GAW, NDACC, GCOS, GRUAN

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WMO OMM

What is GAW?

- WMO-GAW was established 1989 by merging two established WMO networks: GO$_3$OS and BAPMoN.
- GAW focuses on global networks for GHGs, ozone, UV, aerosols, selected reactive gases, and precipitation chemistry.
- GAW is a partnership involving contributors from 80 countries.
- GAW is coordinated by the Atm. Env. Research Division of WMO's Research Dept.
- Currently GAW coordinates activities, data delivery and analysis products from 24 Global stations, 200 Regional stations, and many Contributing stations.

The GAW Mission

- Systematic Global Monitoring of the Chemical Composition of the Atmosphere
- Analysis and Assessment in Support of International Conventions
- Development of Air Pollution and Climate Predictive Capability

The GAW System

SAGs

- Ozone
- UV
- IGACO-Ozone
- Greenhouse Gases
- Precipitation chemistry
- IGACO-GHG
- Reactive gases
- GURME
- Aerosols
- IGACO-Air Quality
- IGACO-Aerosols

GAW Secretariat

WMO

CAS Open Programme Area Group

EPAC

Environmental Pollution & Atmospheric Chemistry

Joint Scientific Steering Committee

Quality Assurance & Science Activity Centres

World & Regional Calibration Centres

GHG	N_2O VOC	CH_4	Precip. chem.	Physical aerosol properties	In situ O_3, CO, CH_4	Optical depth	Total O_3	O_3 Sondes
NOAA ESRL/GMD (USA)	IMK-IFU (DE)	JMA (JP)	SUNY Albany (USA)	IFT (DE)	EMPA (CH)	WORCC (CH)	3 WCC (US, CA, RU) 6 Dobson RCC (JP, AU, ZA, AR, DE, CZ) 1 Brewer RCC (ES)	FZJülich (DE)

Central Calibration Laboratories

Host GAW World Reference Standards

CO_2, CH_4, N_2O CO, Dobson O_3	Brewer total O_3	Ozone-sondes	In situ O_3
NOAA ESRL/GMD (USA)	Environment Canada	FZJülich (DE)	NIST (USA)

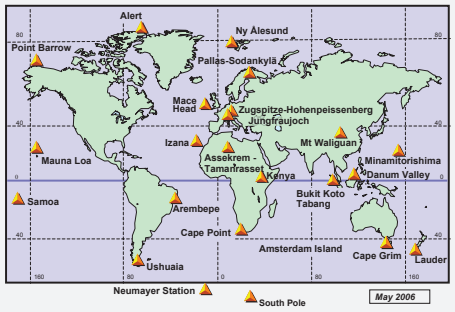
Contributing networks

BSRN

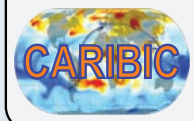
NDACC

SHADOZ

GAW stations & GAWSIS



Satellites & Aircraft



World Data Centres

WOUDC	WDCGG	WDCA	WRDC	WDCPC
Ozone & UV	Greenhouse gases	Aerosols	Radiation	Precip. chem.
Environment Canada (CA)	JMA (JP)	JRC (EU)	MGO (RU)	SUNY Albany (USA)

IGACO products

Bulletins

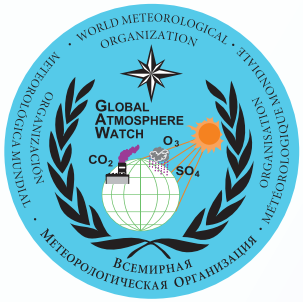
Assessments

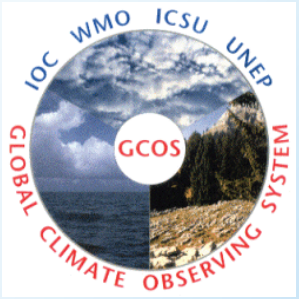
Global fields


Dobson Intercomparison
Buenos Aires, Nov/Dec 2006

Dobson, Brewer & Sondes are now part of GCOS

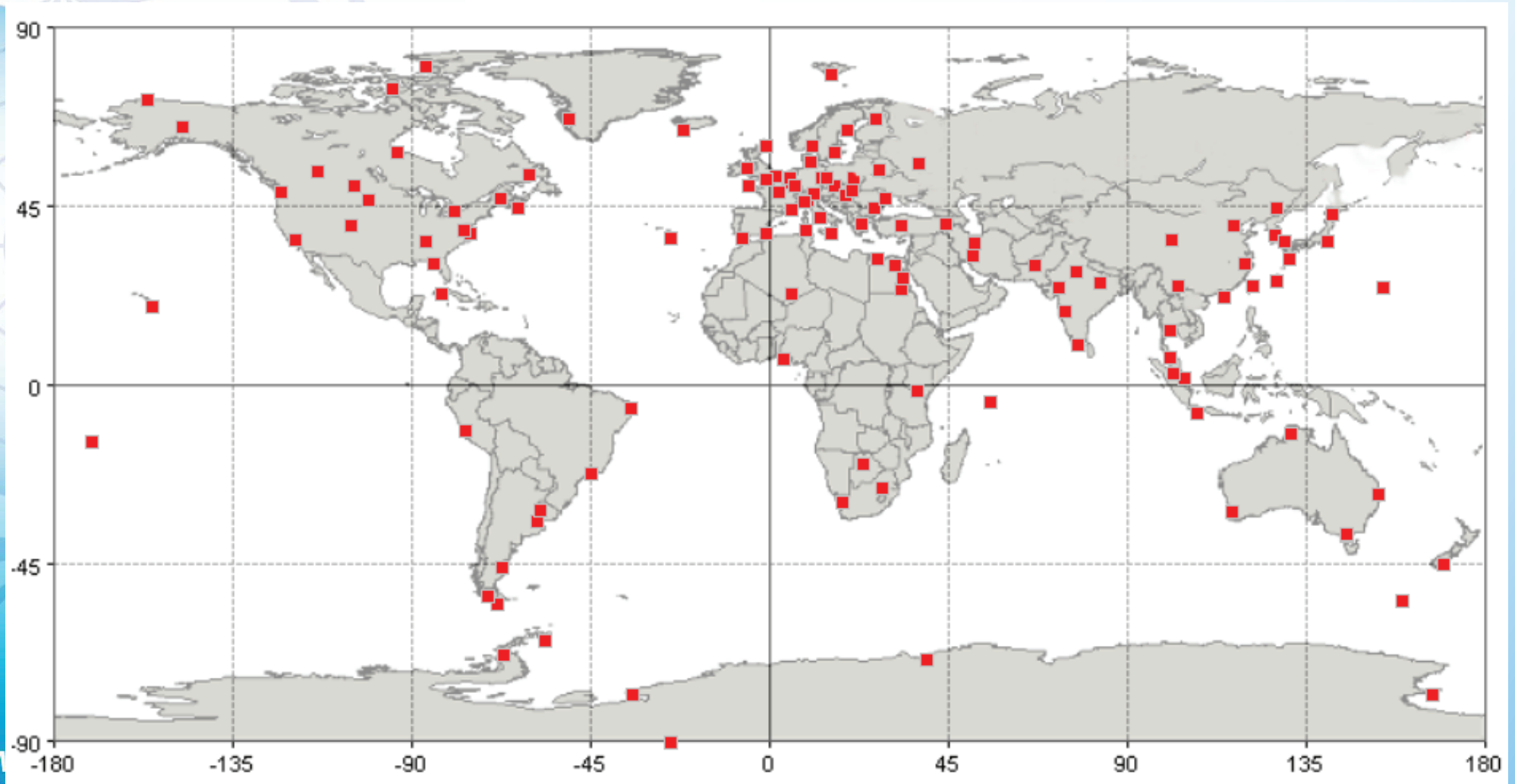
- **Dobson & Brewer Networks constitute:**
  WMO/GAW GCOS Global Baseline Total Ozone Network
- **Ozonesonde Network constitutes:**
  WMO/GAW GCOS Global Baseline Profile Ozone Network
- **Endorsed by GCOS AOPC-XIII 23 April 2007**
- **Adopted at the 15th session of the GCOS Steering Committee in Paris 16-19 Oct 2007**





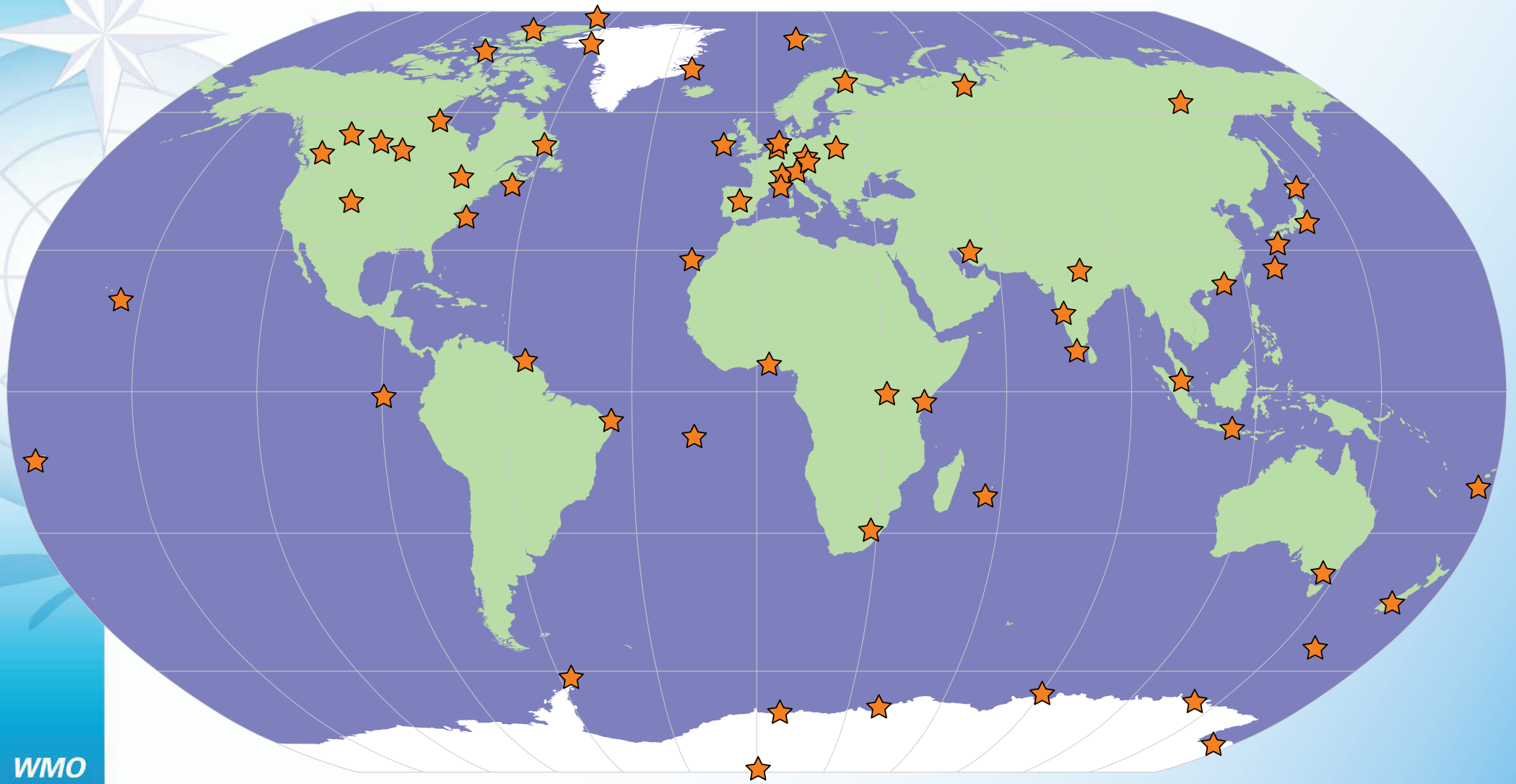
Global Atmosphere Watch
Dobson & Brewer stations

132 stations



GAW/SHADOZ/NDACC Ozonesonde stations

63 stations



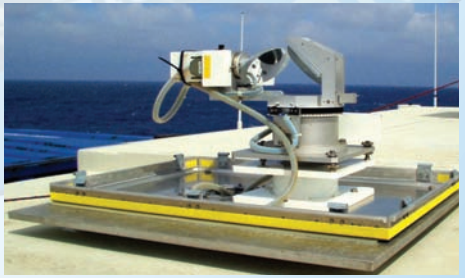
What is NDACC?

Network for the Detection of Atmospheric Composition Change

Priorities

- Studying the temporal and spatial variability of atmospheric composition and structure,
- Detecting trends in overall atmospheric composition and understanding their impacts on the stratosphere and troposphere,
- Establishing links between climate change and atmospheric composition,
- Calibrating and validating space-based measurements of the atmosphere,
- Supporting process-focused scientific field campaigns, and
- Testing and improving theoretical models of the atmosphere.




NDACC Site Selection

Primary and complementary sites

Primary sites have a comprehensive suite of measurements

Complementary sites have a more limited set of measurements

The quality criteria are the same

Stations in different regions

Polar regions (N and S)

Mid-latitude in both hemispheres

Tropical and equatorial sites

A station can consist of several sites

Arctic site: **Eureka, Thule, Søndre Strømfjord, Ny-Ålesund**

Alpine site: **Jungfraujoch, OHP, Payerne, Bern, Zimmerwald, Arosa, Garmisch Partenkirchen, Zugspitze, Hohenpeissenberg**

Antarctic site: **South Pole, Dumont d'Urville, Arrival Heights, McMurdo and Scott Base.**

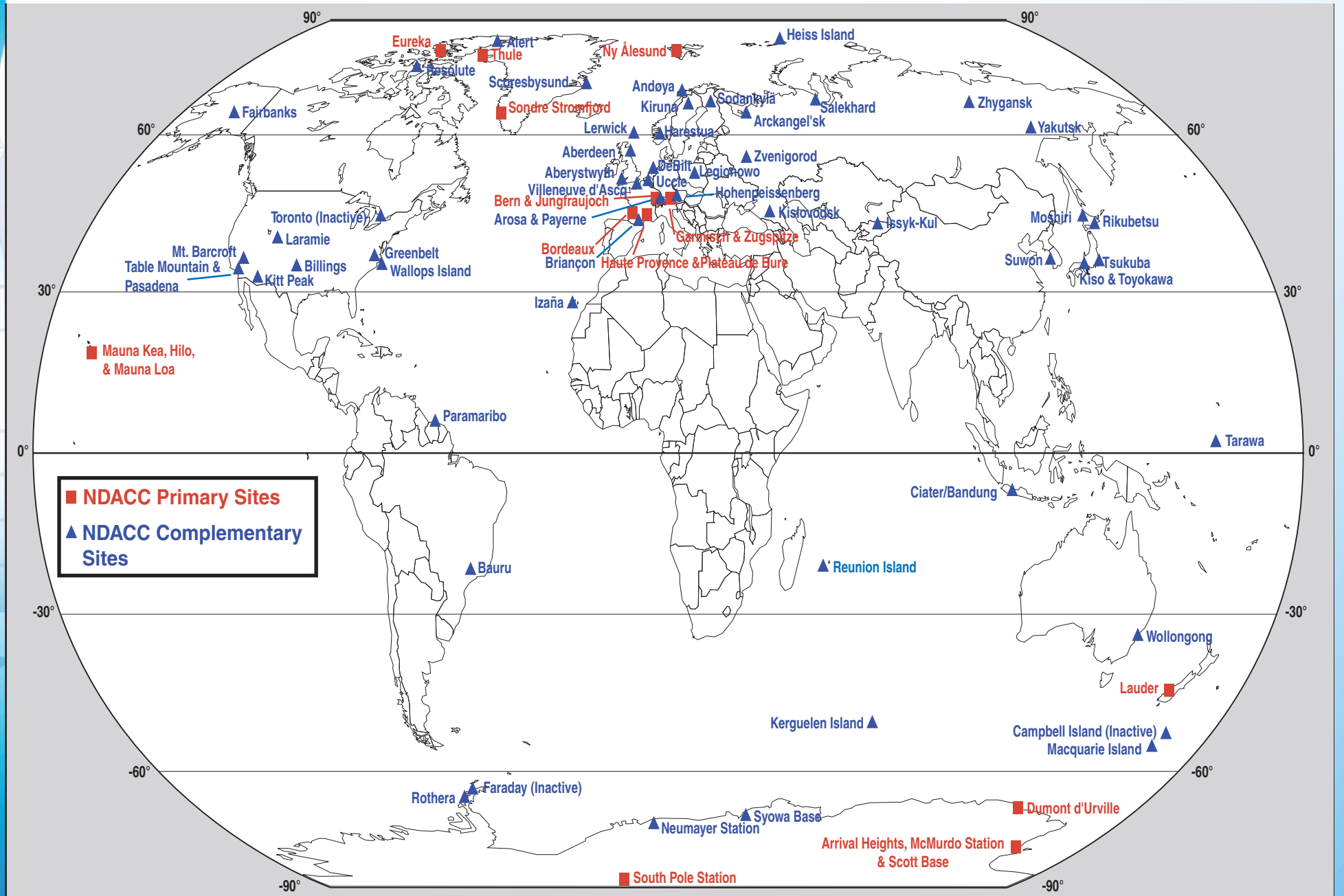
NDACC: Focus on data quality

- **Strict criteria for being and staying affiliated**
- **Network governed by a number of protocols**
  - **Data protocol: Compromise between data availability & IPR**
  - **Validation protocol**
  - **Instrument intercomparison protocol**
- **Regular intercomparison campaigns**
  - **Mobile systems (Lidar, FT-IR)**
  - **Gathering of many instruments at the same location**

Organisation of NDACC

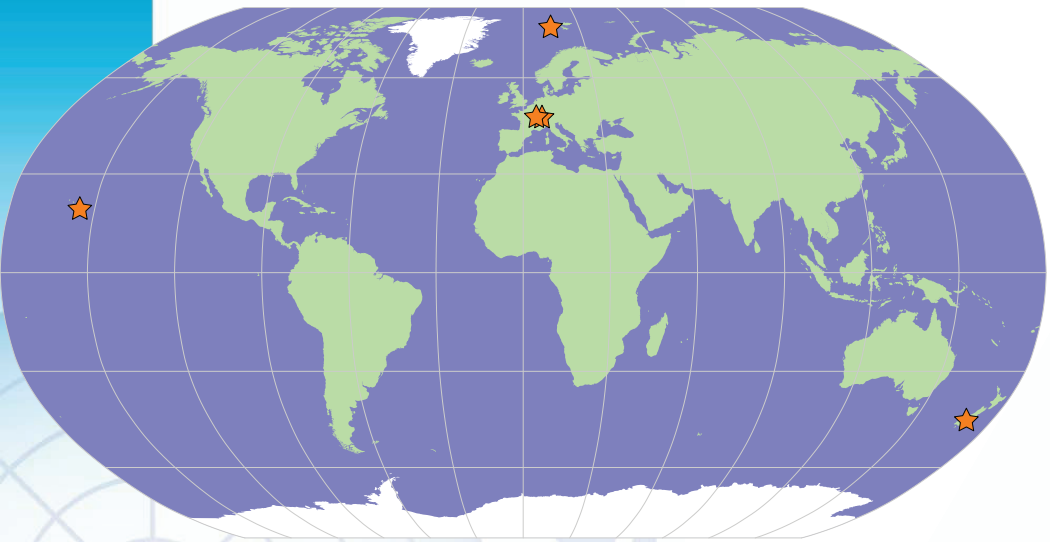
- **Working groups**
  - **UV-Vis, Spectral UV, Ozone&aerosol sondes, FT-IR, MW, Lidars, Dobson&Brewer**
  - **Working groups for Satellites, Theory&Analysis, H_2O, O_3**
  - **Steering Committee with Working Group representatives + peer and ex-officio members (~40 in all)**

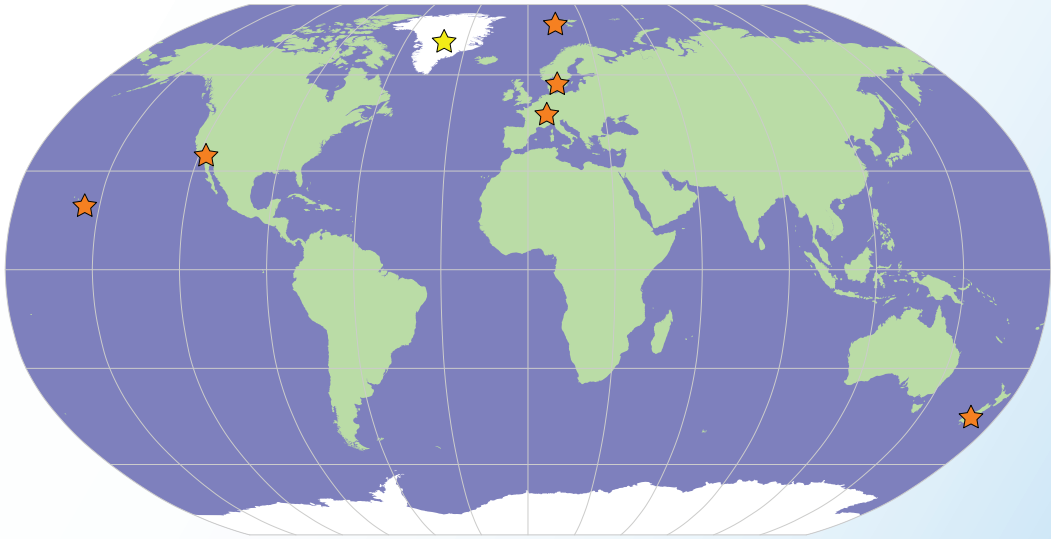
NDACC Station Map



WMO
OMM

NDACC microwave sites





Ozone

Characteristics

Altitude range: 20-70 km

Vertical resolution: 8-12 km

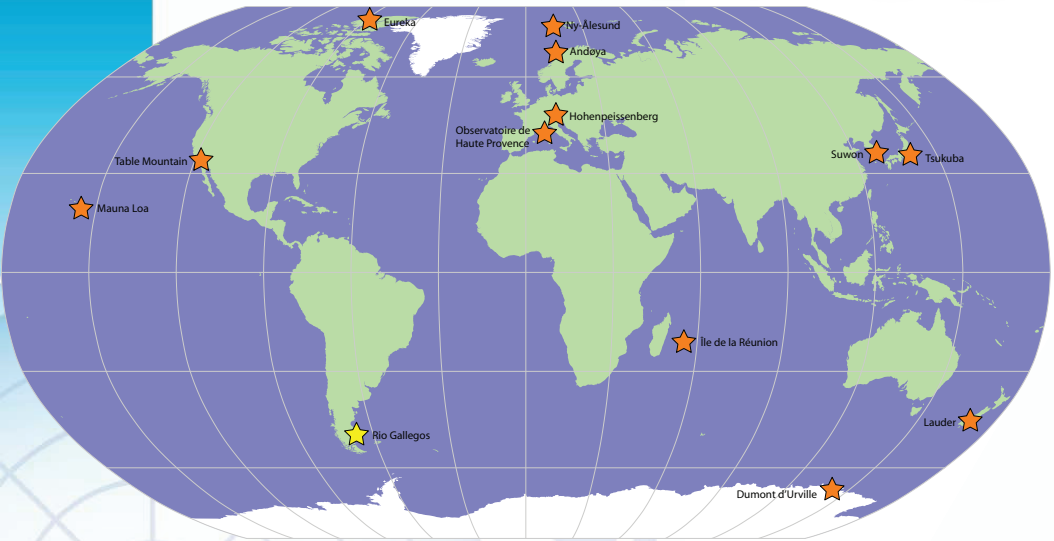
Water vapour

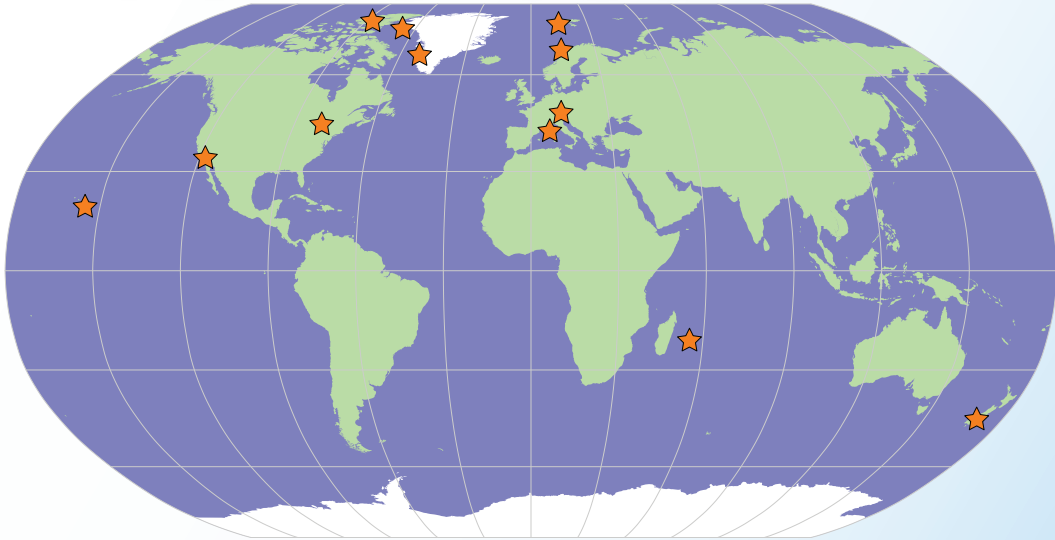
Characteristics

Altitude range: 20-70 km

Vertical resolution: 8-12 km

NDACC lidar sites





Ozone

Characteristics

Altitude range: 10 - 50 km

Vertical resolution: 0.5 - 5 km

Network homogeneous within ± 2% in the 20-35 km range

Temperature

Characteristics

Altitude range: 10-80 km

Vertical resolution: 1-6 km

Network homogeneous within ± 1 K in the 35 - 60 km range

NDACC lidar sites

Water vapour (Raman and DIAL)

Characteristics

Altitude range: ground to 8-17 km

Vertical resolution: 0.1 km

Detection limit: 15 ppb

Accuracy: Depends on calibration source (5-20%)

Precision: 0.001 to 50%

Essential climate variables (ECVs)

Variable	Priority	Lidar	FT-IR	μwave	Dobson Brewer UV-Vis	Sondes
Temperature	1	X				x
Total water vapour	1		X			
Profile water vapour		X	X	X		x
Total Ozone	2		X		X	
Profile ozone	2	X	X	X		x
Methane	2					x

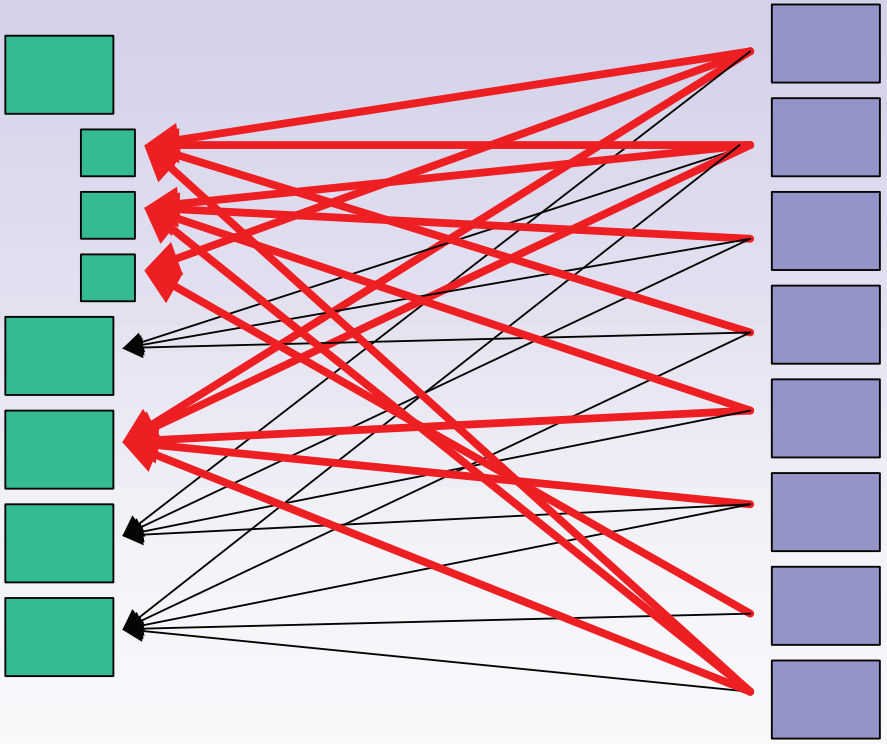
Initial station candidates

ARM Sites, Lindenberg, Camborne, *Payerne*, Cabauw, *Boulder*, *Sodankylä*, Heredia, *Lauder*, Beltsville

Proliferation of data bases

Current situation

data providers
(e.g. ESA, NASA, NASDA, ECMWF, NCEP, station networks, individual stations, field campaign data centers, ...)



data users
(individual research groups)

bureaucratic procedure, i.e., submission of proposal, annual reports, final report, etc.

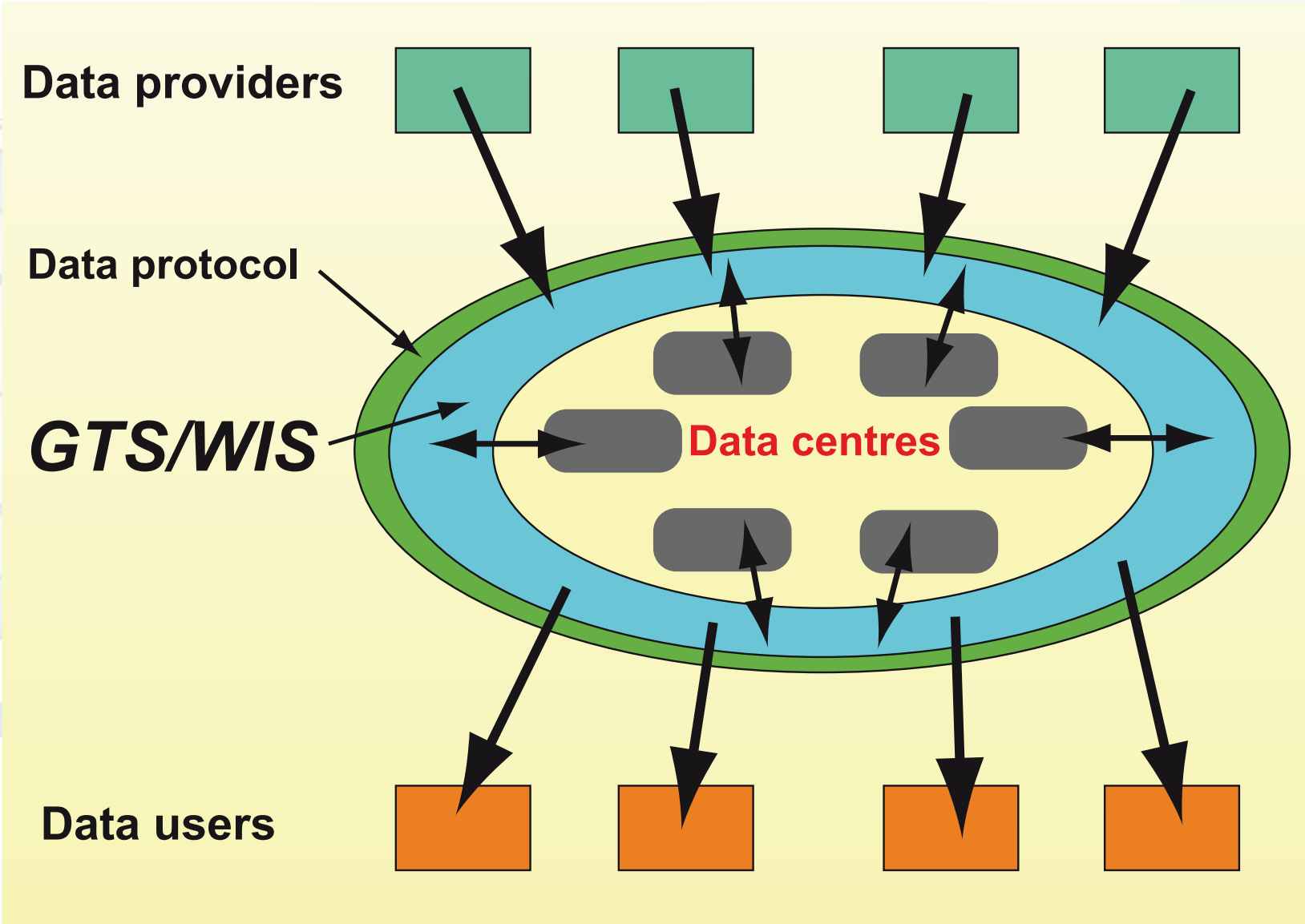
simple registration or free access

AWI

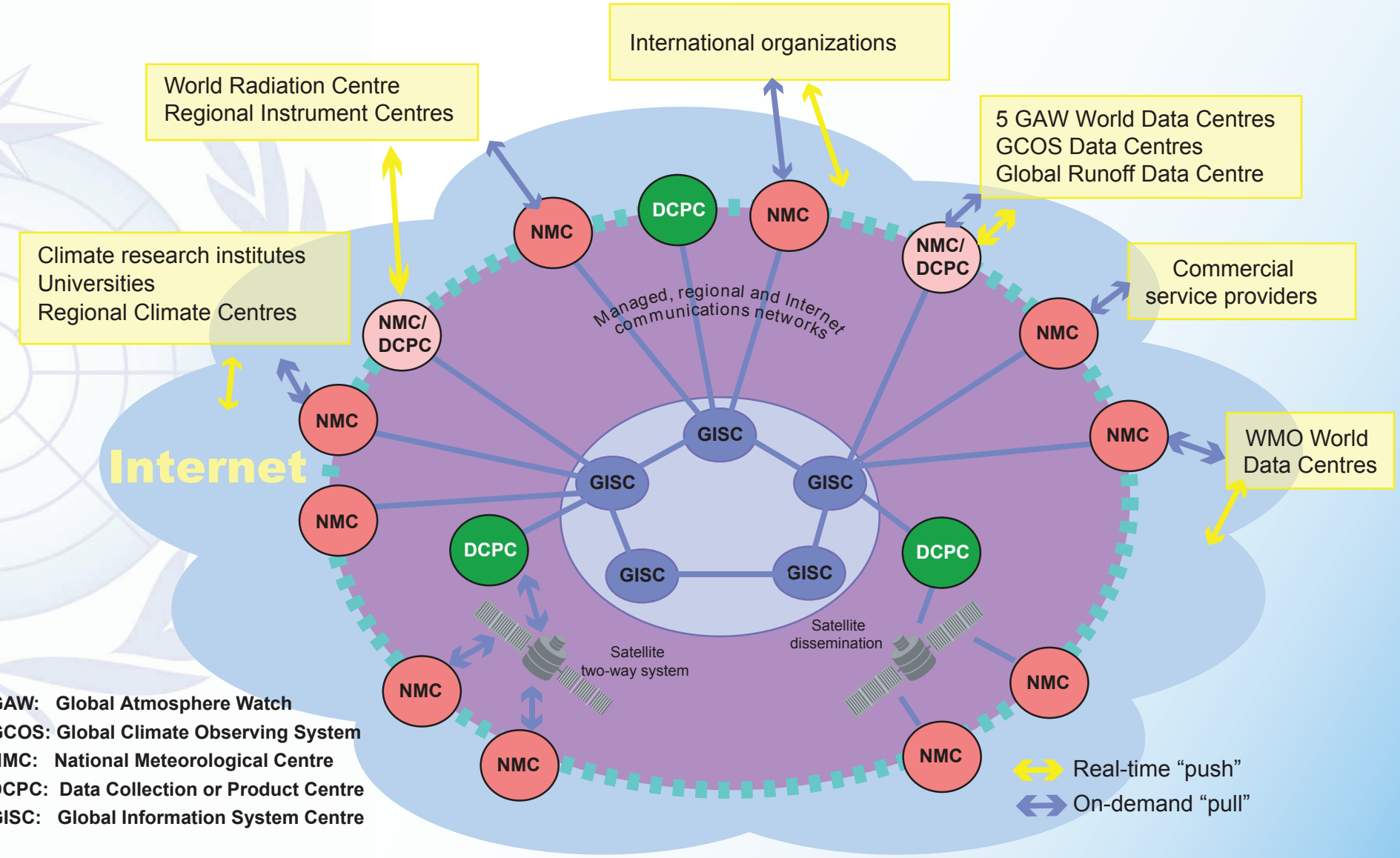
IGACO Workshop Greece, 15 May 2006

Figure courtesy of Markus Rex, AWI

Ideal situation



WMO Information System (WIS)



GAW: Global Atmosphere Watch
GCOS: Global Climate Observing System
NMC: National Meteorological Centre
DCPC: Data Collection or Product Centre
GISC: Global Information System Centre