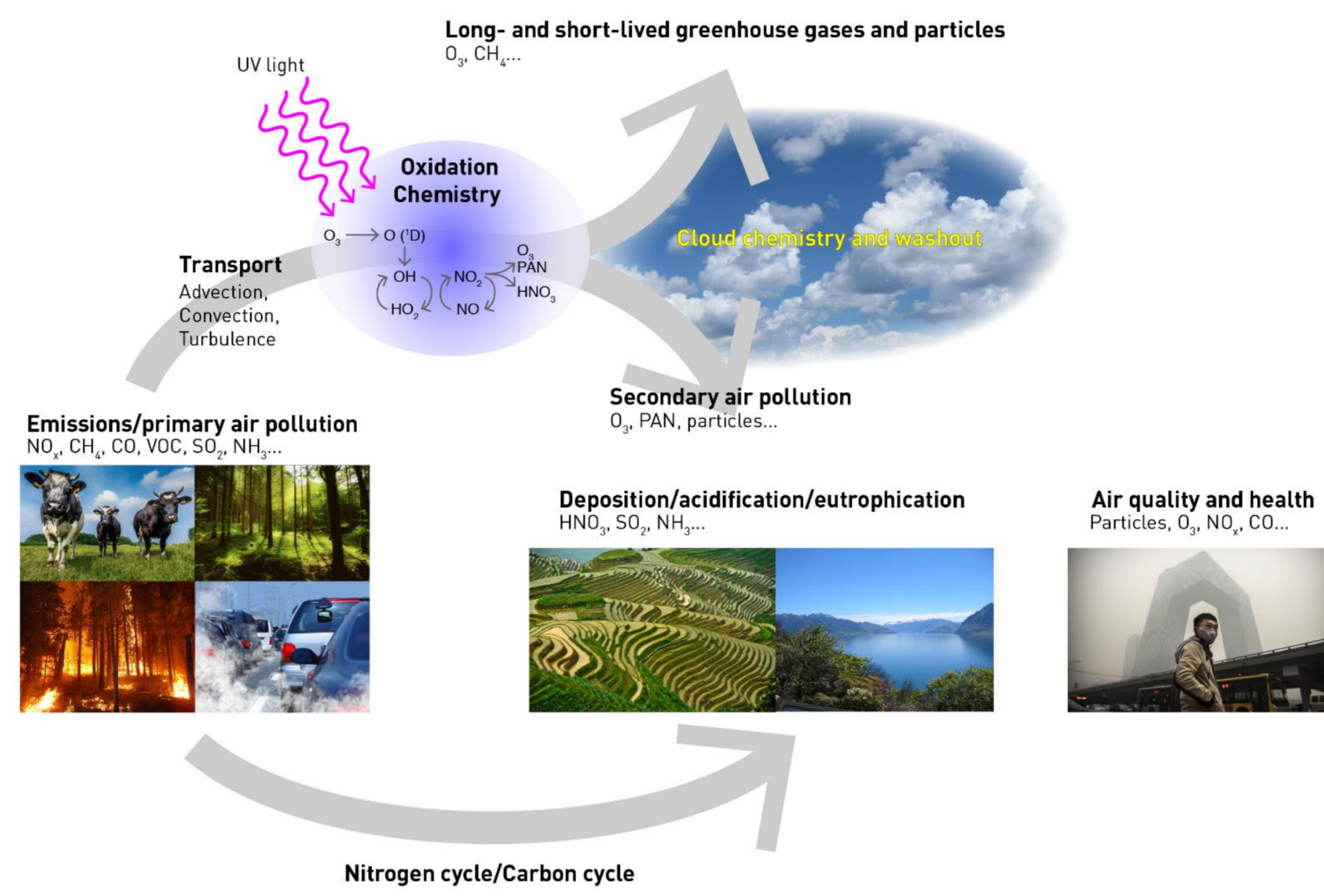


WMO Research Department

The **Global Atmosphere Watch (GAW) Programme** of the World Meteorological Organization (WMO) is the long-term international global research programme that coordinates observations and analysis of atmospheric composition changes. The GAW Programme is a collaboration of more than 100 countries and it relies fundamentally on contributions of WMO Members to help build a single coordinated global understanding of atmospheric composition and its change.

Atmosphere composition observations support multiple applications, including climate change, weather forecasting, human health, terrestrial and aquatic ecosystems service, agricultural productivity, aeronautical operations, etc



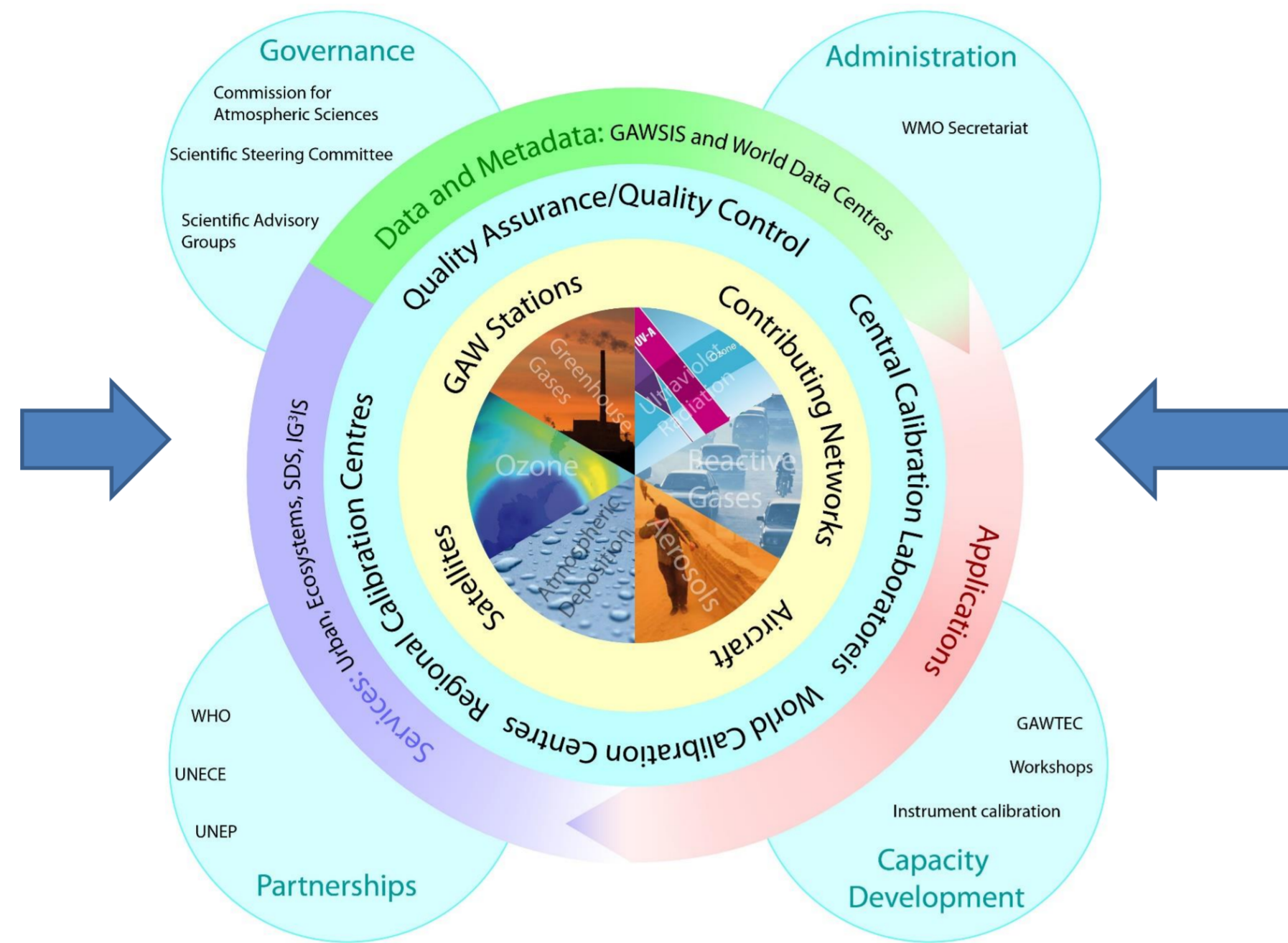
Objectives of the GAW Programme

Meeting the growing need for atmospheric composition information and related services requires:

- Increased efforts towards enhancing observing systems with broader use of GAW observations and research activities to support the development of services with high societal impact;
- Enhanced modeling efforts;
- Improved information management infrastructure;
- Stronger efforts towards building collaborations, capacity and communications.

The GAW Programme includes:

- observing systems
- set of Central Facilities supporting the quality assurance system
- a data management system
- advisory groups, expert teams and a steering committee.



GAW currently focuses on **six groups of variables** (also called focal areas):

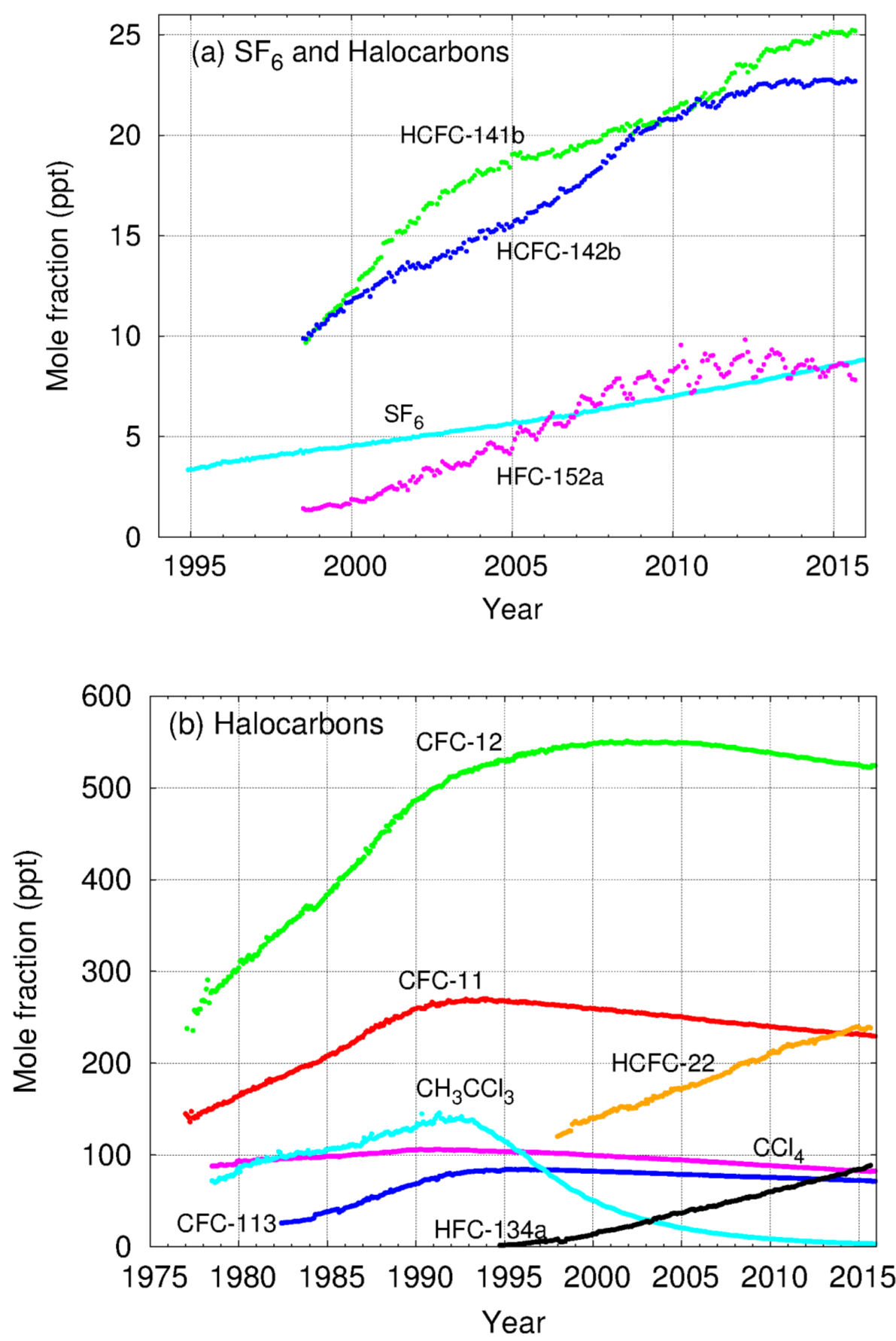
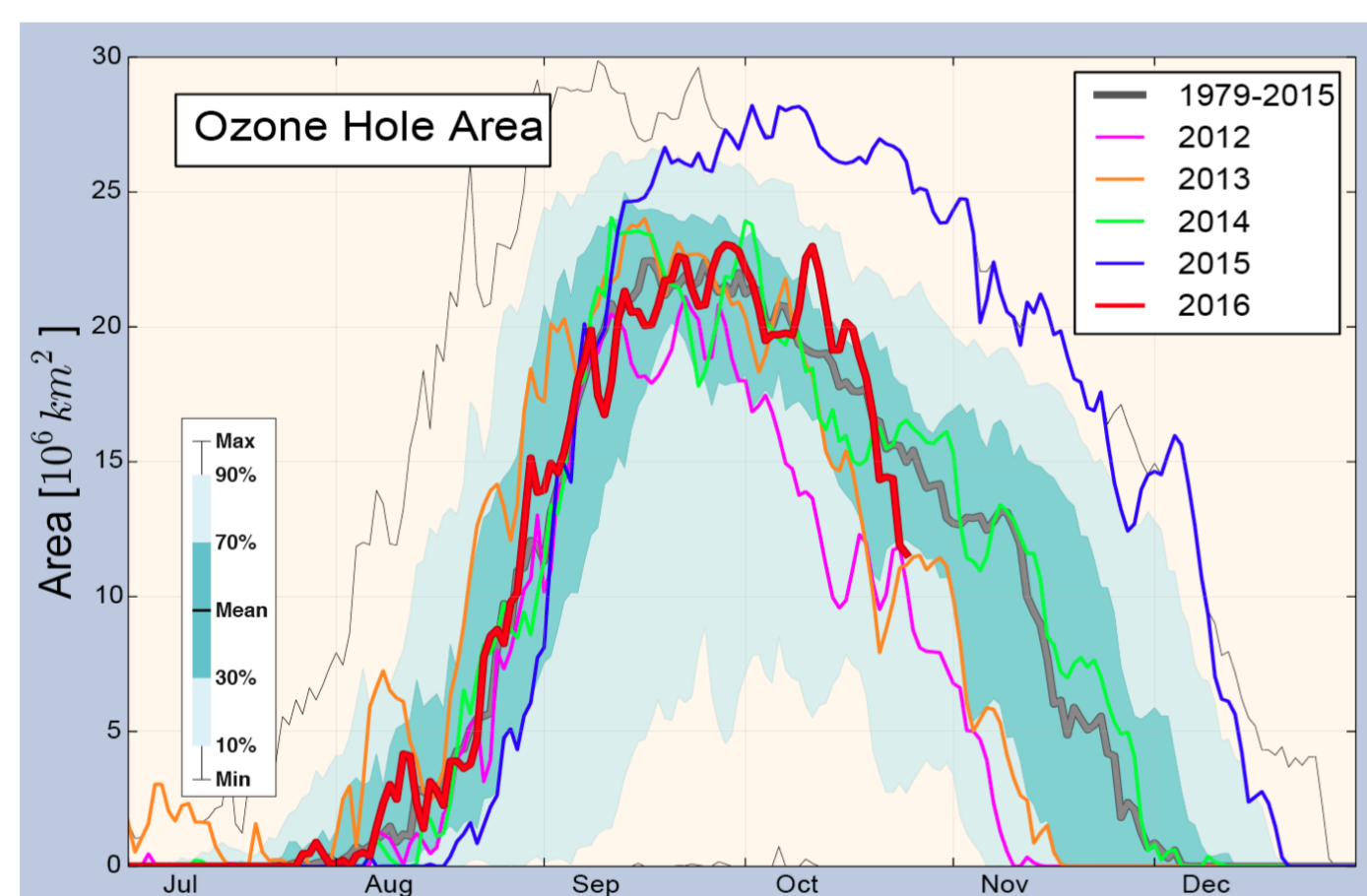
- Greenhouse Gases
- Ozone
- Aerosol
- Selected Reactive Gases
- Total Atmospheric Deposition
- Ultraviolet (UV) Radiation

Information on GAW stations is available in the **GAW Station Information System (GAWSIS)**

High-quality observations constitute the core of GAW.

Vienna Convention and the Montreal Protocol

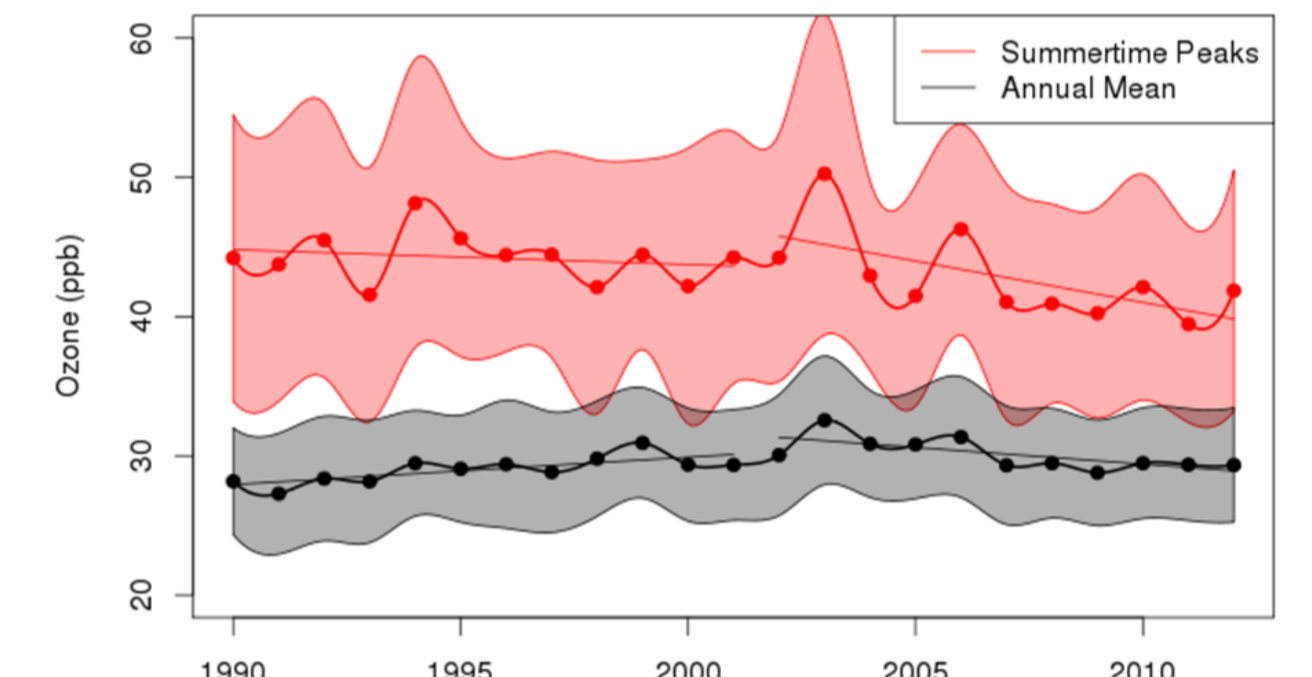
- GAW coordinates observations and QA of ozone depleting gases. These observations allow to monitor the effect of the actions taken under the Montreal protocol (**decline of CFCs**, fig. (b))
- GAW coordinates observations and QA of total ozone (Brewer and Dobson networks) and vertical ozone profiles (ozone sondes) that allow to follow the recovery of the ozone hole



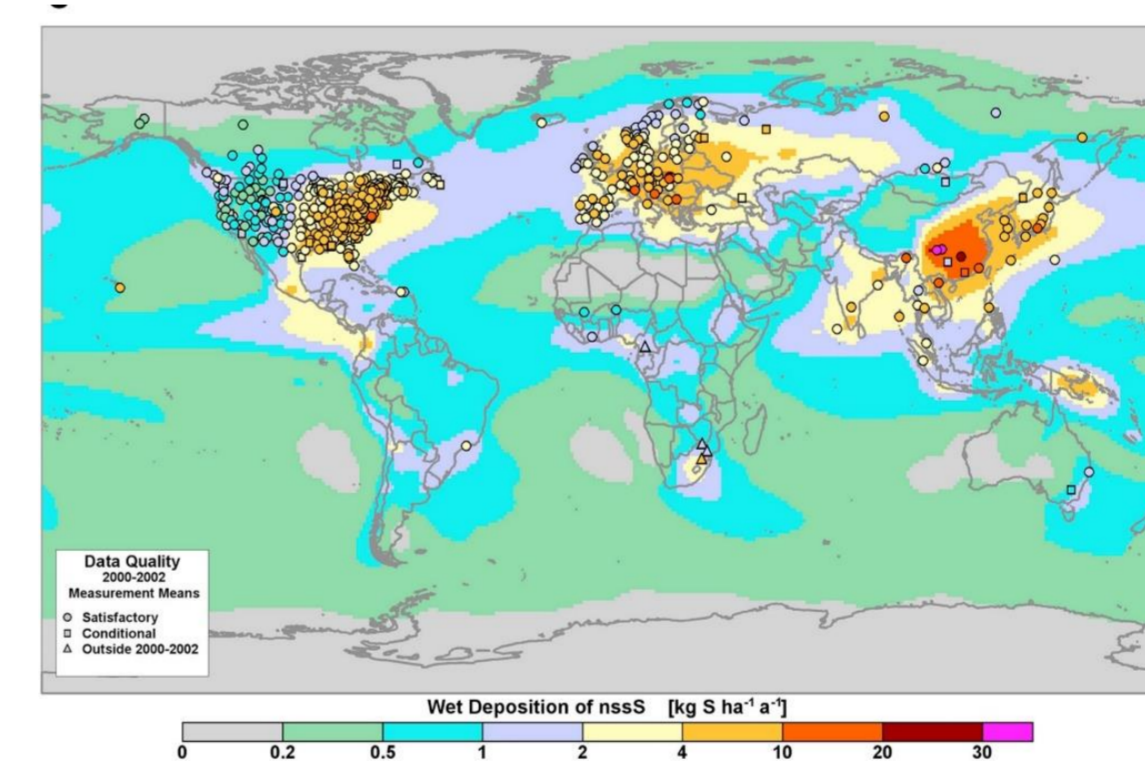
Monthly mean mole fractions of sulphur hexafluoride (SF₆) and the most important halocarbons. SF₆ and lower mole fractions of halocarbons (a) and higher ones of halocarbons (b).

Convention on Long-range Transboundary Air Pollution

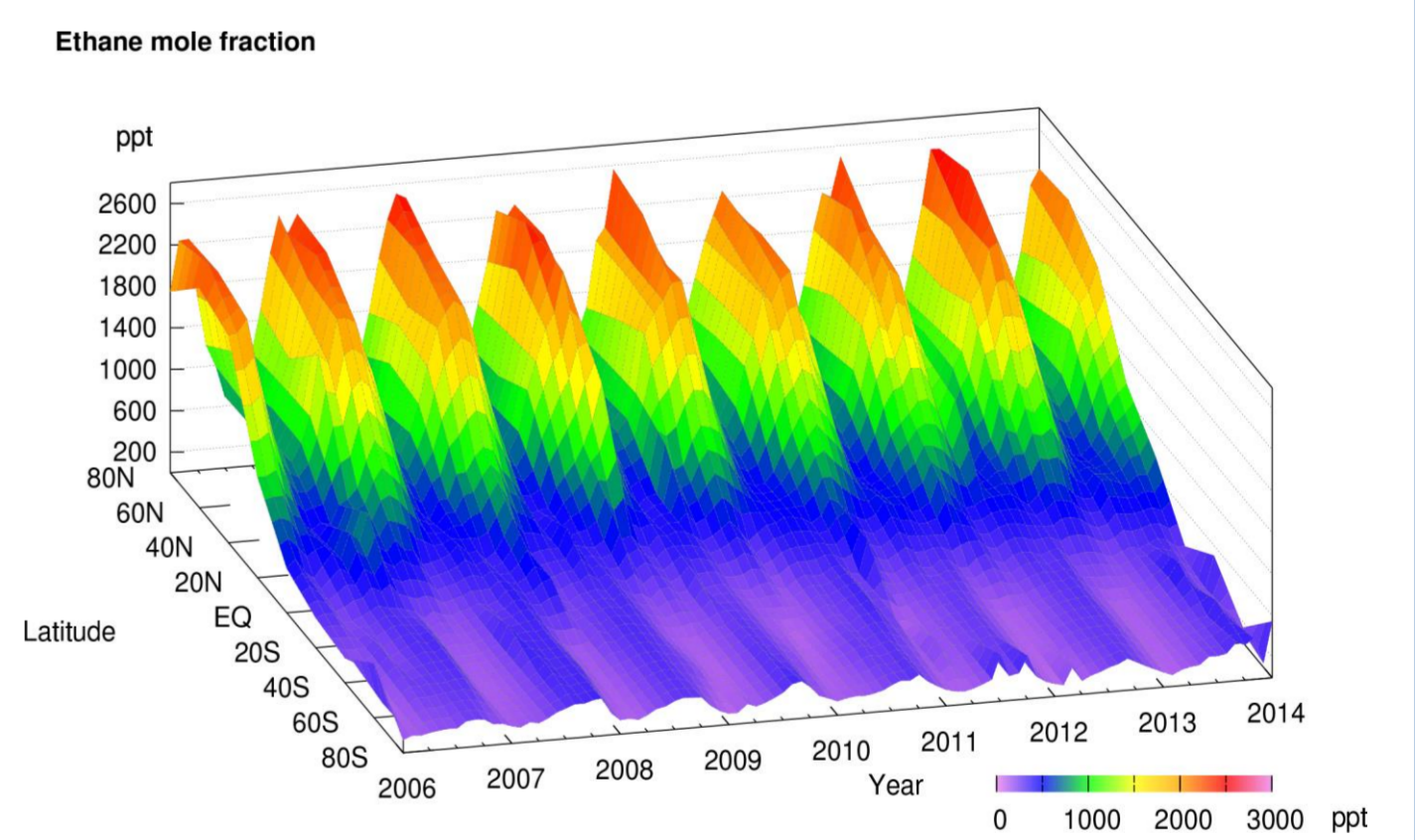
- GAW coordinates observations and QA of reactive gases (O₃, CO, VOCs, NO_x), aerosols and precipitation chemistry
- GAW produced a global assessment of atmospheric deposition
- Observations in Europe were used to confirm the impact of NO_x and VOC emission reductions on European air quality



Evolution of ozone peak (summertime – JJA – average of daily maxima) and annual mean at EMEP monitoring stations. Shaded areas indicate the 1 σ standard deviation. Trend lines are indicative for the periods 1990-2002 and 2002-2012. Data include a subset of 54 EMEP stations, with at least 75 % data coverage.



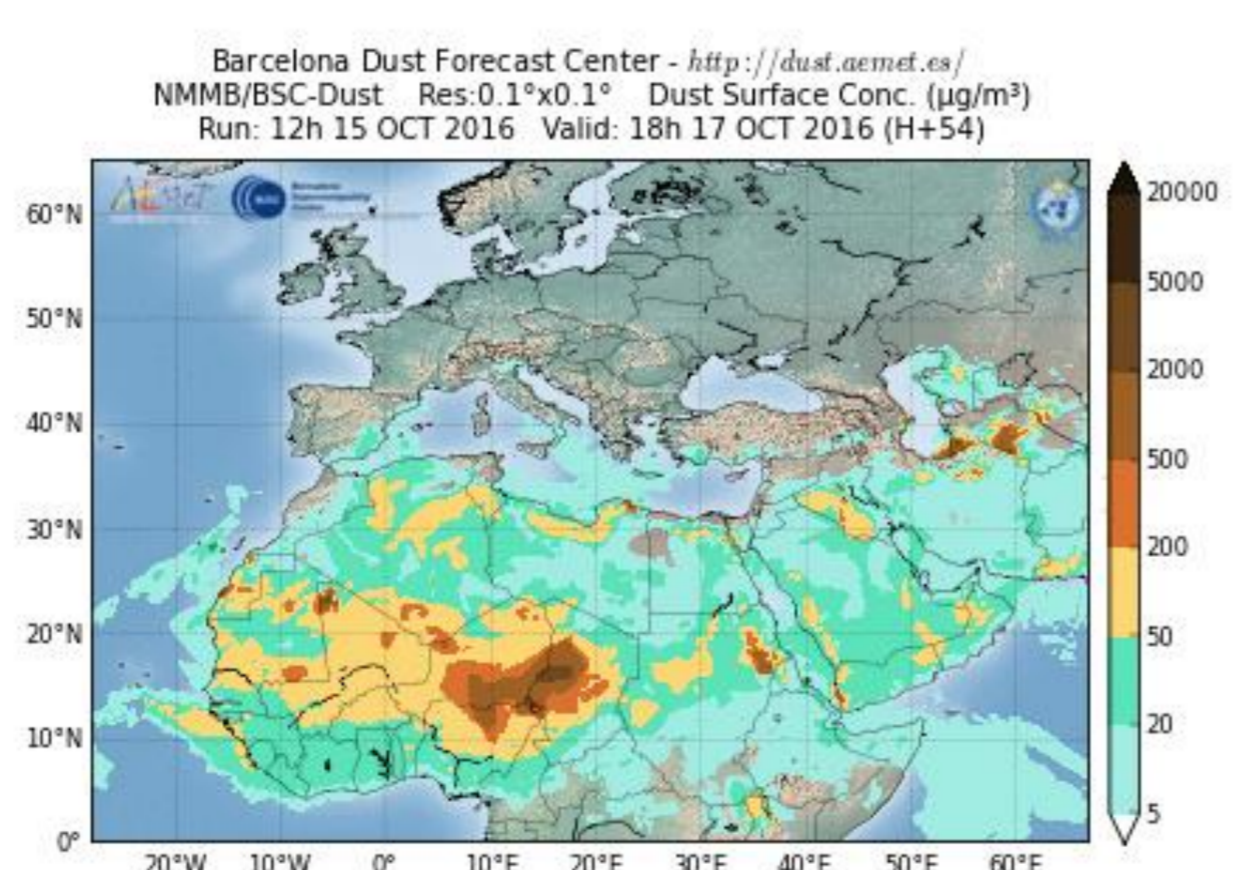
Deposition of sulphur as assessed in the global precipitation chemistry assessment



Global distribution of ethane (one of VOCs) showing global trends

United Nations Convention to Combat Desertification

- GAW coordinates observations and QA of aerosols (as listed in the table below)
- GAW partners produce forecasts of the sand and dust storms through the dedicated Sand-and-Dust Warning and Advisory System
- WMO contributed to the Global Assessment of the Sand and Dust storms



| Variable | Frequency of observation |
|---|--------------------------|
| Multiwavelength aerosol optical depth | Continuous |
| Mass concentration in two size fractions (fine, coarse) | |
| Mass concentration of major chemical components in two size fractions | Intermittent |
| Light absorption coefficient at various wavelengths | |
| Light scattering and hemispheric backscattering coefficient at various wavelengths | |
| Aerosol number concentration | |
| Aerosol number size distribution | Intermittent |
| Cloud condensation nuclei number concentration at various supersaturations | |
| Vertical distribution of aerosol backscattering and extinction | |
| Detailed size fractionated chemical composition | |
| Dependence of aerosol variables on relative humidity, especially aerosol number size distribution and light scattering coefficient. | Intermittent |

United National Framework Convention on Climate Change

- GAW coordinates global observations and QA of the well mixed long-lived greenhouse gases
- WMO works jointly with UNEP on the establishment of the Integrated Global Greenhouse Gas information System (see related poster)

