
MEETING OF THE
EXPERT TEAM ON WORLD DATA CENTRES (ET-WDC)
(NASA Langley, Hampton VA, 1-3 October 2019)

Report of the Chair of ET-WDC

(submitted by Jörg Klausen)

1. Terms of Reference

- ET/WDC-1. Take responsibility for metadata and data management issues in support of the scientific and operational objectives of GAW.
- ET/WDC-2. Work with the SAGs, WMO expert teams and partners to establish harmonized data management guidelines, including standardised data formats to allow for adequate (seamless) interoperability.
- ET/WDC-3. Guide and support the further development of GAWSIS as the central catalogue of observing facilities and observations supporting GAW, linking the WDCs and Contributing Data Centres.
- ET/WDC-4. Keep abreast of and recommend best use of changing technologies affecting information management within GAW.

(Reference: [WMO Global Atmosphere Watch \(GAW\) Implementation Plan: 2016-2023](#), WMO GAW Report No. 228, WMO 2017)

2. Membership of ET-WDC

The membership structure of ET-WDC still consists to a large extent of ex-officio members, and the team struggles to recruit committed 'regular' members. The 'regular' members who were recruited after 2016 have participated with various intensity, mainly due to competing obligations. Additional experts, invited on an ad-hoc basis to meetings provide valuable stimulus and input, but cannot drive the team's activity.

3. Activities since Meeting in 2017

The 2017 ET-WDC meeting in Kjeller agreed a number of action items¹ that were however distributed more than 6 months after the meeting with no context. Unfortunately, a final report

¹ Action items repeated here for convenience:

- Action Item 1 (Markus Fiebig and Tom Kralidis): Station and instrument coordinates should be reviewed. NILU will do it based on GAW ID and coordinates.
- Action Item 2 (Jörg Klausen): GAWSIS will take the tables with coordinates provided by WOUDC and NILU and compare with station data in GAWSIS. Stations for which discrepancies cannot be resolved will be contacted by GAWSIS in order to obtain the exact coordinates (preferably with an accuracy of 10 metres or better).
- Action Item 3 (Jörg Klausen): How to solve the problem of different metadata standards in WIS and WIGOS? Jörg Klausen will make a list of inconsistencies or contradictions.
- Action Item 4 (All): send list of acronyms to Jörg (should have been done by 30 October).
- Action Item 5 (Oleg Gusev): Oleg will try to make metadata for remote sensing from space using the schema.
- Action Item 6 (Jörg Klausen): Jörg will compile the list of acronyms.

MEETING OF THE
EXPERT TEAM ON WORLD DATA CENTRES (ET-WDC)
(NASA Langley, Hampton VA, 1-3 October 2019)

of this meeting was never produced. Coordinated follow-up was therefore limited, and several items remain unresolved. Two telecons (May 2017, telecon-17; June 2017, telecon-18) took place, in addition to some e-mail exchange.

The website of the team has been re-developed by Tom Kralidis (thank you, Tom!) and can now be found at <https://wmo-cop.github.io/et-wdc/>.

Chair ET-WDC reported to 2018 OPAG SSC Meeting (remote participation). The concept of a distributed (“virtual”) “GAW Data” Centre extracted from the IP was presented:

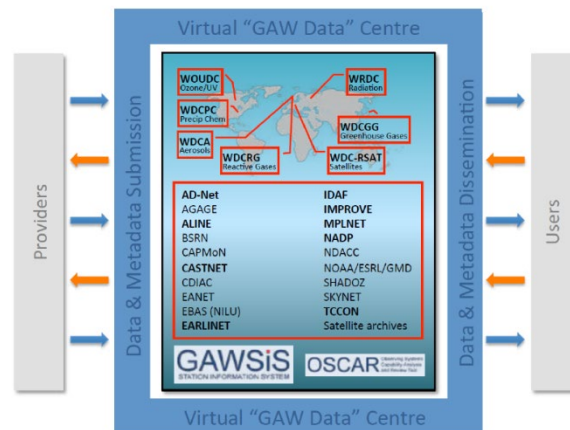


Figure 16 - The concept of the federated data management system

While this concept was included in the official IP, little progress has been made in terms of agreeing a work plan to actually get there. Several other issues were also addressed:

- Migration of RG from WDCGG to WDCRG not complete
- Migration from old WDCGG to new WDCGG ongoing without much consultation of ET-WDC
- Status of WDCPC and WRDC is unclear
- WIGOS metadata representation (XML) now operationally supported by OSCAR/Surface, however, WDCs not yet operationally providing metadata.

- Action Item 7 (Martin Schultz): The ET-WDC should write a recommendation wrt a data license for GAW data and send that to the SSC. The first step is for Martin Schultz to prepare a draft with an assessment of the current situation and develop a proposal for new license. The suggestion is to base this on CC BY 4.0.
- Action Item 8 (Tom Kralidis): Collect XML examples on a github.
- Action Item 9 (All): Provide examples of XML files.
- Action Item 10 (Tom Kralidis and all): There is a need for a guideline document (a user's guide meant for data base managers) that answers questions such as: What is XML, what is XSD etc.? Tom Kralidis will make a first draft, but all should contribute.
- Action Item 11 (Julian Meyer-Arnek): Julian to talk with NextGEOSS WP2 leader, then come back to T3.4 leader. There has been a problem with continuity of the WP2 leadership.

MEETING OF THE
EXPERT TEAM ON WORLD DATA CENTRES (ET-WDC)
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ET-WDC has developed a concept paper on “(N)RT data services from GAW” that was endorsed by SAG APP during its July 2018 session². The vision expressed in this document requires action by the providers of observational data, but the WDCs (and other data centers) have an important role to play as providers of downstream services.

4. Outlook and Scope of 2019 ET-WDC Meeting

The GAW Implementation Plan defines specific tasks for the World Data Centres for the period 2016-2023. At Congress-18 this year, the governance structure of WMO has been changed substantially, and the organization of existing WMO Programmes will follow suite. The concept of GBON³ (Global Basic Observing Network) was approved. At present, GBON is clearly focused on classical meteorological observations, but chemical composition observations are weather- and climate-relevant, and the GAW observational network(s) should contribute somehow. Thus, the tasks outlined in the current GAW Implementation Plan are still relevant. The chair’s (personal) assessment of progress on these tasks has not changed much since the 2017 ET-WDC meeting⁴. This may reflect a certain ignorance on actual progress made due to lack of sufficient communication within ET-WDC or the complexity of the landscape. In summary, WDCs have long provided valuable services at various levels of sophistication to specific communities, but there is a lack of coherence among the WDCs (not to mention other archives relevant to atmospheric composition data) and a lack of ET-WDC to give strategic guidance. As a result, the “whole may not be much more than the sum of its pieces” and may not live up to its full potential quite yet.

The **agenda for this meeting** involves reports of the WDCs and other data centers, as well as an entire day of brainstorming and identifying common (or diverse) objectives for the future of GAW data management and services in the wider context of WMO. Reports to this meeting are requested to keep this in mind, and are encouraged to highlight contributions to the tasks below (copied from the GAW Implementation Plan, and amended with previously suggested actions):

² SAG APP commented: “While diverging opinions from NILU (managing the WDC-aerosol) were mentioned and concerns from ICOS (representing ET-GHG) were expressed during the meeting, the members of SAG-APP concluded that the best way forward for real-time data transmission is to apply the same principle and approach as for operational meteorological data.

A fully centralised data flow is likely to create a bottleneck and a risk of a single point of failure, which can be disruptive for downstream use in operational services. A distributed approach to data flows, following the principles of the WMO Information System (and implemented in the meantime through the Global Telecommunications System) is preferred, as long as there is a centralised management of guidelines and tools (including metadata, format, QC/QA software...), which is precisely within the mandate of the different thematic SAGs and of the ET-WDC.

SAG-APP thus supports the proposal as it is outlined in the paper.”

³ https://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/ICG-WIGOS-8/Item7_GBON-for-Dummies-Rev1.pdf

⁴ <https://wmo-cop.github.io/et-wdc/meetings/2017/2017%20ET-WDC%20Meeting/> (cf. Doc 2.1)

MEETING OF THE
EXPERT TEAM ON WORLD DATA CENTRES (ET-WDC)
(NASA Langley, Hampton VA, 1-3 October 2019)

- WDC-1. Provide adequate archiving facilities for observational data for which GAW has global coordination responsibilities.
 - o Action: ET-WDC should establish a catalogue of criteria to define adequacy in an objective manner. Only then can assessments be made.
- WDC-2. Check submitted data for necessary format elements and the availability of comprehensive metadata and reject the submission of data that do not meet these formal criteria.
 - o Action: All WDCs under WMO/GAW need to adopt the core elements of the WIGOS metadata standard (WMDS) as a minimal standard. The WMDS offers a lot of optional metadata elements that significantly increase the possibility of adequate use of observations.
- WDC-3. Perform plausibility and consistency checks on submitted data, flag data problems, and provide feedback to the data providers, when necessary.
 - o Action: Provide full transparency about handling of data submissions and bring this to the attention of ET-WDC. Again, it may be useful to agree on a common metric and standardize this reporting to some degree.
- WDC-4. Continually improve the ease of access to data of known quality by evolving WDC operations in line with the development of WIGOS and with particular attention to the increasing needs for NRT data services.
 - o Action: Explore within ET-WDC to what extent WDCs can benefit from each other with respect to adopting technological but also conceptual advances. Also, to what extent WDCs could benefit from the operational data delivery mechanisms of the GTS/WIS.
- WDC-5. Contribute to the agreement of standards for interoperability of data archives through the Expert Team on GAW World Data Centres (ET-GAW WDCs). This also includes support for the establishment of harmonized guidelines and data formats for the submission and dissemination of atmospheric composition data, metadata and products.
 - o Action: Develop a common data model based on international standards and software tools and guidance for transformations of various data formats. OM_Observations, INSPIRE, C3S CDM and other standards should be considered.
- WDC-6. Support and participate in the establishment of a distributed data management system involving all WDCs, the archives of contributing networks, and GAW/SIS as the central metadata repository for discovery and access purposes.
 - o Action: Develop a work plan with specific milestones and deliverables that can be used to guide the implementation at all WDCs, as well as interested archives of Contributing Networks.

GAW is very diverse, and it always will be. There are many stakeholders involved in atmospheric composition monitoring, research, data management and service delivery. GAW cannot claim to be the owner of much of what is happening in this regard. However, with

- o stringent data quality control,
- o improved interoperability and standardization,
- o archiving of original raw data,

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- improved documentation of observations in GAWSIS and OSCAR/Surface in support of global discoverability and support of the WIGOS metadata standard,

the WDCs can contribute to a more uniform user experience and strengthen WMO in providing adequate services to its Members.