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Environmental Protection Administration
Executive Yuan, R.O.C. (Taiwan)

Taiwan's support to the Asia-Pacific Mercury Monitoring Network

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What is the Asia Pacific Mercury Monitoring Network (APMMN)?

- Making measurements of mercury in rainwater and air
- Using the same instruments and standard operating procedures across the region

The purpose of the APMMN is to expand coordinated mercury monitoring capacity in the region

- Determine status and trends of mercury in the ambient air and in wet, dry, and total atmospheric deposition
- Characterize the influence of mercury emissions sources on atmospheric mercury transport and deposition to sensitive areas
- Generate a database for regional and global modeling
- Assist partners in developing their mercury monitoring and assessment capabilities
  - Provide training and demonstration of mercury wet deposition sampling operations

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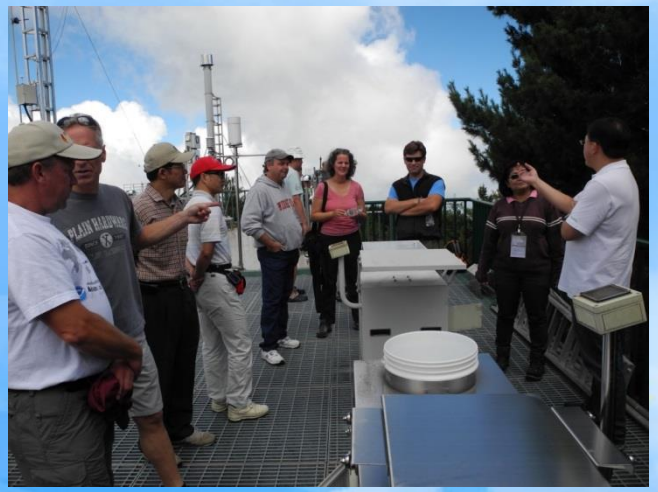
2012 Atmospheric Mercury Monitoring Workshop (Taipei)



Participants

- Canada, Indonesia, Japan, Korea, Taiwan, Thailand, and the U.S

Outcomes

- Identified key monitoring gaps in the region
- Articulated a need for a coordinated network to monitor mercury transport and deposition

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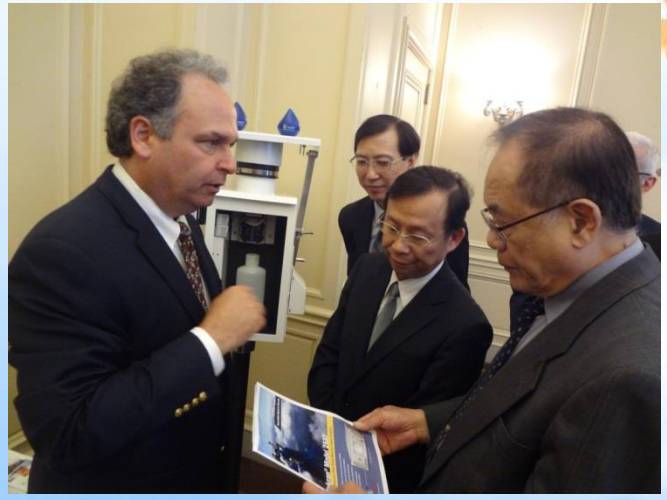
2013 Mercury Monitoring Workshop (Washington D.C.)



Participants

- Canada, Indonesia, Japan, Korea, Taiwan, Thailand, Vietnam, and the U.S

Outcomes

- Agreement on major design elements of an operating mercury wet deposition pilot network for the region
- Established a science advisory group
- Devised a preliminary plan for deploying wet deposition collectors in Southeast Asia

2014 Asia Pacific Mercury Monitoring Network Workshop (Vietnam)

Participants

- Canada, Hong Kong, India, Indonesia, Japan, Korea, Philippines, Taiwan, Thailand, Vietnam, and the U.S

Outcomes

- Completed SOPs for mercury wet deposition
- Proposed pilot sites in Thailand, Vietnam, and Indonesia
- Trained partners on wet deposition operations and atmospheric mercury measurements

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2015 Asia Pacific Mercury Monitoring Network Workshop (Japan)

Participants

- Bangladesh, Cambodia, Laos, Indonesia, Japan, Malaysia, Myanmar, Philippines, Mongolia, Sri Lanka, Taiwan, Thailand, Vietnam, and the U.S

Outcomes

- Mercury monitoring network pilot update
- APMMN website and wet deposition technology transfer center
- Network expansion plans

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2016 Atmospheric Mercury Monitoring Workshop (Taiwan)

Participants

- Bangladesh, Cambodia, India, Korea, Japan, Mongolia, Taiwan, Thailand, Vietnam, and the U.S

Outcomes

- Mercury monitoring network pilot update
- To celebrate the grand opening of the Taiwan EPA and USEPA Center for Environmental Monitoring and Technology
- Demonstration of mercury wet deposition sampling operations.

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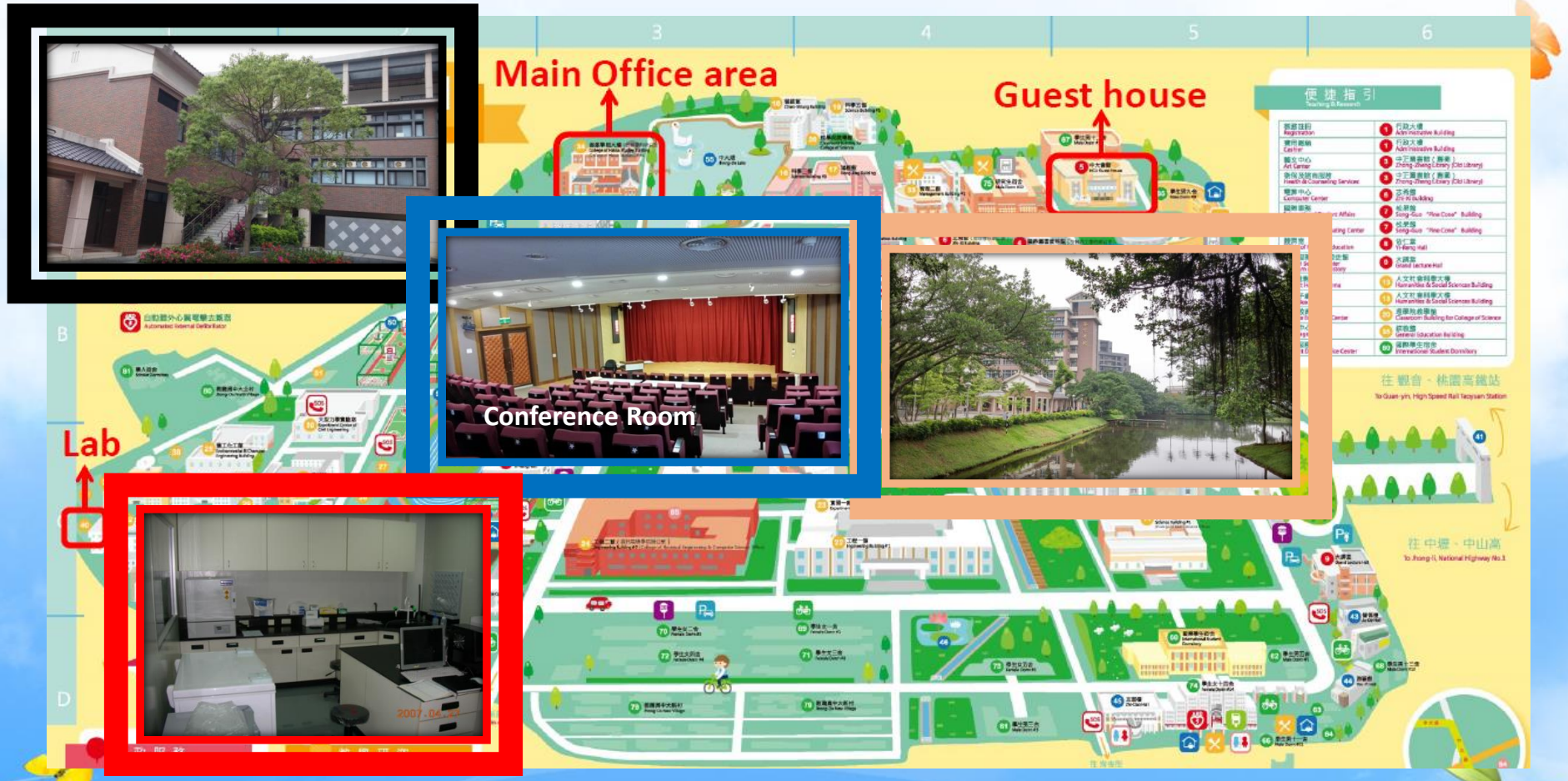
Center for Environmental Monitoring and Technology (NCU Campus)



- Location of Lab, Office and Guest House on NCU Campus

Center for Environmental Monitoring and Technology (NCU Campus)

- Wet Hg deposition sampling and analysis are currently underway with 3 sites in Vietnam, Thailand and Indonesia.
- Hg Lab serves as the regional center for ultra-trace level Hg analysis, training to help analyze rain water samples and some atmospheric Hg samples.
- Train researchers from other Asian countries for capacity building of ultra-trace level Hg sampling and analysis.

Mt.Lulin Atmospheric Background Station

Instruments at the Lulin station

	Instrument, Manufacturer, Model
Aerosols	**Model**
Particle mass concentration	TEOM Particulate mass monitor, R&P 1400 (PM_{10}, $PM_{2.5}$)
aerosol chemical components	Aerosol sampling, R&P, 3500
	Aerosol sampling, R&P, 2025D
NOAA CPD aerosol system	PSAP,TSI 3010 CPC, TSI 3563 intergrating nephelometer
Radiation	**Model**
7 spectral channels	Sunphotoneter, Cimel, CE-318
6 spectral channels	Shadow band, Yankee, MFR-7
UVA	UVA, Solar Light, MODEL 501
UVB	UV-Biometer, Solar Light,
Total flux	Solar radiation sensor, MetOne, 96-1
	Kipp&Zonen CMP-21 pyranometer
	Kipp&Zonen CGR-4 pyrgeometer
Direct sun radiation	Kipp&Zonen CH-1 pyrheliometer
Gas	**Model**
O_3	Ozone analyzer, Ecotech, ML9810B
CO	CO monitor, TraceAnalytical, TA-3000R
	CO monitor, Horiba, APMA-360
CO_2	CO_2 analyzer, LI-COR, LI-7000
Oxides of Nitrogen	Oxides of Nitrogen analyzer family, ECOTECH, EC9841T (NO_x), EC9842 (NH_3), EC9843 (NO_y)
SO_2	Trace SO2 analyzer, ECOTECH, EC9850T
CFCs	Gas Chromatography, Agilent, HP6890N
Air sampling	NOAA/ESRL/GMD CCGG flask sampler
Mercury	**Model**
Gaseous Elemental Mercury	Cold Vapor Atomic Fluorescence Sepectrometry,**Tekran**,
Reactive Gaseous Mercury	Mercury Speciation Unit, **Tekran**, 1130
Particulate Mercury	Particulate Mercury Unit, **Tekran**, 1135
Precipitation chemistry	**Model**
Rainwater sample	Rain sampler
Met.	**Model**
Visibility	Present Weather Detector, VAISALA, PWD22
Meteorological Monitoring System	MetOne (Temp., Humidity, Press., Rain, Wind)

Many thanks for your attention!

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