WMO RA VI WIGOS WORKSHOP
Belgrade, Serbia
24-27 November 2015

KEYNOTE SPEECH: Next Phase of WIGOS Implementation, Guidance from ICG-WIGOS – B. Calpini

Mr. Calpini made an introduction by demonstrating an example of CIMO embracing WIGOS in terms of remote sensing, in situ observation and crowdsourcing. He proceeded to elaborate on WIGOS, defining its vision and aims, particularly drawing attention to the issues of Compliance, Collaboration, Coordination and Communication at global, regional and national levels increasingly recognized as essential for the mutual benefit of all stakeholder and society. In his speech, Mr. Calpini specifically focused on the WIGOS Pre-Operational Phase, thoroughly disscussing the five priority areas in addition to providing a summary of ten key activity areas with regard to WIGOS Framework. In that context, he also pointed out the overarching objective of WPP, that is, a fully operational WIGOS in 2020. He concluded by touching upon the issues related to the significant role of WIGOS in empowering Members to sustain observing systems that meet national needs, as well as to enable RAs and WMO to guide Members in the context of all WMO Priorities.

Role of RA in the WIGOS Pre-Operational Phase – I. Čačić

Mr. Čačić gave an insightful presentation on the Role of RA, outlining broader issues related to this topic in his introductory note. He began by synthesizing the most relevant decisions of Cg-17, and in that regard, he particularly emphasized the importance of assigning high priority to implementation and further development of WIGOS, identified as one of the key requirements for Regional Associations. With specific reference to the 16th RA VI Session, he also indicated the concept of 4C Partnership, including Collaboration, Cooperation, Coordination and Communication, followed by an example of WMO Weather Radar Database, consequently summarizing all related results. In addition, he recognized and stressed the importance of Regional WIGOS Centers in providing regional oversight, coordination and support for WIGOS implementation. He concluded by summarizing the five priority areas along with the 10 key activity areas with regard to WIGOS Framework, stating the numerous benefits resulting from the WIGOS Implementation.

SESSION 1: Role of Members and NHMSs in the national WIGOS implementation

1. ***Secretariat role and support in the WIGOS Pre-Operational Phase – W. Zhang***

   In his presentation, Mr. Zhang highlighted the primary role of WMO Secretariat at WIGOS as a bridge between partners and technology system, further underlining the importance of working in conjuction with national and regional parterns as an unambiguous win-win strategy. Moreover, he noted the interdependency of WPP Priority areas, especially drawing attention to the WIGOS Implementation as a critical need for all Members, addressing the issue of communication of WIGOS benefits as fundamental for its successful Implementation. He concluded by summarizing all the key points in a saying: If you want to go fast, go alone. If you want to go far, go together.

2. Moving from the WIGOS Framework towards the Pre-Operational Phase – J. Dibbern

Mr. Dibbern opened his presentation reflecting on Observations by highlighting their pivotal role for the work of NHMSs as well as for the decision-making process. Simultaneously, he pointed out the necessity of introducing changes in terms of well-targeted communication with national agencies and partnernship with other national non-NMHS organizations in order to successfully meet the future challenges. With a specific reference to Cg-17 decisions, he focused primarily on the National Observing Strategy, and the leading role of NMHS in its developing. He concluded by providing an overview of the WIGOS elements of particular relevance:

- WIGOS Partnerships
- National Cooperation
- National Planning
- National Focal Points
- Registration of observing stations

3. Role of NMHS in the WIGOS Implementation – E. Grüter

Ms. Grüter introduced her presentation by addressing the principle WIGOS tasks at the national level, to proceed with a detailed explanation of the use of Self-Assessment Checklist for Members, followed by a thorough overview of its structure in accordance with the 10 key activity areas of WIGOS IP. Showing an example of MeteoSwiss (on WIGOS Implementation), she concluded by syntethizing all the key findings, and emphasizing the need of RRR approach as a crucial point in evaluation for decision-makers along with the need to combine all observation system specific limitations in order to find a new solutions.

4. WIGOS Technical Regulations – I. Zahumensky

Mr. Zahumensky began by outlining the five priority areas, indicating that the WIGOS Regulatory and Guidance Material are recognized as the second priorty area in the WIGOS Pre-Operational Phase. He continued to define the core of the WIGOS Framework, particulalry emphasizing the main relevant aspects including:

- Documenting and implementing standard and recommended practices and procedures in making and sharing observations,
- Integration and interoperability in all senses
- Timely delivery of observations that meet user needs in a way they can use them

Correspondingly, he explained the concept of 4Cs, highlighting the importance of compliance with the Regulations. Moreover, he provided an extensive overview of the WMO Technical Regulations pyramide, illustrating how to implement and operate national observing systems in accordance with TR. In that context, he also made a specific reference to the WMO Publication 49, pointing out the difference between the standard and recommended provisions, stating that the latter are desirable in contrast to the standard ones which are regarded as necessary. He concluded by providing a short summary of the purpose and scope of WMO TR.

5. WIGOS Information Resource – T. Pröscholdt

In his introductory note, Mr. Pröscholdt concisely presented WIGOS Information Resource illustrating it with an umbrella embracing all the main WIR components;

OSCAR, SORT, PORTAL and DQMS. Consequently, he provided an overall description of the WIR concept, recognizing information on:

- operational status and evolution of WIGOS
- the operational requirements of WIGOS
- standard and recommended practices and procedures used in the WIGOS framework
- their capabilities to meet observational user requirements

as the most relevant for WIGOS stakeholders. Furthermore, he provided some additional information on Web portal, focusing in particular on SORT, OSCAR and DQMS, briefly reporting on their current status as well as visions.

6. WIGOS Data Quality Monitoring – S. Goldstraw

In the light of the fact that Congress identified 5 priority areas for WIGOS during the Pre-Operational Phase (PPS), Mr. Goldstraw gave a thorough overview of the WIGOS plans for the ensuing 4 years (2016-2019), drawing special attention to WIGOS Data Quality Monitoring and its expected milestones. Subsequently, he provided an insight into the WDQMS discourse, shedding light on its context, scope as well as purpose along with the progress report made thus far. Furthermore, he stressed the importance of co-operation and collaboration at the national, regional and global levels for achieving the overall success.

7. Regional WIGOS Centers – W. Zhang

Mr. Zhang gave a talk in which he shared his view on the relevance of Regional WIGOS centers by pointing out their significant role, especially concerning the efficient support provided to the Members and Regions in connection with their WIGOS Implementation efforts both nationally and regionally. Additionally, he underlined the RWCs responsibilities, in particular, regional coordination, followed by an overview of RWCs functionalities, with a special emphasis on the difference between the mandatory (work with data providers in order to facilitate WIGOS metadata collection) and the optional ones (assistance with the coordination of WIGOS projects). Moreover, he stressed the importance of the tight cooperation between RWCs, WMO Regional office and other Regional centers for ensuring the effective WIGOS Implementation and concluded his talk with the illustration of a turtle as the symbol of longevity within the RWCs paradigm.

8. RA VI WIS Centers supporting WIGOS – S. Foreman

Mr. Foreman presented the WIGOS Information System in Region VI, starting with a thorough overview of WMO Information system, including demonstration of its complex structure and by showing the interdependence and interconnectedness of its various and numerous networks (World Data Centers, World Radiation Center, Commercial Service providers, International organizations). He particularly addressed the issues of National Centers, Data Collection and Global Information Data Center within the broad context of WIS Structure as well as the issues concering Information Requirements of WIGOS in RA VI.

9. Marine observations in WIGOS – J. Rozema

Mr. Rozema gave a comprehensive report on Ocean Observations and the curent status of the Global Observing system stating that the 67% of the planned network has already

been completed (with a special mention to Ship, Buoy and Wave observations). He also talked about the role of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), highlighting the main implementation goals as well as challenges they are currently facing. In conslusion, Mr. Rozema acknowledged the very important and significant contributions of JCOMM to WIGOS, focusing primarily on the 5 priority areas in the WIGOS Pre-Operational Phase along with the Capacity Development, Regional Marine Instrument Centers (RMICs), Satcom...

10. GAW Observations in WIGOS – O. Tarasova

Ms. Tarasova elaborated on Global Atmosphere Watch (GAW) noting it is a research program based on partnership with contributors from 100 countries. She provided an insightful description of the Programme, summarizing key issues of special importance:

- its content (observation network, quality insurance system and expert groups),
- focus (atmospheric chemical composition) and
- use (GAW observations in support of aeronautical services, food security and others)

She proceeded the presentation talking about GAW observations, pointing out that surface based in situ and remote sensing observations are the backbone of the GAW network. In connection to that, she introduced a brief evolution of GAW obsevational networks system, indicating its heterogeneity, followed by a summary of of GAW approach to observations and further challenges.

11. Hydrological Observations in WIGOS – D. Berod

In his presentation, Mr. Berod summarized and synthesized the most relevant RA VI hydrological activities with regard to WIGOS, particularly addressing the following issues:

- RA VI working group on Climate and Hydrology
- RA VI Hydrology forum
- Contributions from CHY

He also pointed out the role of the WMO Hydrological Observing System (WHOS) in fullfilling the WIGOS objectives, to proceede with a brief overview of its two implementation phases. In conclusion, he showed the linkage between WIGOS and GEO System of Systems (GEOSS), emphasizing its clear benefit reflected in the enhacing visibility to many interdisciplinary users.

12. GCW Observations in WIGOS – M. Ondraš

Mr. Ondraš provided a thorough insight into the Global Cryosphere Watch (GCW), indicating its important mission in provision of clear and usable data, information and analyses on the past, current and future state of the cryosphere. Additionally, he provided a historical context of the GCW development, briefly outlining the most relevant milestones in its evolution. In that regard, he also highlighted the fact that the decision concerning the GCW mainstreaming into WMO Programme as a cross-cutting activity was endorsed by the 17th WMO Congress in June 2015. Moreover, he explained the concept of "CryoNet", network of surface observations, touching upon the issues related to the CryoNet stations, sites and its development. Moreover, he presented the Snow Watch, concisely reviewing its aims, and giving an overview of the Snow Data Inventory.

DAY TWO - WEDNESDAY, 25 NOVEMBER 2015

SESSION 2: Regional WIGOS relevant projects and activities

1. ***OND Principles and EUCOS as example – S. Klink***

   Mr. Klink began by briefly summarizing a EUMETNET concept, indicating both the number of Members (31), Programs (Observation, Forecasting and Climate) and Obs Programs. His presentation revolved around 2 central topics: Observing System Network Design Principles and EUMETNET Observations Programme (EUCOS). He provided a broad overview of the 12 key OSND Priniciples, undepinning the fact they were approved by WMO Congress in May/June 2015 and published in the Manual in WIGOS. Furthermore, Mr. Klink gave a talk on conclusions from EUCOS completed studies concerning:
   - Upper-air network redesign study – recommendations
   - 2nd Space-Terrestrial study – recommendations
   - E-ASAP impact study – results

2. ***EUMETNET Projects: Weather Radar Data Exchange: Global Expansion and Enhacement of the Aircraft-based Observing System – S. Klink***

   As part of his second presentation, Mr. Klink provided a thorough overview of the OPERA, defining its principle objective, purpose and five central tasks. Additionally, he reflected on the relationship and cooperation between WMO and EUMETNET, emhasizing the main objectives:
   - Implementation of international standards for weather radar data exchange
   - Enhancement of international exchange of weather radar data in support of NWP requirements for these data (EGOS-IP, Global Action 48)

   In conclusion, he presented on the status of E-AMDAR, briefly synthesizing its aims and benefits.

3. ***Copernicus – EUs Earth Observation Program – A.Ch. Koch***

   Ms. Koch joined the meeting from Switzerland to make a presentation on Copernicus, providing an extensive insight into its architecture and the current status, noting that the budget was allocated until 2020 largely for setting of building satellites and operations. Furthermore, the issues of Sentinels and Satellite data available through Copernicus were broadly addressed. Ms. Koch also provided a summary of six operational services:
   - Land Monitoring Service
   - Marine Environment Monitoring Service
   - Atmosphere Monitoring Service
   - Climate Change Service
   - Emergency Management Service
   - Security Service

4. ***Role of ECMWF in the Copernicus Services – M. Suttie***

Mr. Suttie began by drawing attention to the overriding importance of atmospheric composition monitoring, stating the need of understating its fundamental necessity with regard to the increasing impact of changes in atmosphere on human health and well-being. Mr. Suttie also provided an extensive report on Copernicus Climate Change Service (C3S), defining its principle vision, objectives and concept in general, subsequently showing its organizational structure along with the comprehensive overview of the key service elements. In conclusion, he demonstrated the proof of the C3S concept, indicating the significance for sectors such as Water Management, Energy, Infrastructure, Health, Insurance etc….

5. ***INSPIRE – J. Rozema***

Mr. Rozema elaborated on the concept of Infrastructure for Spatial Information in Europe (INSPIRE), providing a broad overview of its purpose with an emphasis on the need for harmonized spatial information as well as their interoperability, as a requirement of environmental policy-making and activities across EU boundaries. Moreover, he discussed Data Specification on Environmental Monitoring Facilities, explaining both application and usage. He concluded with a comparative analysis of INSPIRE EF model and WIGOS metadata model, discussing the issue of possibility of their alignment.

SESSION 3: Capacity development, communications and outreach activities to assist Members in the implementation of WIGOS

1. ***National Observing Strategy and National WIGOS Implementation Plan – E. Grüter***

Mr. Grüter began by displaying summarized information on the main activities at MeteoSwiss regarding WIGOS, discussing the following topics:

- Consolidation of different measurement systems into one integrated platform (SMN)
- Integration of all different data sources in a centralized data platform
- Integration of 3rd partner data
- Development of integrated products
- Implementation of a RRR process

He also pointed out that the central metadata repository encompassing information on stations, instruments, variables and algorithms is the key success determinant concerning data management system at MeteoSwiss. In conslusion, acknowledging the saying „Think big, start small", he stressed the overarching significance of having a vision along with the application of iterative approach.

2. ***National partnership opportunities and arrangments in Croatia – I. Čačić, D. Klarić***

Taking note on the urging need for changes in terms of meeting national needs for weather, climate and environmental infomation, Ms. Klarić reflected on the future challenges, by underscoring the fundamental role of observations associated both with NHMS performance and decision-making process on safety, well-being and sustainability. With regard to that, she particularly addressed the issue of partnership with non-NHMS entities important for the increase in overall volume of observation data in WIGOS. Moreover, she elaborated on the benefits of WIGOS Implementation, demonstrating Croatia as an example and providing thematical context for understanding the role of Adriatic Marine Meteorological Center (AMMC) .

3. ***Application of WIGOS Principles at MeteoSwiss – E. Grüter***

Ms. Grüter gave a talk on the topic concerning Application of WIGOS principles, focusing specifically on the MeteoSwiss case. In that context, using a demo example „Densification and optimization of the data basis for warning purposes", she demonstrated which principles were applied and described how it worked. In addition to outlining the main outcomes, Ms. Grüter set particular emphasis on the importance of combining the following four options to achieve optimal results:

- Construction
- Modernisation, automation
- Combination/integration of meas. Methods (i.e. CombiPrecip)
- Data integration

4. ***Application of WIGOS Principles at DWD – J. Dibbern***

Mr. Dibbern elaborated on the Application of WIGOS Principles, referring primarily to the most relevant examples from DWD. He began by summarizing the 10 key activity areas with regard to WIGOS Framework, and continued by addressing and disussing the issues related to these three in particular:

- Design, Planning and Optimised Evolution
- Quality Management
- Observing System Operation and Maintenance

5. ***Application of WIGOS Principles at RHMSS – P. Petković***

Mr. Petković reported on the Application of WIGOS Principles, reflecting principally on the examples and experiences from the RHMSS. He started by providing a short summary of the Legislative Framework, indicating the historical context and circumstances for embedding laws and bylaws regulating hydrometeorological activities. Subsequently, he focused on the Optimization of Observing Networks, underlining the importance of meeting the requirements of nowcasting and short-term forecasting given the increasing frequency of extreme events in the last five years.

6. ***National self-assessment of readiness for WIGOS Implementation – E. Büyükbaş***

Mr. Büyükbas expressed his view on the relevance and necessity of self-assessment checklist, particularly focusing on the justification of its usefulness with regard to WIGOS, emphasizing the need of understanding whether the status is in compliance with the WIGOS Framework or not. Futhermore, he gave a comprehensive overview of the 10 key activity areas, reflecting on the Turkish example and providing historical background of the development of Turkish observational network.

SESSION 4: Adoption of the Observing Systems Capability Analysis and Review Tool – OSCAR/Surface

1. ***Strategic role of OSCAR/Surface in WIGOS – L.P. Riishojgaard***

   Mr. Riishojgaard elucidated on the current status of the WIGOS Framework, spotlighting the issues of its purpose and the Congress decision to implement it. Consequently, he provided a broad overview of:
   - Technical and scientifical advances (observing technology, telecommunications)
   - Economic realities (efficiency resulting from synergies)
   - Broadening of the NMHS mandate (air and climate monitoring, oceans, cryosphere)

   Moreover, he provided a overall summary of WIGOS Pre-Operational Phase (2016-2019) recognizing priority areas II and III as vital for assessment of observing systems and WIGOS performance. It was followed by an in-depth report on the primary role of OSCAR in support of RRR with specific regard to WIGOS.

2. ***Operational impacts of WIGOS: metadata and station identifiers, Migration from Pub.49, Vol.A to OSCAR/Surface and the new Vol. A format – S. Foreman***

   Mr. Foreman gave a talk primarily focused on WIGOS Metadata, emphasizing its utility in support of observations as well as its essential role as part of observation network planning. Simulatenously, he shed light on the contraints related to its applicability and acceptability, to proceed with the summary of the main principles for WIGOS Metadata. He also broadly addressed the issues of:
   - Context
   - High level contents
   - Station identifiers

   In conclusion, he reviewed all the key elements, pointing out the difference between the mandatory, conditional and optional ones.

3. ***OSCAR/Surface: Overview and Populating – T. Pröscholdt***

   T. Pröscholdt elaborated on the Observing System Capability Analysis and Review Tool (OSCAR), reflecting on the issues of underlying importance for its population, highlighted as the central discussion topic of the presentation. In that context, he provided a detailed explanation to the two key questions regarding its update, how and who can update OSCAR, describing both user and machine to machine interface. He also made a special mention to the economics of OSCAR, demonstrating the diversity and enormity of its benefits spanning from the resource efficiency to affordability for Members. He concluded by providing an overview of the various ways of downloading information from OSCAR, reviewing both current and the next version.

SESSION 5: Regional WIGOS Implementation Plan (R-WIP) – Taking NHMSs requirements into account

1. Introduction to the Regional WIP for RA VI (R-WIP-VI) – D. Schröder

Mr. Schröder opened his presentation with an in-depth and up-to date report of the WIGOS, precisely clarifying what it means and what it implies, emphasizing the maximization of benefits of observation activities for the whole WMO community as its overarching aim. He proceeded by making a clear distinction between what WIGOS Implementation aims and what doesn't, providing a detailed scheme of its hierarchy and structure, along with the explanation of the nexus between National, Regional and Global WIPs. Furthermore, he made a special mention to the Structure of WIP (content), identifying its 10 key activities and the related tasks, accordingly. He concluded by outlining the five priority areas identified for WIGOS Pre-Operational Phase:

1. National WIGOS implementation
2. WIGOS Regulatory and Guidance Material
3. WIGOS Information Resource
4. WIGOS Data Quality Monitoring System
5. Regional WIGOS Centres

2. Outcomes from TT-WIGOS 2 - E. Büyükbaş

Mr. Büyükbaş elaborated on the most relevant outcomes from TT WIGOS 2, discussing the key topics revolving around the TORs and the main tasks, by further providing an insight in weaknesses, advantages and needs of the task teams. In addition, he also identified and discussed the main challenges of WIGOS in RA VI as well as ways of overcoming them, recognizing insufficient awareness and difference in responsibilities, regulations and priorities as the most critical ones. Moreover, he addressed the issue of TORs in the context of WIGOS, synthesizing the following objectives:

- review and update of R-WIP-VI to ensure the efficient application in the Region;
- assist RA VI Members to develop their national WIPs;
- determine the needs of the existing Regional Observation Networks
- cooperation with TT-RIC for efficient use of RICs by Members

3. Updating R-WIP-VI: Briefing on the Groups work - D. Schröder

Prior to commencing the interactive work group, Mr. Schröder gave a short introduction on brainstorming ideas simultaneously providing a brief overview of the thematic scope of the working groups tasks, summarizing main discussion topics with focus on the objectives and expected (desirable) outcomes:

I. Working group: Communication and Working Structure for the WIGOS Implementation in RA VI

Focus – how to get in touch with Focal points with Member states
(selection of the most suitable tools and methods)
Requirements from RA VI members for their implementation support

II. Working group: Role of Regional WIGOS Centers

Focus – discussion on determining tasks, defining responsibilities and organizational structure of the center, as well as making decisions on who can be part of the center

III. Working Group: Regional WIGOS Implementation plan

Focus – review and update with specific regards to implementation challenges and solutions for the RA VI members

IV. Working Group: Guidance for RA VI members

Focus – how to write, prepare and implement their N-WIP