World Meteorological Organization

Weather • Climate • Water

The Global Atmosphere Watch (GAW) Programme: addressing nitrogen

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Global Atmosphere Watch Programme

- WMO/GAW was established 1989 by merging GO_3OS and BAPMoN
- WMO/GAW addresses global state of the atmospheric chemical composition and some related physical properties.
- GAW is a partnership involving contributors from 100 countries.
- GAW implements end-to-end approach (from observations through research to delivered products and services)
- GAW observations and analysis serve **different applications**, including climate studies, air quality forecasting, Numerical Weather Prediction, ecosystem services, human health etc.
- General concept: “Science to services”

GAW focal areas

- Stratospheric Ozone and vertical ozone distribution
- Greenhouse Gases (*CO_2 and its isotopes , CH_4 and its isotopes, N_2/O_2 ratio, N_2O, SF_6, CFCs and substitutes*)
- Reactive Gases (*O_3, CO, VOCs, NO_x, SO_2*)
- Precipitation Chemistry
- Aerosols (*chemical and physical properties, AOD*)
- UV Radiation

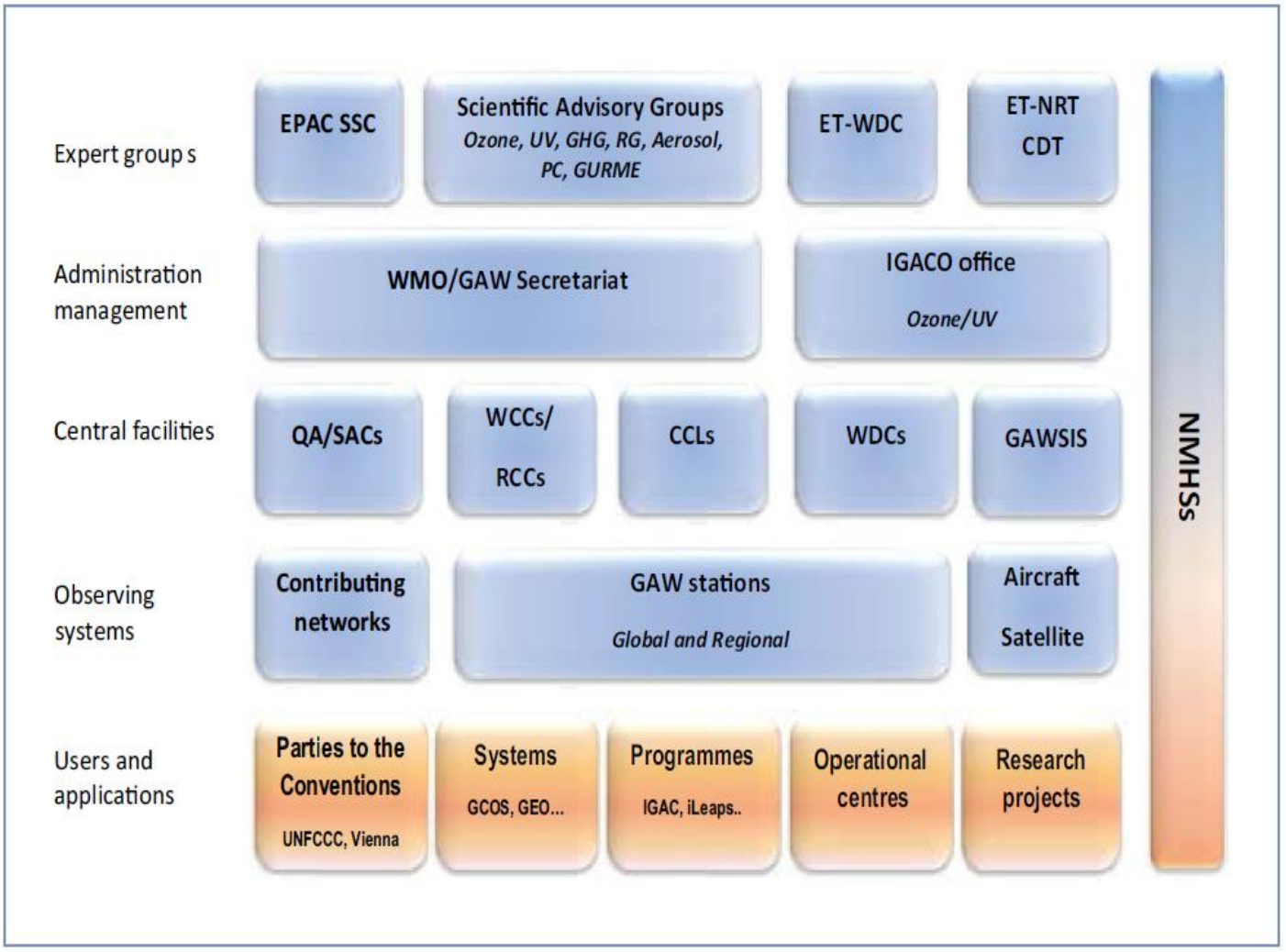
<u>GAW Includes:</u>

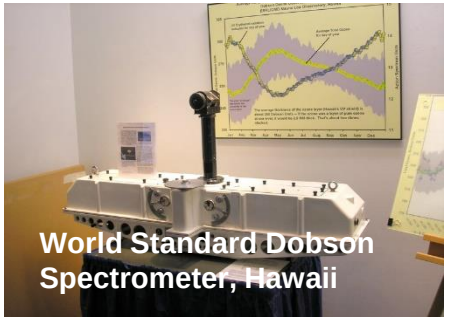
GAW Urban Meteorology & Environment (GURME) project

Scientific Advisory Group on NRT and modelling applications

Expert Team on the World Data Centres

The GAW Programme Elements




World Standard Dobson Spectrometer, Hawaii

Observations in GAW

GAW ***strives*** to implement “integrated” observing system including ground-based observations and satellite remote sensing integrated through models

Surface-based *in situ* and remote sensing observations constitute a backbone of the GAW network.

There are Global and Regional GAW stations and stations working within contributing networks. New category of “local stations” is being considered

Currently GAW coordinates activities and data from 30 Global stations, about 400 Regional stations, and 100 Contributing stations (http://gaw.empa.ch/gawsis/)

How nitrogen cycle is reflected in GAW

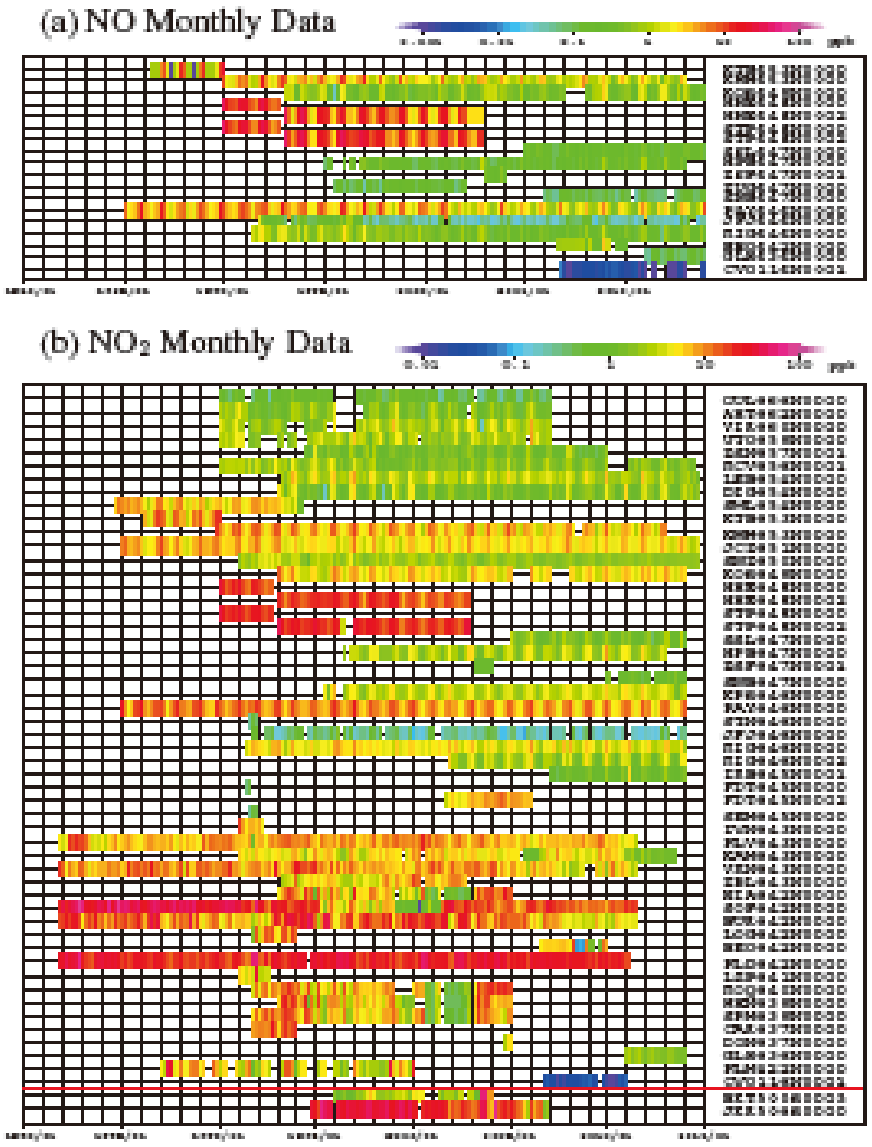
- NO and NO_2 in the group of reactive gases
- N_2O in the group of greenhouse gases
- In precipitation chemistry /total deposition (NO_3^-)
- In aerosol chemical properties (Nitrate and Ammonium)

These observations and analysis are currently **not link together** and address individually air pollution, climate forcing and partly nitrification (e.g. through collaboration with GESAMP)

GAW network for different parameters is not spatially uniform and stations are required to be placed in locations without direct anthropogenic impact

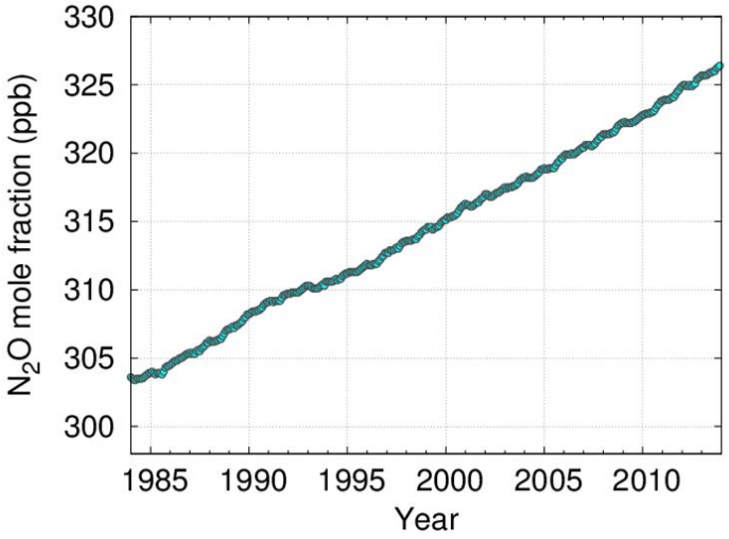
How GAW contribute to INMS and where we need help

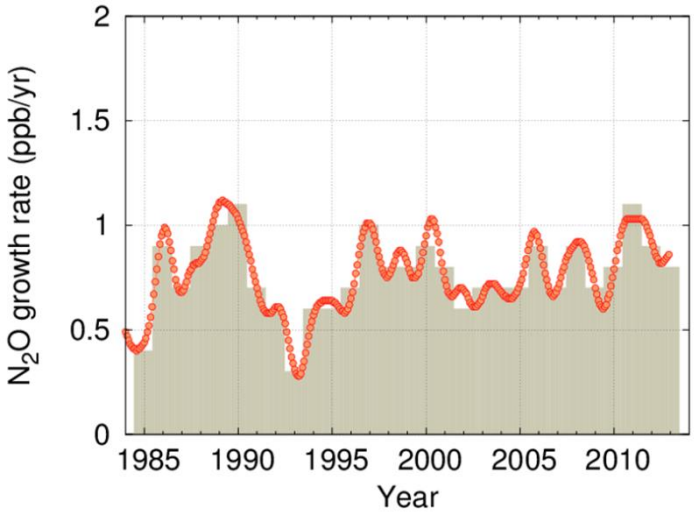
- GAW coordinates high quality observations of several nitrogen components in different groups. These observations can be used for verifications of different elements of nitrogen cycle
- Bringing nitrogen observation and analysis within one cycle can help to fill the gaps in observational network and extend observational programme at existing stations
- Integrated products addressing user needs will elevate the relevance of the nitrogen cycle research within National Meteorological Services

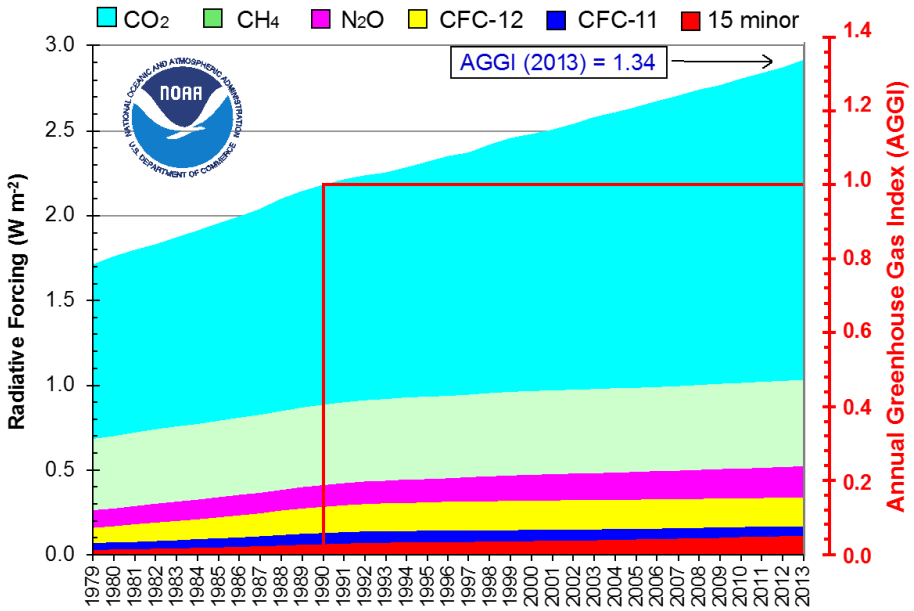


NOx from WDCGG data summary No.39

Nitrogen and climate







Global averaged N_2O mole fraction and N_2O contribution to the radiative forcing

N in deposition from the global PC assessment

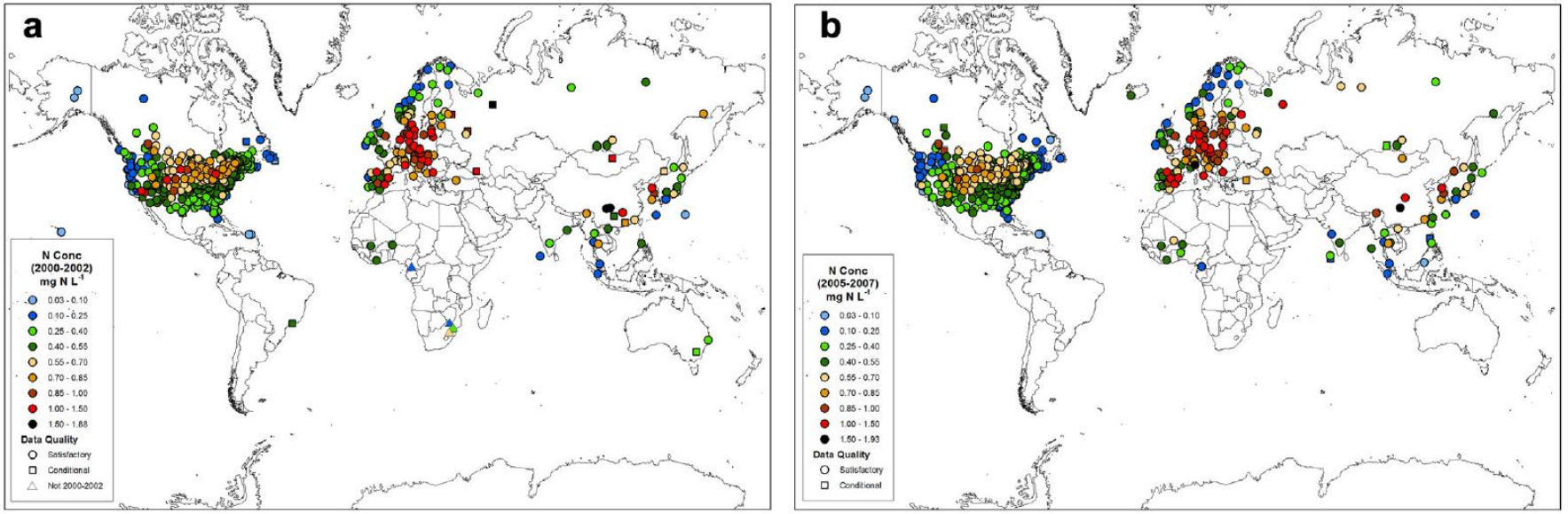
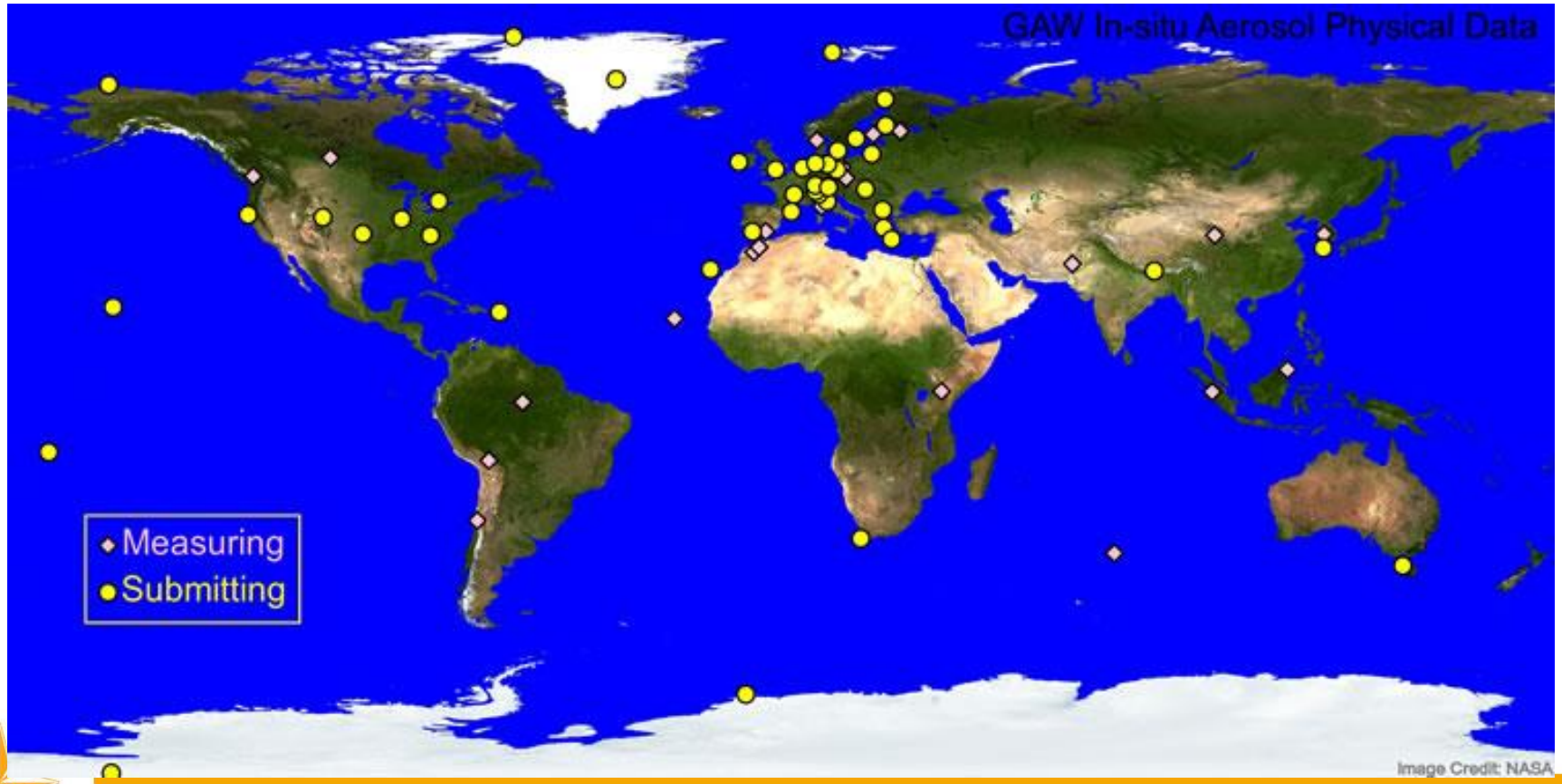


Fig. 4.2. Measurement-based patterns of 3-year average precipitation-weighted mean concentrations of N in mg N L^{-1} for: (a) 2000–2002 and (b) 2005–2007.

GAW in-situ aerosol monitoring network (physical and chemical properties of aerosol)



Thank you for your attention!

GAW publications available from:

http://www.wmo.int/pages/prog/arep/gaw/gaw-reports.html