World Data Centre for Aerosol: Status & News 2014

Fiebig, M.; Fjæraa, A.M.; Tørseth, K.
WDCA at the Norwegian Institute for Air Research

NILU Norsk institutt for luftforskning

WMO GAW

Items Covered

- WDCA setup, features, services
- WDCA Status: Key numbers and figures
  - Stations Reporting
  - Access Statistics
  - Geographical Coverage
- Database upgrade (still ongoing)
- Aerosol vocabulary for WIS, status
- Further Activities
  - GAWTEC course
  - Trend papers for IPCC AR5
  - Making ground station data usable for satellite validation
- Reports on relevant issues
  - Ongoing discussion on data policy and «substantial»
  - Ongoing discussion on use of DOIs

The WDCA Homepage: www.gaw-wdca.org

Web-Interface

- Co-hosted with other frameworks (EMEP, InGOS, GUAN, …) in EBAS relational database.
- Offers atmospheric variability and instrument uncertainty (precision, accuracy, both constant or time dependent).
- Extensive set of metadata (SOP, calibration standards, inlet config., …, also time dependent, all after upgrade)

Observations with Reporting Support

Regular / Advanced (traceable):

- Particle number concentration
- Particle number size distribution (sub-micron) **(NRT)**
- Cloud Condensation Particle Number Conc. / Size dist.
- Scattering Coefficient **(NRT)**
- Absorption Coefficient **(NRT)**

Regular only:

- Aerosol optical depth **(NRT)**
- PM mass (gravimetric)
- PM mass (online)

To be added:

- Aerosol Chemical Composition (GAW standard)
- Aerosol Chemical Speciation (online, AMS / ACSM)
- Particle number size distribution (super-micron, OPC, APS)
- Met. Base paramaters

Traceability Implementation at WDCA

Data Level	Description		Used for
0	• Annotated raw data • format instrument specific • all data / information for processing to final value.	• contains all parameters provided by instrument as provided • "native" time resolution	NRT
1	• processed to final parameter • invalid data removed	• "native" time resolution • format property specific	intercom-parisons
1.5	• aggregated to hourly averages • variability quantified • format property specific • STP correction if necessary	auto-processed	NRT
2		manual QA	regular collection

- SOP describes steps from one to the next level.
- All levels use EBAS NASA-Ames format.
- chain of data acquisition / processing / QA can be traced back to measurement.
- Archiving with long-term perspective, allows reprocessing.

Plans for Including GALION in WDCA

- Portal for distributed data centre implemented through EU-projects.
- Will allow distributed WDCA when including GALION.
- Depends on progress within GALION.
- Portal includes page hosting secondary datasets.

Data Feedback Portal: mantis.nilu.no

- Allows users to request new features and track their fate.
- Users can see what features have already been proposed, and avoid duplications.

Status of Ongoing Data Collection, Key Numbers

Number of Stations Reporting
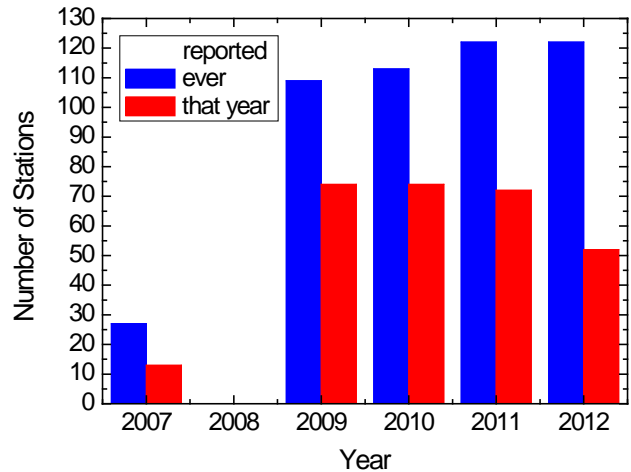
Number of Station/Inst. Reported
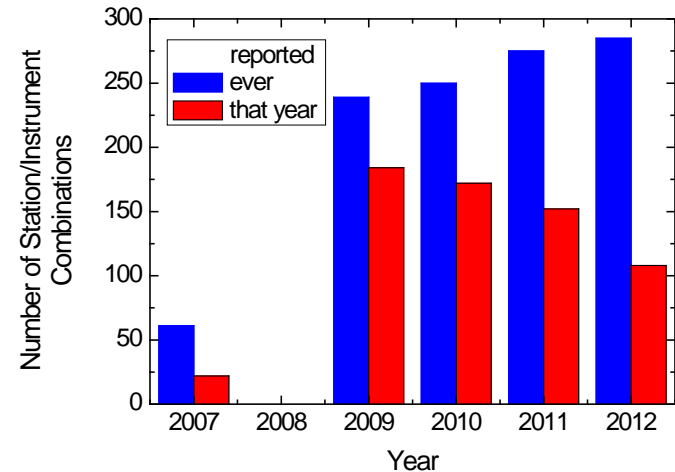
Number of NRT Stations / Instruments
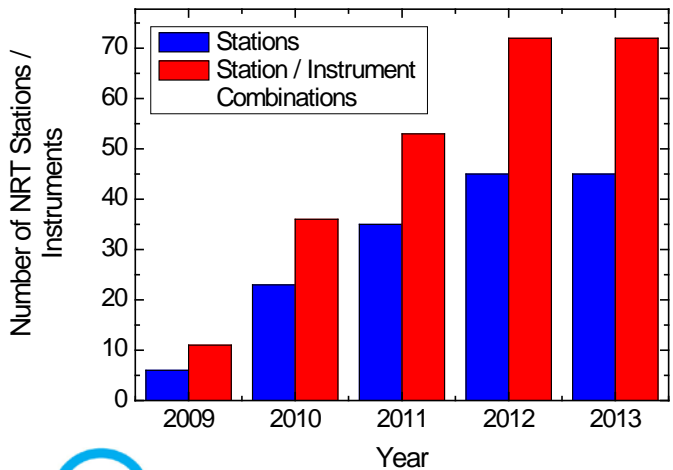
- Number of stations increased by «chasing effort» and collaborations.
- Collaboration with U.S. IMPROVE network.
- Collaboration with European projects (EUSAAR, ACTRIS)

Active Ground Stations Included in WDCA

Image Credit: NASA
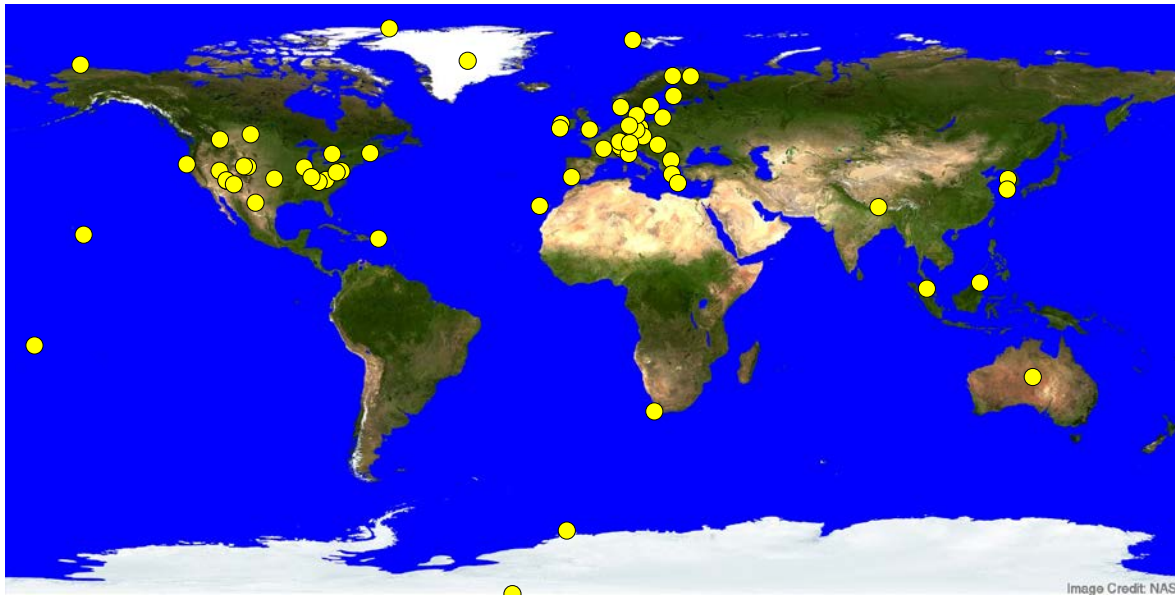
- 73 sites worldwide

- Includes European **ACTRIS** sites, **NOAA** network, **IMPROVE** network.

- Ground in situ observations of **particle number concentration / size distribution**, **aerosol scattering / absorption coefficient**, aerosol optical depth.

- Focus on data quality

- Most sites in Europe and North America

- More sites to come, e.g. Mount Chacaltaya, Bolivia.

Coverage for Microphysical Parameters
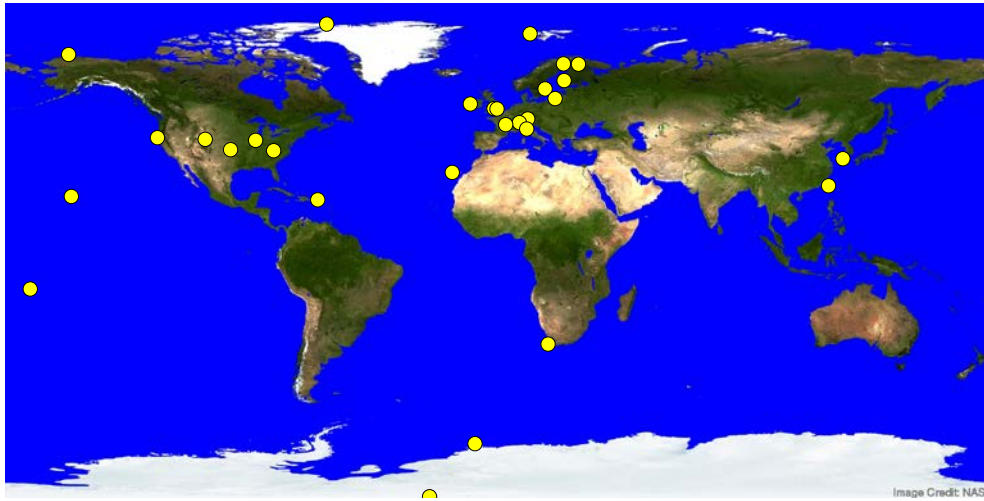
Particle number concentration:

- 29 sites

- 19 sites more than 5 years

- 13 sites more than 10 years

Particle number size distribution

- 28 sites, mainly Europe

- 16 sites more than 5 years

- 5 sites more than 10 years

- **Accuracy: D_p 5%, N 10-15%**
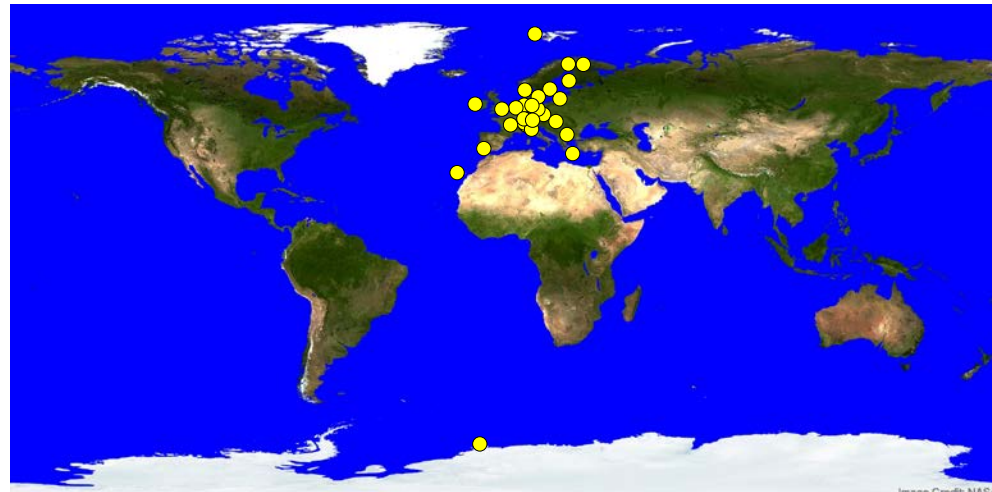
Coverage for Optical Parameters
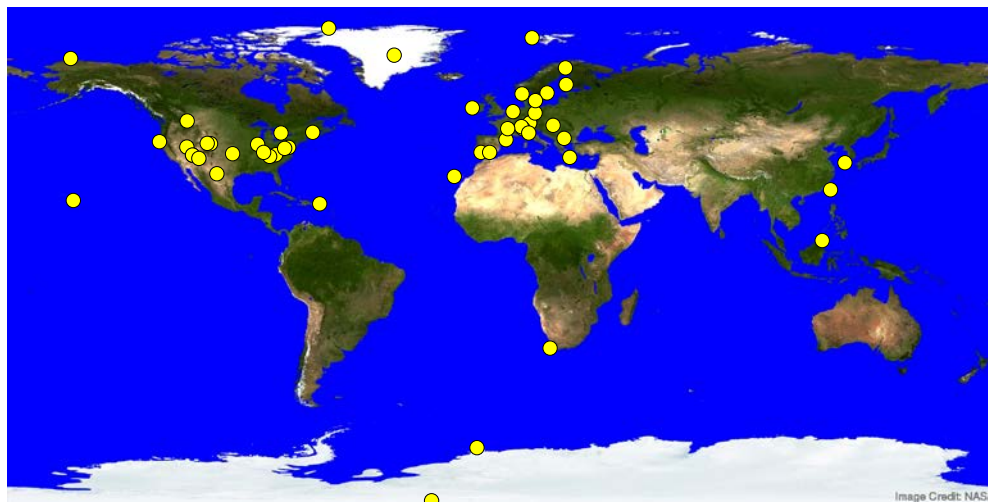
Aerosol scattering coefficient:

- 50 sites

- 32 sites more than 5 years.

- 16 sites more than 10 years

- **accuracy 10% or better.**

Aerosol absorption coefficient

- 48 sites

- 27 sites more than 5 years.

- 9 sites more than 10 years.

- **Accuracy instrument dependent**
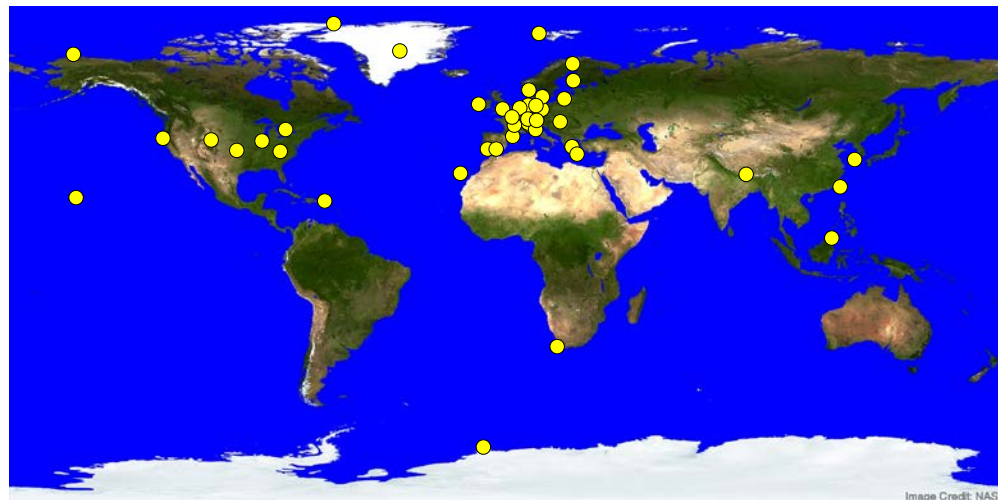
How Much Are WDCA Data Used?

Downloads
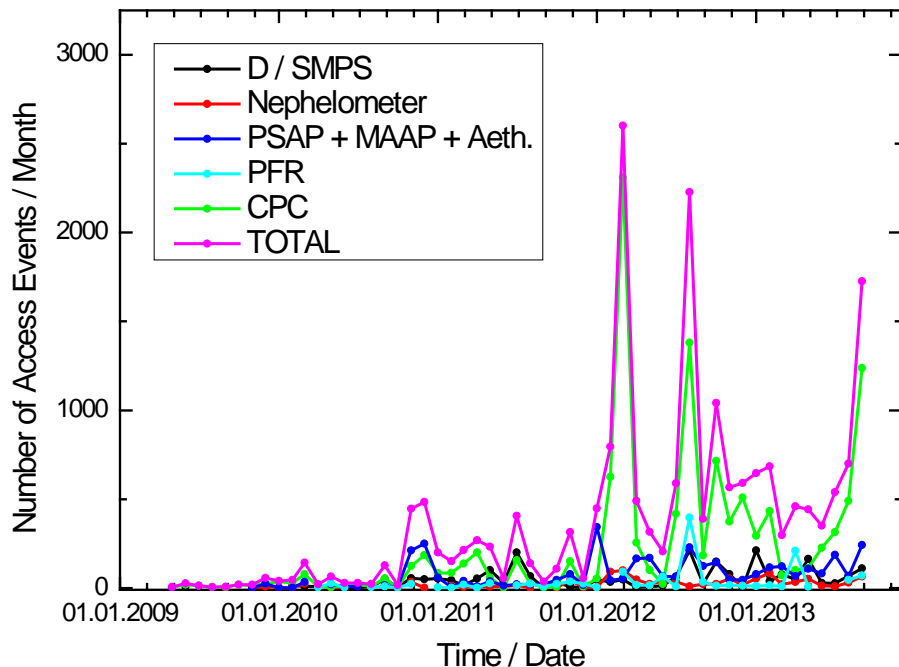
Downloads & Plots
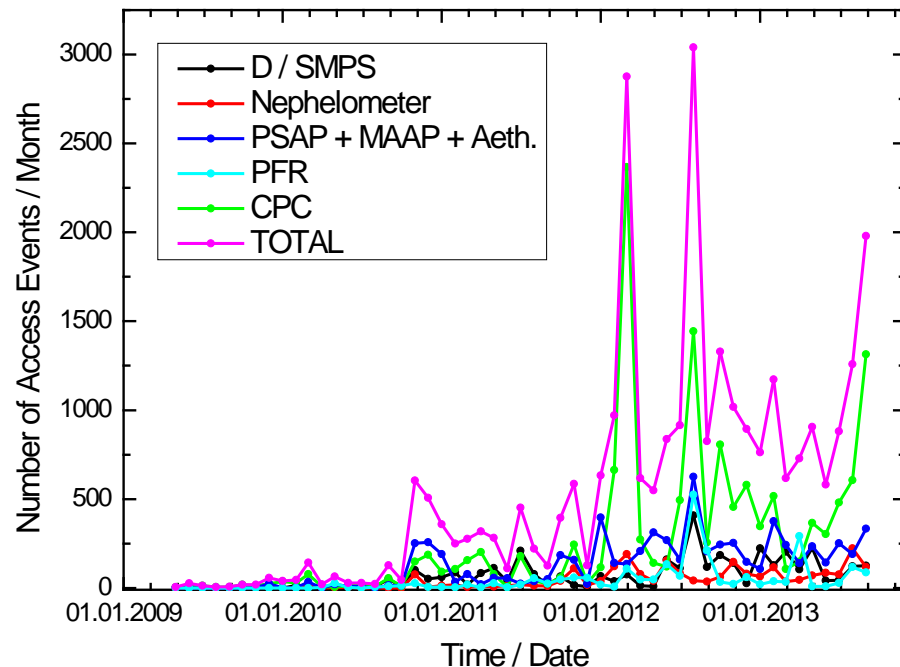
- Our date are being used!
- The use is increasing with time.

Where Are the WDCA Users Located? Number of Unique Users (IPs) by Country (2009-2013)

25 - 0

50 - 25

75 - 50

100 - 75

150 - 100

175 - 150
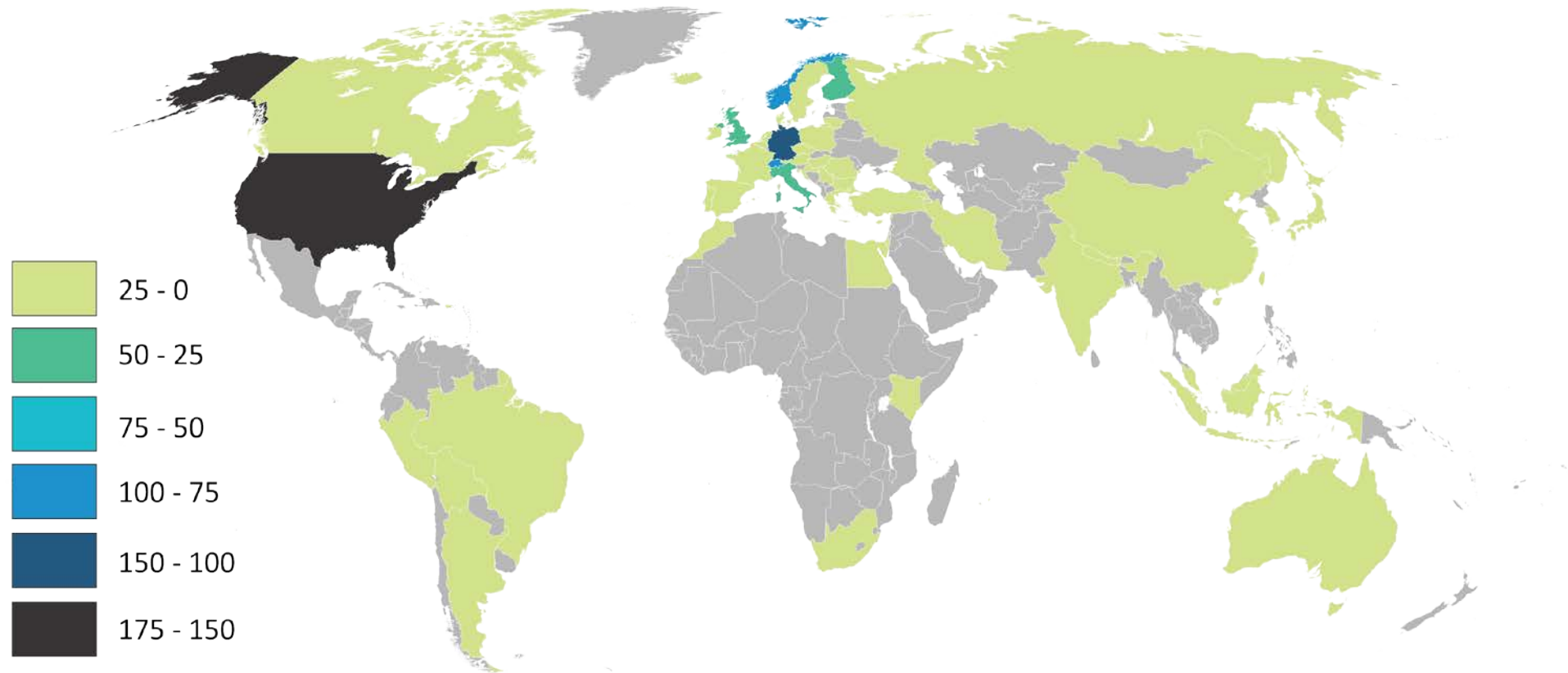
Where Are the WDCA Users Located? Number of Annual Datasets (station / instrument) Downloaded

Legend:
- 50 - 0
- 100 - 50
- 250 - 100
- 500 - 250
- 1000 - 500
- 2000 - 1000
- 3000 - 2000
- 4000 - 3000
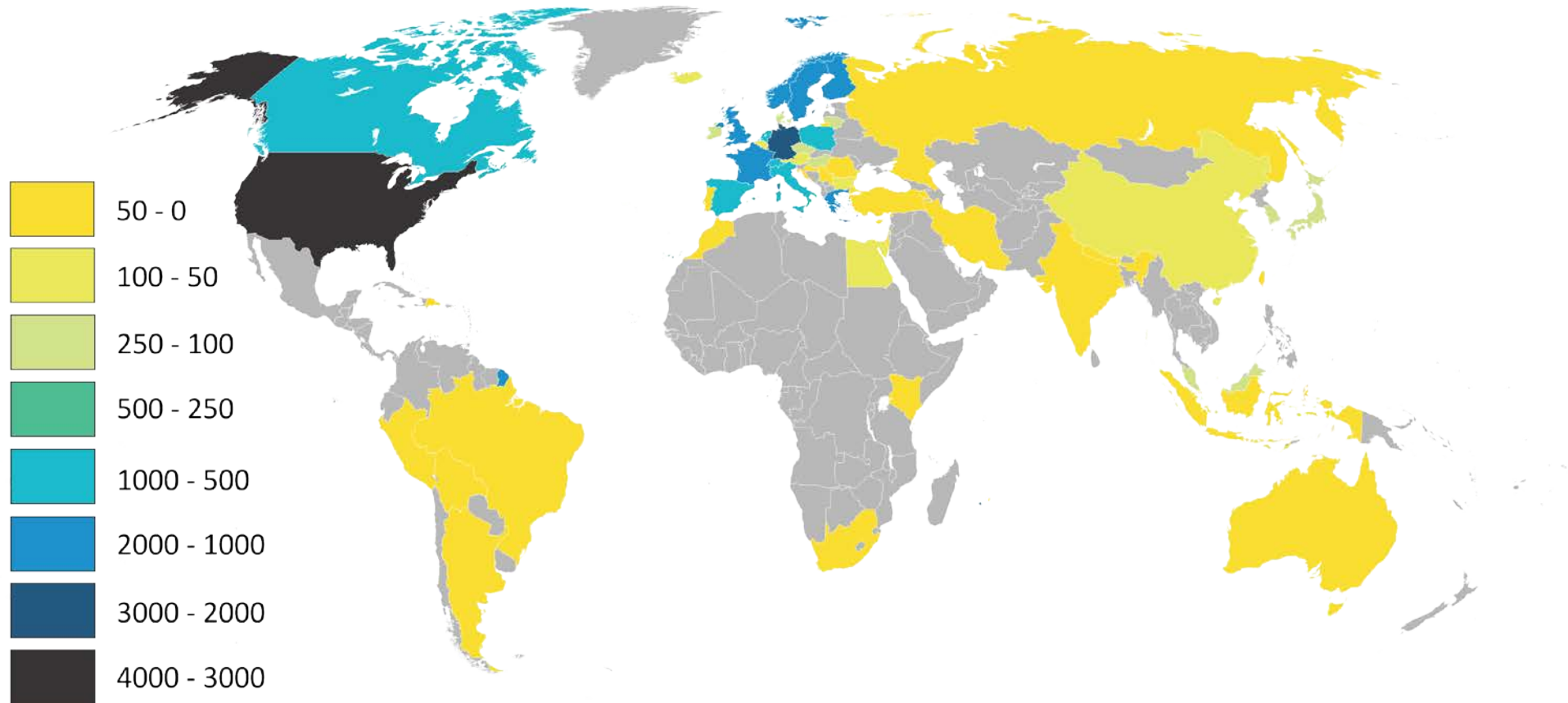
Redesign of Database, Adapted Web-Interface

- Redesign necessary to accomodate:
  - additional and time-dependent metadata items (PIs, serial numbers of otherwise identical instruments, …).
  - Different data levels storable and searchable.
  - Database should keep revision history of dataset (publication reference).
  - Not just atmospheric variability, also instrumental uncertainty should be documented.
- Challenge in conversion of legacy data where specifications were less strict.
- Improved automatic checks on submission format and content (boundary/outlier check) on roadmap.
- Main challenge: resources!

Terminology for WIS (still ongoing)

1. volume_scattering_coefficient_in_air_due_to_dry_aerosol
2. volume_absorption_coefficient_in_air_due_to_dry_aerosol
3. volume_spherical_backscattering_coefficient_in_air_due_to_dry_aerosol
4. surface_volume_scattering_coefficient_at_stp_in_air_due_to_pm1_dry_aerosol
5. surface_volume_scattering_coefficient_at_stp_in_air_due_to_pm10_dry_aerosol
6. surface_volume_absorption_coefficient_at_stp_in_air_due_to_pm1_dry_aerosol
7. surface_volume_absorption_coefficient_at_stp_in_air_due_to_pm10_dry_aerosol
8. surface_volume_spherical_backscattering_coefficient_at_stp_in_air_due_to_pm1_dry_aerosol
9. surface_volume_spherical_backscattering_coefficient_at_stp_in_air_due_to_pm10_dry_aerosol
10. volume_scattering_coefficient_in_air_due_to_dried_aerosol
11. volume_absorption_coefficient_in_air_due_to_dried_aerosol
12. volume_spherical_backscattering_coefficient_in_air_due_to_dried_aerosol
13. surface_volume_scattering_coefficient_at_stp_in_air_due_to_pm1_dried_aerosol
14. surface_volume_scattering_coefficient_at_stp_in_air_due_to_pm10_dried_aerosol
15. surface_volume_absorption_coefficient_at_stp_in_air_due_to_pm1_dried_aerosol
16. surface_volume_absorption_coefficient_at_stp_in_air_due_to_pm10_dried_aerosol

- Main challenge: co-ordination between SAG, ET-WDC, and CF group.

Further WDCA Activities

- **GAWTEC aersol course Oct. 2012**
  - Lecture on data submission

- **GEO AQ CoP Data centre interoparibility workshop, Sept. 2012, Dublin.**

- **GAW aerosol trend papers for IPCC AR5**
  - Asmi et al., ACP, 2013
  - Collaud Coen et al., ACP, 2013
  - Lessons:
    - improve data quality (time dependence of submitted information due to reporting improvements.)
    - Chase updates from stations.
    - Store product as secondary dataset

- **Participation in ESA aerosol Climate Change Initiative (CCI) project**
  - How to make ground station aerosol data usable for satellite validation?

- **National collaboration project between AeroCom and WDCA / NILU**

Report on Relevant Issues

- Data Policy, what is «substantial use»?
  - Revived discussion in aerosol community.
  - Effort to define what «substantial use» is, but stake holders who want stricter data policy.
  - We should actively promote existing data policy as good and proven compromise between 2 extremes.
- Use of DOIs for WDCs
  - Use costs of DOIs as compared to static links
  - DOI items mustn't change: tracing dataset history at WDC.
  - Contradiction between DOI data policy and GAW data policy.
  - Possible solution: DOI-on-demand.