Report on DWD activities and plans

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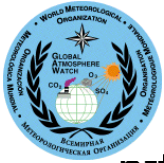
Outline

- Activities in months 1-12

- Evaluation: selection of events

- Plans for months 13-30 (AER, GRG)

- Needs & open questions

Activities

- Established/configured **access to ECMWF** data server MARS

- **Introduced GEMS** during GMES-, GAW-, NDSC-, and CO- Workshops

- **Requested data** from networks and stations

- Data survey → **compiled tables** of coverage of AOD and selected gases in GAW data bases

- **Retrieved 2003 data** from GAW data bases

- Set up data handling **routines**

GAW Data Centres

http://wdca.jrc.it

http://www.woudc.org

http://www.empa.ch/gaw/gawsis

http://wrdc.mgo.rssi.ru

http://gaw.kishou.go.jp/wdcgg.html

Data Overview - GRG I

Number of Stations by Parameter and Region

	Region I	Region II	Region III	Region IV	Region V	Region VI	Antarctica	Mobile	Total
Station	12	30	8	62	33	117	21	29	312
Country	8	10	5	6	7	31	8	3	66
O_3	4	6	2	17	5	47	4		85
CO	6	9	3	16	14	21	8	3	80
NO_2				1	2	42			45
NO						11			11
NOx						6			6
NOy						3			3
SO_2					2	46			48

Region I: Africa, II: Asia, III: South America, IV: North/Central America, V: South-West Pacific, VI: Europe
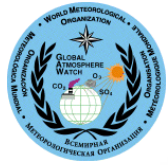
CO
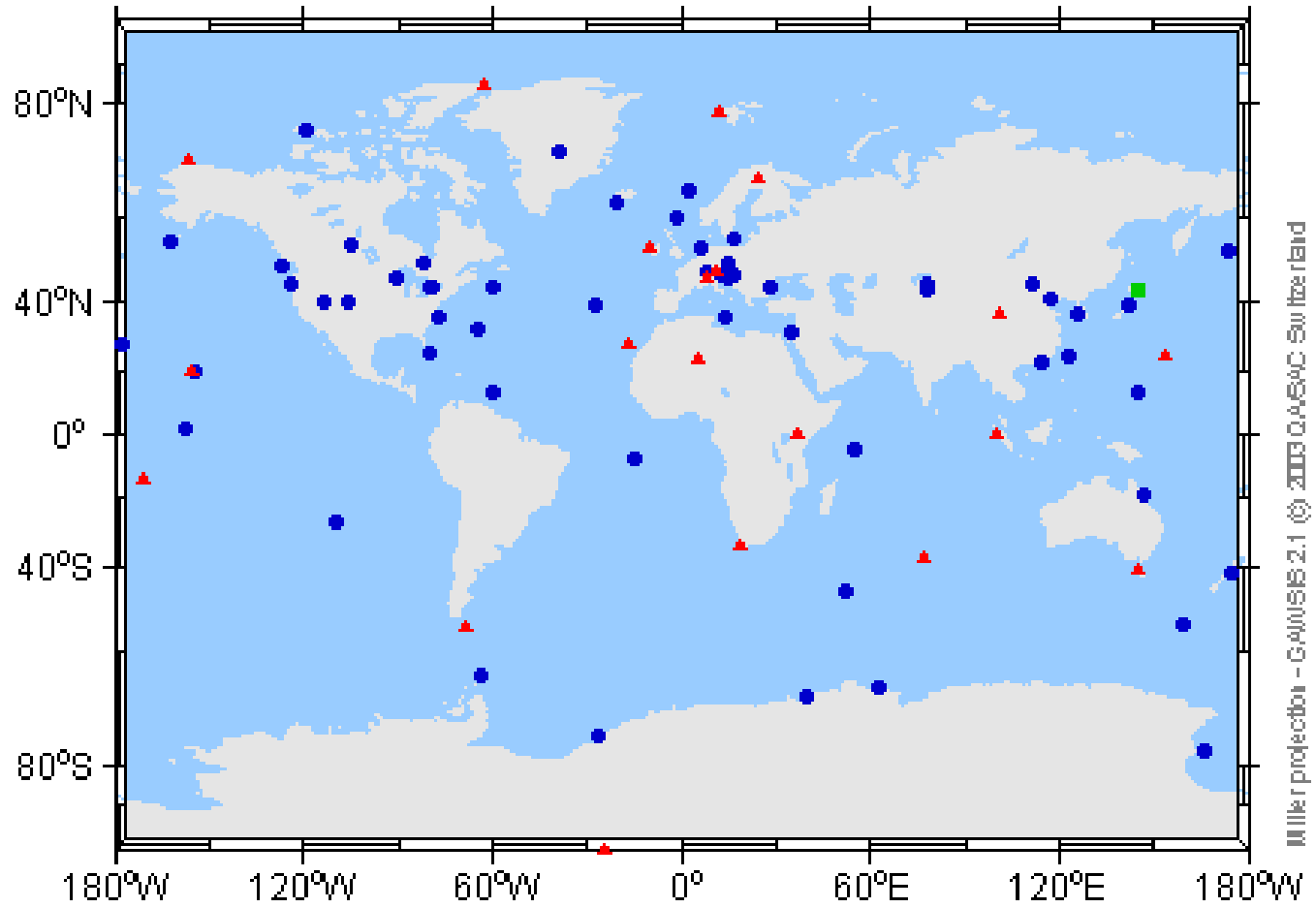
CO Monthly Data

CO

N

S
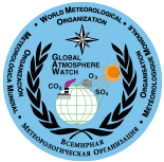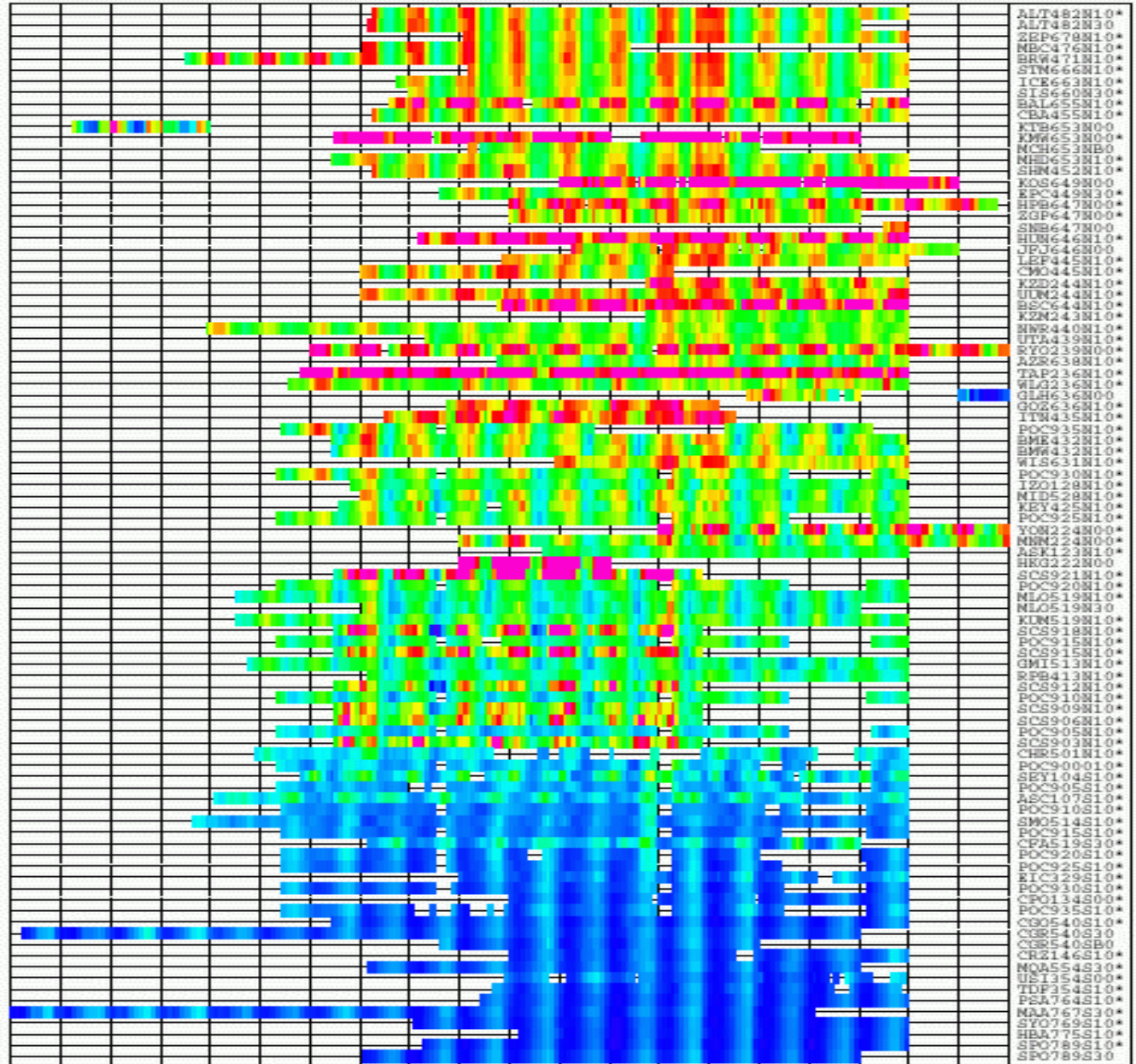
1990   2003
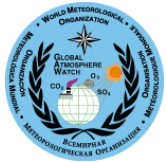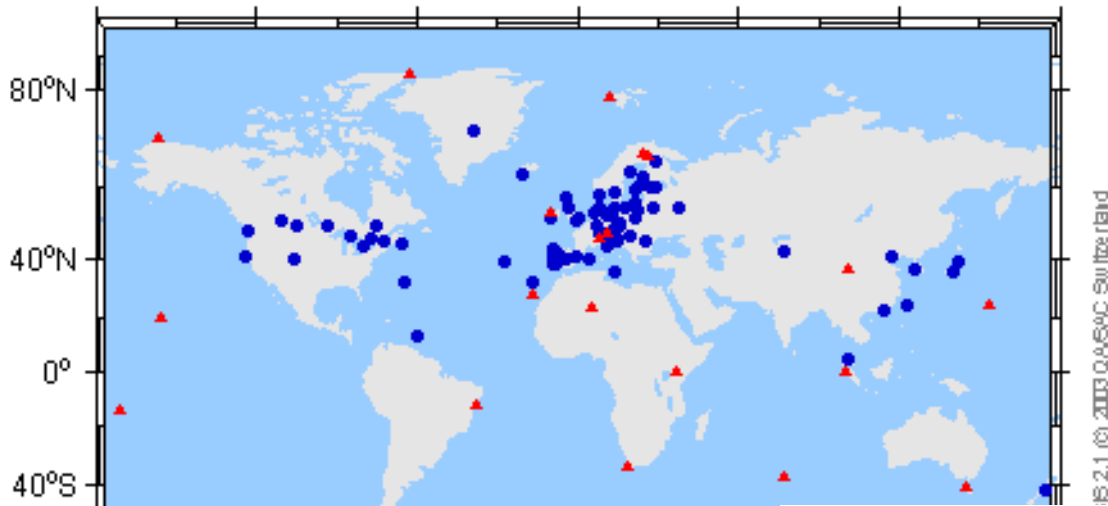
Surface Ozone

WOUDC Ozonesonde Platforms - Data years 2002 - 2005
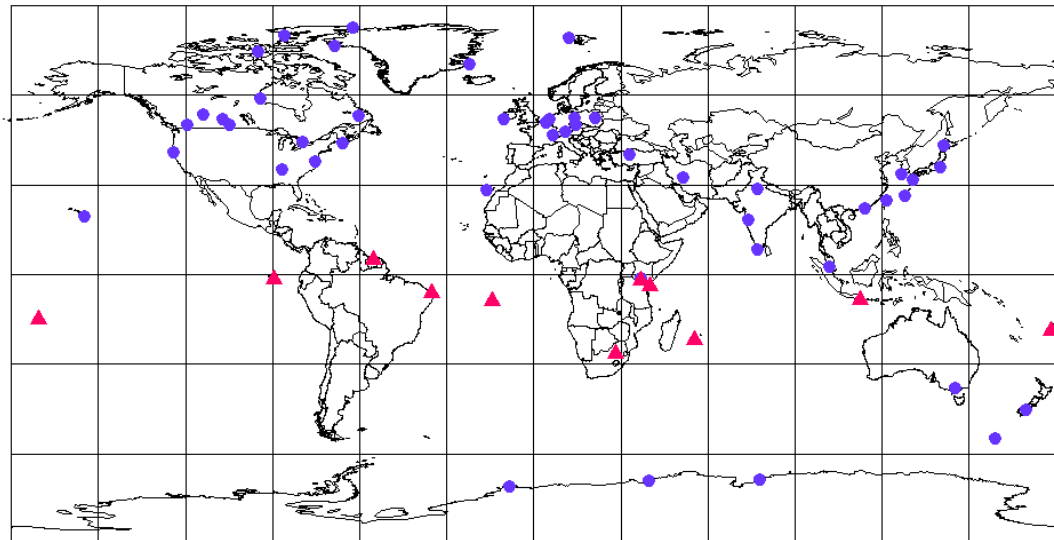
● GAW Regional Station   ▲ GAW Global Stat...

● WMO-GAW and Other Network Sites   ▲ SHADOZ Sites

O₃ Monthly Data

Surface O3
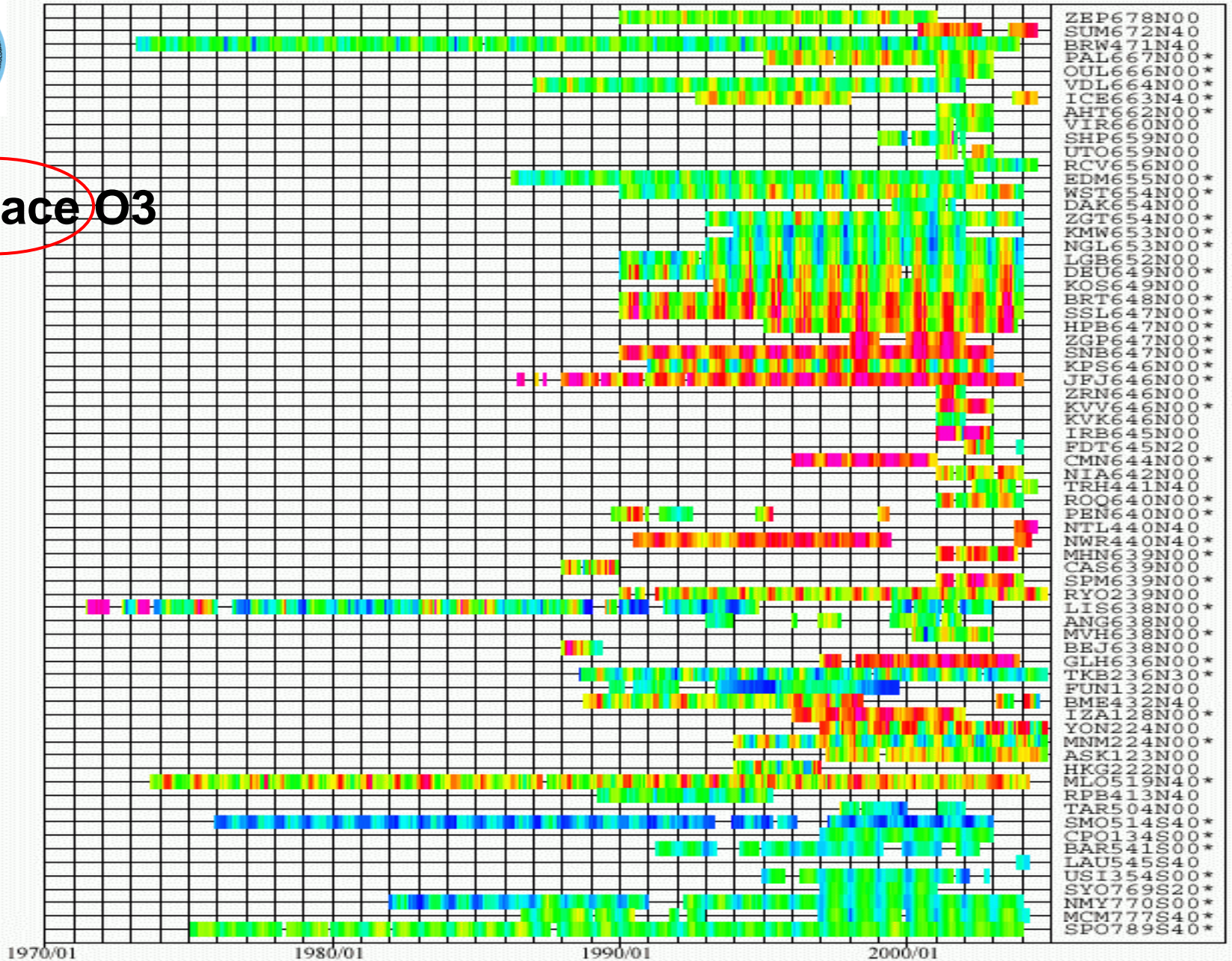
2003

NOx

NO2
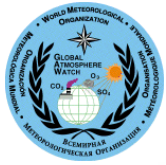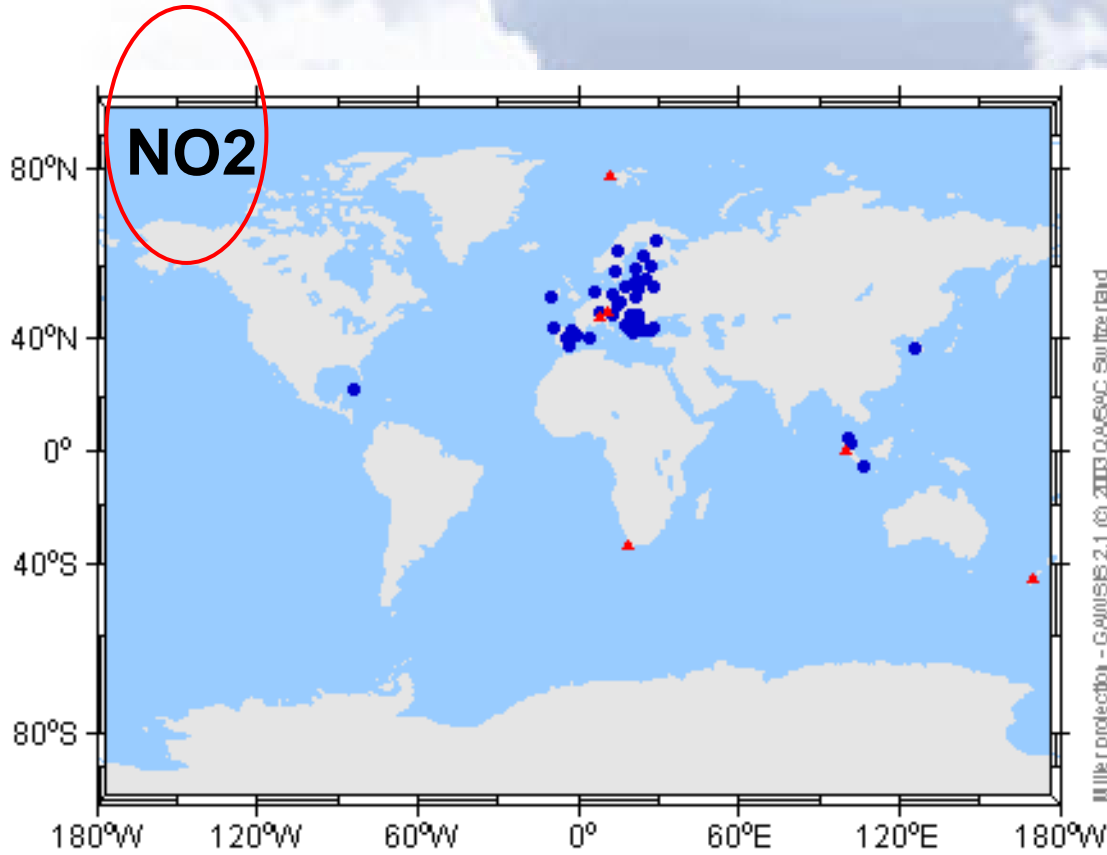
[Reactive Gas] NO   30-Jan-2006

NO
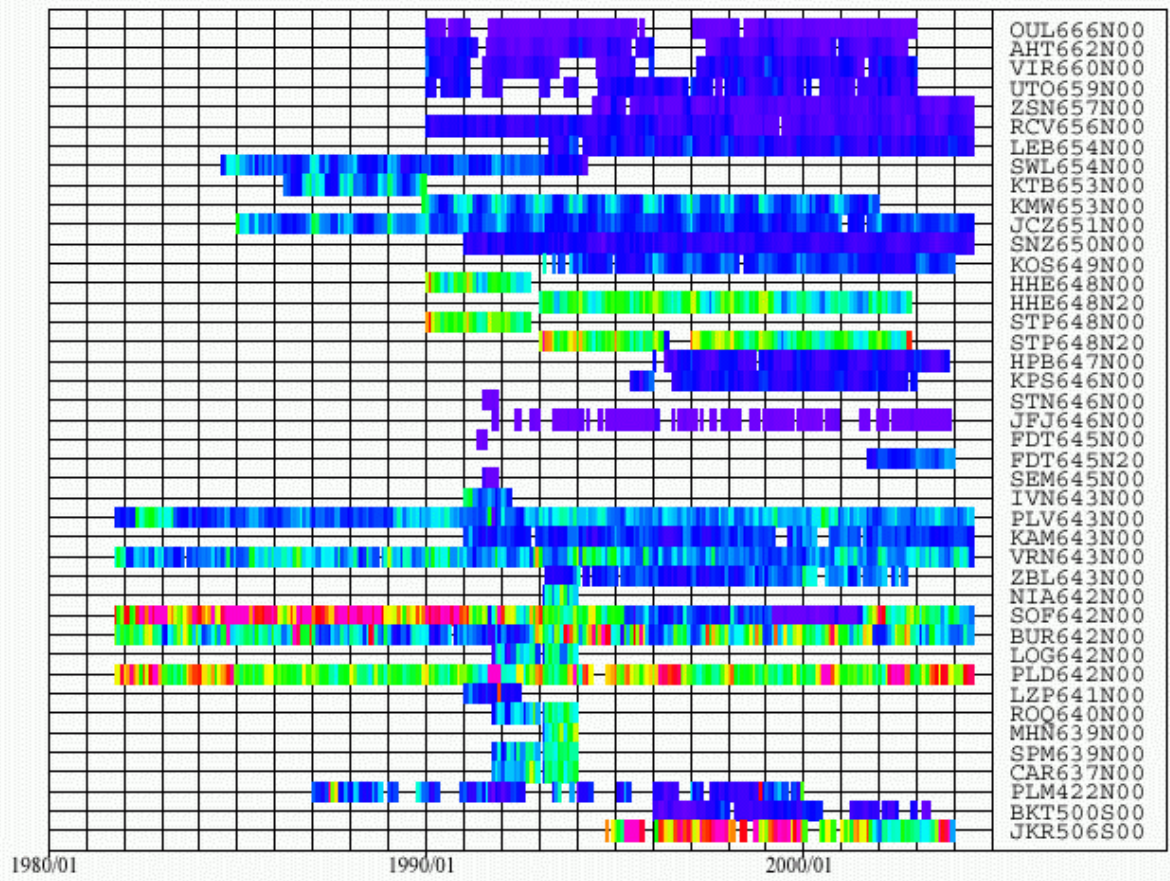
• GAW Regional Station   ▲ GAW Global Station

(a) NO₂ Monthly Data

(b) NO Monthly Data

NO2

NO

Episode I

Forestfire plume at Ryori GAW station on 23 May 2003

Searching for events with

signatures in AOD, CO, NO_x

NOAA-HYSPLIT

CO - MOPITT
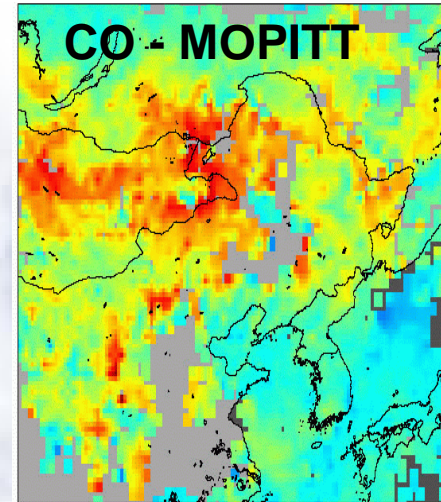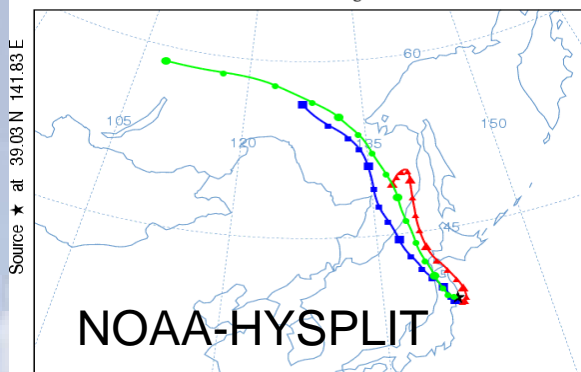
Ryori   (Jan–Jun 2003)
Aerosol OD

140 valid 12h means of 487 single obs.
AE > –5.

Model – Sea Salt   Model – Dust
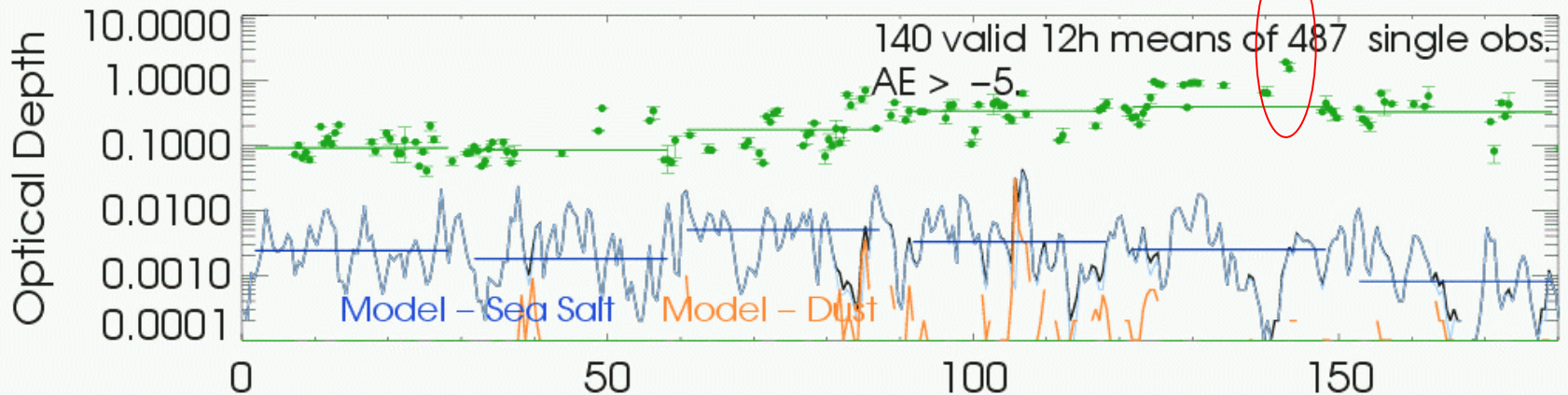
Episode II

Forestfire plume at Ryori GAW station on 23 May 2003

Searching for events with

signatures in AOD, CO, NO$_x$

NOAA-HYSPLIT

CO - MOPITT
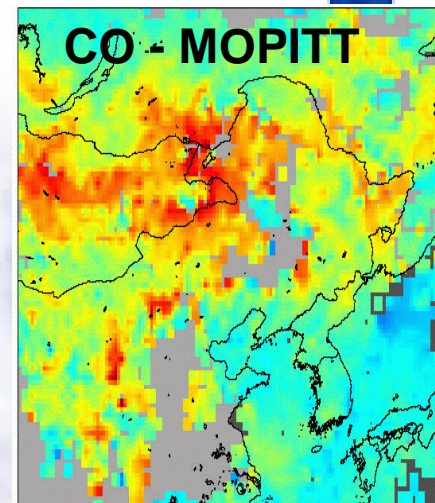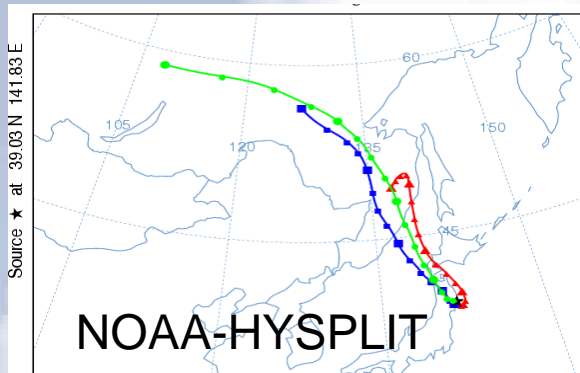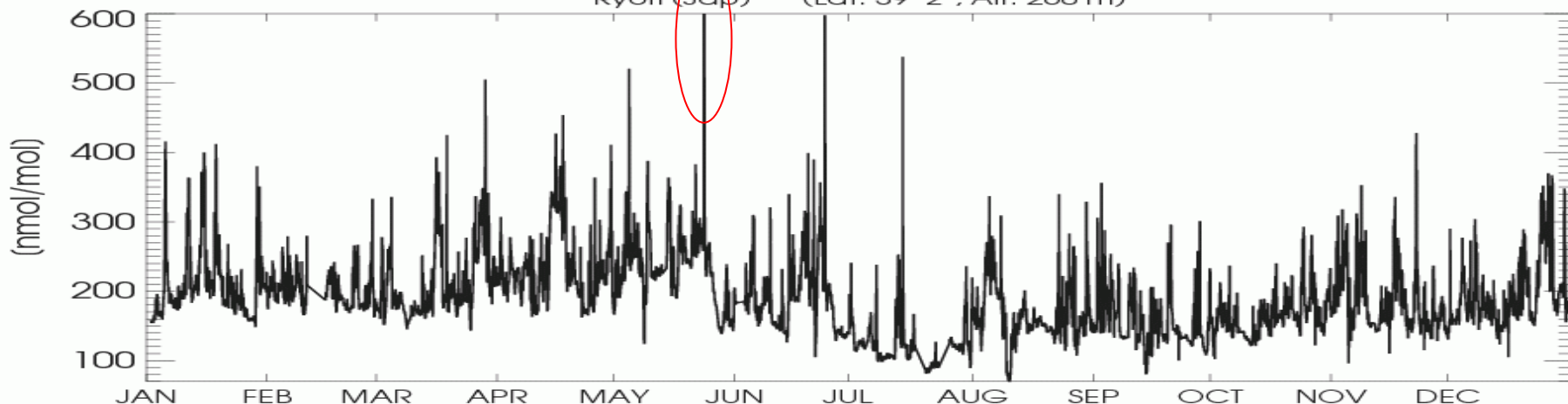
CO Long-range transport episodes

1-12 Jan	Pollution over China
15-20 Jan	Bushfires in SE-Australia
27 Jan–3 Feb	Fires in N-Africa
27 Jan–2 Feb	Pollution over China
20–25 Feb	Fires in SE-Asia
13 Feb–4 Mar	Fires in northern S-America SE-Asia, W-Africa
18–22 Mar	Fires in central America
3–13 Apr	Fires in SE-Asia
…	

Carbon Monoxide Concentration (parts per billion)

Carbon Monoxide Concentration (parts per billion)

0 — 120 — 240
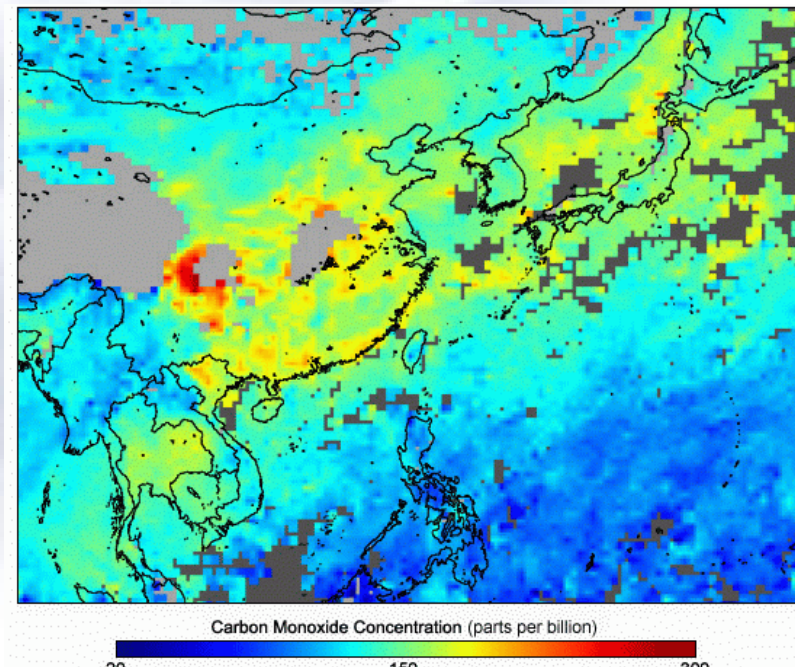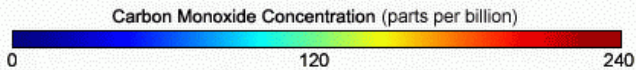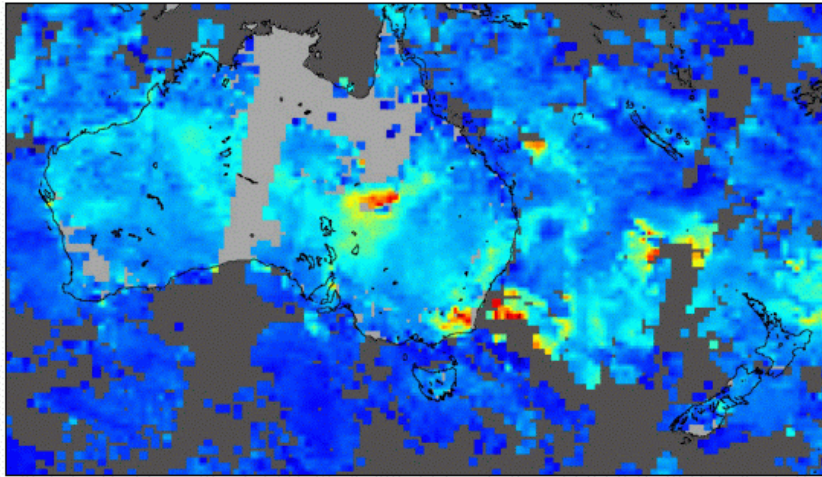
Click here to view high-resolution version (620.3KB)
Image Acquired: January 20, 2003

Bushfires Raging in Southeast Australia
Bushfires continue to burn in southeast Australia. This false-color image shows the resulting concentrations of carbon monoxide (CO) at an altitude of roughly 3 km (700 millibars) in the atmosphere over Australia and New Zealand. Data taken by the Measurements Of Pollution In The Troposphere (MOPITT) instrument aboard NASA's Terra satellite have been combined for 6 days from January 15-20, 2003. The colors represent the mixing ratios of carbon monoxide in the air, given in parts per billion by volume. In this scene, values range from as high as 250 ppbv (purple pixels) to as low as 50 ppbv (blue pixels). The white areas show where no data were collected, either due to persistent cloud cover or gaps between satellite viewing swaths.

Carbon monoxide is produced as a result of incomplete combustion during burning processes, and is important due to its impact on chemistry in the lower atmosphere. It is a good indicator of atmospheric pollution, and its presence adversely affects the atmosphere's ability to cleanse itself. Because carbon monoxide is persistent for several weeks, it clearly shows the propagation of pollution plumes from the region of the Australian fires out thousands of kilometers into the usually pristine atmosphere of the southern Pacific Ocean. The distribution of pollution over Australia corresponds closely with satellite observed aerosol emitted by the fires as observed by TOMS.

Where in the World

Image Posted
January 30, 2003

Satellite & Sensor
Terra- MOPITT

Other Images for this Event
Posted: Mar 07, 2003
Posted: Feb 07, 2003
Posted: Feb 06, 2003
Posted: Feb 04, 2003
Posted: Feb 04, 2003
Posted: Feb 03, 2003
Posted: Jan 31, 2003
Posted: Jan 29, 2003

Carbon Monoxide Concentration (parts per billion)

20 — 150 — 300
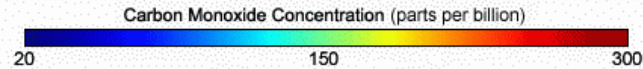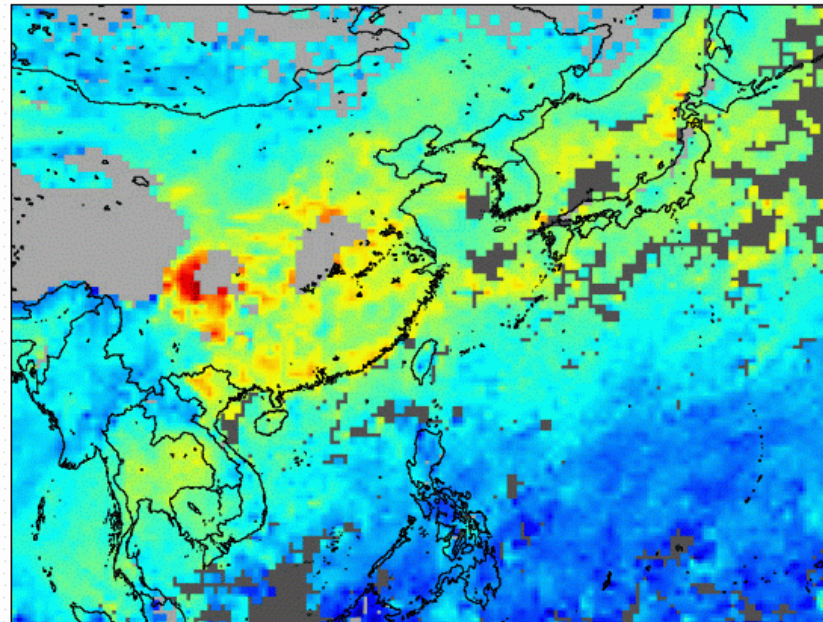
Click here to view high-resolution version (1.05MB)
Image Acquired: January 20, 2003

Pollution over China
This false-color image shows concentrations of carbon monoxide at an altitude of roughly 18,000 feet (500 millibars) in the atmosphere off the coast of Asia and out over the Pacific Ocean. This image represents a composite of data collected over a 20-day period, from January 1-20, 2003, by the Measurements Of Pollution In The Troposphere (MOPITT) instrument aboard NASA's Terra satellite. The colors represent the mixing ratios of carbon monoxide in the air, given in parts per billion by volume. In this scene, values range from as high as 220 ppbv (purple pixels) to as low as 40 ppbv (blue pixels). The white areas show where no data were collected, either due to persistent cloud cover or gaps between viewing swaths.

During the early part of the year, there is considerable outflow of pollution from China and southeast Asia. Carbon monoxide is a good tracer of this pollution since it is produced by incomplete combustion processes such as the burning of fossil fuels in urban and industrial areas, the use of biofuels in developing countries, and by biomass burning in the tropics. The Asian

Where in the World

Image Posted
January 30, 2003

Satellite & Sensor
Terra- MOPITT

Other Images for this Event

Carbon Monoxide Concentration (parts per billion)

0   90   180   270

Click here to view high-resolution version (522.32KB)
Image Acquired: February 02, 2003

Widely Scattered Fires across North Africa
Satellite remote sensing provides a useful way to investigate the impact of intense local pollution sources, such as widespread wildfires or biomass burning, on regional air quality. This false-color image shows carbon monoxide plumes at an altitude of roughly 3 km (700 millibars) in the atmosphere over northwestern Africa and extending westward well out over the Atlantic Ocean. This image represents a composite of data collected from January 27 through February 2, 2003, by the Measurements Of Pollution In The Troposphere (MOPITT) instrument aboard NASA?s Terra satellite. The gray areas show where no data were collected, either due to persistent cloud cover or gaps between viewing swaths.

Carbon monoxide is a good tracer of pollution since it is produced by incomplete combustion processes, such as those associated with electricity generation, petrochemical processing, and biomass burning.

Where in the World
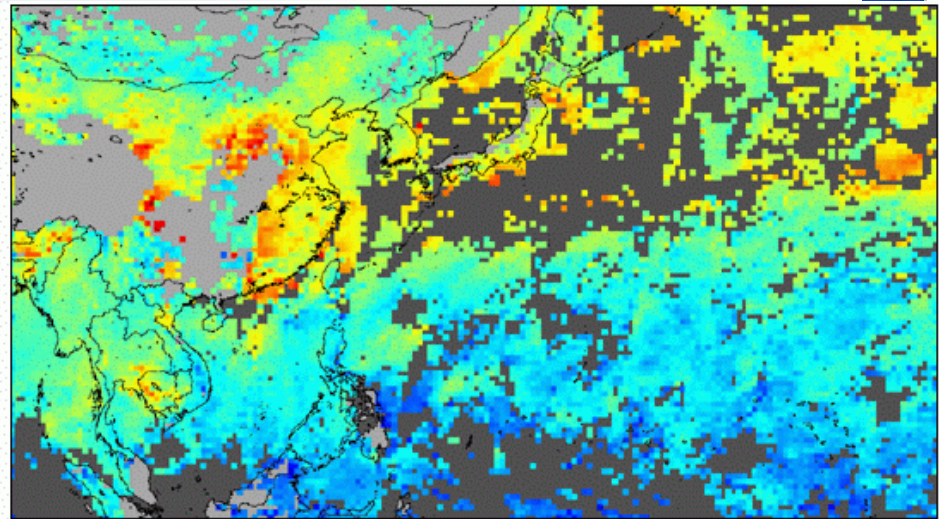
Image Posted
February 06, 2003

Satellite & Sensor

Carbon Monoxide Concentration (parts per billion)

0   90   180   270

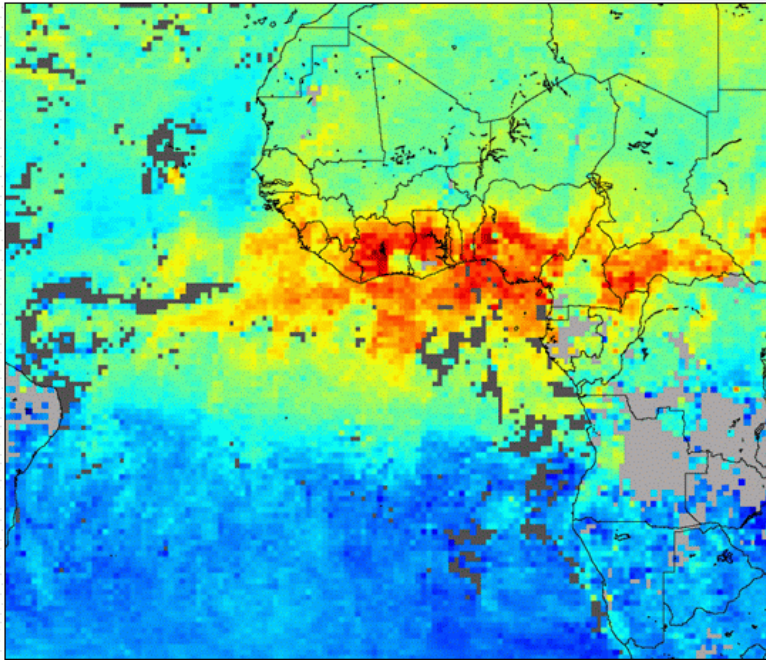Click here to view high-resolution version (620.93KB)
Image Acquired: February 02, 2003

Pollution over China
Satellite remote sensing provides a useful way to investigate the impact of intense local pollution sources, such as urban and industrial emissions, on regional air quality. This false-color image shows carbon monoxide plumes at an altitude of roughly 3 km (700 millibars) in the atmosphere over eastern Asia and extending eastward well out over the Pacific Ocean. This image represents a composite of data collected from January 27 through February 2, 2003, by the Measurements Of Pollution In The Troposphere (MOPITT) instrument aboard NASA's Terra satellite. The white and gray areas show where no data were collected, either due to persistent cloud cover or gaps between viewing swaths.

Carbon monoxide is a good tracer of pollution since it is produced by incomplete combustion processes, such as those associated with electricity generation and petrochemical processing in the region.
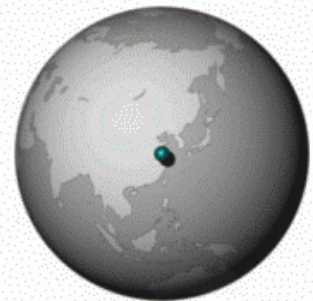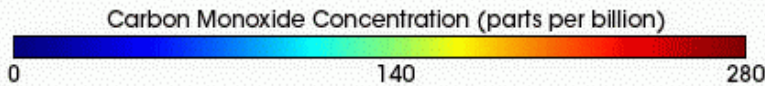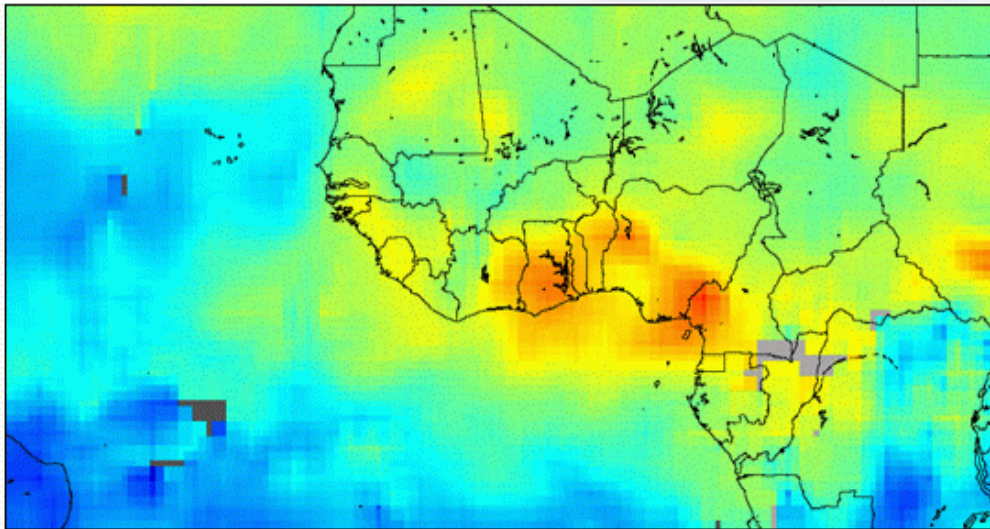
Where in the World

Image Posted
February 06, 2003

Satellite & Sensor
Terra- MOPITT

Carbon Monoxide Concentration (parts per billion)

0   140   280

Click here to view high-resolution version (229.36KB)
Image Acquired: March 18, 2003

Fires in West Africa

Fires burning in West Africa during are producing high concentrations of carbon monoxide (CO) which is being measured by the Measurements of Pollution in The Troposphere (MOPITT) instrument on NASA?s Terra satellite. This false-color image shows the mixing ratio of CO at an altitude of roughly 3 km (700 hPa) averaged over March 13-18, 2003. The location of the highest mixing ratios correlates well with the location of the West African fires detected by MODIS on the Aqua satellite.
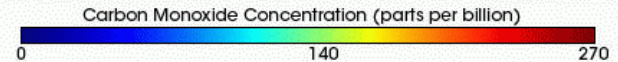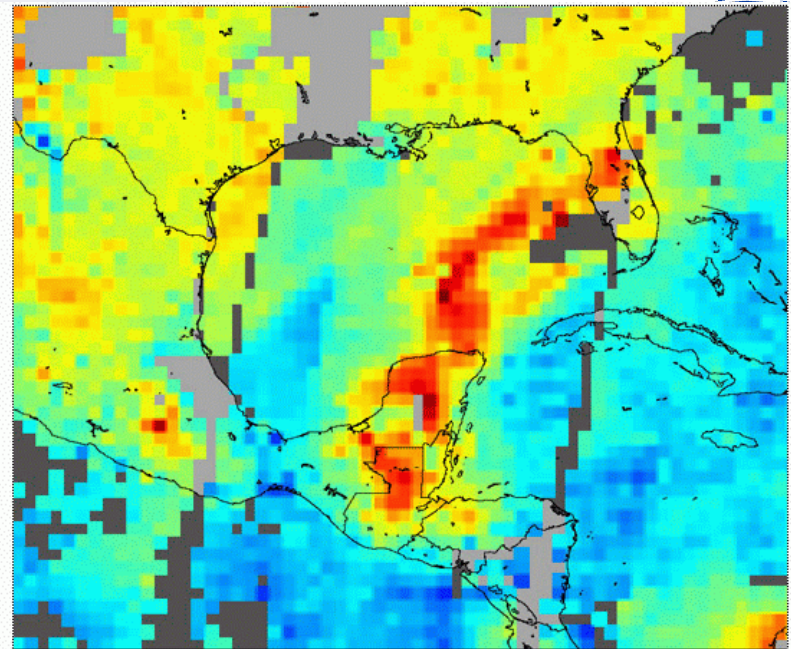
Carbon monoxide is produced by combustion processes and has a lifetime in the atmosphere of several weeks. It is a good indicator of the influence of pollution on downwind regions. This image shows CO being carried to the west over the tropical Atlantic Ocean.

Where in the World

Image Posted
March 24, 2003

Carbon Monoxide Concentration (parts per billion)

0   140   270

Click here to view high-resolution version (294.55KB)
Image Acquired: March 22, 2003

Fires in Mexico and Central America

Measurements of carbon monoxide (CO) from the Measurements of Pollution in The Troposphere (MOPITT) instrument on NASA?s Terra satellite show the pollutants from wildfires in southern Mexico being carried towards Florida. This image shows the mixing ratio of CO at about 3 km (700 km) above the surface for March 18-22, 2003. An image from SeaWIFS shows the smoke from the fires in the same region. There were numerous fires burning during this period on the Yucatan Peninsula.

Carbon monoxide is a good tracer of pollution since it is produced as a by-product of the combustion associated with wildfires and agricultural fires. The reds in this image show the highest levels of CO and blues show the lowest levels. The gray areas show where no data were collected, either due to persistent cloud cover or gaps between viewing swaths.

Image courtesy the NCAR and University of Toronto MOPITT

Where in the World

Image Posted
March 31, 2003

Satellite & Sensor
Terra- MOPITT

Plans for Project Months 13 - 30

- continue (spectral) AOD validation based on GAW global and regional database (target year 2003), identify / select specific events suitable for model evaluation

- extend validation of reanalysis runs from year 2003 to longer period (e.g., 1996-2005) incl. validation of modelled aerosol radiative effects on surface irradiance

- continue to complete GAW aerosol optical properties database (station contacts) and begin with transition to real-time data flow (DWD as GAW/GEMS interface)

- establish / improve quality level characterization of station AOD data incl. station characteristics

- collaborate with RMIB on AOD validation

- merge task 4.2 validation results to support overall validation by NUIG

- collaborate with modellers to identify model deficits and improve model(s)

Plans for Project Months 13 - 30

- **Evaluate GRG model runs** with GAW global and regional database (target year 2003)

- Identify / select specific **events** suitable for model evaluation

- Extend validation of reanalysis runs from year 2003 to longer period (e.g., 1996-2005)

- Continue to **complete GAW trace gas database** (station contacts) and begin with transition to real-time data flow (DWD as GAW/GEMS interface)

- Establish / improve **quality level characterization** of station trace gas data incl. **station characteristics**

- Collaborate with modellers to **identify model deficits and improve model(s)**

Questions & Needs

- **Redundant data in different data bases $\rightarrow$ co-ordination**

- **"Real time" (tbd.) data flow**

- Data format and delivery

  - reanalysis data

  - real time data in operational phase

- **Regular meetings/telcons between observers and evaluators**

- **Evaluate models on basis of periods with existing measurement data**