

CLIMATE AND AIR QUALITY STUDIES IN MALAYSIA

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Ministry of Science, Technology and Environment**

- Climate and Air Quality Issues
- Some Observing Systems & Ongoing Studies
- The Danum Valley GAW Station
- International Collaboration
- Opportunities from participation in OP3 Research Project

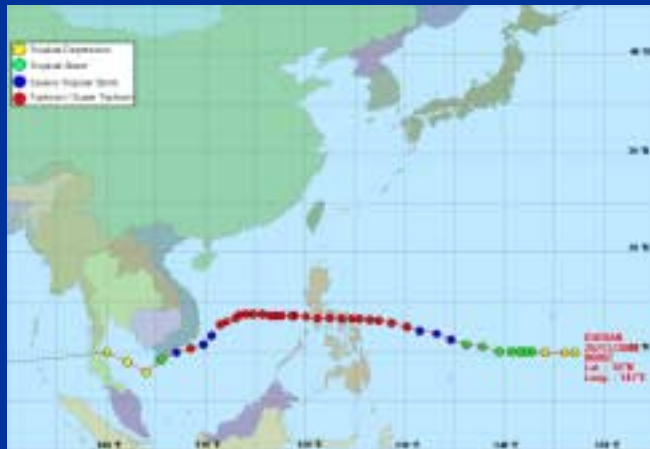
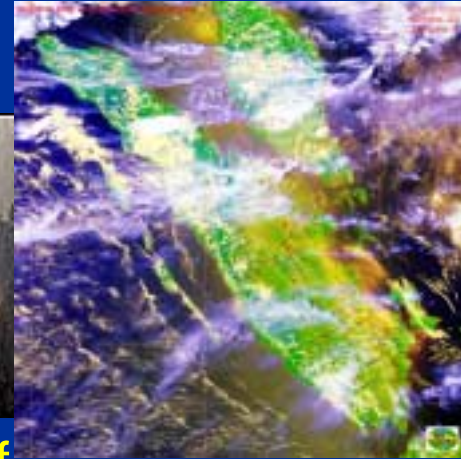
Climate Change or Climate Variability?



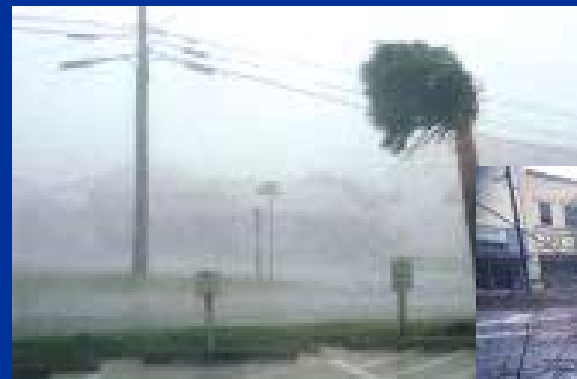
Increased flood, landslide and mudslide damage



Increased risk of drought and forest fires



Increase super typhoons

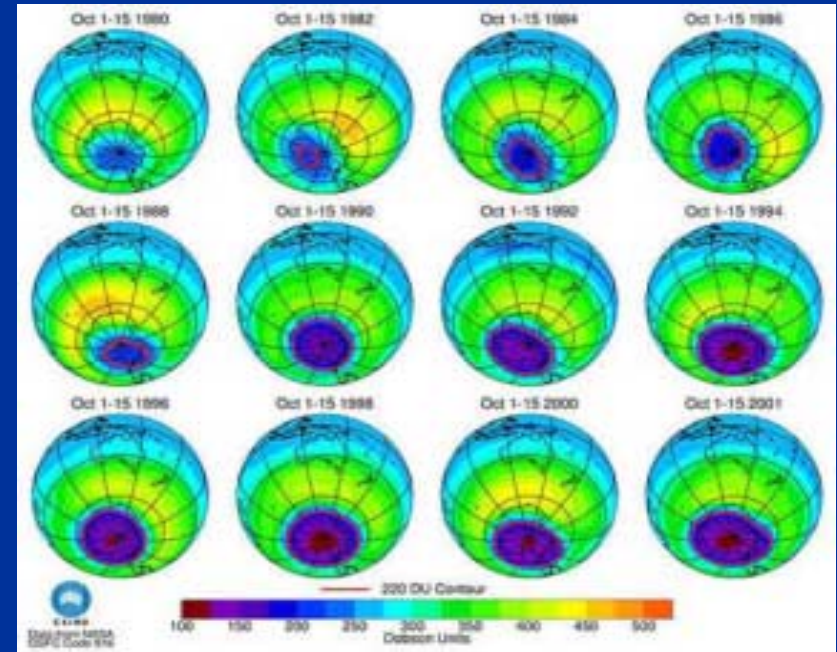


More intense precipitation events

Atmospheric Acidification



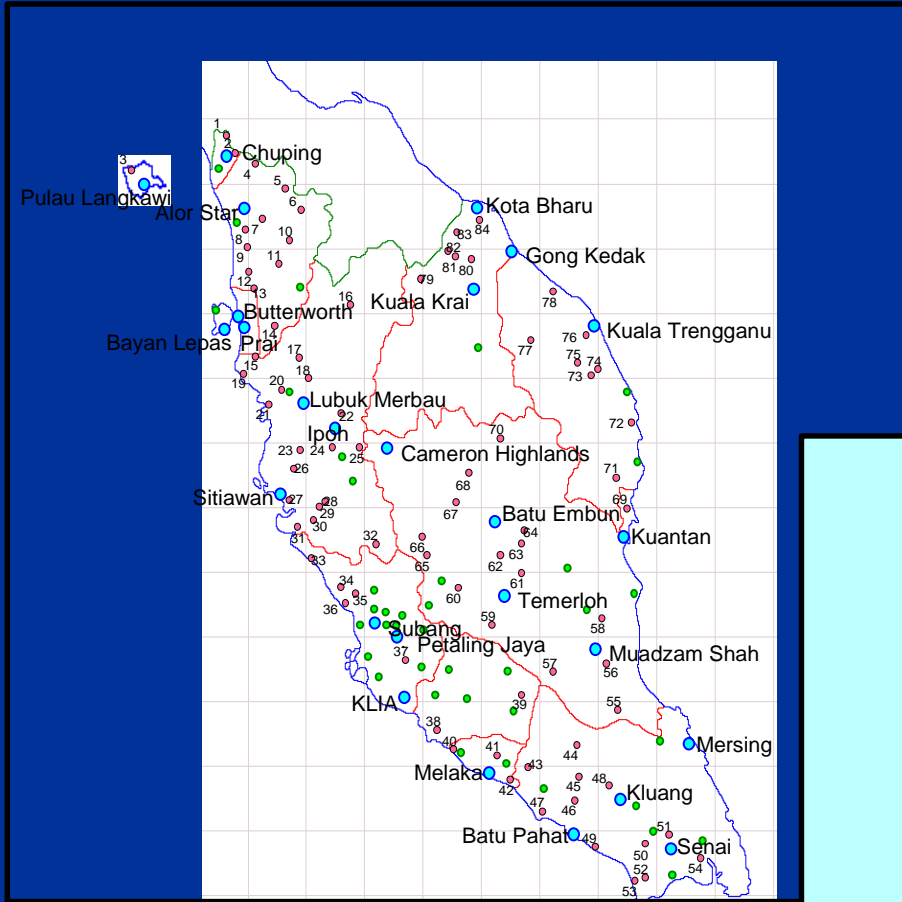
Ozone Depletion



Atmospheric Haze

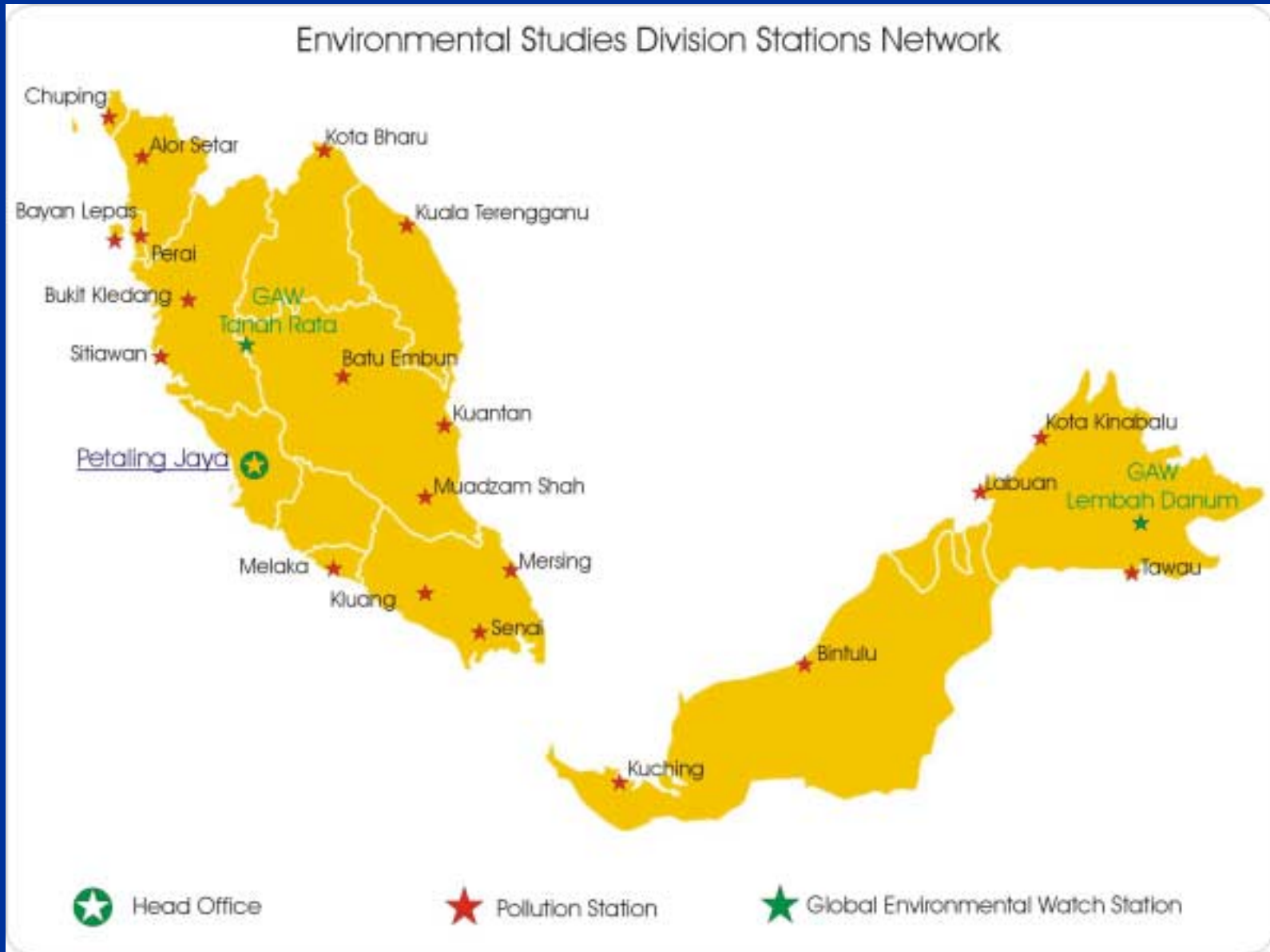


Surface Observation Network



35 principal stations, 75 climate stations, 117 rainfall stations

MMD's Network of Air Quality Monitoring Stations



WMO Global Atmospheric Watch (GAW) Network of Stations

Objectives :

To make reliable, comprehensive observations of the chemical composition and selected physical characteristics of the atmosphere on a regional and global scale for the purpose of monitoring and predicting changes in atmospheric composition and its impacts

Monitoring and Assessment Programs

- Carbon dioxide
- Ozone (total column ozone, ozone profile, surface ozone)
- Other Greenhouse Gases (CFCs, Methane, Nitrous oxide)
- UV radiation
- Precipitation chemistry
- Aerosol (particulate load and properties)
- Reactive gases
- Persistent organic pollutants
- Meteorology

Monitoring Systems

- Wet and dry fallout collector – Air Pollution Sampler, Ecotech wet-only collector (23 sites)
- High volume air sampler (23 sites)
- Filter pack (4 sites)
- Passive sampler (3 sites)
- Multigas analyser (Tanah Rata)
- TEOM (8 sites, real time)
- Nephelometer (GAW site)
- Brewer spectrophotometer (PJ)
- Ozone sonde (KLIA)
- Automatic weather system (GAW site)
- Passive sampling for POPs (GAW site)
- LoFlo carbon dioxide system (GAW site)
- Multi angle absorption photometer (GAW site)
- Sunphotometer (GAW site – 2006)

Acid Deposition Monitoring Programme

Wet-Only
Collector



Gas
Analysers



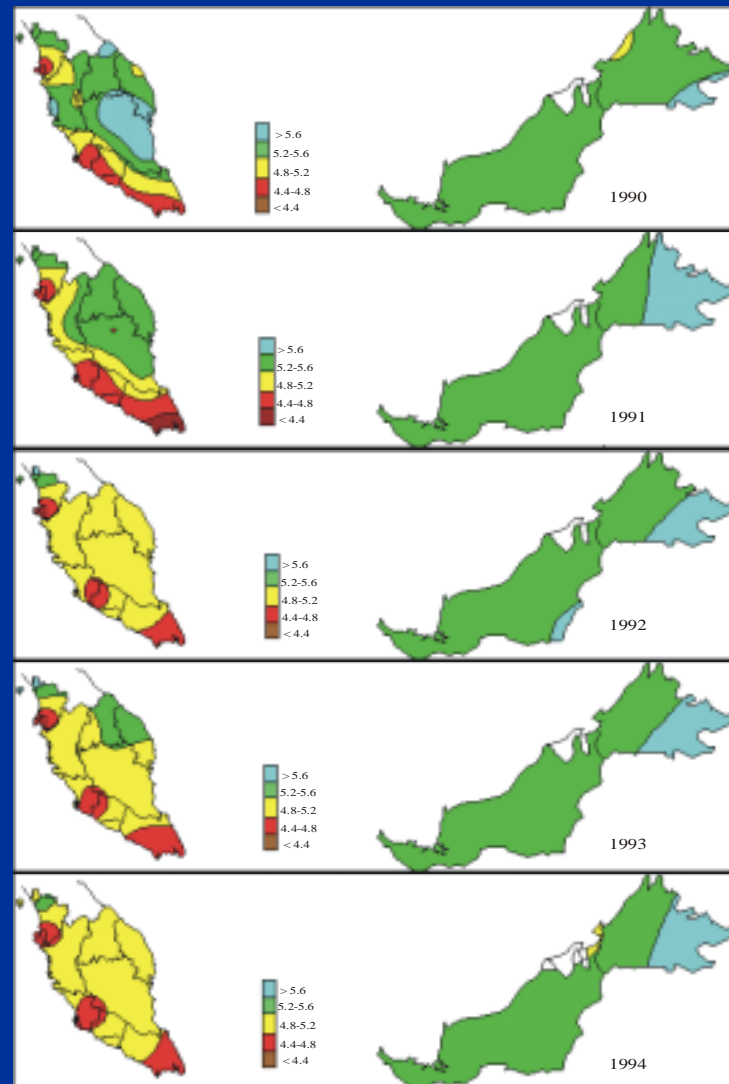
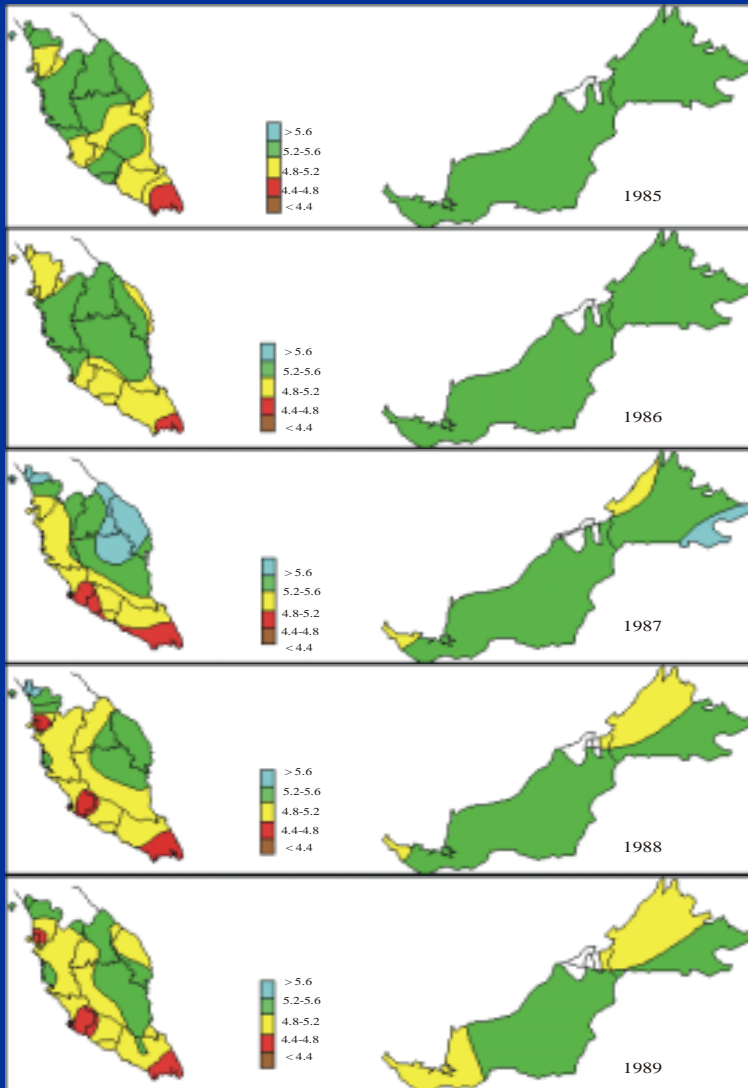
Filterpack

Passive Sampler

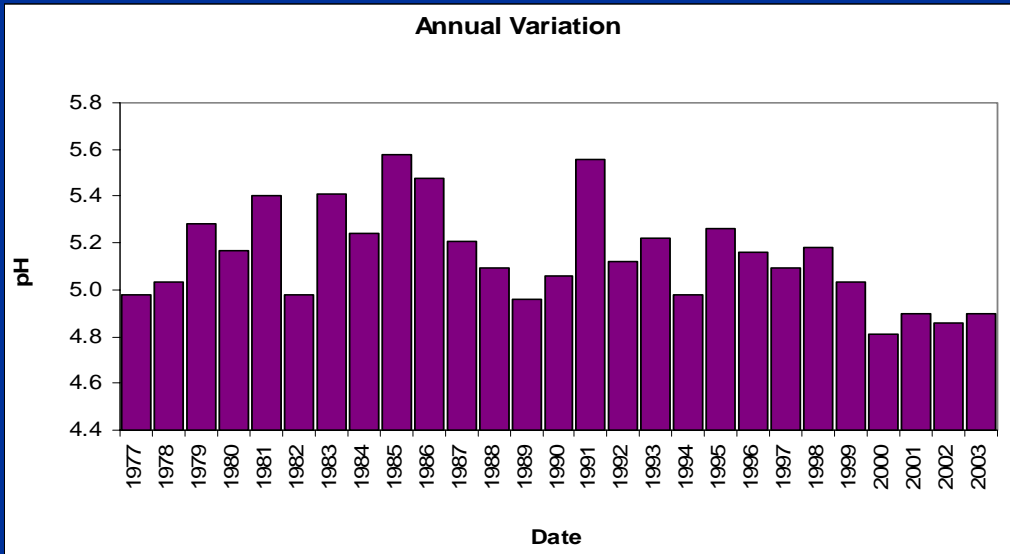


Acid Rain Trends

Annual Variation of Rainwater pH in Malaysia

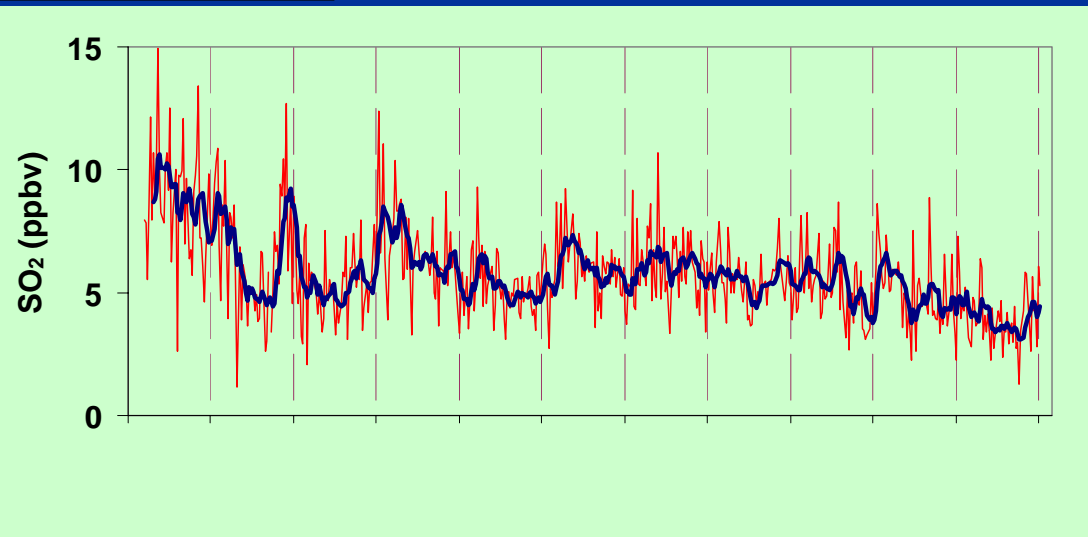


Changes in Atmospheric Acidity

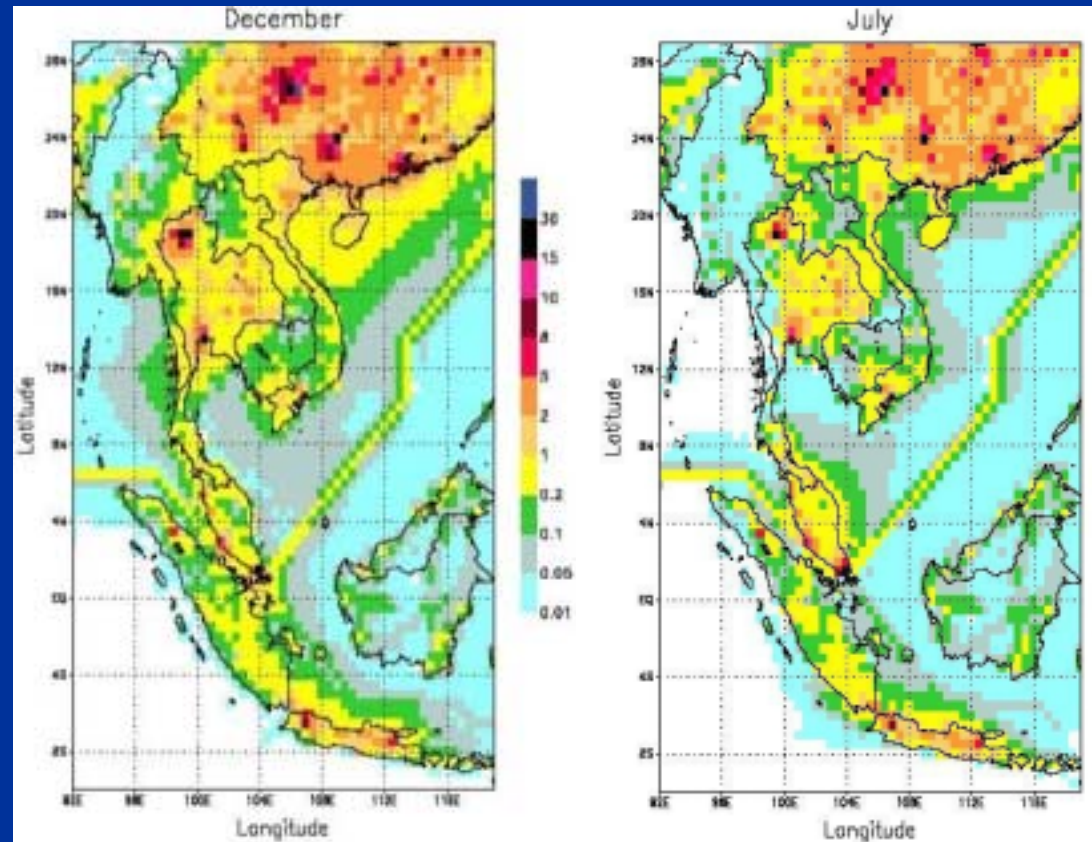
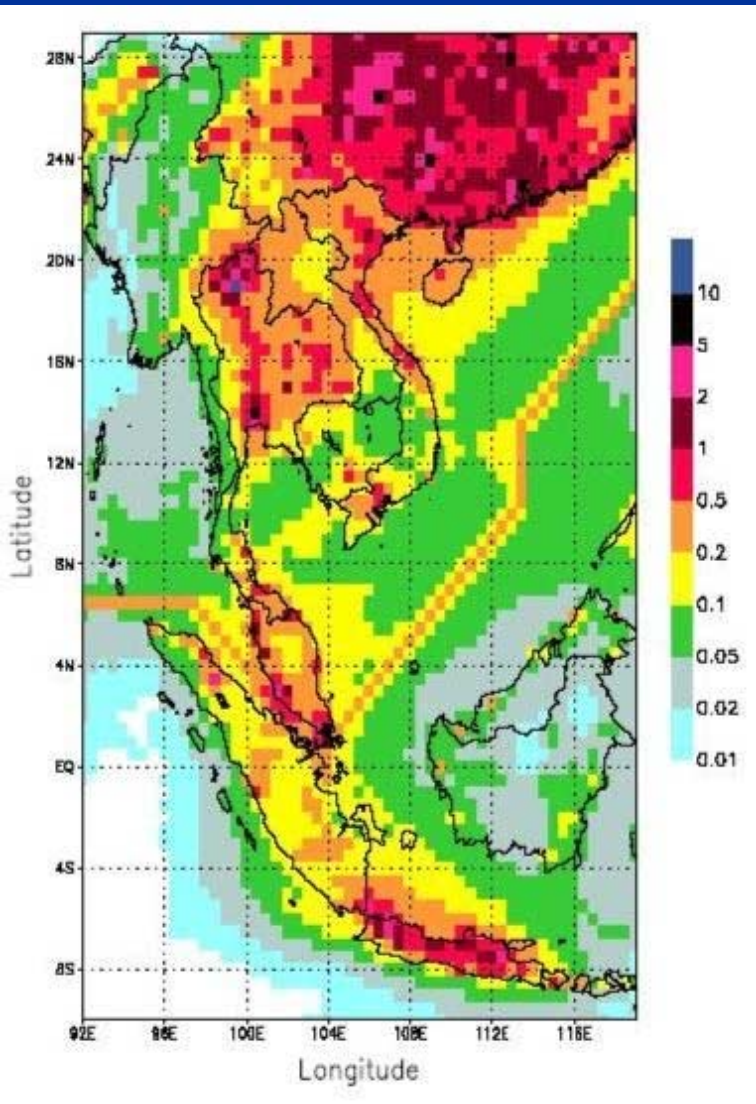


pH Trends

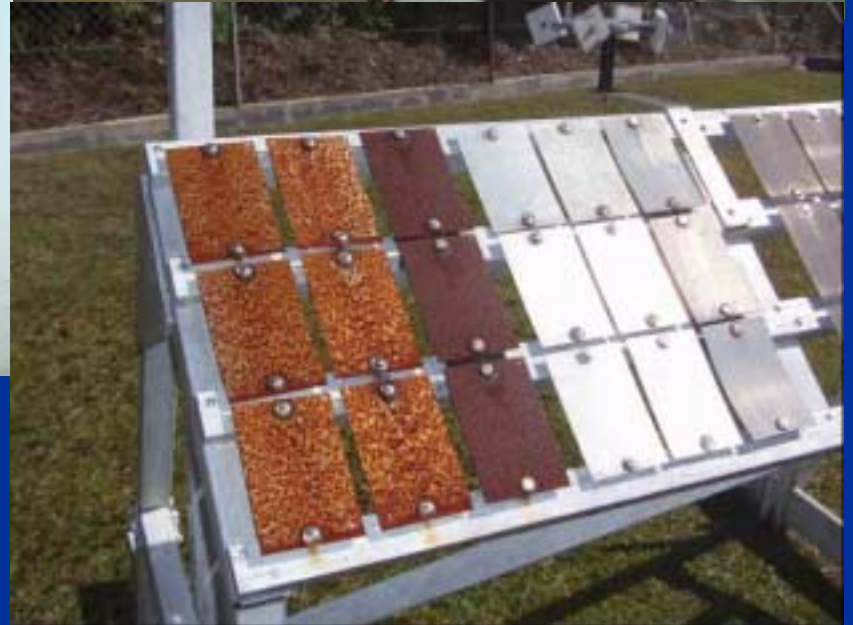
SO₂ concentrations in
Petaling Jaya (passive
sampling)



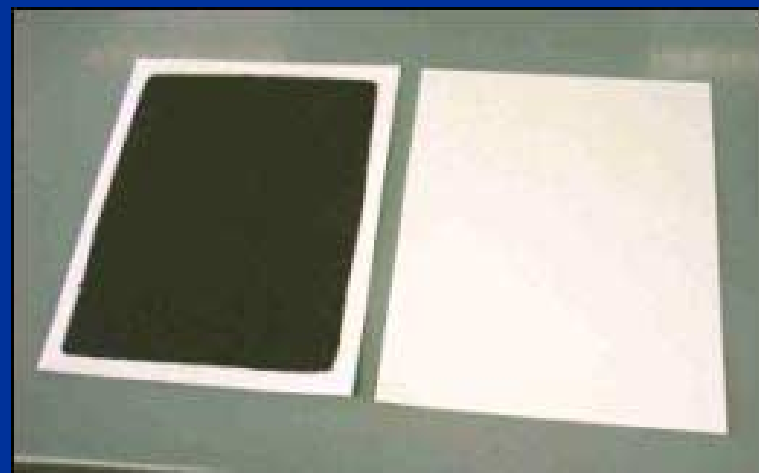
Air Pollution Transport Modelling with the Swedish Meteorological and Hydrological Institute



Corrosion Study of the IGBP RAPIDC Project

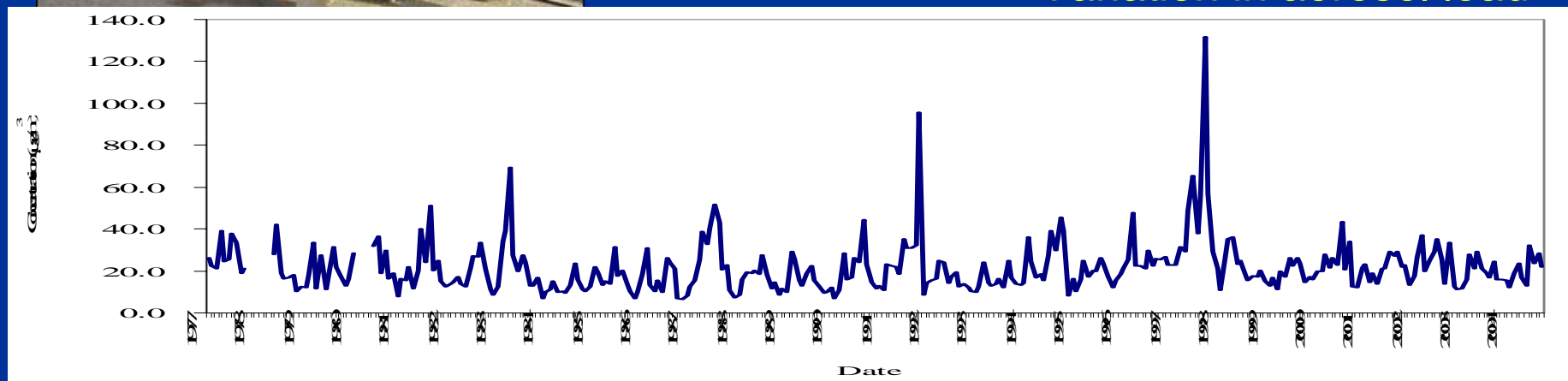


Atmospheric Aerosols Monitoring Programme



High Volume Air Sampler

Variation in aerosol load



Atmospheric Aerosols Monitoring Programme

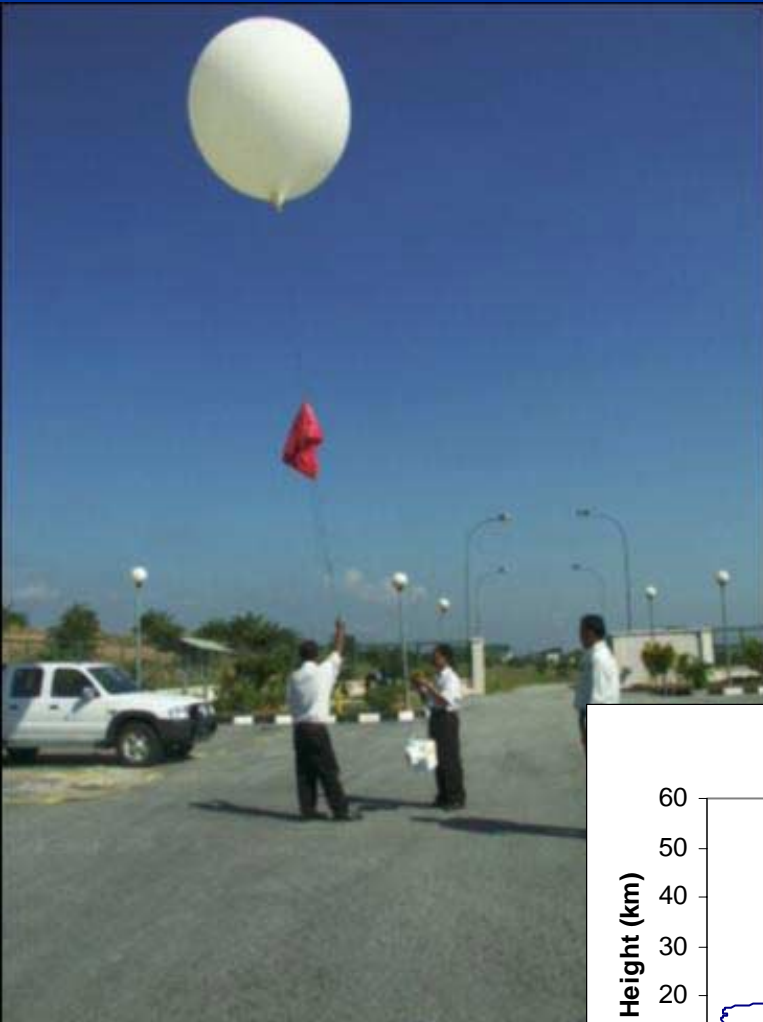


Real Time PM10 concentrations

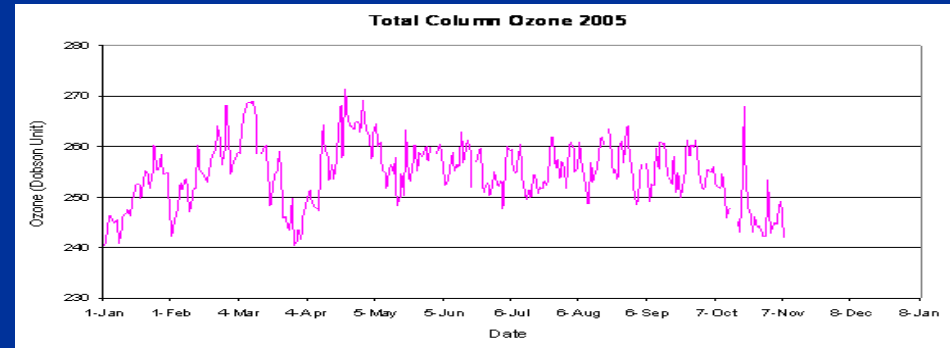


Tapered Element Oscillating Microbalance Instrument (TEOM)

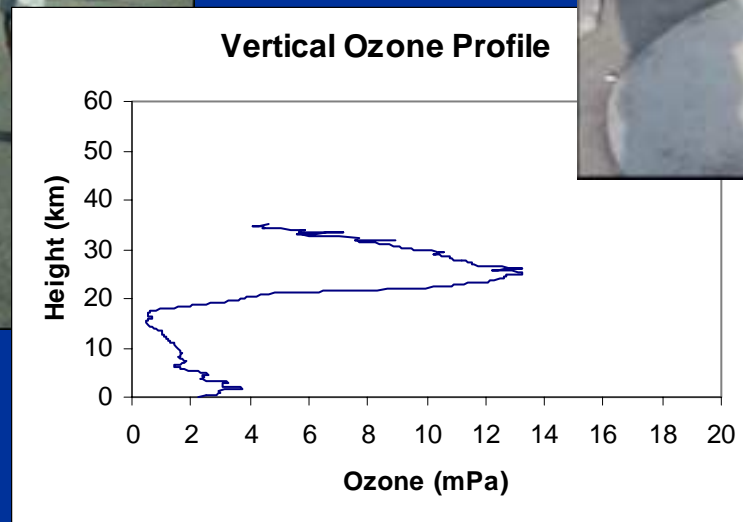
Ozone Monitoring Programme



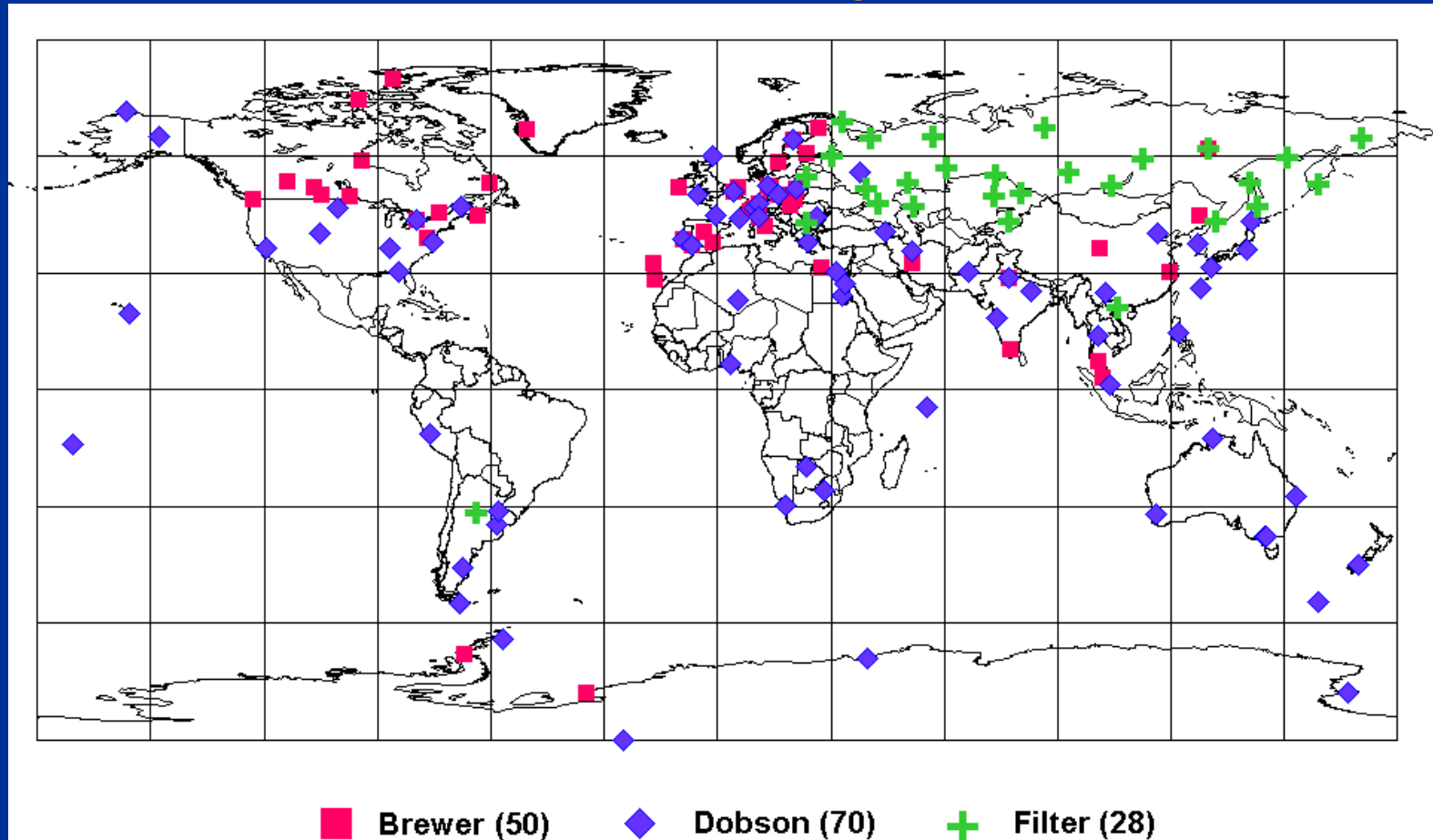
Vertical Ozone Profile
- Ozonesondes



Total Ozone and UV
radiation - Brewer
spectrophotometer



GAW GLOBAL TOTAL COLUMN OZONE NETWORK: 2001- 2004 Stations Submitting Data





Southern Hemisphere Additional Ozonesondes Programme

SHADOZ Sites

Click on a site to access the data archive.



The Global Atmosphere Watch Station



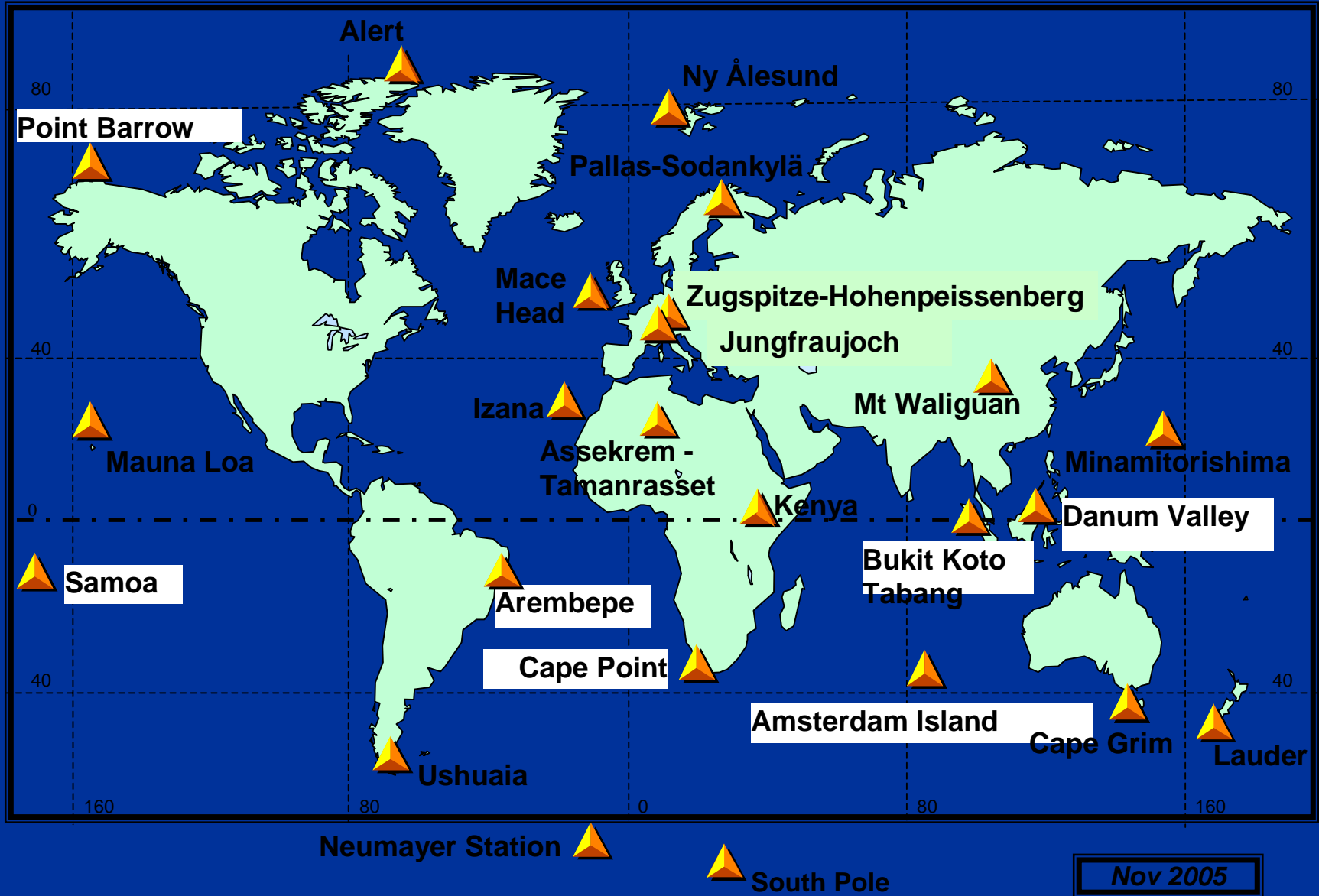
- **Site selection in 2001**
- **Construction started in 2002**
- **Completed in late 2004**

**Latitude: $04^{\circ} 58' 53''$ N
(4.95 deg. N)**

**Longitude: $117^{\circ} 50' 37''$
E (117.85 deg. E)**

**Elevation: 426 metres
above MSL (Bukit Atur)**

World Meteorological Organization Global Atmosphere Watch Network





Located within a 973 km² forest region managed by the Sabah Foundation



- Easy Access
- Security
- Managed by MMD & DVMC
- Research Environment





Facilities: Fully Air-Conditioned Laboratory and Office, Meeting Room, Laboratory & General Room





A 100 metre instrumented tower with air intakes at 30, 60 & 100 m



Communications via VSAT



Transportation



UPS



Clean water supply

**Two 100kVA
generators
located at
INFAPRO
nursery**

Aerosols



Black Carbon



TEOM System



Nephelometer

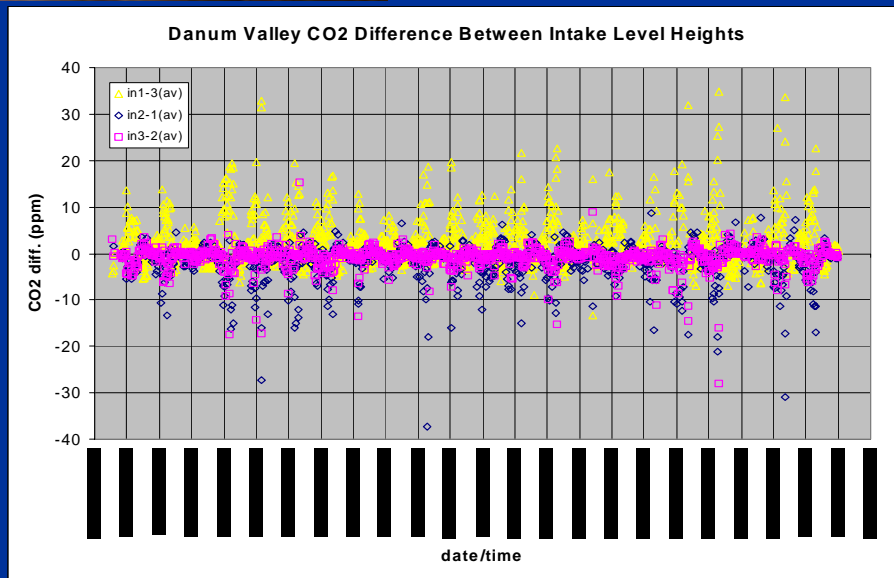
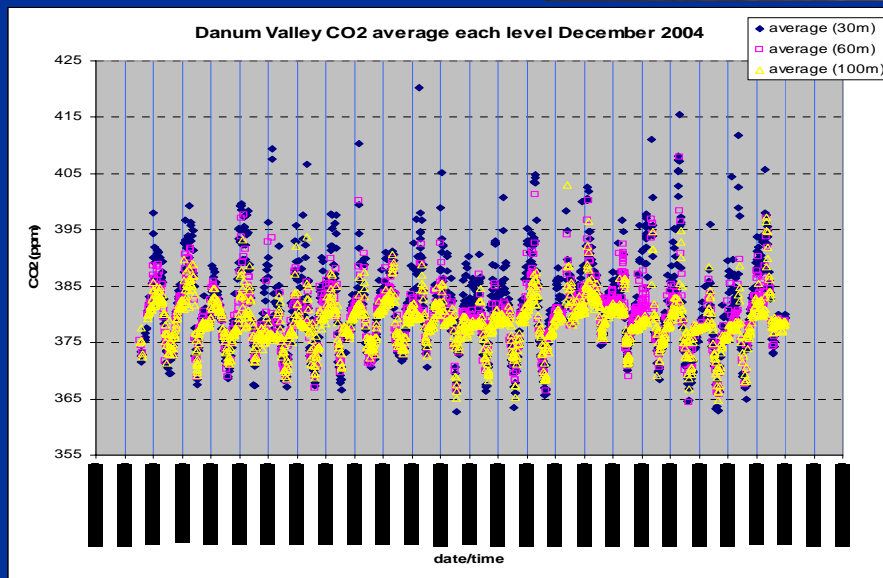
Five core aerosol parameters:

1. Optical depth
2. Mass
3. Major chemical composition
4. Light absorption coefficient
5. Light scattering coefficient

Greenhouse Gases

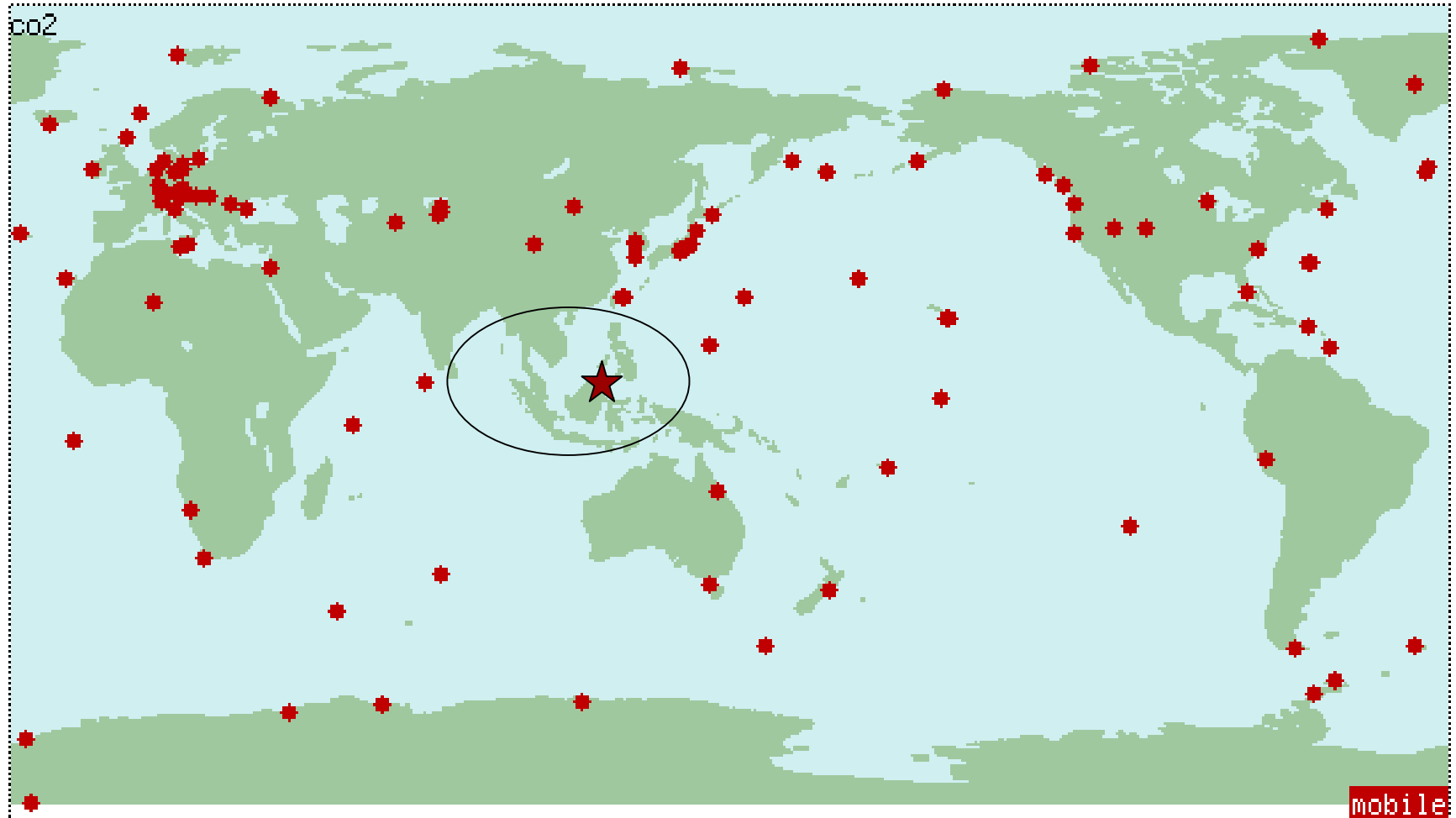


LoFlo System for monitoring CO₂



WMO WDCGG DATA

Carbon Dioxide (CO₂)



Acidic Deposition



Wet & dry deposition monitoring



Soil and vegetation monitoring



Inland aquatic ecosystem monitoring

East Asia Acid Deposition Monitoring Network (EANET) Monitoring Sites : 47



Participating Countries

- Cambodia
- China
- Indonesia
- Japan
- Lao P.D.R.
- **Malaysia**
- Mongolia
- Myanmar
- Philippines
- Republic of Korea
- Russia
- Thailand
- Viet Nam

Persistent Organic Pollutants - POPs



The Canadian Global
Atmospheric Passive
Sampling (GAPS) Study
40 sites on 7 continents

Assessment of spatial
distribution of POPs on a
worldwide basis at remote sites

Verification of global transport
models for POPs

Contribute to Stockholm
Convention



Meteorology



**Collaboration
with other
GAW stations,
Waliguan, Cape Grim,
Cape Point
&
with other regional and
international
environmental
programs/networks
is
essential for
sustainability**





Collaboration with regional and international programs enhances capacity building

Opportunities from OP3

- Enhancement of existing monitoring and research programme. Better understanding of soil-canopy-atmosphere processes and their influence on climate
- Technology transfer to Malaysian academic institutions and scientists from government departments – monitoring and assessment skills
- Local scientists can conduct related projects in Danum Valley and share available resources and database
- Partnership links with established international researchers
- Training opportunities for Malaysian students at UK universities in the state-of-the-art measurement and modelling technologies. Masters and PhD programmes?
- Interest in study of tropical ecosystems and atmospheric chemistry - eventually a larger pool of local researchers!

THANK YOU

