristics (temporal resolution, height, etc.) should be enhanced from the next generation of satellites (such as Geo)?
General	
S8. UA: Regional upper-air network design studies	Upper-air network design studies such as those that have been performed for the European composite observing system (EUCOS) are required also in other Regions, especially in Region I where the basic networks are under pressure. Assessments of recent changes in the networks, including the impact of launching radiosondes once per day or at non-synoptic times.
S9. Sfc and Sat: Impact of satellite observing capabilities on the design of the surface-based observing systems	What is the impact of the increasing capabilities of space-based observing systems on the design and evolution of surface-based observing systems? With special emphasis on the impact on network design in areas with very sparse surface-based networks. The following two questions (S9-a and S9-b could be viewed as specific examples of this generic question).
S9-a. Sfc and Sat: Density of marine surface pressure observations to complement satellites	For marine observing systems: What density of surface pressure observations over the ocean is needed to complement high-density surface wind observations from satellites?

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S9-b. Sfc and Sat: Network of stratospheric observations to complement satellites	For upper air observations: What network of in situ profiling observations is needed in the stratosphere to complement current satellite observations (including radio occultation)? Assessments addressing the Tropics are encouraged.
S10. AdjEns: Application of adjoint and ensemble methods	What insights can be gained from adjoint and ensemble-based impact measures tailored for applications such as severe weather, aviation and energy? Specific impact metrics may be required.
S11. Ocean: Impact in ocean-coupled assimilation	Which ocean observations are particularly important for NWP? Investigate the role of ocean observations, in particular profile observations provided for example by the moored buoy arrays, in coupled atmosphere-ocean data assimilation with a focus on the 7-14 day range.
S12. Land: Impact in land-coupled assimilation	Which land-surface observations are particularly important for NWP at all forecast time ranges? Investigate the role of surface observations in coupled atmosphere-land data assimilation with a focus on the 7-14 day range.
S13. Data frequency/Timeliness	Assess the impact of increased temporal frequency of observations, e.g. by using data from both operational and back-up LEO sounders, Consider also the case of AMDAR, radiosonde, GEO satellites AMVs and ground-based remote sensing observations (such as Doppler radar, wind profiler, ground based GNSS receivers) for regional and global NWP. Assess the impact of reduced (or increased) data latency on the quality of the forecasts.
S14. Atmospheric composition	Study observation impact in atmospheric composition and air quality application and the impact of atmospheric composition observations (e.g. aerosol) on NWP.
S15. OSSEs	Observing system simulation experiments are encouraged in support of satellite system design criteria such as orbit optimization for GNSS-RO satellites, or for emerging technology sensors (such as Geo-based hypersperspectral IR or MW sounders, Small/Cube satellites, etc.).
S16. Impact Assessment for Seasonal And Climate Applications	Observational Impact Studies are encouraged for extended range prediction systems, especially using coupled models. These could be used to investigate ways to optimize the design of climate observing systems networks.
S17. Ground-Based GNSS	Promote undertaking impact studies to assess the impact of ground-based GNSS on NWP. This will help measure the potential need to exchange data internationally. In addition to regional impacts, global impacts or at least wide-regional impacts are encouraged.
S18. RBON: Regional Basic Observing Network design studies	NWP impacts studies are encouraged to evaluate aspects of the design of surface synoptic observing networks and surface-based remote-sensing observing networks. The studies will contribute to the development of WMO guidance on the design of Regional Basic Observing Networks.
S19. Impact Assessment for Arctic observation	NWP and Seasonal impact studies, especially those using coupled systems, are encouraged to assess the impact of Arctic observations (type, coverage, frequency) on prediction skill in the Arctic and mid-latitudes. The studies will contribute to formulation recommendations for the design of future Arctic observing systems network.