TOAR Data User Guide #1

The TOAR Data Portal

toar-data.org

Version 1.0 | 05 August 2021

Forschungszentrum Jülich GmbH
ESDE | JSC - FSD
52425 Jülich

Document status

Created by:	Amirpasha Mozaffari, Mathilde Romberg	03 December 2021
Reviewed and approved by:	Martin Schultz	18 August 2021
Released by:	Mathilde Romberg	23 August 2021

Revision History

Version	Date	History
1.0	03 December 2021	Initial Version

Content

1 Introduction

The TOAR[1] data portal is a central access point for a variety of ozone data. Users can access data through the portal, contribute additional resources to it, or engage in the TOAR-II activity of the International Global Atmospheric Chemistry (IGAC) project[2].

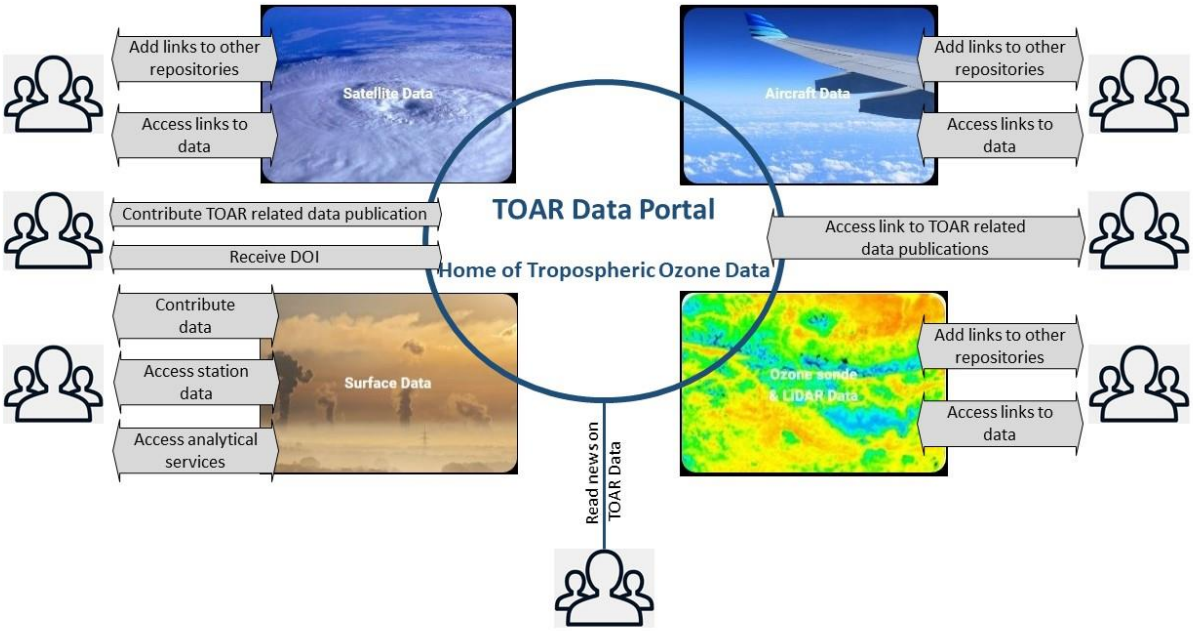

Figure 1: User interaction with the components of the TOAR data portal

Figure 1 shows the five categories of data provided by the portal: satellite, aircraft, surface, and ozone sondes and LiDAR sensors measured data as well as TOAR related data publications. Links to data collections in these categories are provided. Users are welcome to provide links to other repositories. For the surface data, which is collected and harmonised in the TOAR database by JSC[3], users can contribute measured surface data to be included in the TOAR database. Except for the surface data all other data sources are the responsibility of the respective organisations.

The portal also offers to contribute to TOAR science by joining the group and analysing data to support the ozone assessment report under development. Published data sets compiled for these analyses can be accessed through a link provided by the TOAR data portal.

In the following, the functions of the TOAR data portal are explained in more detail.

[1] Tropospheric Ozone Assessment Report

[2] https://igacproject.org/activities/TOAR/TOAR-II

[3] Jülich Supercomputing Centre (fz-juelich.de/ias/jsc)

2 Data Access

The TOAR Data Portal links to several sources to simplify the search for ozone data. The links to the data sources are grouped into four categories where currently the following data is connected:

1. Satellite Data
   - NOAA STAR
     National Oceanic Atmospheric Administration's STAR portfolio contains information on products, services, and tools that STAR scientists develop and maintain.
   - OMI-SAO
     The Ozone Monitoring Instrument (OMI) instrument can distinguish between aerosol types, such as smoke, dust, and sulfates, and measures cloud pressure and coverage, which provides data to derive tropospheric ozone.
   - Goddard OMI/MLS
     As members of the Aura Ozone Monitoring Instrument (OMI) science, the team develops several tropospheric ozone data products from OMI combined with Aura Microwave Limb Sounder (MLS).
   - OMI-RAL
     This dataset provides estimates of the monthly mean values of the ozone concentration, mixing ration and mole content over the globe from a large set of satellite sensors.
   - IASI+GOME2 multispectral observation of ozone
     The Aeris portal provides the multispectral observation of ozone at the lowermost troposphere and above from synergism of IASI thermal infrared and GOME-2 ultraviolet measurements.
   - ESA CCI Ozone
     The Ozone_cci project has been part of the ESA Climate Change Initiative (CCI) programme since it was initiated in early 2010.
2. Aircraft Data
   - IAGOS Data Portal
     In-service Aircraft for a Global Observing System (IAGOS) is a European Research Infrastructure for global observations of atmospheric composition from commercial aircraft.
   - ATom
     It is a dataset that provides greenhouse gasses and human air pollution conducted by NASA's Atmospheric Tomography (ATom) mission.
   - ACT-America: L3 Merged In Situ Atmospheric Trace Gases and Flask Data
     The ACT-America airborne dataset provides merged data products acquired during flights over the central and eastern United States as part of the Atmospheric Carbon and Transport – America (ACT-America) project.
3. Surface Data
   - TOAR database infrastructure (landing page: https://toar-data.fz-juelich.de)
     The TOAR database at Forschungszentrum Jülich collects hourly data of long-term surface air quality measurements from over 10,000 stations globally.
4. Ozone Sonde and LiDAR Data
   - WOUDC
     The World Ozone and Ultraviolet Radiation Data Centre (WOUDC) is one of six World Data Centres which are part of the Global Atmosphere Watch programme of the World Meteorological Organization.
   - SAHDOZ
     The Southern Hemisphere ADditional OZonesondes (SAHDOZ) is an archive of sub/tropical and remote ozone-sonde data.

- NDACC
  The International Network for the Detection of Atmospheric Composition Change (NDACC) is composed of more than 70 globally distributed, ground-based, remote-sensing research stations with more than 160 currently active instruments.
- TOLNet

  Tropospheric Ozone Lidar Network (TOLNet) provides time/height ozone measurements from near the surface to the top of the troposphere to describe in high-fidelity their spatio-temporal distribution.

5. TOAR Data Publications
   - Access to the TOAR data publication available in B2SHARE[4] which houses the repository of air quality and meteorological data sets related to global tropospheric ozone.

[4] https://b2share.fz-juelich.de/communities/TOAR

3 Contribute Data to TOAR

All information about the current Tropospheric Ozone Assessment Report activity can be found on the TOAR-II web page: https://igacproject.org/activities/TOAR/TOAR-II. You may want to sign-up for the TOAR-II mailing list (http://eepurl.com/gU7JIX) to keep up to date.

3.1 Contribute access to a repository

If there is a repository with relevant ozone data which should be linked from the TOAR data portal, please get in touch with us through the upper contact form at https://toar-data.org/contribute/#contribute_toar_data.

3.2 Contribute surface ozone data to the TOAR database

Time series of surface ozone observations and accompanying meteorological information or precursor data form a key part of the TOAR trend assessment. The TOAR database strives to compile a complete picture of global surface ozone observations. Therefore, we would be pleased to include your data in this collection. We provide in return the recognition of your contribution to a large international assessment activity, a set of data checking and quality control plots which may help you to identify potential issues with your data set, and a user-friendly web interface that will allow visualisation and comparison of data sets. We guarantee that you maintain full ownership and control over your data and that your contribution will be duly acknowledged and cited in the TOAR analyses. If you want to have your data set being published in its curated form, we take care of it and provide you with the corresponding DOI.

In order to be of use for TOAR we require that all time series submitted to us originate from quality-controlled measurements using commonly accepted standard instrumentation (i.e. we do not accept data from low cost sensors), that they are reported with at least hourly time resolution, and that they cover at least two years of measurement or two “ozone seasons”. Data from shorter field campaigns may be acceptable if they originate from a data-sparse region. Also, historic data (prior to 1990) may be acceptable with coarser time resolution. If in doubt, please contact us using the general contact form at https://toar-data.org/contact/.

Time series data should be compiled according to the format given in the TOAR_UG_Vol05_Data_Submission_Guide and submitted through the contact form[5] of https://toar-data.org/contribute/#contribute_toar_data.

[5] the contact form beneath the headline „Time series of additional observations for the TOAR database”