Coordination of efforts with NDACC

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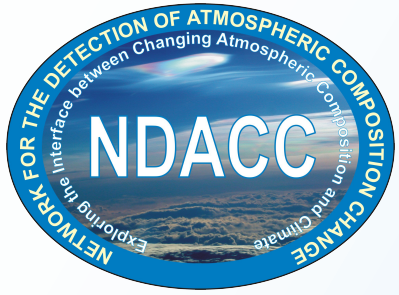
Atmospheric Environment Research Division, WMO's Research Department

&

NDACC Co-Chair

Dobson, Brewer & Ozonesondes are now part of GCOS

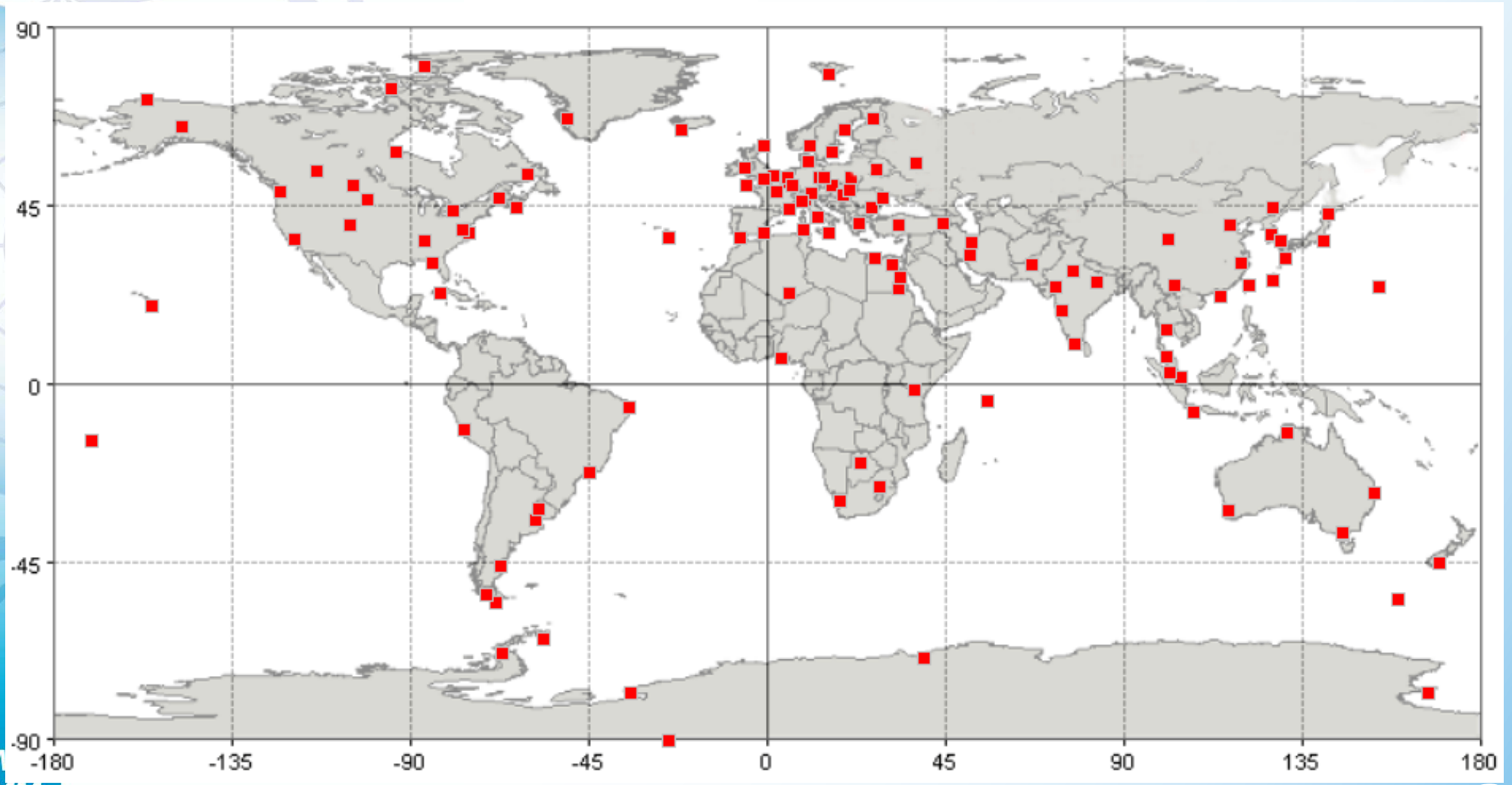
- **Dobson & Brewer Networks constitute:**
  - ✔ **WMO/GAW GCOS Global Baseline Total Ozone Network**
- **Ozonesonde Network constitutes:**
  - ✔ **WMO/GAW GCOS Global Baseline Profile Ozone Network**
- **Endorsed by GCOS AOPC-XIII 23 April 2007**
- **Adopted at the 15th session of the GCOS Steering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



GCOS
GLOBAL CLIMATE OBSERVING SYSTEM

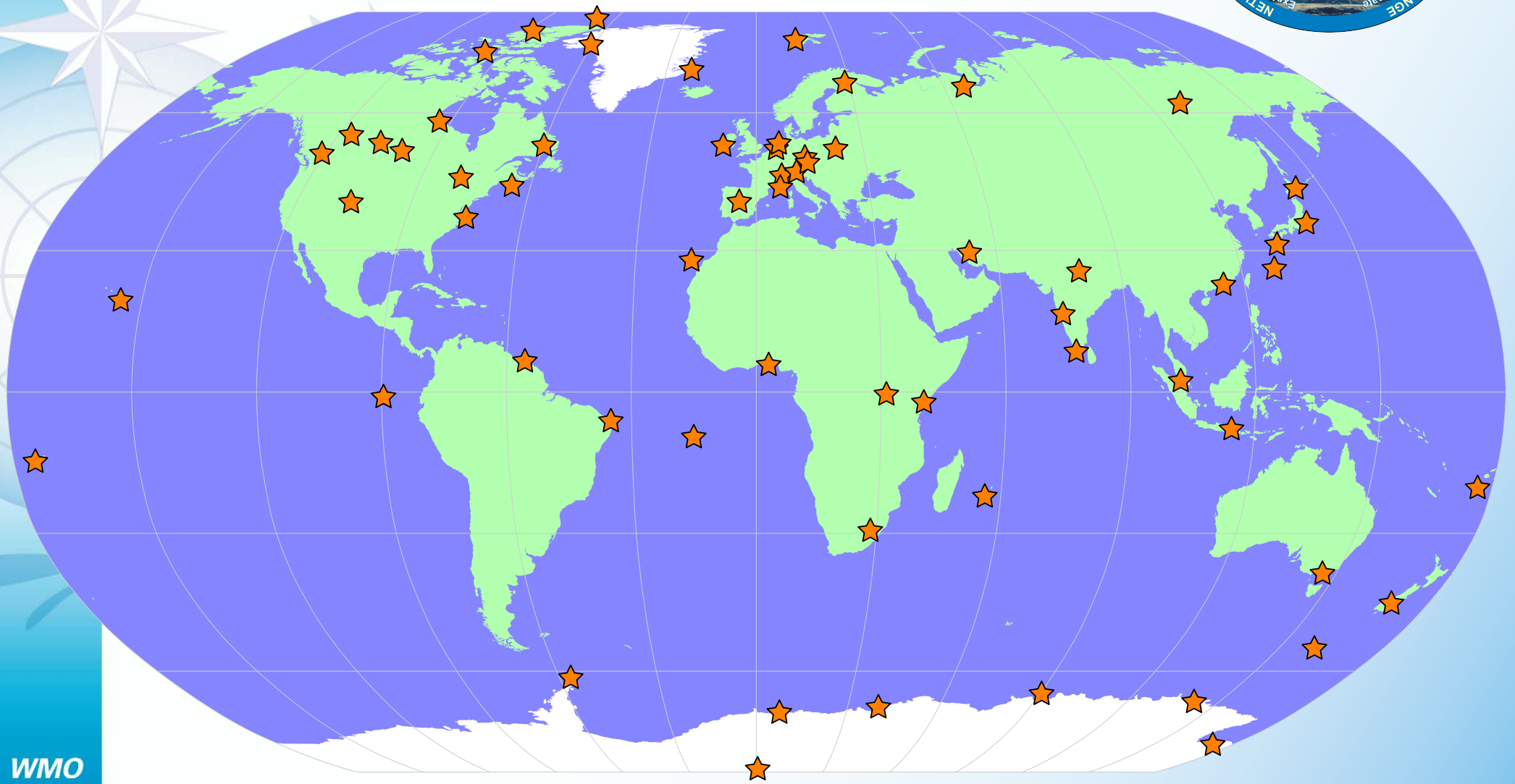
Global Atmosphere Watch
Dobson & Brewer stations

132 stations



GAW/SHADOZ/NDACC Ozonesonde stations

63 stations



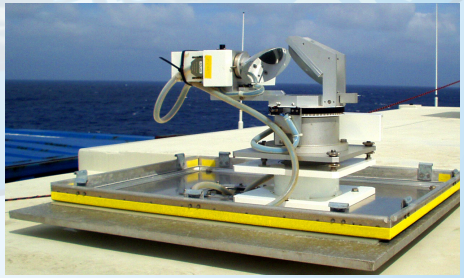
What is NDACC?

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

Only one type of stations

- There used to be primary and secondary stations, depending on the suite of measurements and the commitment
- The quality criteria were and are the same for all stations/instruments
- Some Complementary Stations had all instrument types and long term commitments
- Original designation misleading – no quality difference
- Original designation compromised long-term funding commitments

Stations in different regions

- Polar regions (N and S)
- Mid-latitudes in both hemispheres
- Tropical and equatorial sites

NDACC Site Selection

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 Organizational Chart

Steering Committee

Co-Chair | Co-Chair | Executive Secretary

Working Group Representatives

Dobson & Brewer | FTIR | LIDAR | Microwave | Sondes

Spectral UV | UV-Visible | Satellites | Theory & Analysis

Ex-Officio & Peer Representatives

NETWORK FOR THE DETECTION OF ATMOSPHERIC COMPOSITION CHANGE

Exploring the Interface between Changing Atmospheric Composition and Climate

NDACC

Working Groups and Science Teams

Dobson & Brewer | FTIR | LIDAR | Microwave | Sondes | Spectral UV | UV-Visible

Satellite | Theory & Analysis | Water Vapour | Ozone | Measurement Strategies & Emphases

Quality Assurance

Protocols

Instrument Validation

Instrument and Algorithm Intercomparisons

Cooperating Networks

NOAA — National Oceanic and Atmospheric Administration — U.S. Department of Commerce — ESRL/GMD/HATS

TCCON — total carbon column observing network

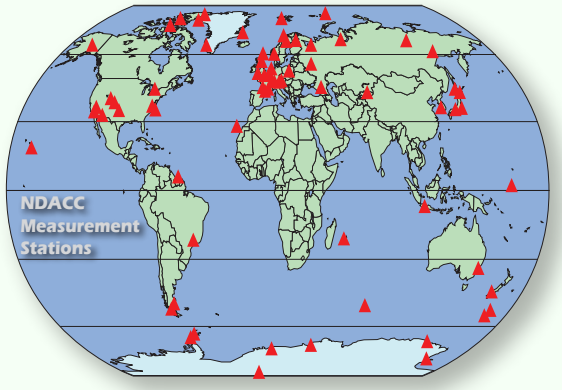
The Micro Pulse Lidar Network — MPLNET

AERONET — AEROSOL ROBOTIC NETWORK

SHADOZ — Southern Hemisphere Additional Ozonesondes

AGAGE

Station Network



Goals & Results

Long-term time series for detection of changes and trends

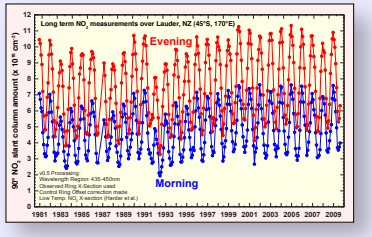
Establish scientific links and feedbacks between climate change and atmospheric composition

Satellite calibration and validation

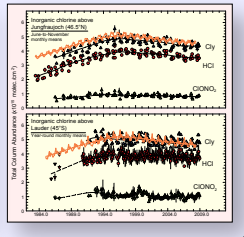
Support to scientific field campaigns

Model validation

NO_2 Slant Column

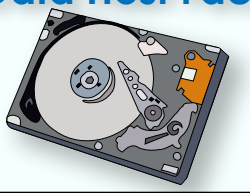


Inorganic Cl Column

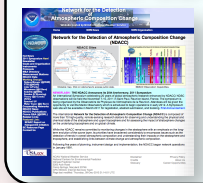


Data Archiving and Outreach

Data Host Facility



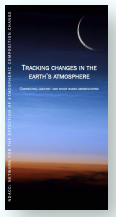
Web Sites



Newsletter

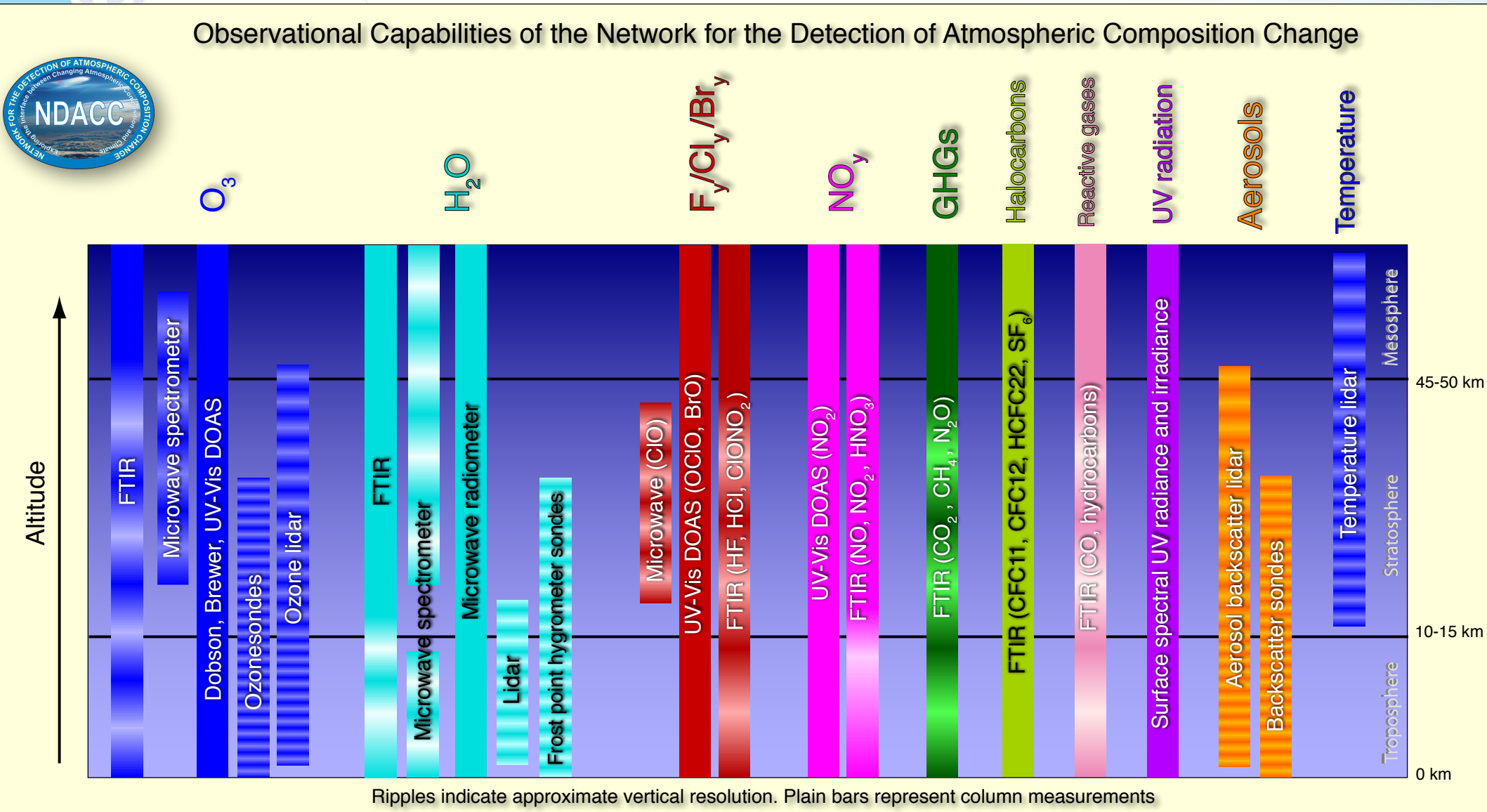
Brochure

Leaflet

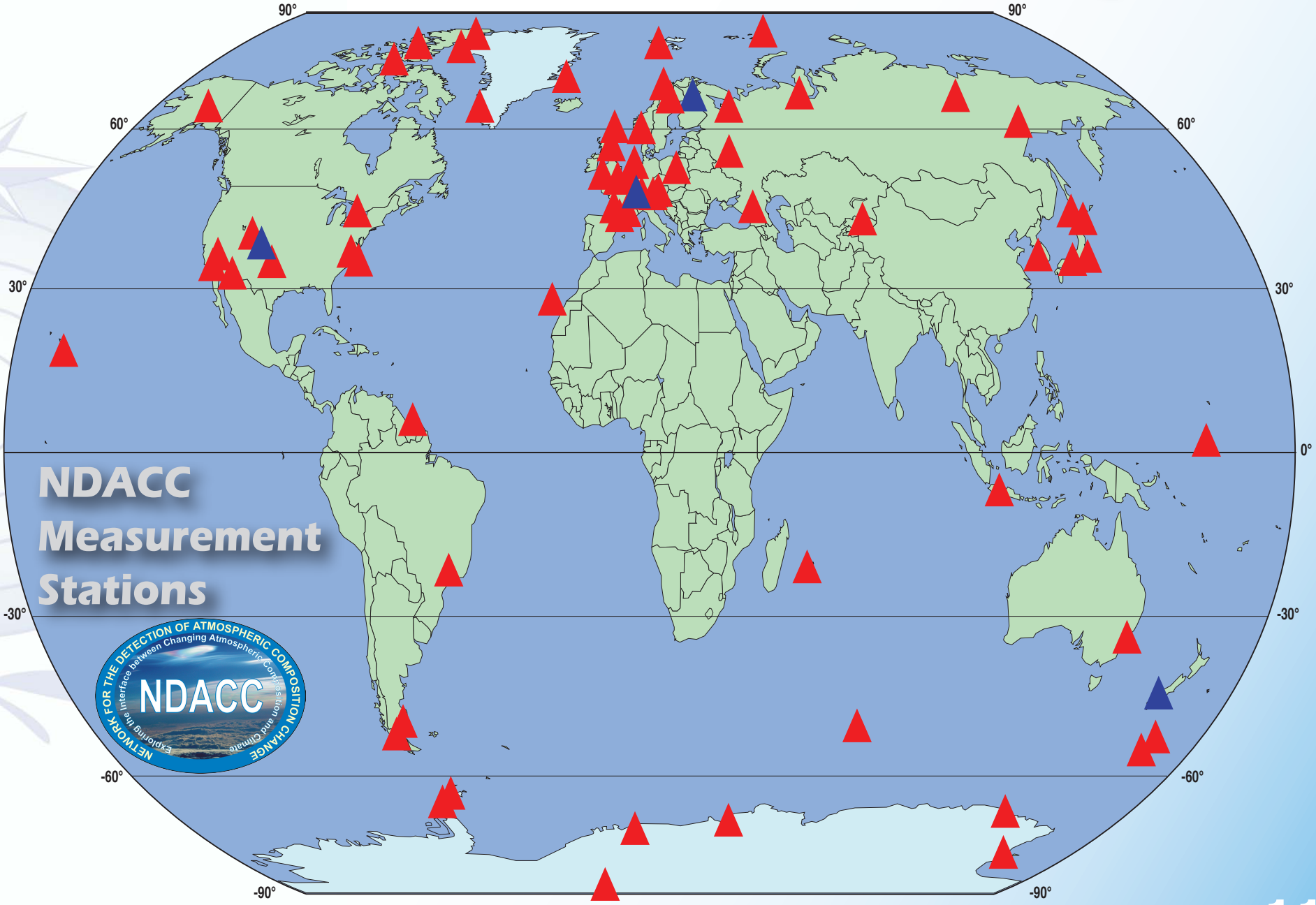


Overview of NDACC species and how they are measured:

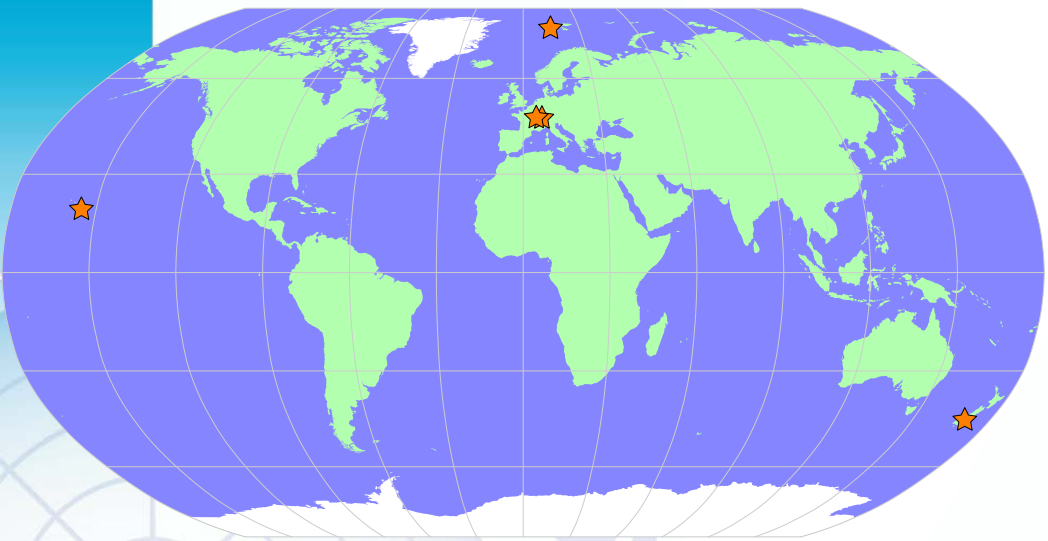
The NDACC Observational Capability Chart

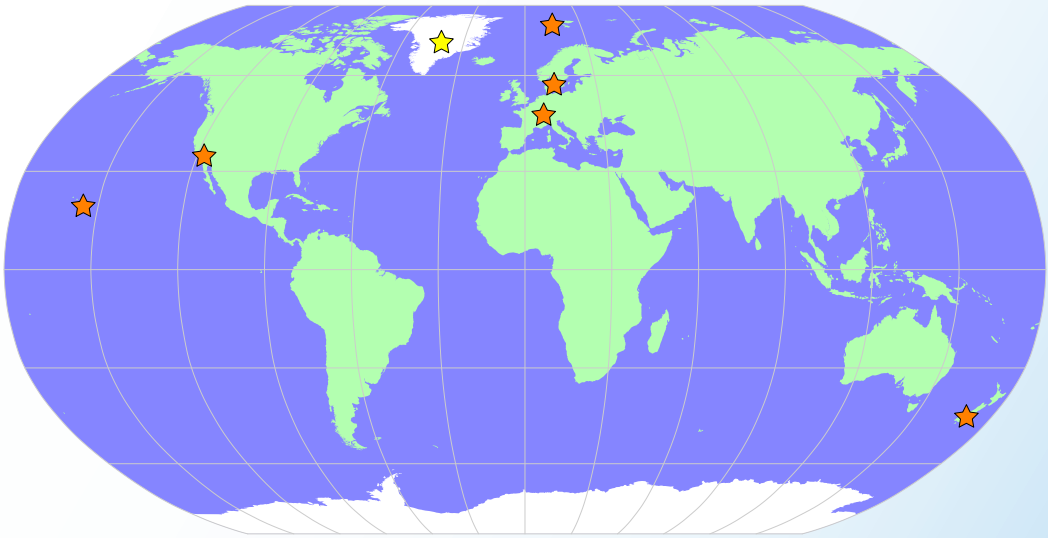


NDACC Station Map



NDACC microwave sites





Ozone

Characteristics

Altitude range: 20-70 km

Vertical resolution: 8-12 km

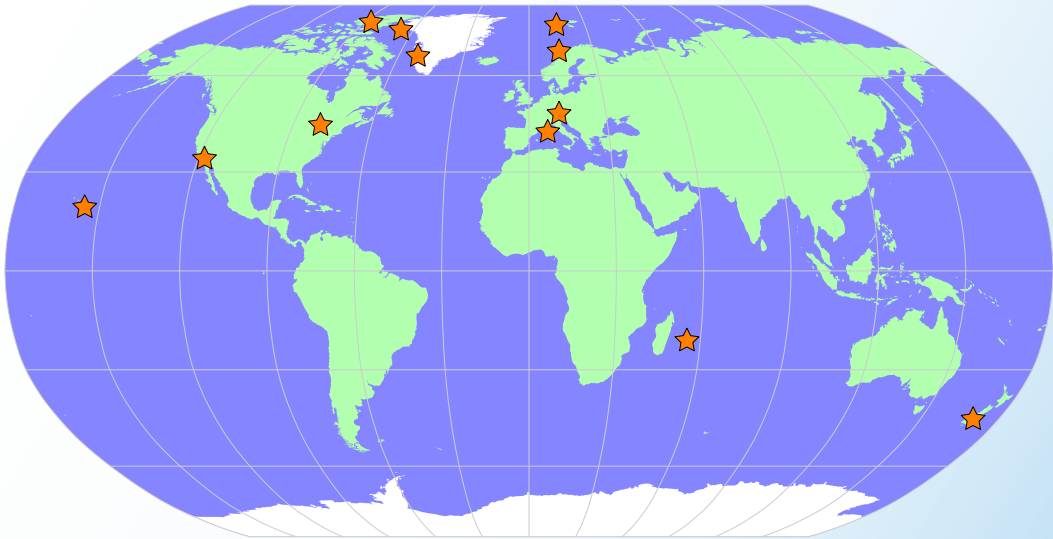
Water vapour

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

GCOS
GLOBAL CLIMATE OBSERVING SYSTEM

GRUAN

Recommendations for GRUAN

Don't Reinvent the Wheel

- ✔ Draw on capabilities of established high-quality networks
- ✔ Augment these capabilities as needed to provide key climate variables on a global scale

Instrument-Specific WGs First

- ✔ Include Engagement of Satellite Community
- ✔ Validation enables patching of long-term datasets
- ✔ GRUAN is the Reference Network for GUAN
- ✔ Emphasis on measurement accuracy & precision
- ✔ Build-up phase is better supported by an instrument-specific organization
- ✔ Mirror NDACC instrument WG functions

Parameter-Specific WGs Second

- ✔ Once Instruments Are Fully Characterized

GRUAN NDACC Collaboration

- NDACC Is Eager to Cooperate & Collaborate
- Infrastructure & Instruments at NDACC Sites Can Aid in Campaign Implementation
- Instrument intercomparison & characterization
- Guide ongoing development of measurement requirements
- For example, Raman Lidar for water vapor profiles
- See Thierry Leblanc's presentation earlier this week

GRUAN/NDACC Collaboration

Commonality of Interests

- ✔ Water Vapor Profiles – growing NDACC heritage
- ✔ Campaigns for measurement characterization
- ✔ Analyses to guide measurement requirements
- ✔ Ozone Profiles – strong NDACC heritage

How can GRUAN benefit from NDACC?

- ✔ Infrastructure & instruments at NDACC sites can aid in intercomparison campaigns – e.g., Raman Lidar for water vapor profiles

How can NDACC benefit from GRUAN?

- ✔ GRUAN Measurements May Be More Frequent at Some Locations
- ✔ Useful in Resolving Measurement / Model Differences

2009: Inception of NDACC Cooperating Network Affiliation

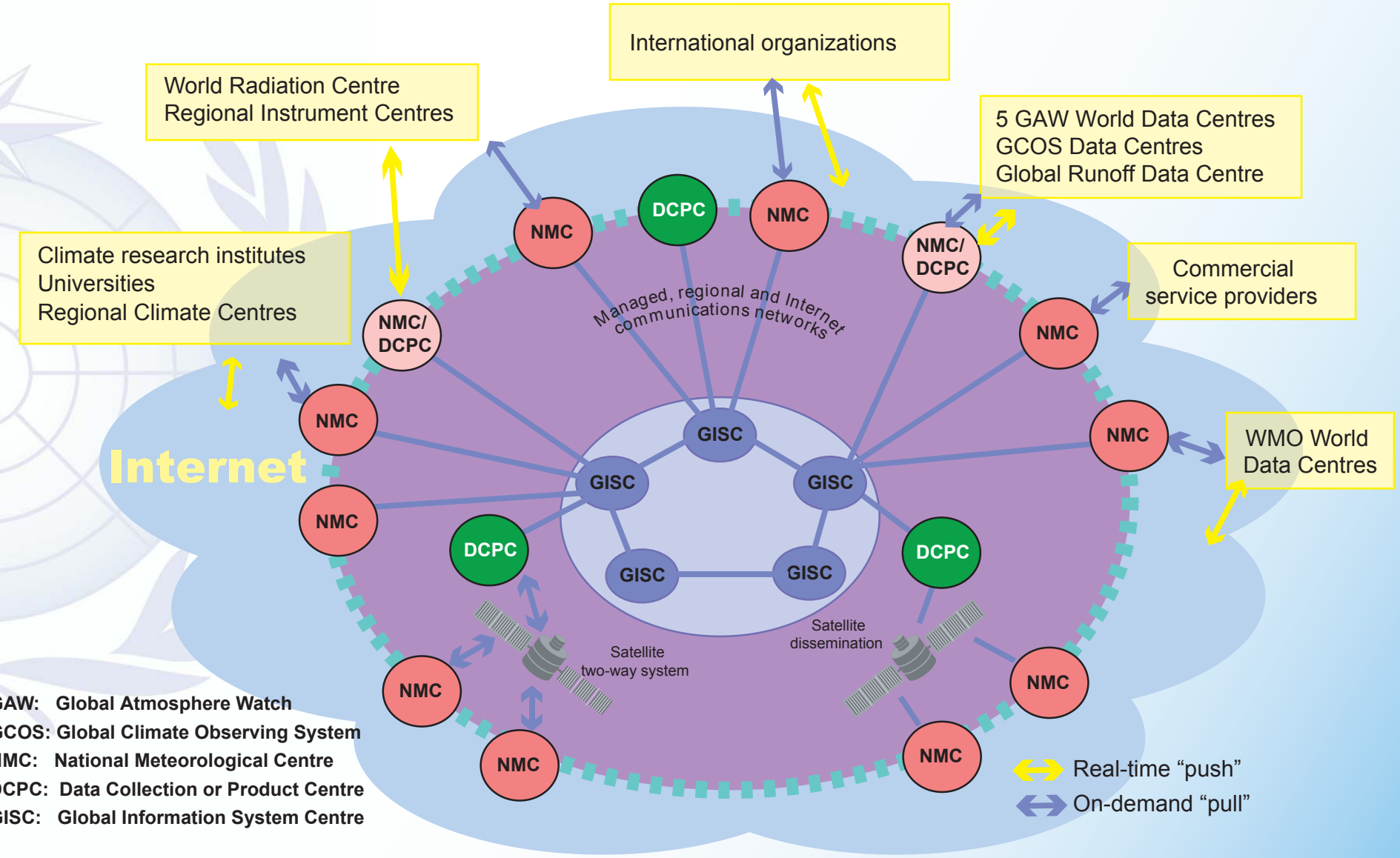
Recognition of measurement capabilities developed externally to NDACC

- ✔ Regional, Hemispheric, or Global Networks Operating Independent of NDACC
- ✔ Existing quality assurance guidelines
- ✔ Existing operational requirements
- ✔ Existing data archiving policies
- ✔ Existing national or international recognition
- ✔ Mutual Benefit of Strong Measurement and Scientific Cooperation

Agreements finalized with five networks

- ✔ AGAGE, AERONET, MPLNET, NOAA-HATS and SHADOZ

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

Acknowledgements

- Mike Kurylo
- NDACC Lidar Working Group
- NDACC Microwave Working Group