

TOAR

tropospheric
ozone
assessment
report

TOAR-II data portal for global measurements of ozone and its precursors



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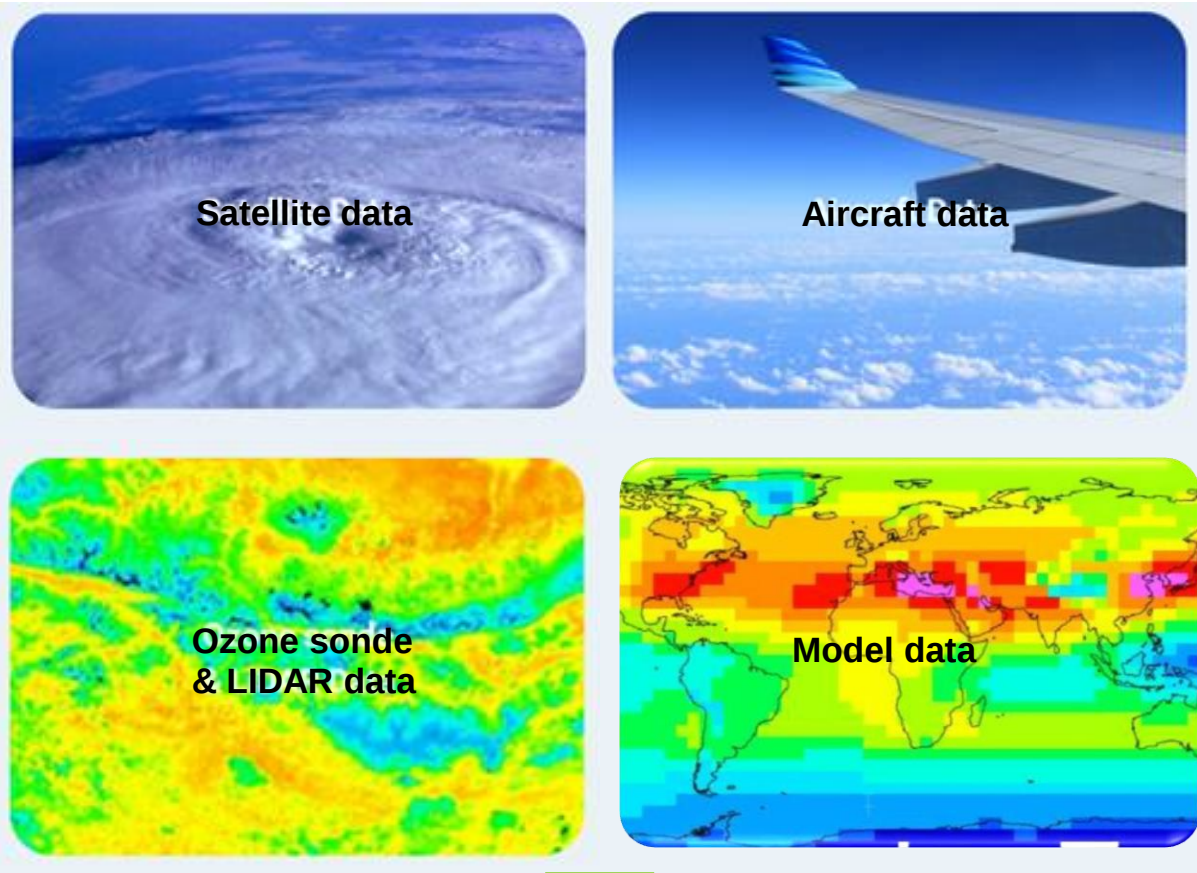
CEOS Atmospheric Composition VC#18
2022-03-17



TOAR-II Data management



TOAR database



TOAR data portal

The TOAR-II Data Portal

a one-stop portal for global ozone observations



TOAR:DATA
PORTAL

Home

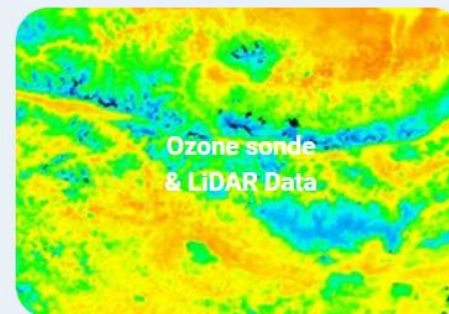
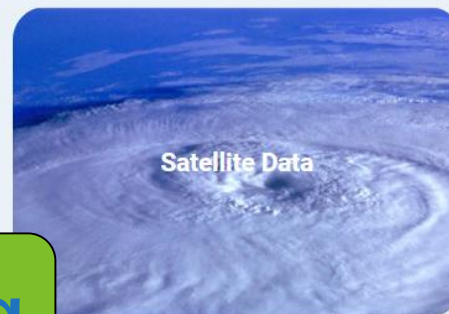
News

Data Access ▾

Get In Touch ▾

TOAR Data Portal

The Home of Tropospheric Ozone Data



Latest News

<https://toar-data.org>



The TOAR-II Data Portal

find ozone data



TOAR DATA PORTAL Home News Data Access ▾ Get In Touch ▾



NOAA STAR

Welcome to the STAR portfolio. This portfolio contains information on products, services, and tools that STAR scientists develop and help maintain. It helps to ensure that there are adequate requirements and resources for STAR's mission science activities to meet NOAA user requirements for upcoming satellite missions. ... [More](#)

 REST:API  Contact  License



OMI-S

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. ... [More](#)

 REST:API  Contact  License

links to original web site

The TOAR-II Data Portal

Contribute descriptions and links to data



TOAR DATA PORTAL

Home News Data Access ▾ Get In Touch ▾ About ▾

Links and descriptions of other data centres or repositories for inclusion in the TOAR data portal

Add an entry to the TOAR data portal via the following online form, or download the **registration-form**, with explanations, fill it in and send it back to us. You can also use these forms to request an update to an existing entry (please indicate this) or inform us about an error in one of the listed entries.

[Repository registration form](#)

Name Email

Data Category

https://toar-data.org/contribute/#contribute_toar

Web URL of data set description

Logo for the dataset (PNG,or SVG) , Maximum file size 2 MB.
Durchsuchen... Keine Datei ausgewählt.



The TOAR Database in a nutshell

Contents:

- Harmonized and quality-controlled surface ozone measurements and related data from all over the world (one of the largest collections of global air quality data)
- Globally consistent metadata to describe station characteristics and aid the interpretation of ozone data

Purpose:

- To provide globally consistent metrics for analyses of health, vegetation, and climate impacts from ozone air pollution

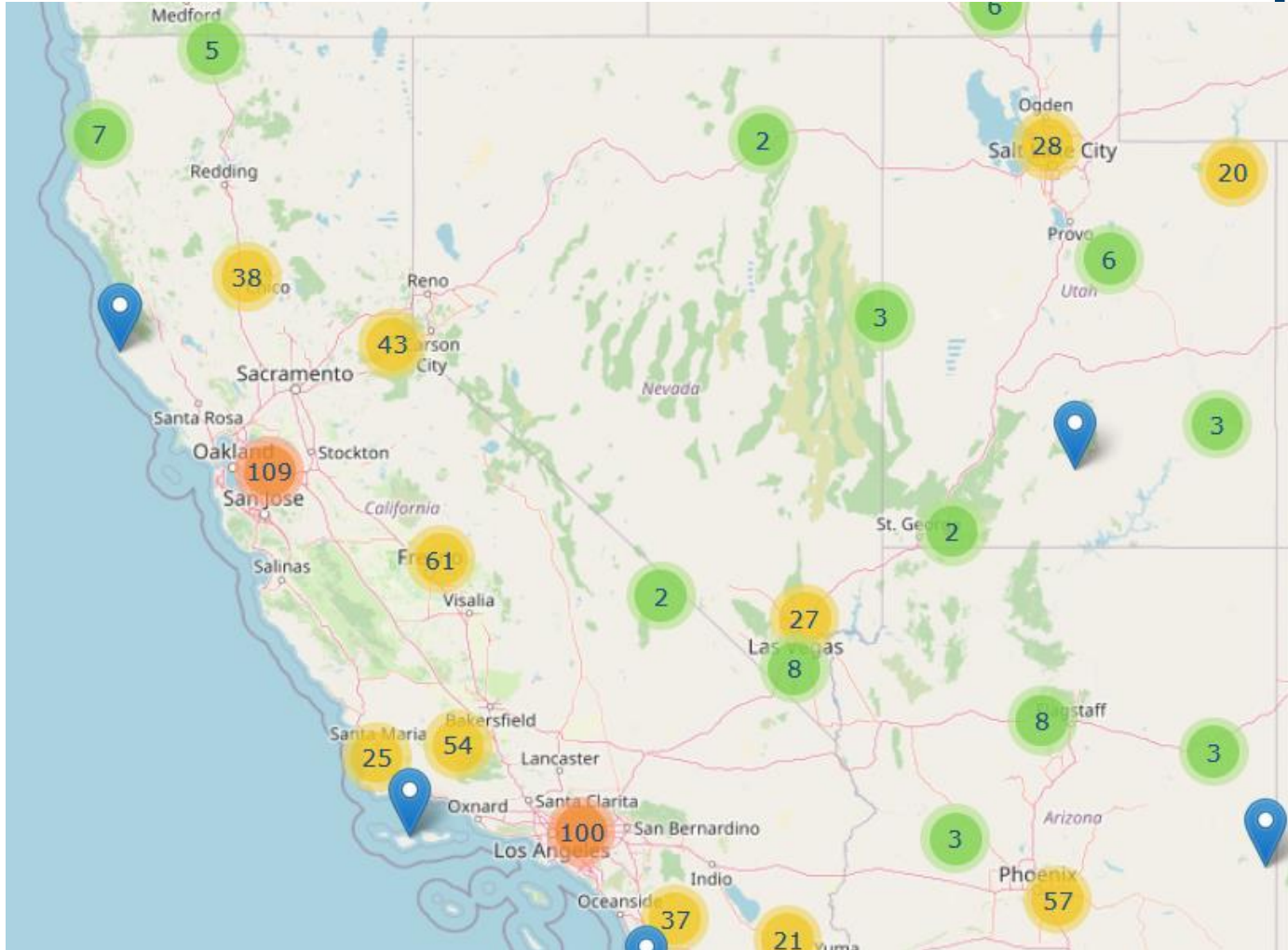
Data sources:

- Various environmental agencies and programs
- Universities and individual researchers
- OpenAQ (in version 2)
- COSMO (version 1) and ERA-5 (version 2) reanalysis data



The TOAR Database

a harmonized and documented collection of global surface measurements of ozone and its precursor



13,257 stations

103,735 time series

~12,000,000,000 data points

Ozone, NO, NO₂, CO, PM_{2.5}, PM₁₀, ethane, propane, benzene, toluene, irradiance, cloud cover, T, RH, q, u, v, wdir, wspeed, Rn

~40 contributing networks and research groups

harmonized data and metadata
enhanced station metadata

1970 – 2013
some datasets extended to 2017



Main changes in the TOAR Database version 2

- PostGIS database (supports geographic queries)
- Improved metadata schema:
 - Data versioning & documented QC
 - Better attribution to PIs, providers, etc (roles)
 - Use of controlled vocabulary
 - More flexibility to handle provider-specific metadata
 - Automated workflows including statistical QC
 - Station characterisation from higher resolution geospatial data
- Clear data license and data use policy (CC-BY 4)
- Provision of hourly data



The TOAR Database documentation

<https://toar-data.fz-juelich.de>



TOAR
tropospheric
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report
Phase II



TOAR Data User Guide #3

The TOAR Database User Guide

Version 1.0 | 25 August 2021



Forschungszentrum Jülich GmbH
ESDE | JSC - FSD
52

User guides

TOAR
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Phase II



TOAR Data Technical Guide #2

TOAR Data Input and Processing

Version 1.0 | 30 August 2021



Forschungszentrum Jülich GmbH
ESDE | JSC - FSD

Technical guides

Detailed documentation
(gitlab pages)

toardb_fast

TOAR II

Models

Composite

Name	Type	Description	Required
metadata		all metadata available to the data	Yes
data	[Data]	the data itself	Yes

Contact

Name	Type	Description	Required
id	integer	for internal use only	Yes
person	Person	A contact is either a person or an organisation	No
organisation	Organisation	A contact is either a person or an organisation	No

Coordinates

Name	Type	Description	Required
lat	number	latitude coordinate of station (decimal degrees_north). This is our best estimate of the station location which is not always identical to the official station coordinates (see potential changelog entry).	Yes
lng	number	longitude coordinate of station (decimal degrees_east). This is our best estimate of the station location which is not always identical to the official station coordinates (see potential changelog entry).	Yes
alt	number	altitude of station (in m above sea level). This is our best estimate of the station altitude, which is not always identical to the reported station altitude, but frequently uses the elevation from google earth instead (see potential changelog entry).	Yes

TOAR II Database

Models

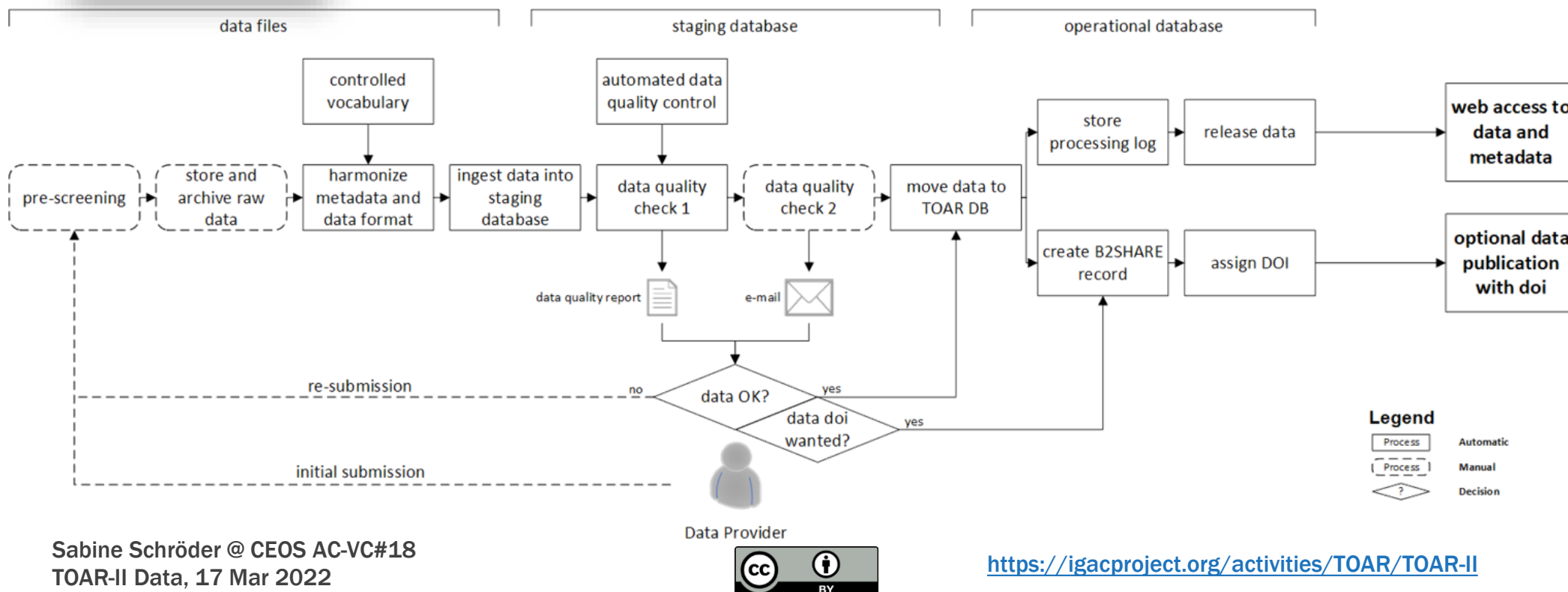
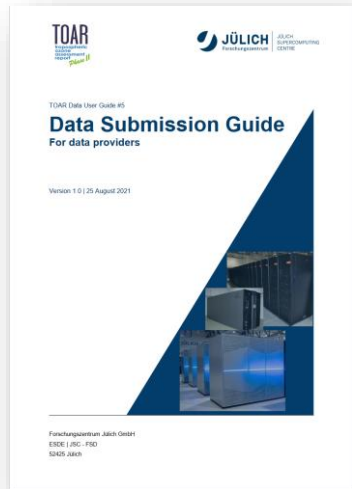
- Composite
- Contact
- Coordinates
- Data
- Organisation
- Person
- Stationmeta
- StationmetaAnnotation
- StationmetaAuxDoc
- StationmetaAuxImage
- StationmetaAuxUrl
- StationmetaChangelog
- StationmetaGlobal
- StationmetaRole
- Timeseries
- TimeseriesAnnotation
- TimeseriesChangelog
- TimeseriesProgramme
- TimeseriesRole
- Variable
- Geolocation URLs

Controlled Vocabulary

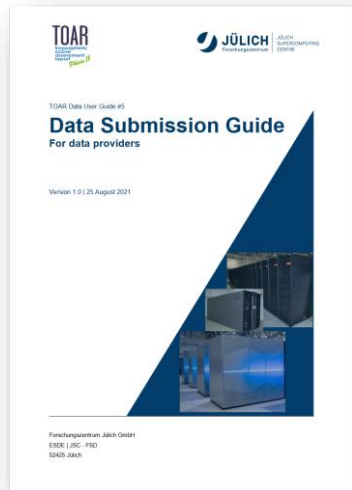
- Role Code
- Role Status
- Kind Of Annotation
- Kind Of Organization
- Data Access Right
- Sampling Frequency



TOAR-II Database – data submission workflow



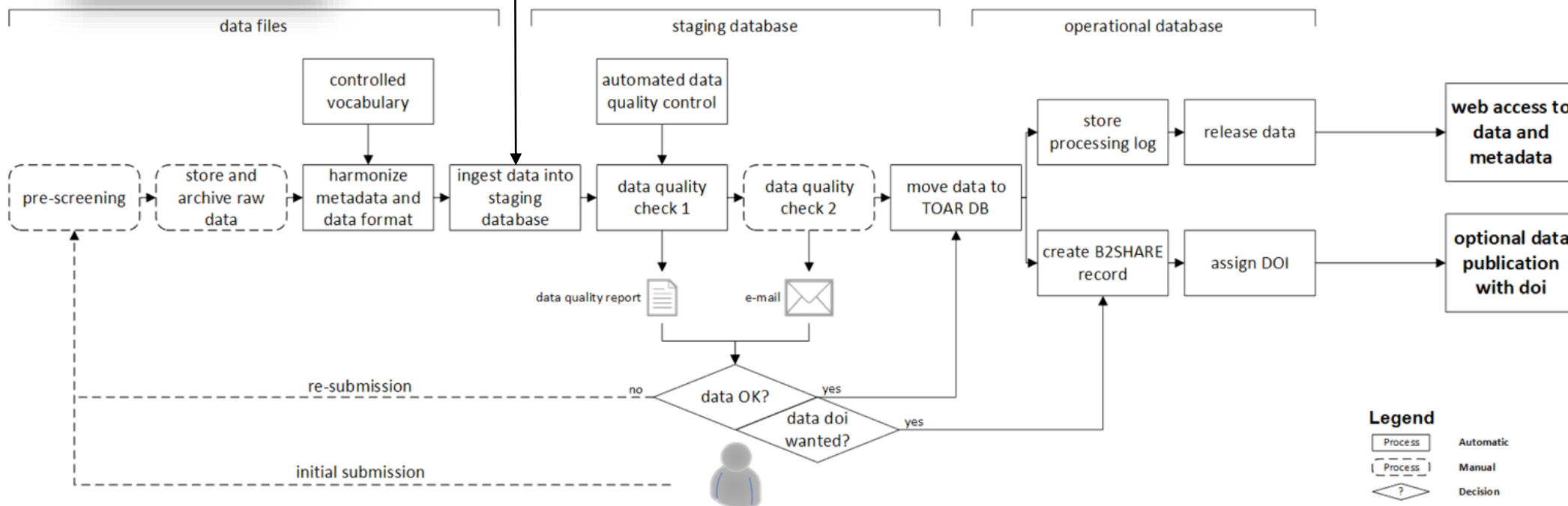
TOAR-II Database – enrichment of metadata



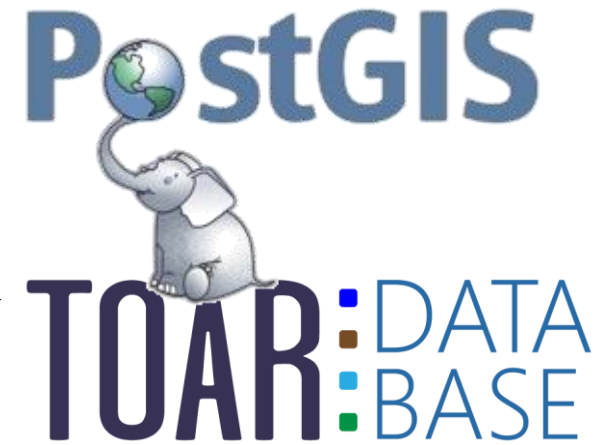
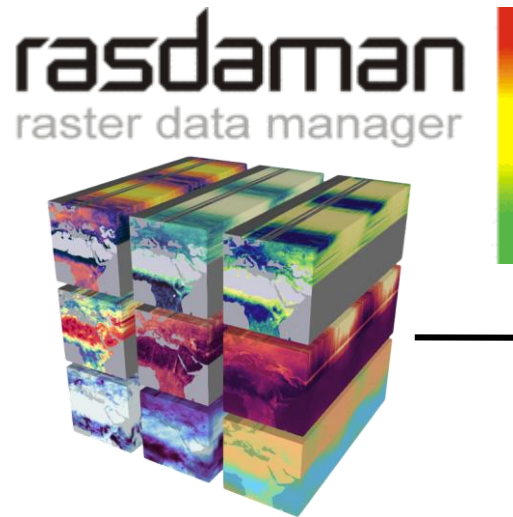
„Station characterisation from
higher resolution geospatial data“

→ GEO-PEAS

(GEOdata Point Extraction and Aggregation Service)



TOAR-II Database – enrichment of metadata



TOAR-II Database – enrichment of metadata

mean_srtm_alt_90m_year1994
mean_srtm_alt_1km_year1994
max_srtm_relative_alt_5km_year1994
min_srtm_relative_alt_5km_year1994
stddev_srtm_relative_alt_5km_year1994

climatic_zone_year2016

htap_region_tier1_year2010

dominant_landcover_year2012
landcover_description_year2012

dominant_ecoregion_year2017
ecoregion_description_year2017

distance_to_major_road_year2020

mean_population_density_250m_year2015
mean_population_density_5km_year2015
max_population_density_25km_year2015
mean_population_density_250m_year1990
mean_population_density_5km_year1990
max_population_density_25km_year1990

mean_nox_emissions_10km_year2015
mean_nox_emissions_10km_year1990

mean_nightlight_1km_year2013
mean_nightlight_5km_year2013
max_nightlight_25km_year2013
max_nightlight_25km_year1992

Thank you for your attention

TOAR data portal

<https://toar-data.org>

TOAR database

<https://toar-data.fz-juelich.de>

Additional material



TOAR Data Infrastructure

Mission Statement

The Tropospheric Ozone Assessment Report (TOAR) data centre is the central hub for data access in support of research assessing the impacts of ozone air pollution on human health, vegetation, and climate. Besides maintaining a [data portal](#) with links to ozone data sets from research organisations all over the world, we operate a database of harmonised surface ozone measurements and related data. This is one of the largest collections of quality controlled air pollution measurements in the world. All data in the database are easily accessible through open, freely available and well documented web services. The TOAR data centre team is committed to the FAIR principles and aims to achieve the highest standards with respect to data curation, archival, and re-use.

[Terms of Use](#)

TOAR V2

TOAR V2 supports the [second phase](#) of the TOAR activity

Services

- [REST API to access TOAR V2](#)
- [DO3SE \(beta version\)](#) REST API service for flux-based vegetation damage assessment
- [toarstats \(beta version\)](#) REST API service for statistics on TOAR data
- [GEO-PEAS -- under development \(only internally \(VPN\) available\)](#) REST API to our GEOdata Point Extraction and Aggregation Service

Documentation

User Guides

- [Data Portal \(pdf\)](#) - Brief Introduction
- [Database \(pdf\)](#) - Content, access, variables, metadata and FAIR D
- [Data Submission \(pdf\)](#) - Data contributions' HowTo

Technical Guides

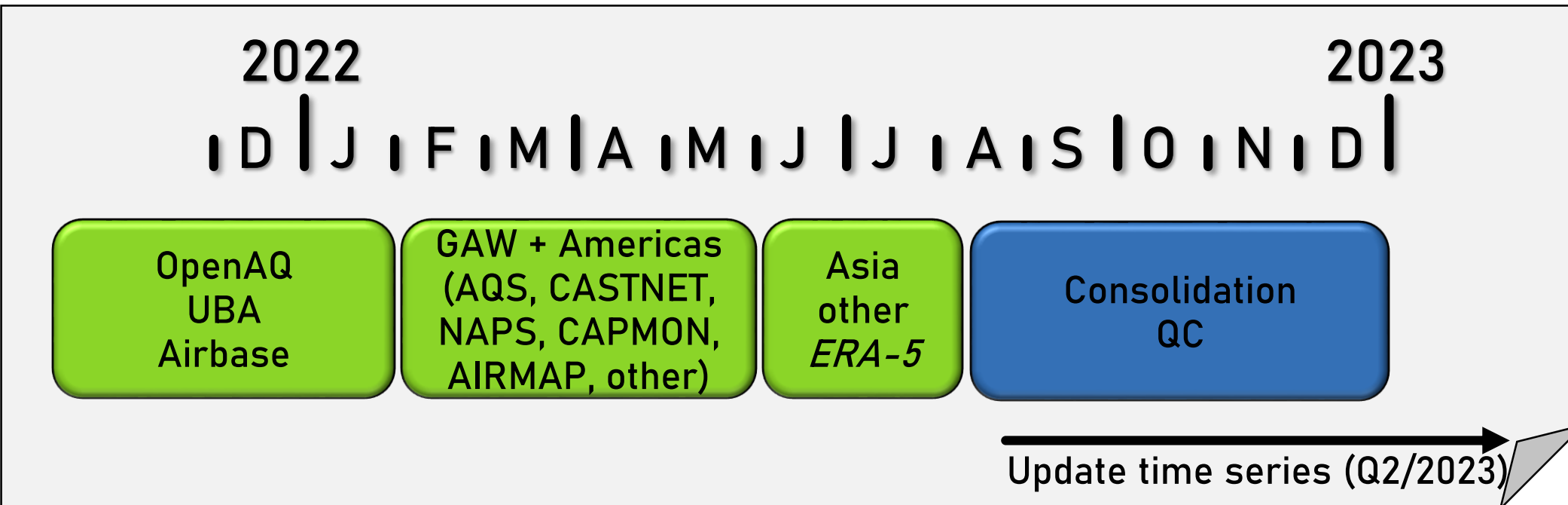
- [Infrastructure \(pdf\)](#) - setup of systems and services
- [Data Processing \(pdf\)](#) - data harmonisation and curation
- [OAIS Mapping \(pdf\)](#) - TOAR Data Infrastructure and the Open Archival Information System reference model
- [TOAR DB Reference \(pages\)](#) - Models, Controlled Vocabulary and Rest API

General Guides

- [Glossary \(pdf\)](#)
- [Ontology \(format: OWLdoc or xml\)](#)

<https://toar-data.fz-juelich.de>

TOAR-II Database – data ingestion timeline



Status: 2022-01-21

