TOAR
tropospheric
ozone
assessment
report

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


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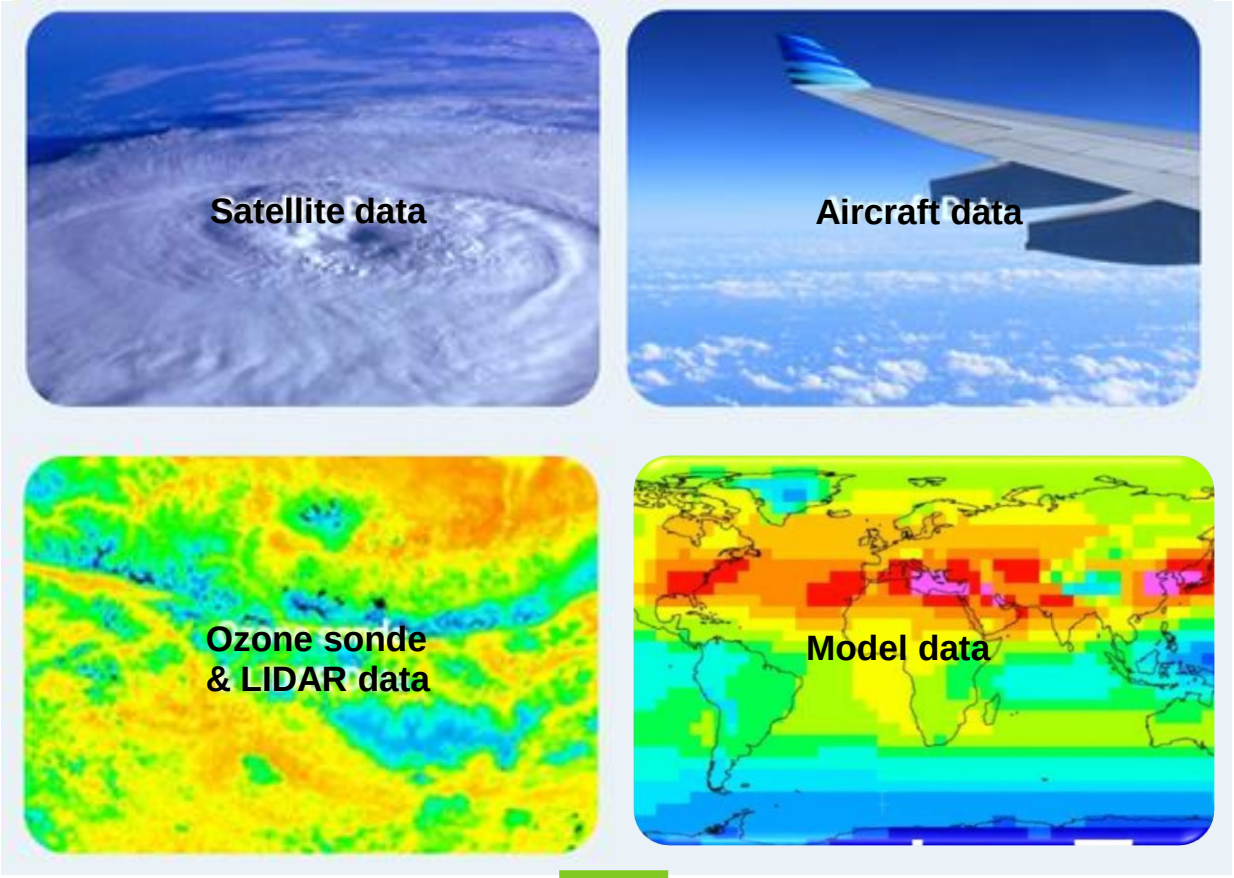
CEOS Atmospheric Composition VC#18
2022-03-17

INTERNATIONAL GLOBAL ATMOSPHERIC CHEMISTRY
IGAC

JÜLICH Forschungszentrum

TOAR-II Data management



TOAR database

TOAR data portal

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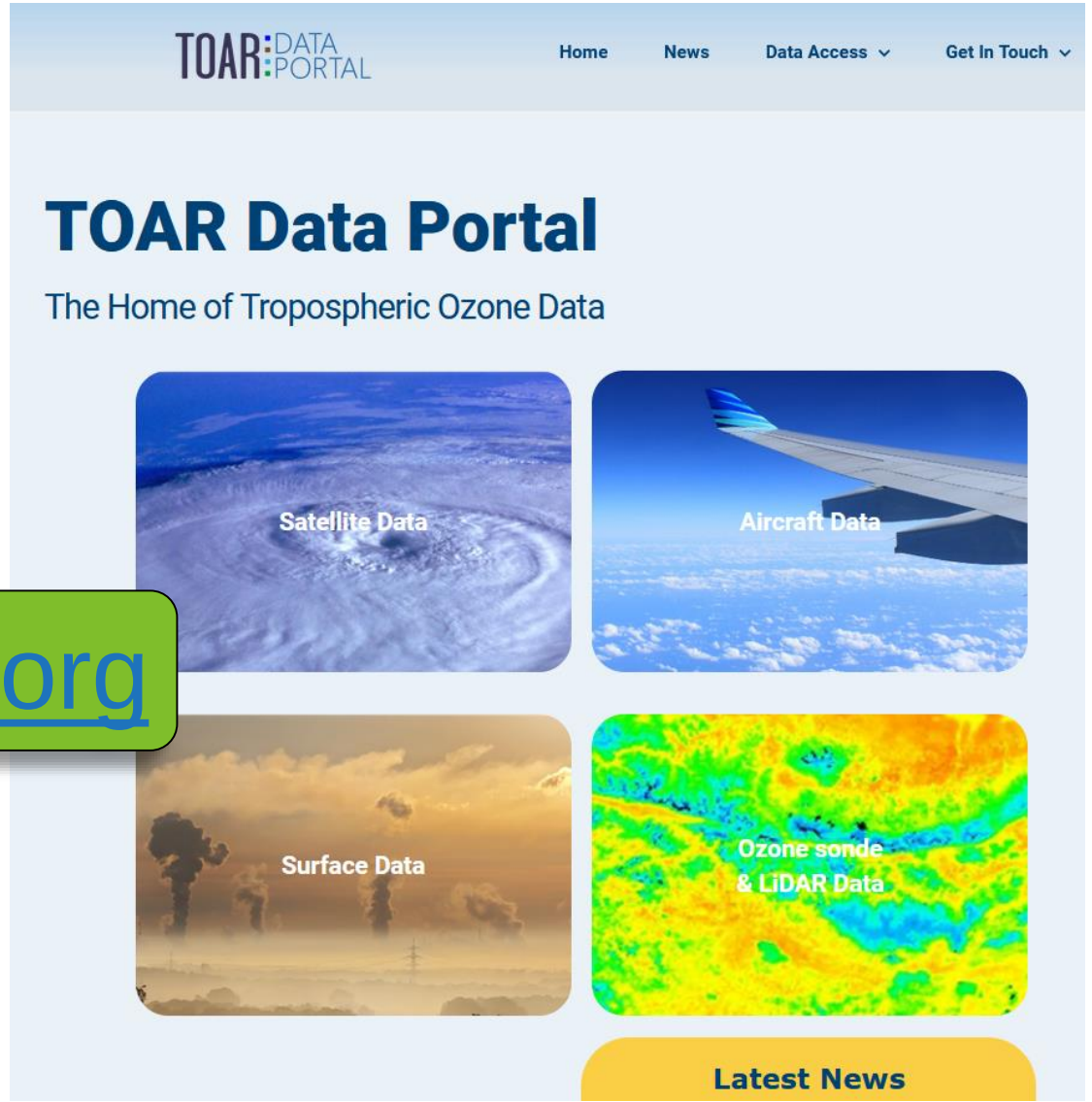
TOAR-II Data, 17 Mar 2022

https://igacproject.org/activities/TOAR/TOAR-II

The TOAR-II Data Portal

a one-stop portal for global ozone observations



https://toar-data.org

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The TOAR-II Data Portal

find ozone data

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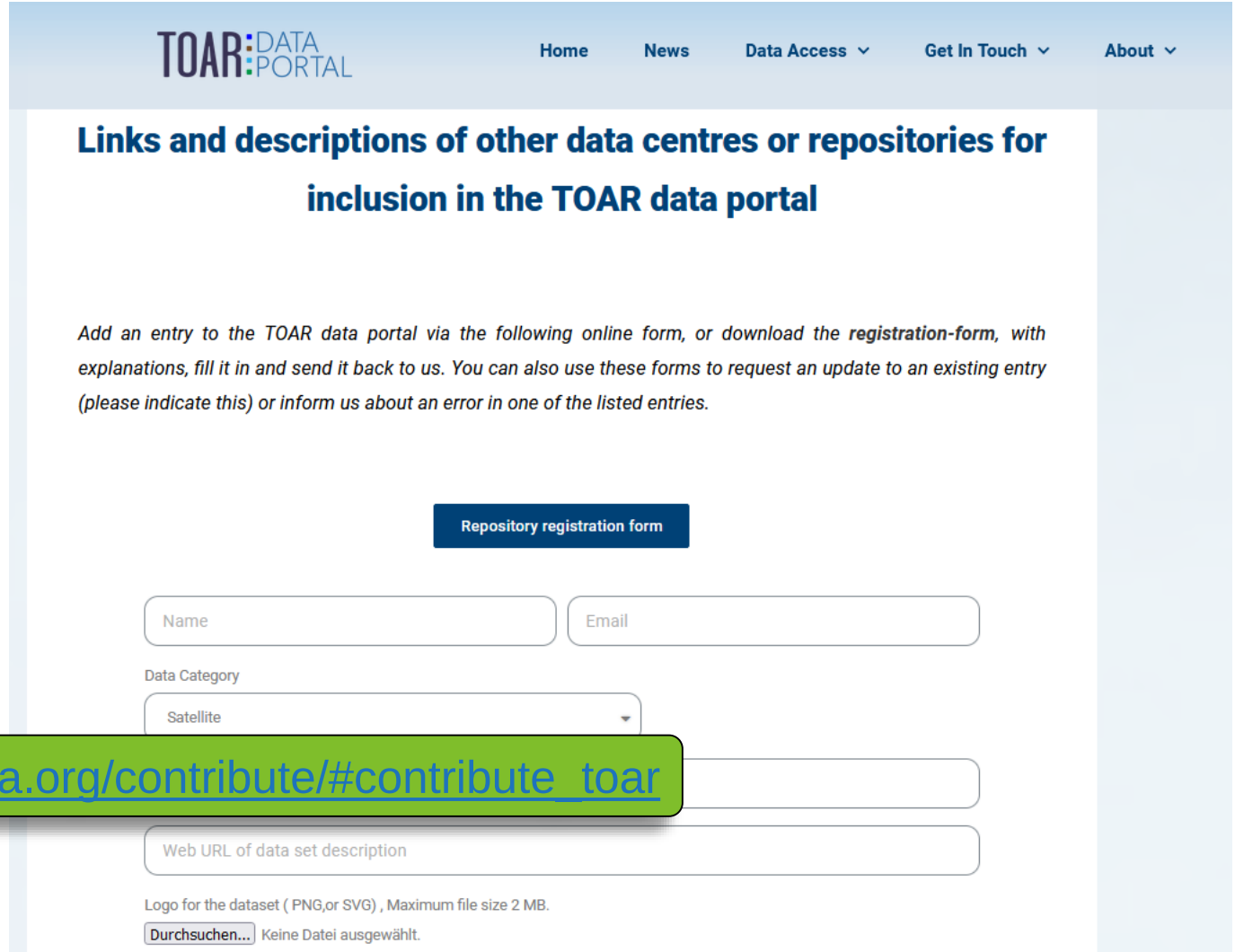
The TOAR-II Data Portal

Contribute descriptions and links to data



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

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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

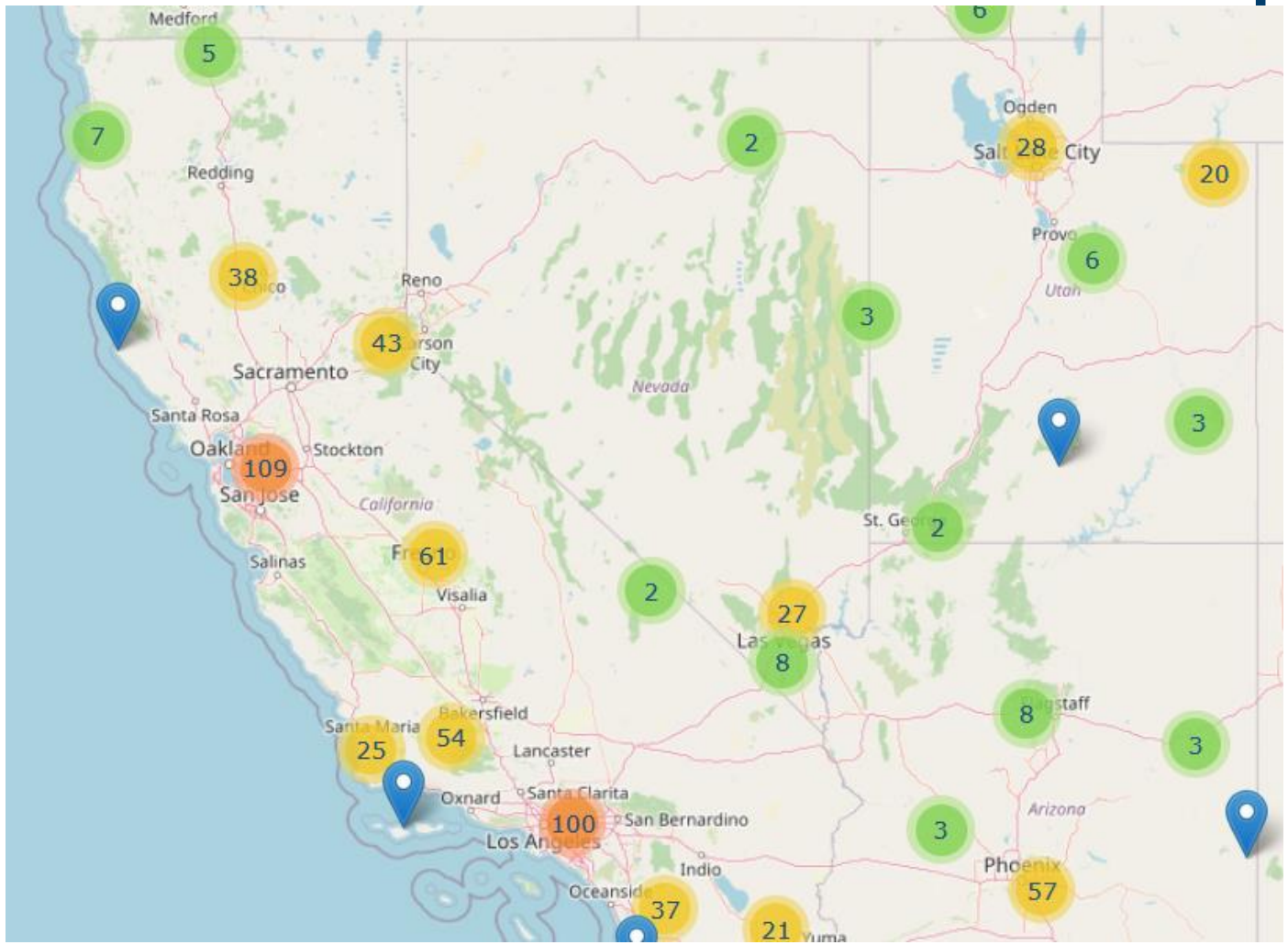
→ OpenAQ (in version 2)

→ COSMO (version 1) and ERA-5 (version 2) reanalysis data

https://igacproject.org/activities/TOAR/TOAR-II

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, PM2.5, 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

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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

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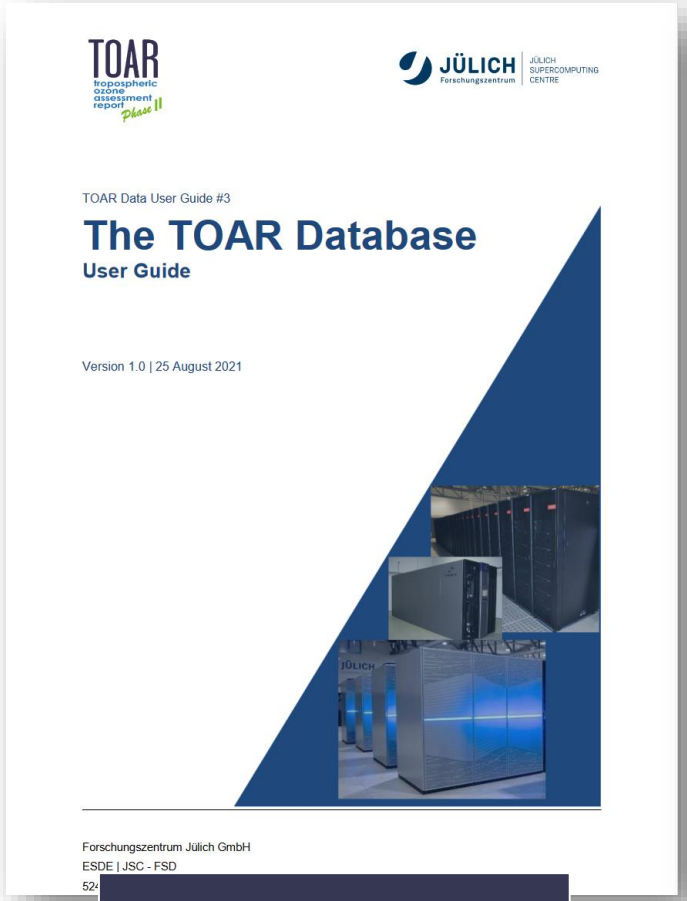
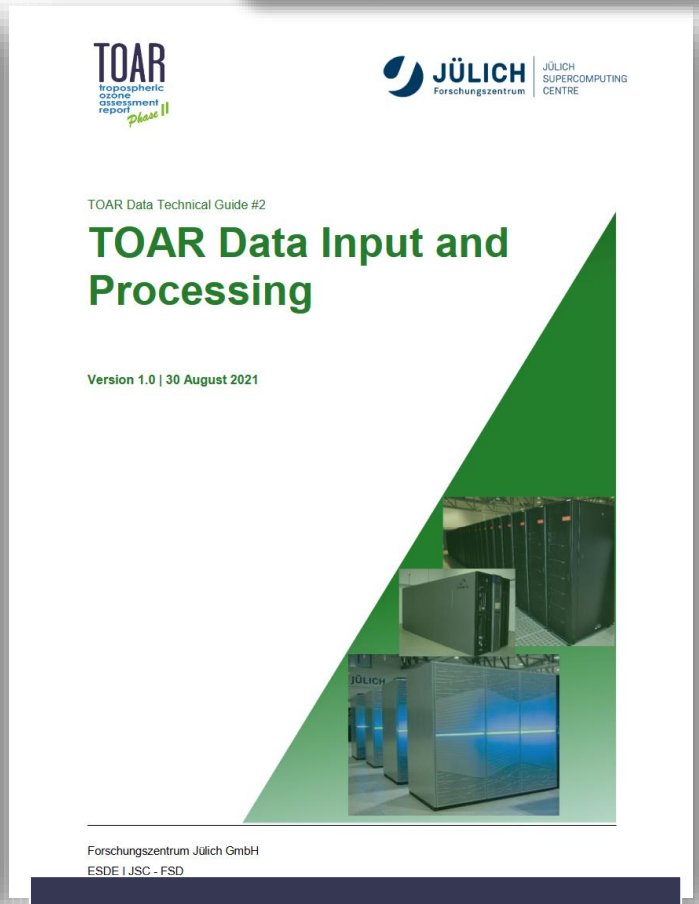
The TOAR Database documentation

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

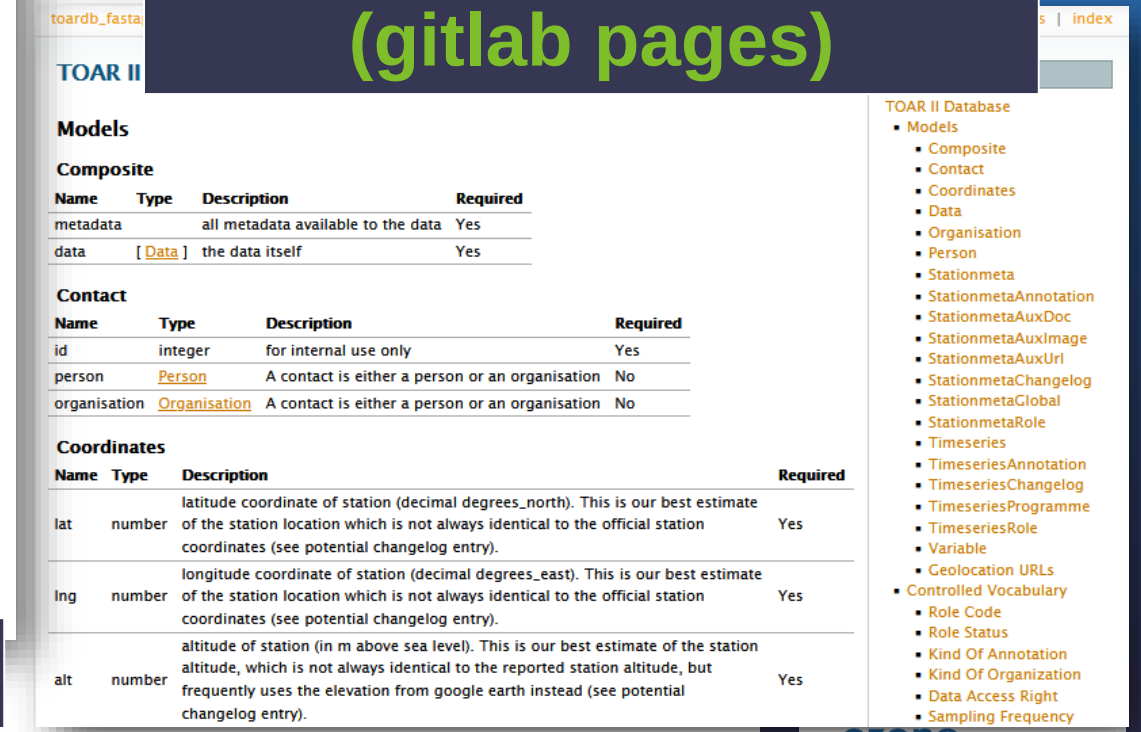


User guides



Technical guides

Detailed documentation (gitlab pages)



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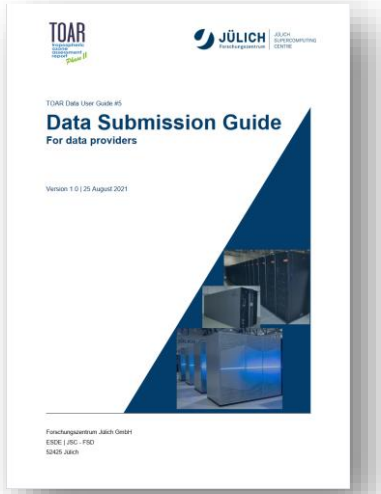
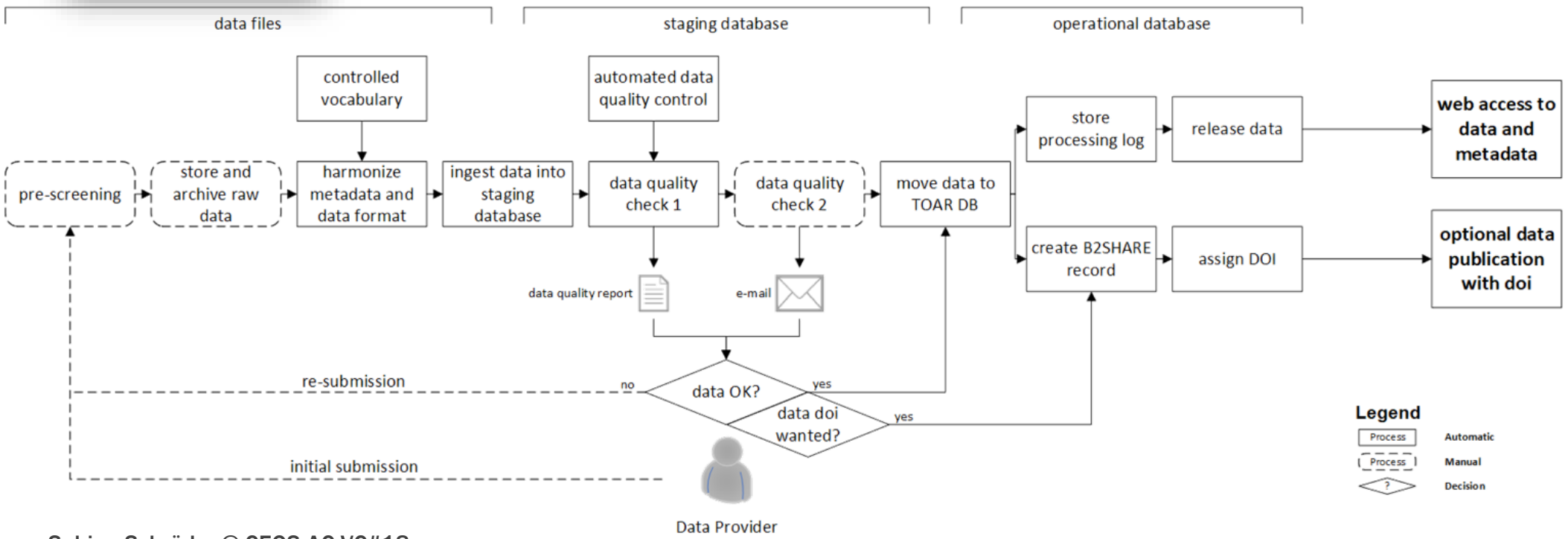
TOAR-II Database – data submission workflow





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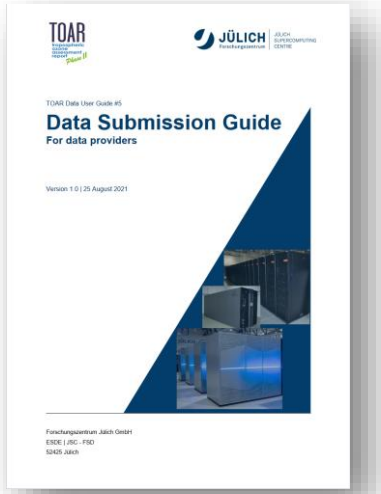
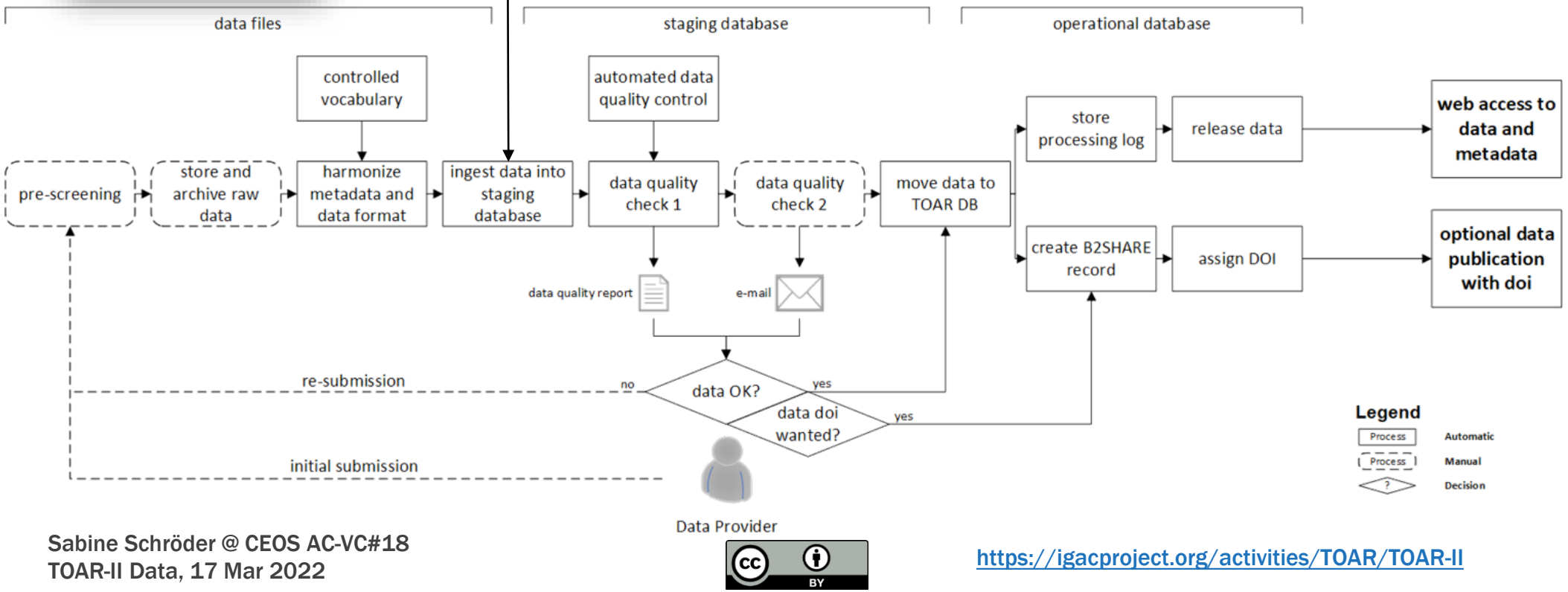
TOAR-II Database – enrichment of metadata

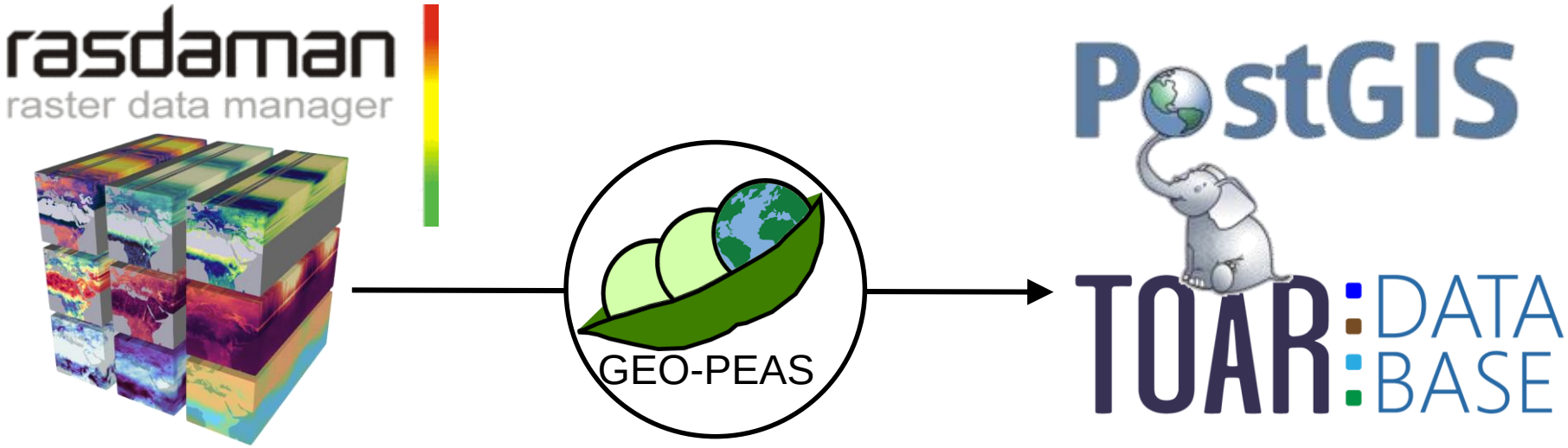


„Station characterisation from higher resolution geospatial data“
→ GEO-PEAS
(**GEO**data **P**oint **E**xtraction and **A**ggregation **S**ervice)



https://igacproject.org/activities/TOAR/TOAR-II

TOAR-II Database – enrichment of metadata



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TOAR tropospheric ozone assessment report Phase II

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

https://igacproject.org/activities/TOAR/TOAR-II

TOAR tropospheric ozone assessment report Phase II

Thank you for your attention

TOAR data portal

https://toar-data.org

TOAR database

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

https://igacproject.org/activities/TOAR/TOAR-II

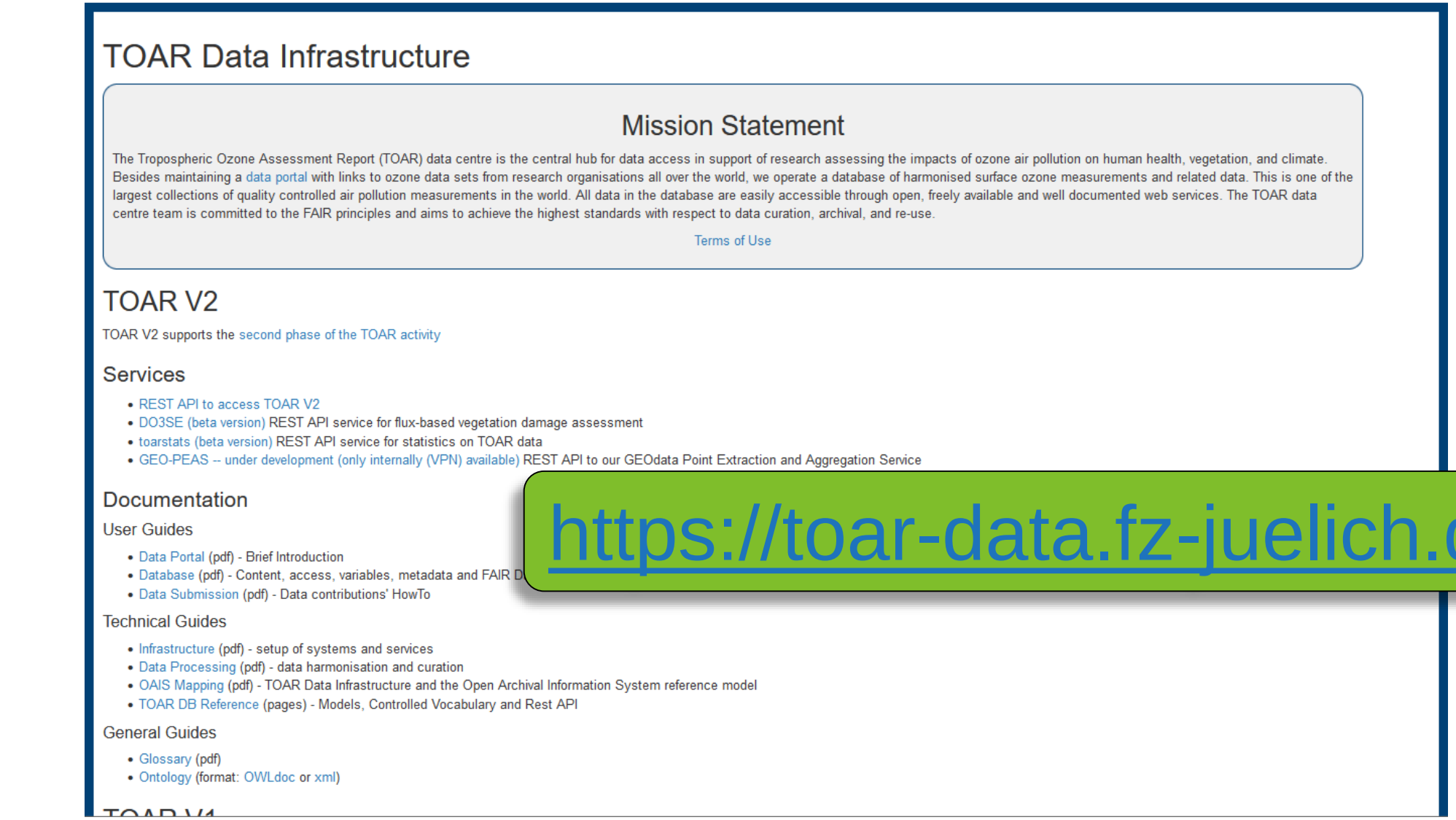
TOAR tropospheric ozone assessment report Phase II

Additional material

https://igacproject.org/activities/TOAR/TOAR-II

TOAR tropospheric ozone assessment report Phase II

The TOAR Database Infrastructure



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

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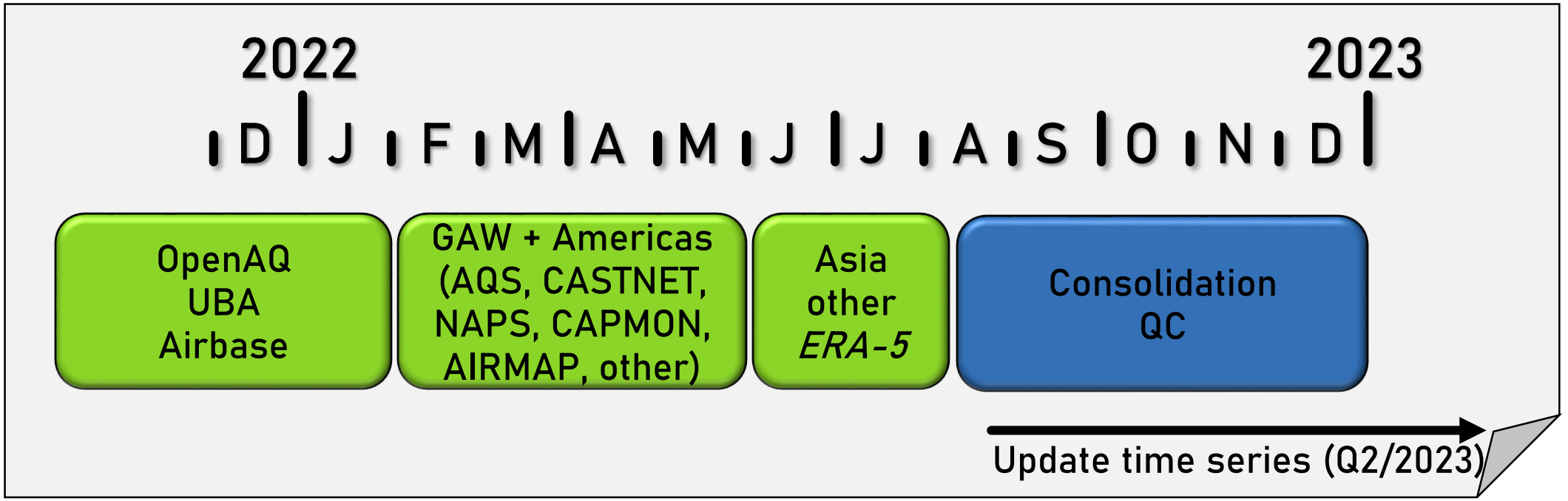
TOAR-II Database – data ingestion timeline



Status: 2022-01-21

https://igacproject.org/activities/TOAR/TOAR-II