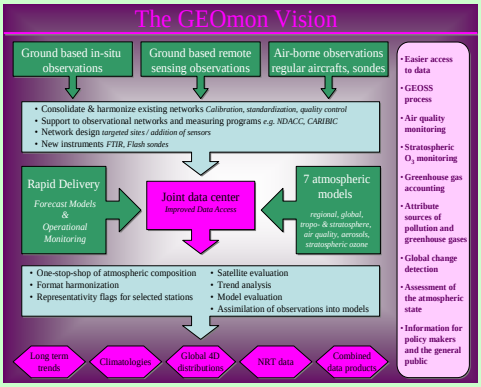
Plans and visions of data harmonization efforts in GEOmon and beyond

J. Klausen, C. Textor, A. Vik, P. Ciais, P. Keckhut, P. Rayner, M. De Maziere and GEOmon Data Management Committee,

GEOmon Vision: A "one-stop shop"

- Construct prototype system for atmospheric composition monitoring for climate applications including near-real time data products.
- Provide and get access to atmospheric observations and model data of known quality
- Inform the public and politicians on the changing composition of the atmosphere



Common search facilities for and access to :

- GEOmon-funded data
- External data
- National & international databases of past and ongoing scientific projects, and other relevant activities

The Vision from Archiver's Perspective

- To take pride in serving data users and supporting data providers
- To be able to reasonably gauge the quality of submitted data
- To be a safe home for project data and data for which no dedicated archive exists
- To be able to interface with other specialized archives (machine-to-machine)
- To offer superior discovery-and-retrieval functionality

The Vision from Data Provider's Perspective

- To be able to meet reporting obligations by submitting data and metadata just once, to just one place that distributes data further to relevant data centres
- To be able to submit data in just one format
- To be informed about the use of their data and assessments of the data quality

The Vision from User's Perspective

- To be able to discover relevant data to support a particular science/policy question
- To be able to retrieve these data easily in a format that invites its use
- To be able to access harmonized data of known quality for scientific use
- To have enough meta information available
- To have univocally stated and easily accessible information on data policy, data ownership, and required type of acknowledgement
- restrictions applying to data use and publication

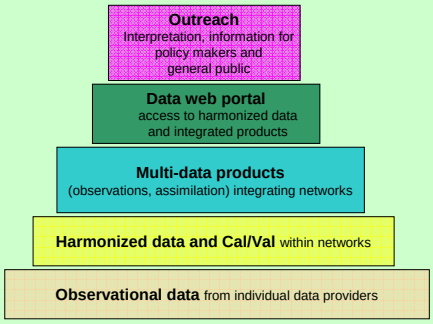
The Vision from Funder's Perspective

- To ensure lifetime / perspective beyond project
- To create something that lasts and outgrows itself
- To reduce cost / complexity of operation involved
- To stimulate value-adding / competition
- To get 'value-for-money' and 'return-on-investment'

State of Atmospheric Data availability now

- Data submission and retrieval processes complex and rather not user-friendly
- Metadata generally poor and poorly presented
- Many different formats for data and meta data
- Uncertainty of observations (and model results) poorly expressed, although equally important as observations themselves for scientific use
- Some valuable data lost, especially from projects with finite life times
- Data only available with a long delay after the actual measurement
- Near-Real time data availability very limited
- Many good single-species (or few species) sites
- Several good thematic sites

Five Levels of Data Harmonization



Data Harmonization – what do you mean?

Ongoing/future observations

- Recommend methods
- Specify data quality objectives
- Specify QA/QC procedures

Past observations

- Evaluate compatibility and classify data
- Document traceability, QA/QC procedures
- Assess uncertainties

Data management

- Streamline processes (submission, quality control, archiving)
- Standardize interfaces (discovery, retrieval)

Data harmonization in GEOmon

GEOmon-funded observations

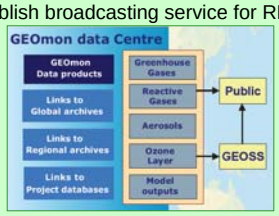
- Recommend methods
- Specify data quality objectives
- Specify QA/QC procedures

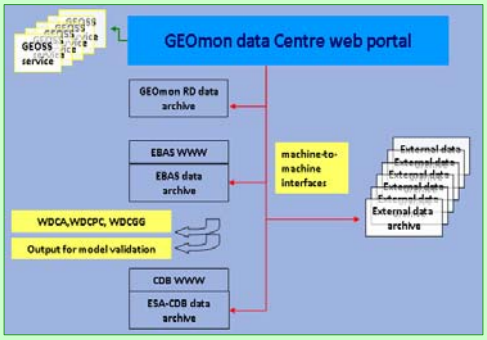
Past observations

- Evaluate and homogenize existing in-situ data of O_3, CO, NO_2
- Integrate individual aerosol networks into the European Network of Aerosol Observation Networks
- Combine CO_2 and CH_4 data with other relevant data, e.g. from aircraft campaigns
  - Harmonize existing time series (stratospheric O_3)

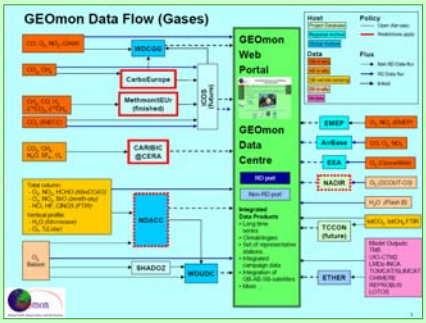
The GEOmon Data Centre

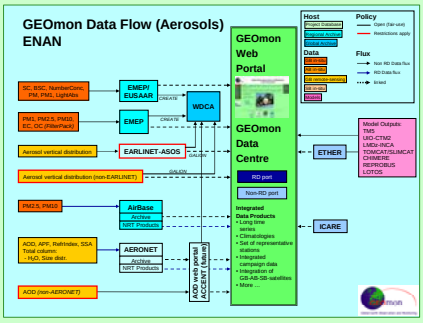
- Provide a search facility across data bases
- Implement and expose metadata in standard form
- Establish interfaces to external data archives
- Machine-to-machine interfaces
- Establish broadcasting service for RD data





Architecture of the GEOmon data centre – data flow diagrams





Outreach - Bridging the gaps

- Web interfaces, quick look tools, brochures
- Linking to international agencies and networks
- Presence at international science conferences
- Publication in scientific and popular journals
- Provide information for policy makers

And beyond?

- Maintain observations started under GEOmon
  - Improve / simplify data flows in Europe
  - Continue data harmonization & integration efforts
  - Be part of European and international initiatives EEA-SEIS, GMES-GAS, INSPIRE, GECA GEOSS, WMO-WIS, GAW-IGACO, GE[illegible]alCL[illegible]