

Innovative Air Quality Services: The TOAR Database Infrastructure

abstract for theme “Data exchange for earth system monitoring and prediction”

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In a community effort involving more than 200 scientists from over 60 countries, the Tropospheric Ozone Assessment Report (TOAR) [1, 2] has produced the first comprehensive analysis of global tropospheric ozone changes. A major factor of its success and widespread reception is the extensive database of global surface observations, which has been built with multi-faceted metadata and user-friendly web services in the spirit of Open Data and the FAIR principles. TOAR data are made available via a graphical web interface [3], a REST service [4] and as aggregated products on PANGAEA [5] together with software tools for data analysis.

In the 2nd phase of TOAR, the database is now complemented with data from OpenAQ [6] (the world’s leading effort to collect global air pollutant measurements in near real-time) and combined with high-resolution geographic data, and weather information in order to characterize individual measurement locations and regional air pollution patterns. The metadata is enriched by blending controlled vocabulary and ontologies with less constrained full text fields. Furthermore, an automatic flagging system for quality assurance is installed. TOAR data users are provided with a flexible and powerful infrastructure for data access and online analysis. Ensuing performance issues are addressed through exploration of modern concepts and tools for distributed workflows.

[1] <http://www.igacproject.org/activities/TOAR>

[2] <https://collections.elementscience.org/toar>

[3] <https://join.fz-juelich.de/>

[4] <https://join.fz-juelich.de/services/rest/surfacedata/>

[5] <https://doi.pangaea.de/10.1594/PANGAEA.876108>

[6] <https://openaq.org/>