



# Progress Report on the Airborne Composition Standard Variable Name and Time Series Working Groups of the 2017 ESDSWG



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## Abstract

The role of NASA's Earth Science Data Systems Working Groups (ESDSWG) is to make recommendations relevant to NASA's Earth science data systems from users' experiences and community insight. Each group works independently, focusing on a unique topic. Progress of two of the 2017 Working Groups will be presented.

In a single airborne field campaign, there can be several different instruments and techniques that measure the same parameter on one or more aircraft platforms. Many of these same parameters are measured during different airborne campaigns using similar or different instruments and techniques. The Airborne Composition Standard Variable Name Working Group is working to create a list of variable standard names that can be used across all airborne field campaigns in order to assist in the transition to the ICARTT Version 2.0 file format. The overall goal is to enhance the usability of ICARTT files and the search ability of airborne field campaign data.

The Time Series Working Group (TSWG) is a continuation of the 2015 and 2016 Time Series Working Groups. In 2015, we started TSWG with the intention of exploring the new OGC (Open Geospatial Consortium) WaterML 2 standards as a means for encoding point-based time series data from NASA satellites. In this working group, we realized that WaterML 2 might not be the best solution for this type of data, for a number of reasons. Our discussion with experts from other agencies, who have worked on similar issues, identified several challenges that we would need to address. As a result, we made the recommendation to study the new TimeseriesML 1.0 standard of OGC as a potential NASA time series standard. The 2016 TSWG examined closely the TimeseriesML 1.0 and, in coordination with the OGC TimeseriesML Standards Working Group, identified certain gaps in TimeseriesML 1.0 that would need to be addressed for the standard to be applicable to NASA time series data. An engineering report was drafted based on the OGC Engineering Report template, describing recommended changes to TimeseriesML 1.0, in the form of use cases. In 2017, we are conducting interoperability experiments to implement the use cases and demonstrate the feasibility and suitability of these modifications for NASA and related user communities. The results will be incorporated into the existing draft engineering report.

## Airborne Metadata Action Plan

### Mission Statement

The Atmospheric Composition Variable Standard Name Working Group will work to create a list of variable standard names that can be used across all airborne field campaigns in order to assist in the transition to the ICARTT Version 2.0 file format. The overarching goal is to enhance the usability of ICARTT files and the searchability of airborne field campaign data.

### Stakeholders

- Airborne campaign sponsoring agencies
- DAACs
- Airborne science data archival centers
- Atmospheric modeling community
- Airborne measurement community
- End users

### Approach

- 1) Identify and review existing variables for current and past airborne field campaigns.
- 2) Identify and review the variable name lists developed by other groups and variable names accepted by research communities.
- 3) Solicit community about best practices for grouping variables based on existing standards.
- 4) Develop a list of recommended standard names.
- 5) Develop recommendations on a method for creating new standard names.

### Outcomes, Deliverables

A community reviewed and approved list of standard names for existing variables  
A set of recommendations for the creation of new standard names

The Atmospheric Composition Standard Variable Name Working Group (ACWG) discussions began by determining the scope of what this group is trying to accomplish. Without standard variable names, it becomes difficult to search across data sets from field campaigns and various instrument platforms to find similar types of data. This group is not trying to standardize variable names for everyone, mostly just for future NASA airborne field campaigns. And mostly to allow PIs to use their own names and then translate to NASA names upon data submission.

The ACWG has been evaluating several existing variable name lists including CF (Climate and Forecast Metadata) conventions, Tools for Airborne Data (TAD) and CSDMS (Community Surface Dynamics Modeling System) Standard Names. The current plan is to modify the TAD Common Naming System based on feedback from the working group members.

## Time Series Action Plan

### Mission Statement

Demonstrate the feasibility and suitability of TSWG-recommended changes to TimeseriesML (TSML) 1.0 for NASA and related user communities.

### Stakeholders

- EOSDIS and DAACs
- Organizations and communities that are temporal- and feature-oriented
- Hydrologic, environmental, and other science domain communities
- OGC (TSML SWG)

### Approach

- 1) Conduct interoperability experiments (IEs) of proposed modified TSML 1.0 with the 2 existing use cases (UNAVCO GPS and NASA IMERG).
- 2) Develop 2 additional use cases and conduct related IEs for NASA SORCE and NASA/CNES SWOT.
- 3) Engage with OGC TSML Standards Working Group regarding incorporating IEs and submitting the Engineering Report.

### Outcomes, Deliverables

- 1) OGC Engineering Report on NASA and other time series data user needs with regard to TSML 1.0.
- 2) Recommendation to ESDIS (Earth Science Data and Information System Project) regarding TSML and potential adoption by NASA.

The Time Series Working Group (TSWG) reviewed 4 datasets as Interoperability Experiments, SORCE (solar irradiance data), GPM IMERG (satellite precipitation data), SWOT (surface water and ocean topography) and UNAVCO GPS data. Interoperability Experiments are short, structured and approved initiatives performed by OGC members to achieve specific technical objectives. Use Case scenarios, written for the community to understand, provide a description of the problem.

Use Case templates were completed for each of these time series datasets. Some issues arose and discussions for possible future implementations of the OGC TimeseriesML (XML encoding of time series data for easy exchange across information systems) ensued. The OGC spec used just one variable per time. But these use cases used multiple variables per time or multiple elements per time. And sometimes there are missing data or data gaps.

The data gaps issue is going to be addressed in OGC's TimeseriesML v1.2. An Application Profile of TimeseriesML to cover the special requirements needs to be created. The IMERG, GPS and SORCE use cases were combined and presented at the OGC TC (Technical Committee) on Dec 6, 2017 in New Zealand. This presentation focuses on supporting multiple variables per time step so that future versions of TimeseriesML will handle this issue.

Possible advantages of the modifications that the TSWG may make to the Timeseries ML versions are providing data to the community in a standardized form, adding metadata at selected times, adding quality flags, and utilizing a large number of data values per time step. These could be useful for the community as well as NASA.

## Discussion

In the remaining months (until April), the ACWG will ask research communities about their variable naming conventions, collect that feedback and create a list existing variables. A set of recommendations for adding new standard variable names will be created and submitted to the EOSDIS Standards Office.

The TSWG will perform additional analyses of the use cases presented at the OGC TC meeting with some guidance from the TimeseriesML Standards Working Group. After finishing these analyses, incorporate that information into the Engineering Report for the OGC. This report discusses modifications to TimeseriesML that will be useful for NASA and others. And also submit recommendations to ESDIS (Earth Science Data and Information System) concerning potential adoption by NASA.

## Summary

There is active participation from several (but different) people on the telecons in both Working Groups (WGs). Significant progress has been made by both groups in preparing recommendations to ESDIS (Earth Science Data and Information System Project). These will be submitted at the face-to-face meeting in April 2018.

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