



VIETNAM ENVIRONMENTAL ADMINISTRATION (VEA)
CENTRE FOR ENVIRONMENTAL MONITORING (CEM)
Website: <http://www.quantracmoitruong.gov.vn/>

AIR QUALITY MONITORING NETWORK AND ATMOSPHERIC MERCURY POLLUTION MONITORING IN VIETNAM

NGUYEN VAN THUY

Director of Centre for Environmental Monitoring

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1. BRIEF INTRODUCTION: AIR MONITORING ACTIVITIES IN VIETNAM

➤ 1993:

- Establishment of the first environmental protection organisation: National Environmental Agency (NEA) -Ministry of Science, Technology and Environment (MOSTE);
- First Environmental Law of Vietnam released.

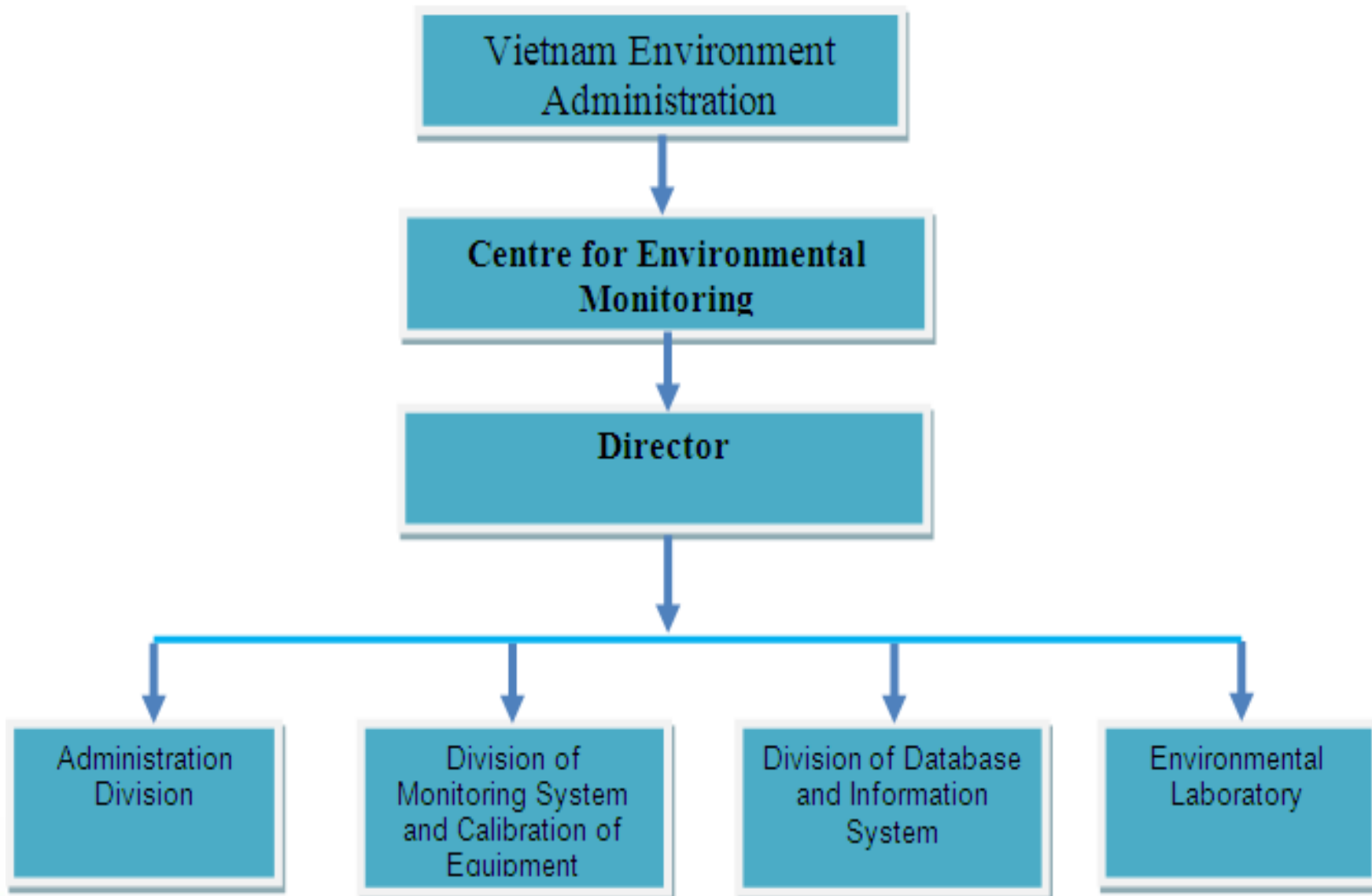
➤ From 1994:

- Development of air monitoring at some research institutes and universities;
- Establishment of provincial monitoring centers;

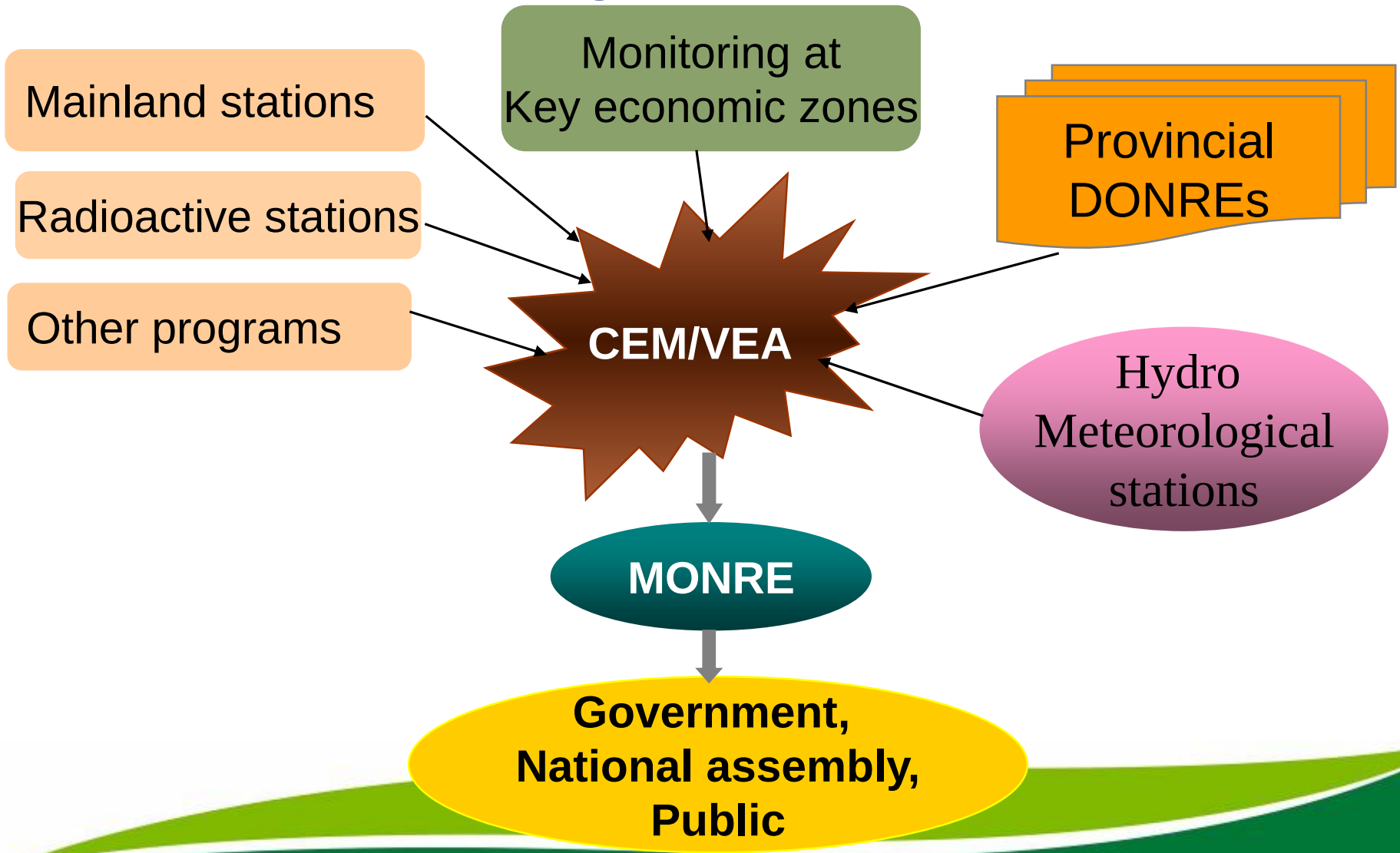
➤ 2000: Automatic stations for air quality installed in main cities: Hanoi, Hochiminh City, Haiphong, Danang, etc.

➤ 2005: Adopt the new Environment Law.

Organisational chart of CEM

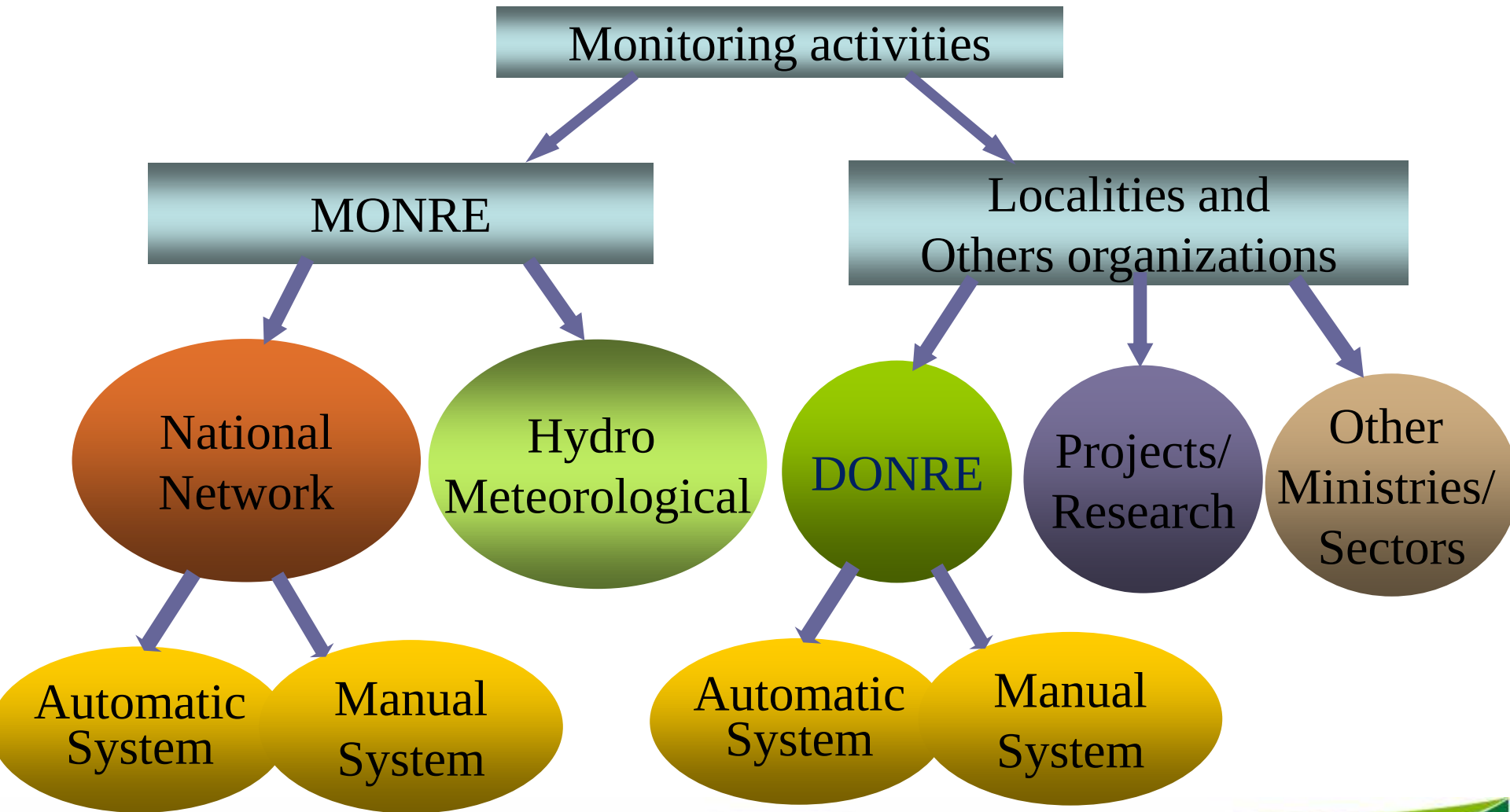


Management and reporting of environmental monitoring data and information



2. NATIONAL AIR QUALITY MONITORING NETWORK IN VIETNAM

Air quality monitoring network in Vietnam



Air quality monitoring network in Vietnam

Consist of :



Continuous, automatic
monitoring activities



Manual
monitoring activities

Air quality monitoring network in Vietnam

1. Air monitoring network belonging to MONRE: divided into 2 systems:

▪ **National Hydro – Meteorological monitoring system**

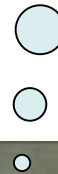
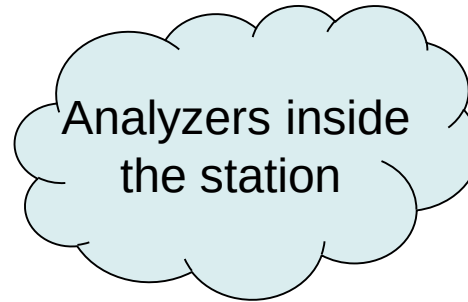
→ Automatic monitoring: 10 fixed automatic air quality stations and meteorological monitoring sites sampling performed by meteorological stations.

▪ **National Environmental monitoring system**

→ Automatic monitoring: including:

+ 9 fixed automatic air quality monitoring stations, of which 05 newly established including Ha Noi (2008), Da Nang (2010), Khanh Hoa (2012), Hue (2013), Phu Th๑ (2013), and the Ho Chi Minh Mausoleum (2012) stations;

+ 02 mobile automatic air quality monitoring stations in Ha Noi and Ho Chi Minh city.



Automatic air quality monitoring station at Da Nang University of Technology



Automatic air quality monitoring station at Nguyen Van Cu street, Long Bien, HaNoi



Hochiminh Mausoleum Station

Computer control system

Radioactive automatic monitoring equipments



Map of fixed, automatic air quality monitoring stations

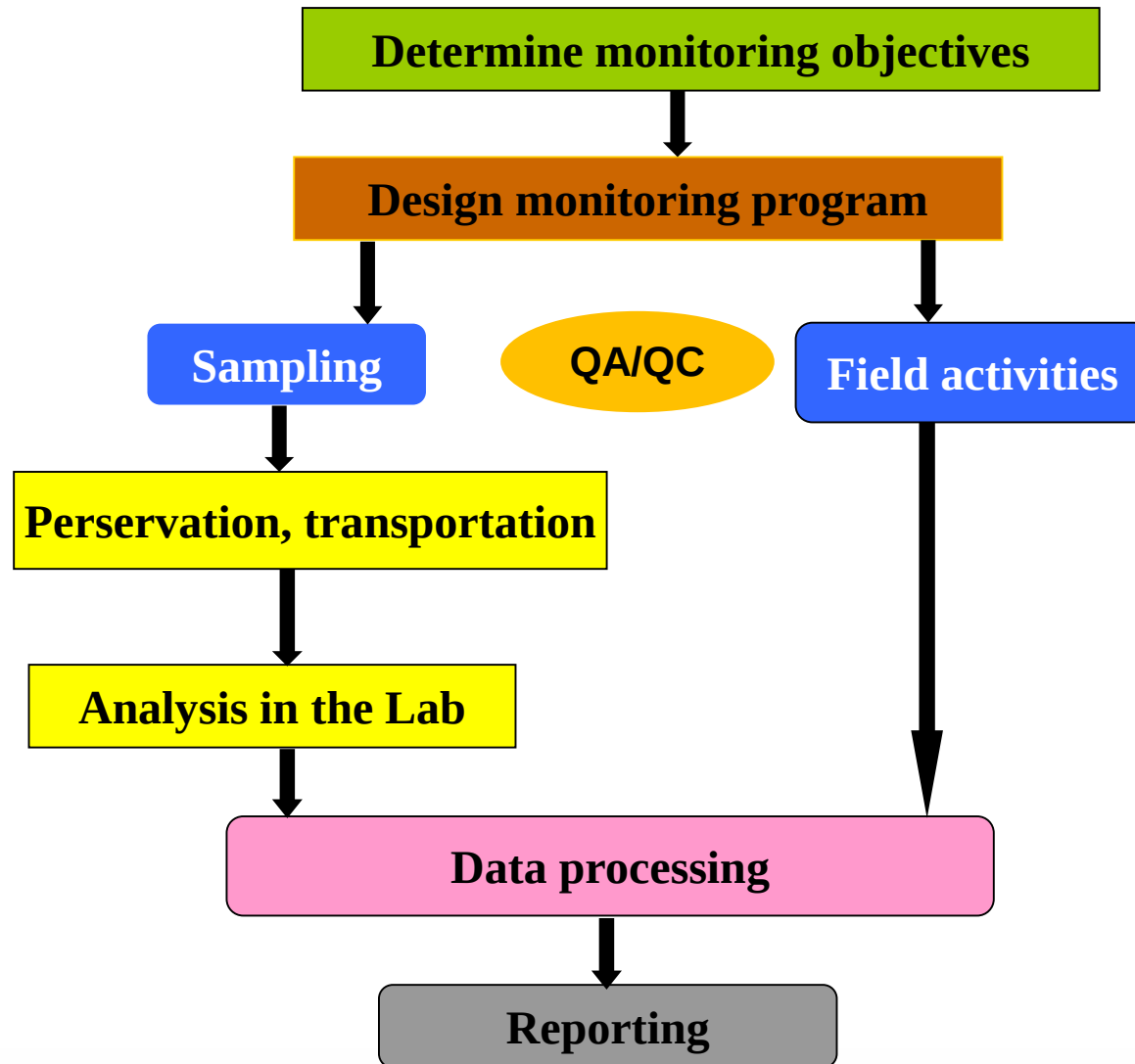


Air quality monitoring network in Vietnam

- Manual monitoring: Frequency of 4 to 6 times/year
- + Monitoring the North, Central and South regions: 80 monitoring sites, conducted by Mainland stations 1, 2, and 3;
 - + Radioactive monitoring in the air: performed by Radioactive stations 1, 2, and 3;
 - + Air monitoring at the three Key economic zones: North (27 monitoring sites/ 7 cities or provinces), Central (39 monitoring sites/ 5 cities or provinces), and South (32 monitoring sites/ 7 cities or provinces).



Manual Monitoring procedure



Air quality monitoring network in Vietnam

2. Air provincial monitoring network

- Automatic station:
 - + Ha Noi: 2 fixed automatic stations, including 1 roadside and 1 residential area stations;
 - + HCM city: 9 fixed automatic stations, including 4 roadside and 5 residential area stations;
 - + Dong Nai province: 2 fixed automatic stations.
- Manual monitoring:
 - + Frequency: 2-6 times/year. Monitoring sites are located in hotspots in large cities, industrial zones;
 - + Monitoring parameters : NO_x, CO, O₃, SO₂ , PM₁₀, TSP, Pb and meteorological parameters.

Continuous automatic air monitoring stations in Vietnam



**Air automatic monitoring stations
at Nha Be, Hochiminh city
and Da Nang city**



Master plan for the National environmental monitoring network

- On 29th January 2007, the Prime Minister has approved Decision No. 16/2007/QD-TTg on approving the Overall planning of the resources and environment network by 2020 which consists the network of air quality monitoring;
- According to the Plan, by 2020, 58 fixed continuous air monitoring stations will be established in Vietnam, focusing on Industrial zones (IZs), Export processing zones (EPZs), dense urban cities, cluster craft villages, landfills, and waste treatment facilities.

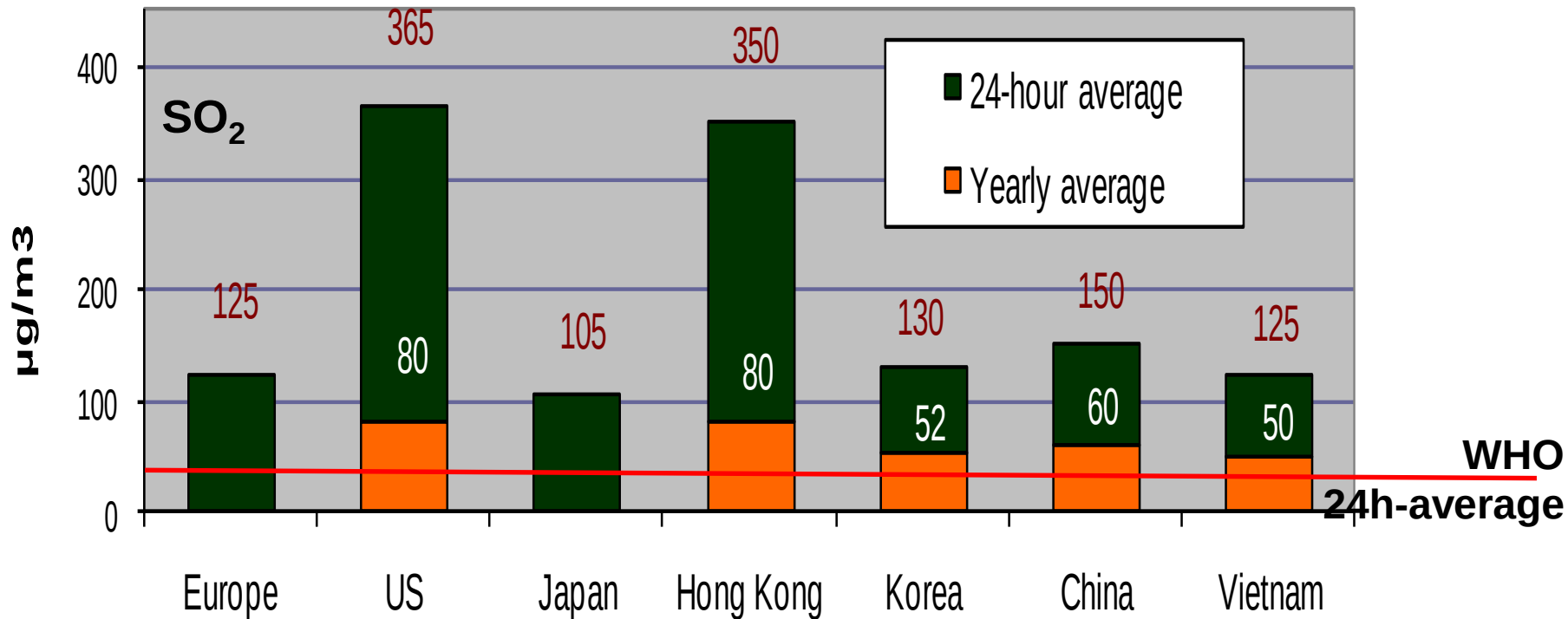
National technical regulation on ambient air quality QCVN 05:2009/BTNMT

Unit: $\mu\text{g}/\text{m}^3$

No.	Parameter	1-hour average	8-hour average	24-hour average	Yearly average
1	SO ₂	350	-	125	50
2	CO	30000	10000	5000	-
3	NO _x	200	-	100	40
4	O ₃	180	120	80	-
5	Total suspended solids (TSP)	300	-	200	140
6	Particulate matter (PM) $\leq 10 \mu\text{m}$	-	-	150	50
7	Lead (Pb)	-	-	1.5	0.5

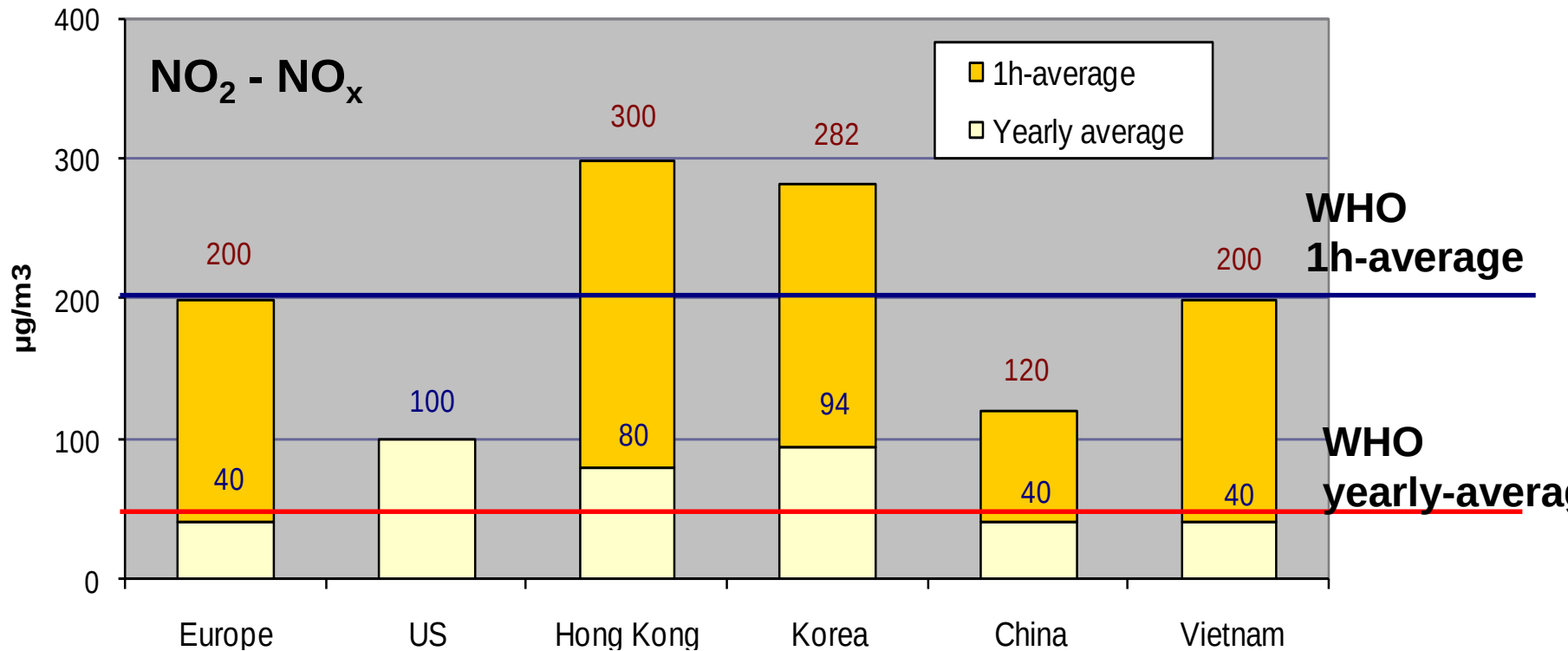
Note: (-) not defined

National technical regulation vs International standards for air quality



National technical regulation for SO₂ is reasonably strict comparing to many other countries. However, the standard is still far above the permitted level promulgated by the World Health Organisation

National technical regulation vs International standards for air quality



Vietnam Technical Regulations for NO_x is relatively strict compared to many other countries, developed countries as well as standards recommended by the World Health Organization and the European Community included

Air Quality Index

Hour	3.00 – 4.00 p.m
AQI index	92 (Fair)

AQI range	Air quality	Human health impacts	Colour code
0 - 50	Good	No impact on human health	Green
51 - 100	Fair	Sensitive groups should limit the time outdoor	Yellow
101 - 200	Bad	Sensitive groups must limit the time outdoor	Orange
201 - 300	Worse	Sensitive groups avoid going out. The others limit time stay outdoor	Red
Above 300	Hazardous	Everybody should stay at home	Brown

3. ATMOSPHERIC MERCURY MONITORING ACTIVITIES IN VIETNAM

Source of mercury emission in the air in Vietnam

- Burning of coal and fossil fuels;
- Coal burning power plants;
- Waste incinerators;
- Mining, gold mining;
- Oil refinery;
- Production of metals, alkalis, cement, etc.
- Natural sources: Deforestation, volcanoes eruption, etc.

Atmospheric mercury pollution monitoring in Vietnam

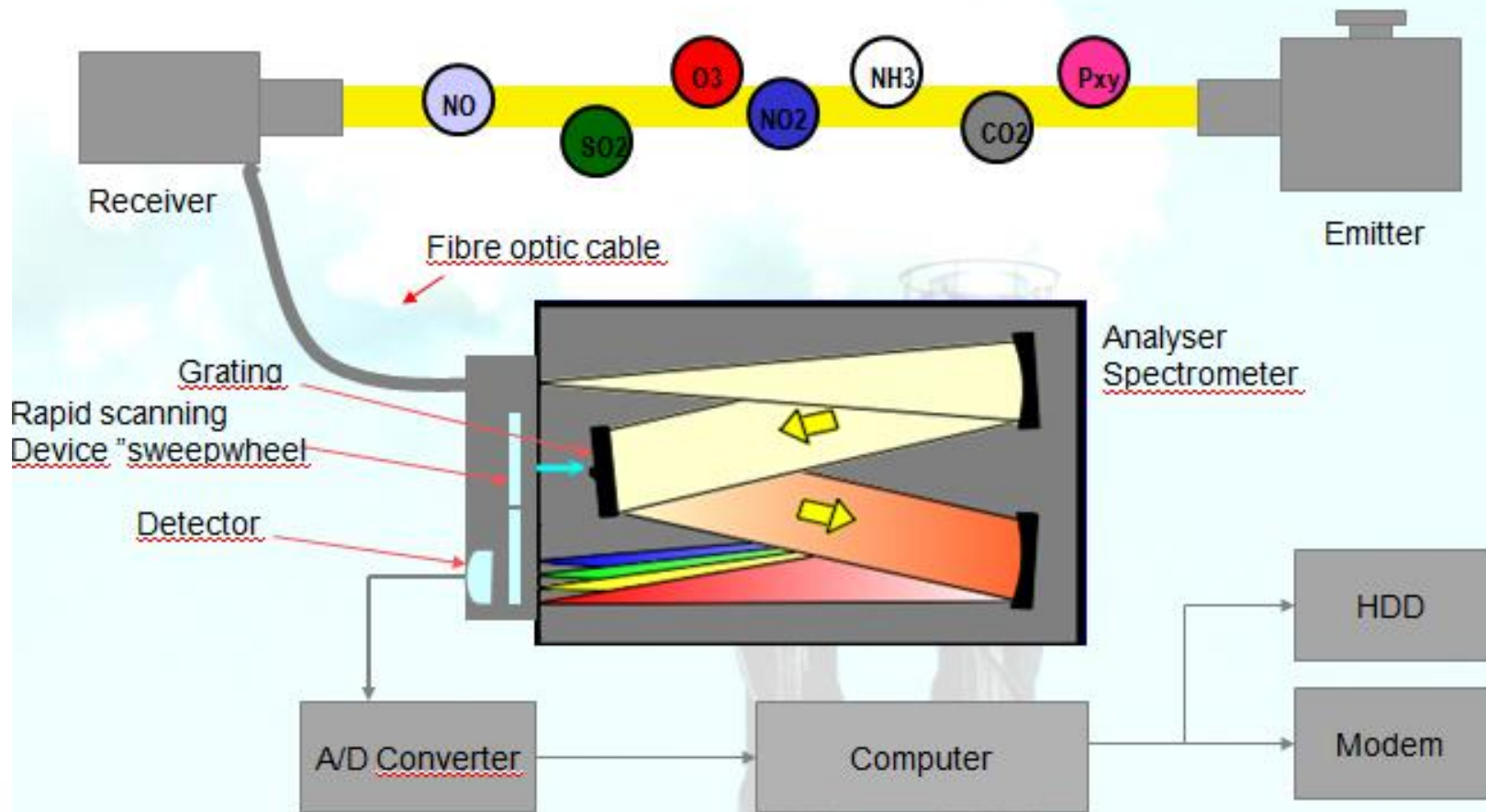
- Monitoring mercury using semi-automatic technology is hardly carried out regularly;
- Mercury sampling is performed in some international cooperation projects;
- Reasons:
 - + Complicated technology;
 - + High cost;
 - + Improper training for staff in the area of mercury monitoring mercury.
- Automatic monitoring of atmospheric mercury: Conducted at Hochiminh Mausoleum using the optical technology.

Atmospheric mercury monitoring at the Hochiminh Mausoleum station

- An automatic continuous air monitoring station;
- Was established and started operations from 2012;
- Technology: Differential Optical Absorption Spectroscopy;
- Analysing parameters: SO₂, NO₂, NO, O₃, Benzene, Toluene, p-Xylene, m-Xylene, Formaldehyde, Phenol và Hg;
- Hg measurement range: 0 - 2000 ng/m³.

Differential Optical Absorption Spectroscopy technology

UV analyser schematic



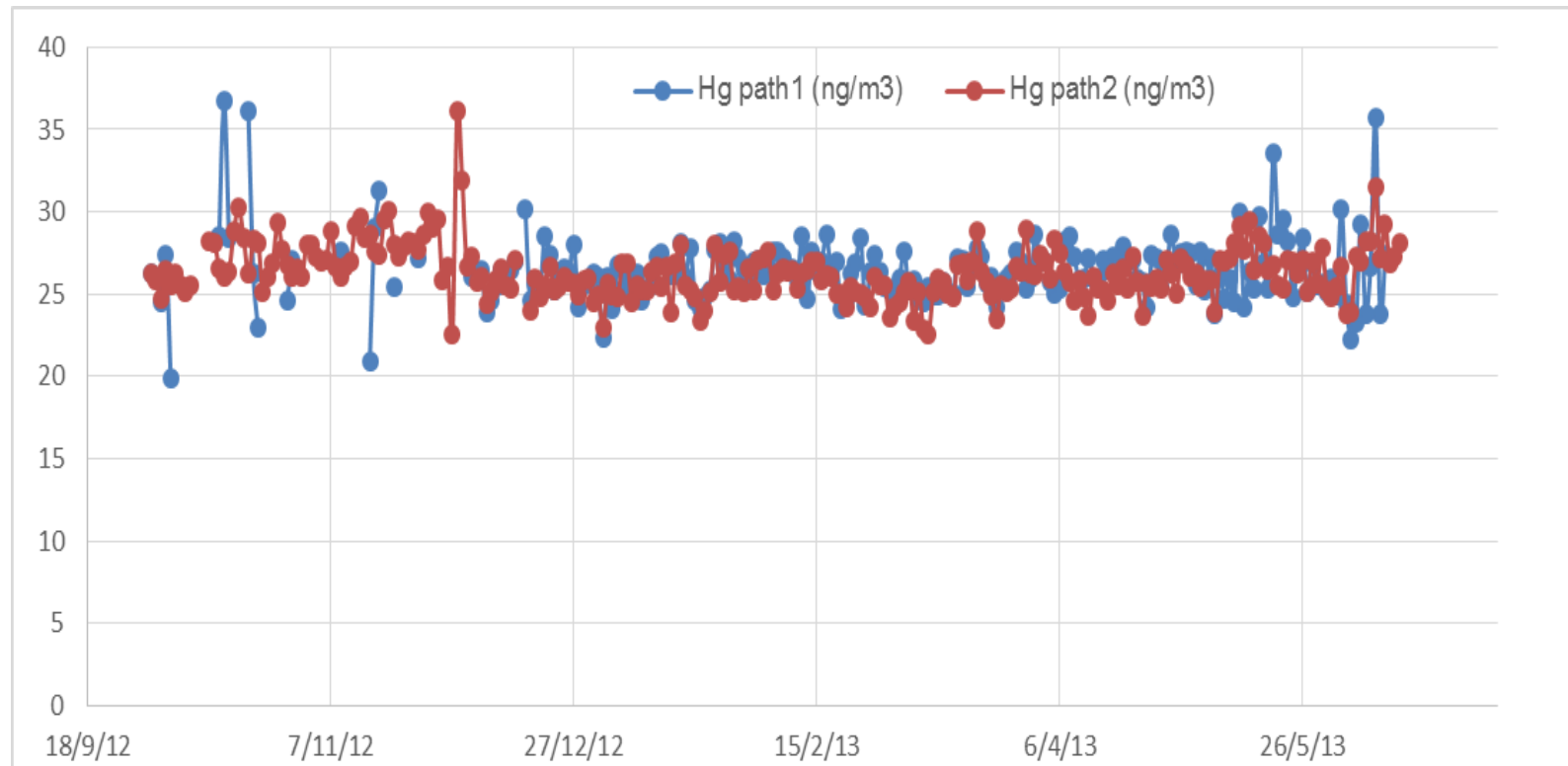
Hochiminh Mausoleum station



Transceiver Unit for Air Quality Monitoring



Mercury Data at Hochiminh Mausoleum station



24-hour-average Hg concentration

QCVN 06/2009: National technical regulation on hazardous substances in ambient air. The Hg 24-hour-average standard is 300ng/m³

Atmospheric mercury sampling in Da Nang within the international cooperation project with Taiwan 7-SEA





4. Future Orientation



Future orientation

- Join the mercury monitoring network in Asia;
- Organization in charge in Vietnam: the Centre for Environmental Monitoring (CEM) - Vietnam Environment Administration;
- Strengthen the monitoring equipments and facilities for mercury sampling and analysis;
- Training the staff.

Future orientation

- Activities as the member of atmospheric mercury monitoring network:
 - + Comprehensive assessment of mercury pollution in the air in Vietnam;
 - + Conduct surveys, select areas and specific positions satisfy requirements for monitoring and assessment of atmospheric mercury;
 - + Sharing data and information across the network.

**THANK YOU
FOR YOUR ATTENTION!**