Summary of air monitoring program in Japan

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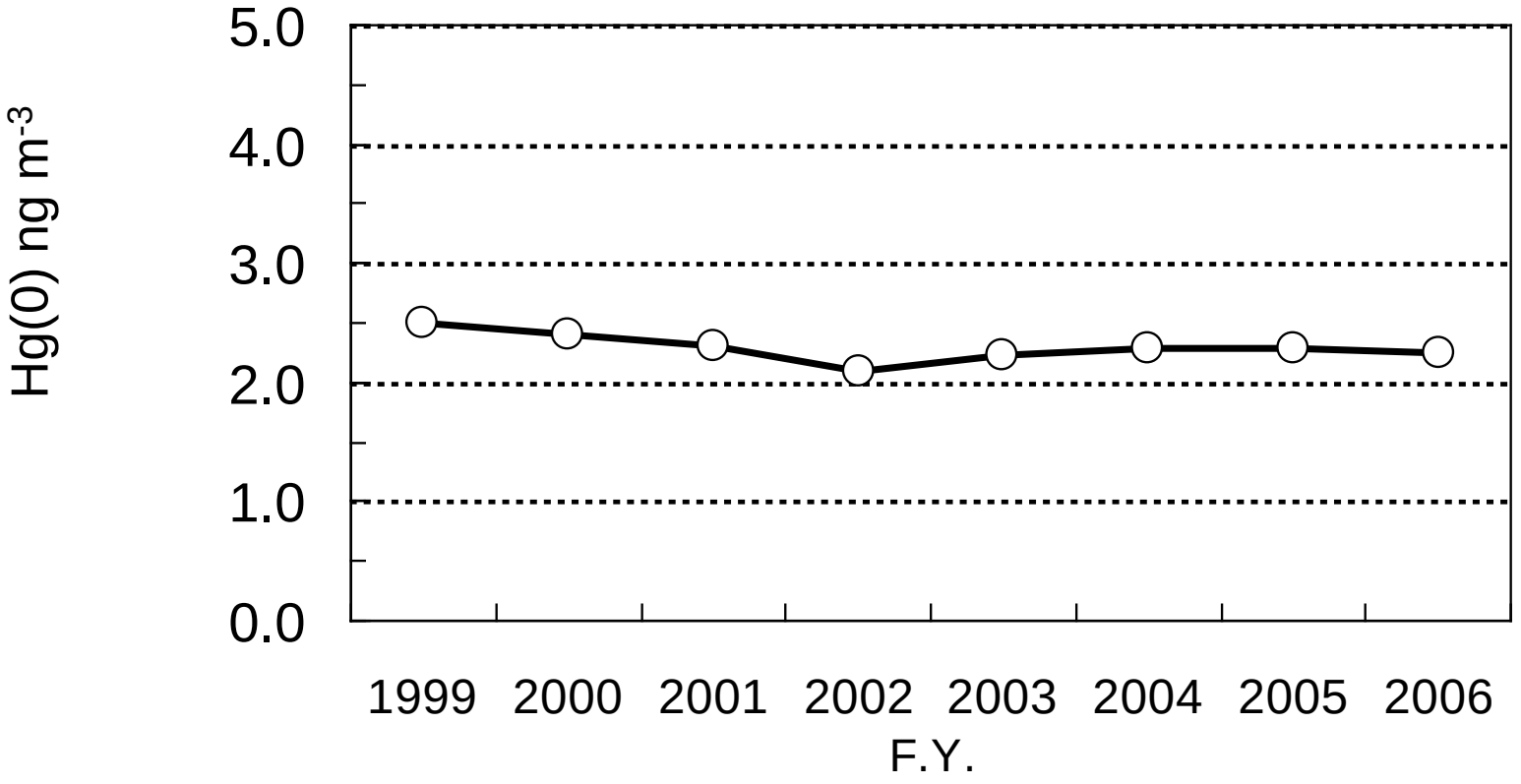
Overview examples of mercury monitoring in Japan

- Ambient air monitoring as hazardous air pollutant
  - Monitoring in residential area in Japan in three categories:
    1) Ambient air pollution monitoring station
    2) Stationary source monitoring station
    3) Roadside air pollution monitoring station
  - Mercury data of about 200 ambinet air monitoring stations from F.Y.1999 to 2006 are used in this overview.
- Speciated continuous monitoring at remote site Cape Hedo
  - Monitoring in remote site

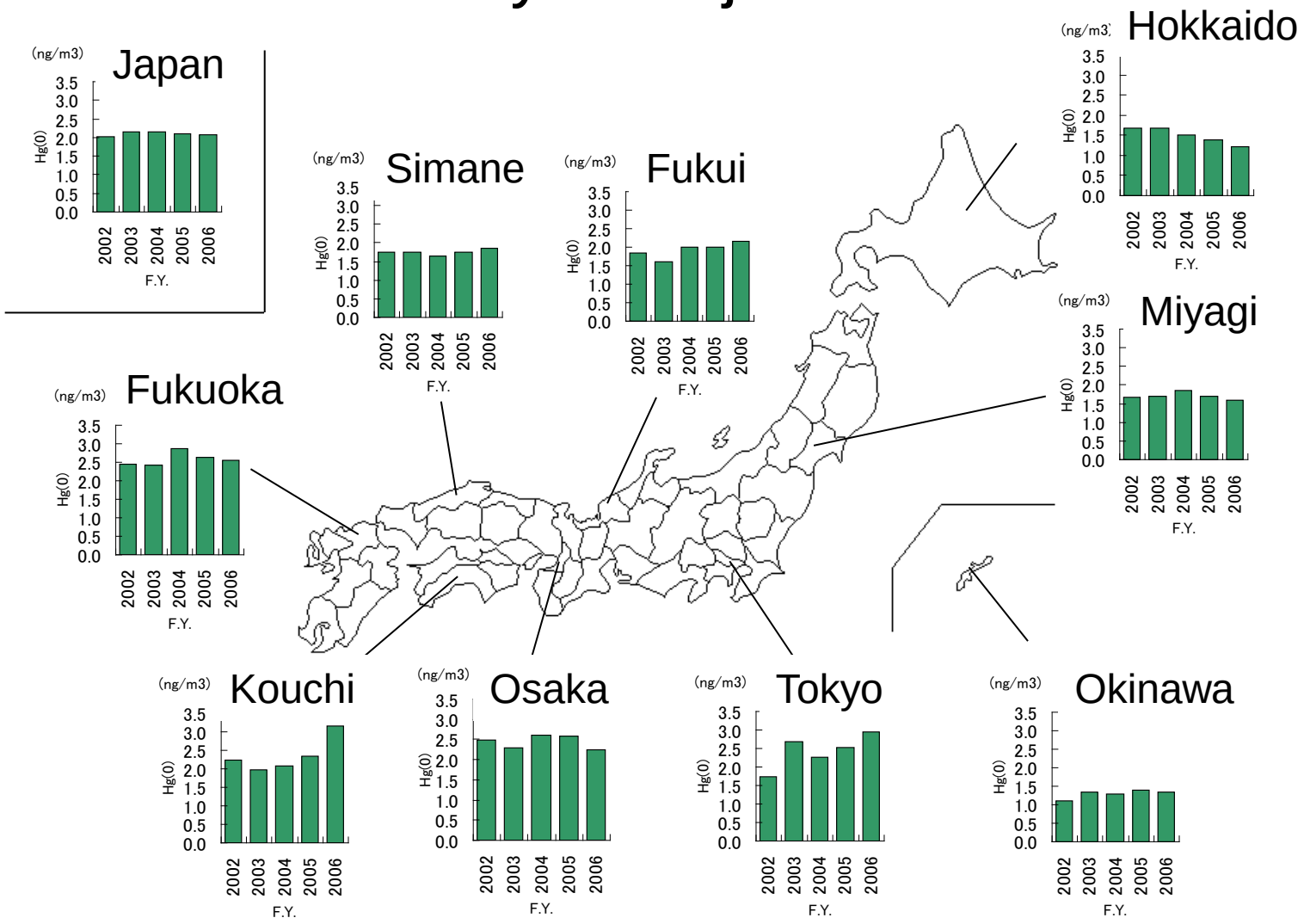
Overview of ambient mercury levels in Japan as hazardous air pollutant

- Seasonal sampling each for 1 day
- Yearly trend of annual average of data show no significant trend until 2006



Overview of ambient mercury levels in Japan

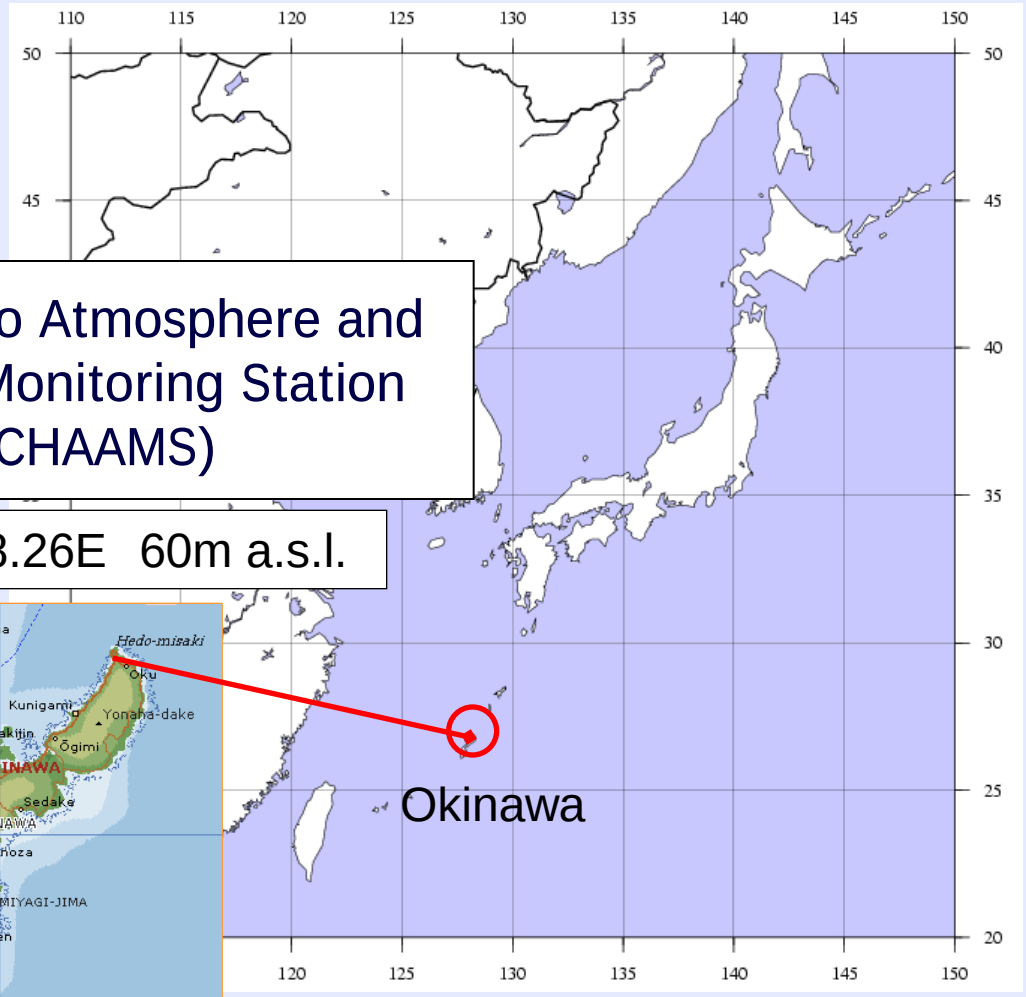
Trends of annual average of gaseous elementary mercury in major cities



Mercury monitoring at remote site, Cape Hedo station in Okinawa, Japan

Cape Hedo Atmosphere and Aerosol Monitoring Station (CHAAMS)

26.87N 128.26E 60m a.s.l.



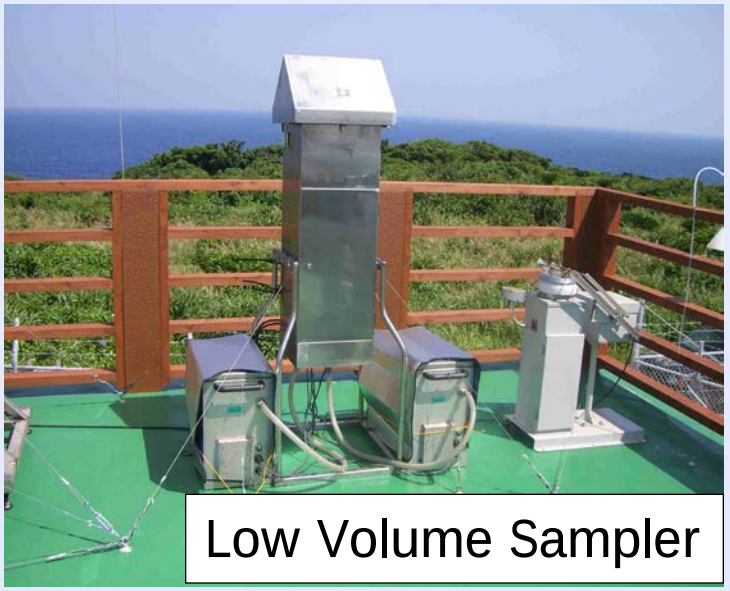
Measurement items, sampling, and analytical methods

Cape Hedo, 2007-2015

Component	Measurement items		Sampling and analytical methods
Atmosphere	Mercury	Mercury speciation (GEM, GOM, PBM)	Continuous measurement with Tekran mercury speciation system
		Hg	24 hours continuous sampling by gold amalgamation method and followed by CVAAS
	Particulate matter	Pb, Cd, Cu, Zn, As, Cr, V, Ni, Se, Sb, Ba, Co, Mn, Sn, Te, Tl, Be, Al, Fe, Ca, Na, K	7 days continuous sampling by the low-volume sampler and analyzed by ICP/MS
Precipitation	Hg		Sampling by the automatic wet-only sampler and analyzed by CVAAS (EPA method 1631)

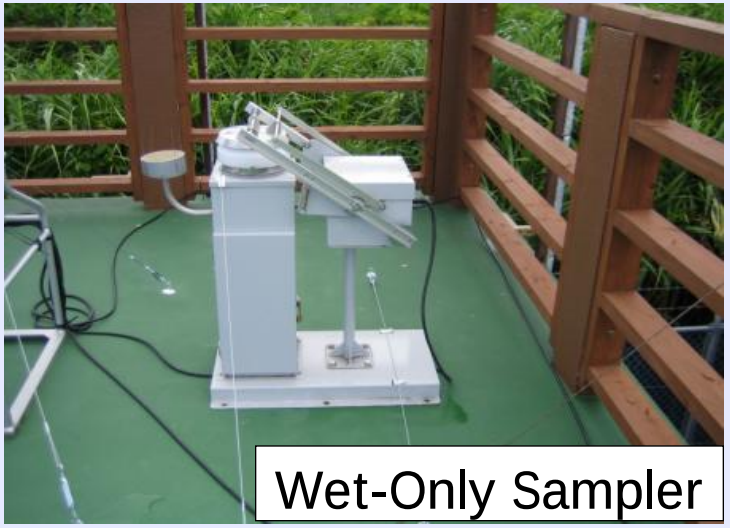
Sampling apparatus

Model 1130&1135
Tekran Instruments



Low Volume Sampler

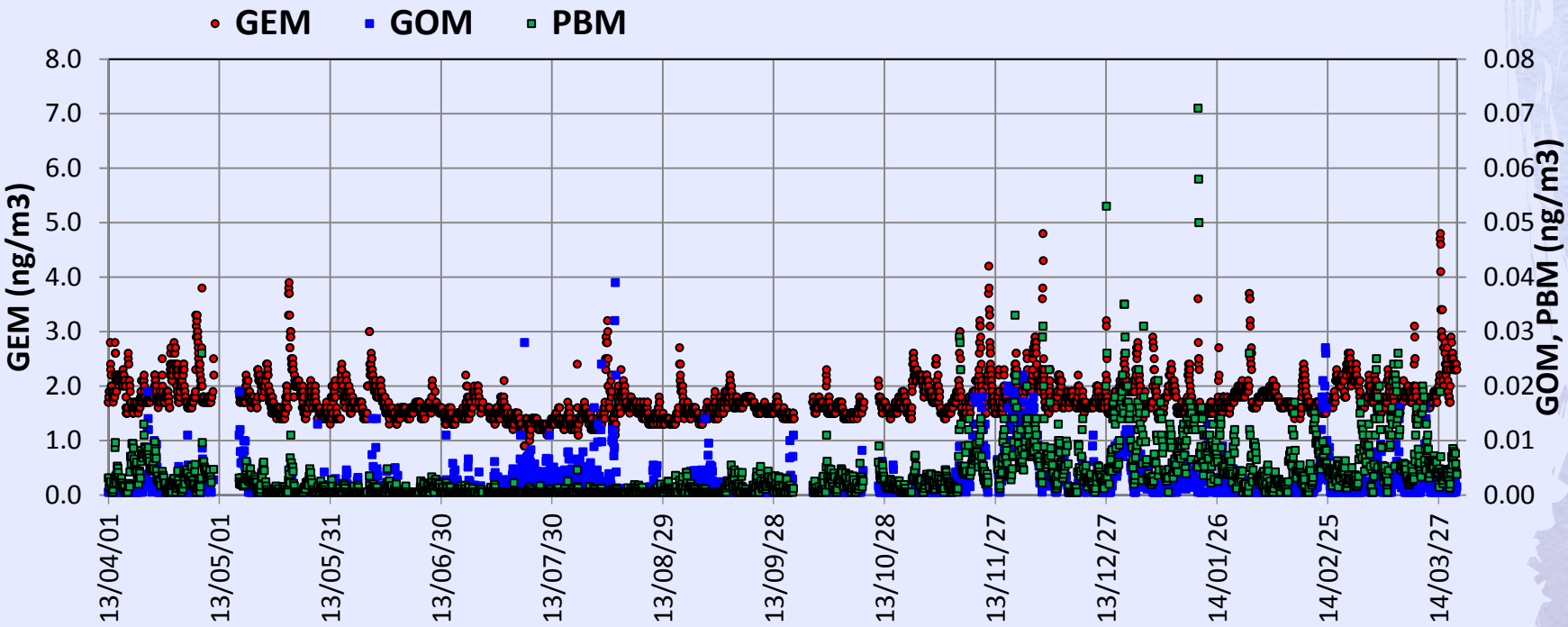
a glimpse of the monitoring site



Wet-Only Sampler

Observations of mercury species

Cape Hedo, FY2013 (Apr 2013-Mar 2014)



Observations of mercury species

Annual variations of GEM

Statistics

Hourly Mean of GEM
Unit: ngm^{-3}

	FY2010 (Apr 2010 - Mar 2011)	FY2011 (Apr 2011 - Mar 2012)	FY2012 (Apr 2012 - Mar 2013)	FY2013 (Apr 2013 - Mar 2014)
Mean	1.9	2.1	2.0	1.7
Median	1.8	2.0	1.9	1.6
Min	1.2	1.1	1.3	0.9
Max	6.0	4.7	7.3	4.8
Standard Deviation	0.5	0.5	0.5	0.3

Observations of mercury species

Annual variations of GOM, PBM

Cape Hedo, FY2010-FY2013

Statistics

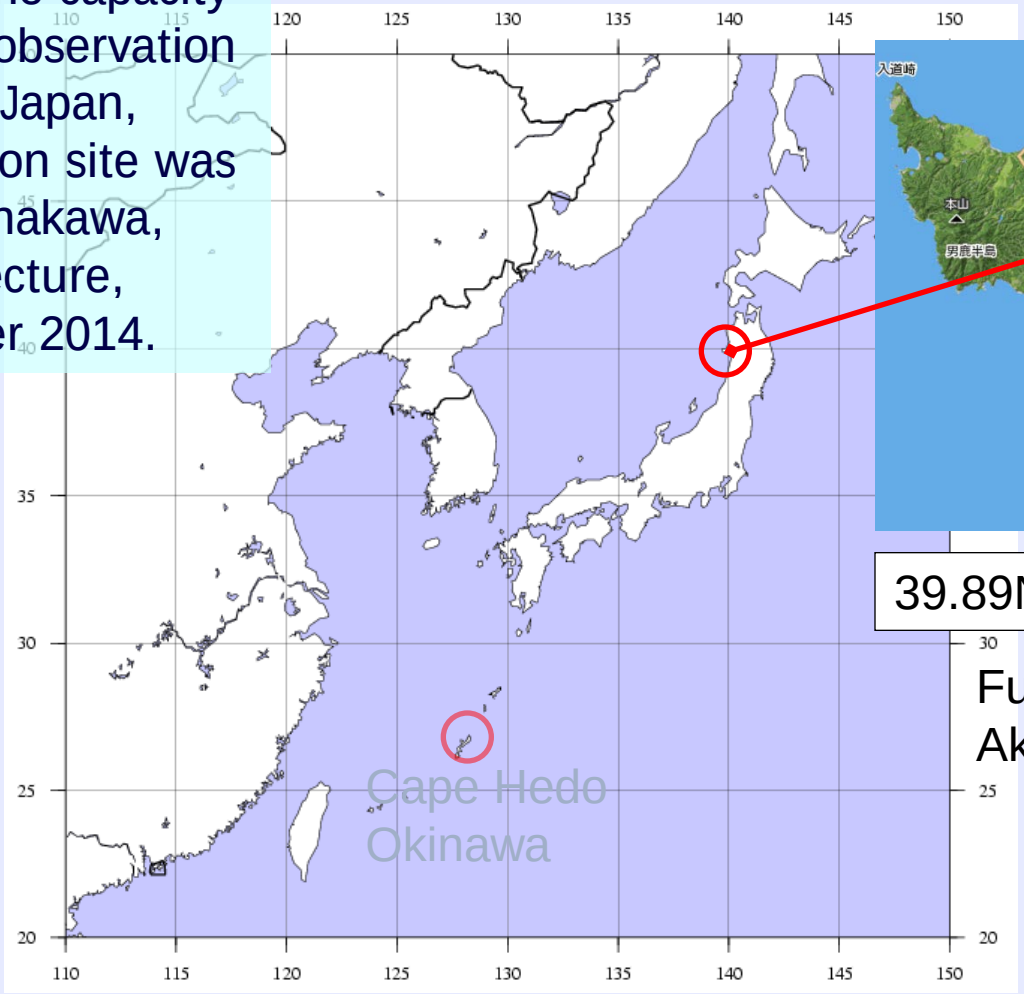
Hourly Mean
Unit: pgm^{-3}

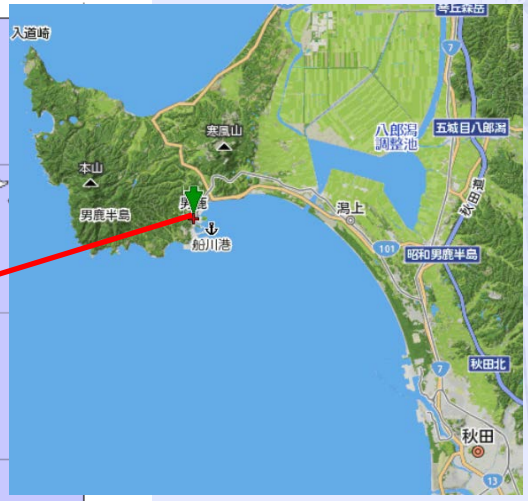
GOM				
	FY2010 (Apr 2010 - Mar 2011)	FY2011 (Apr 2011 - Mar 2012)	FY2012 (Apr 2012 - Mar 2013)	FY2013 (Apr 2013 - Mar 2014)
Mean	1.5	1.9	1.1	2.3
Min	0.5	0.5	0.5	0.5
Max	58	44	24	39

PBM				
	FY2010 (Apr 2010 - Mar 2011)	FY2011 (Apr 2011 - Mar 2012)	FY2012 (Apr 2012 - Mar 2013)	FY2013 (Apr 2013 - Mar 2014)
Mean	2.4	2.3	2.1	3.7
Min	0.5	0.5	0.5	0.5
Max	48	41	27	71

Mercury monitoring station in Akita , Japan

To strengthen the capacity of the mercury-observation network in Japan, a new observation site was set up at Funakawa, Akita Prefecture, in September 2014.





39.89N 139.85E

Funakawa, Akita

Sampling apparatus

Model 1130&1135
Tekran Instruments

Wet-Only Sampler

Global fate of mercury and environmental monitoring

- Mercury exists in multimedia environment, including atmosphere, water, land, etc.
- Monitoring on variety of media is necessary as a whole
- Monitoring of atmosphere and deposition is important to understand fast and long-range transport of mercury

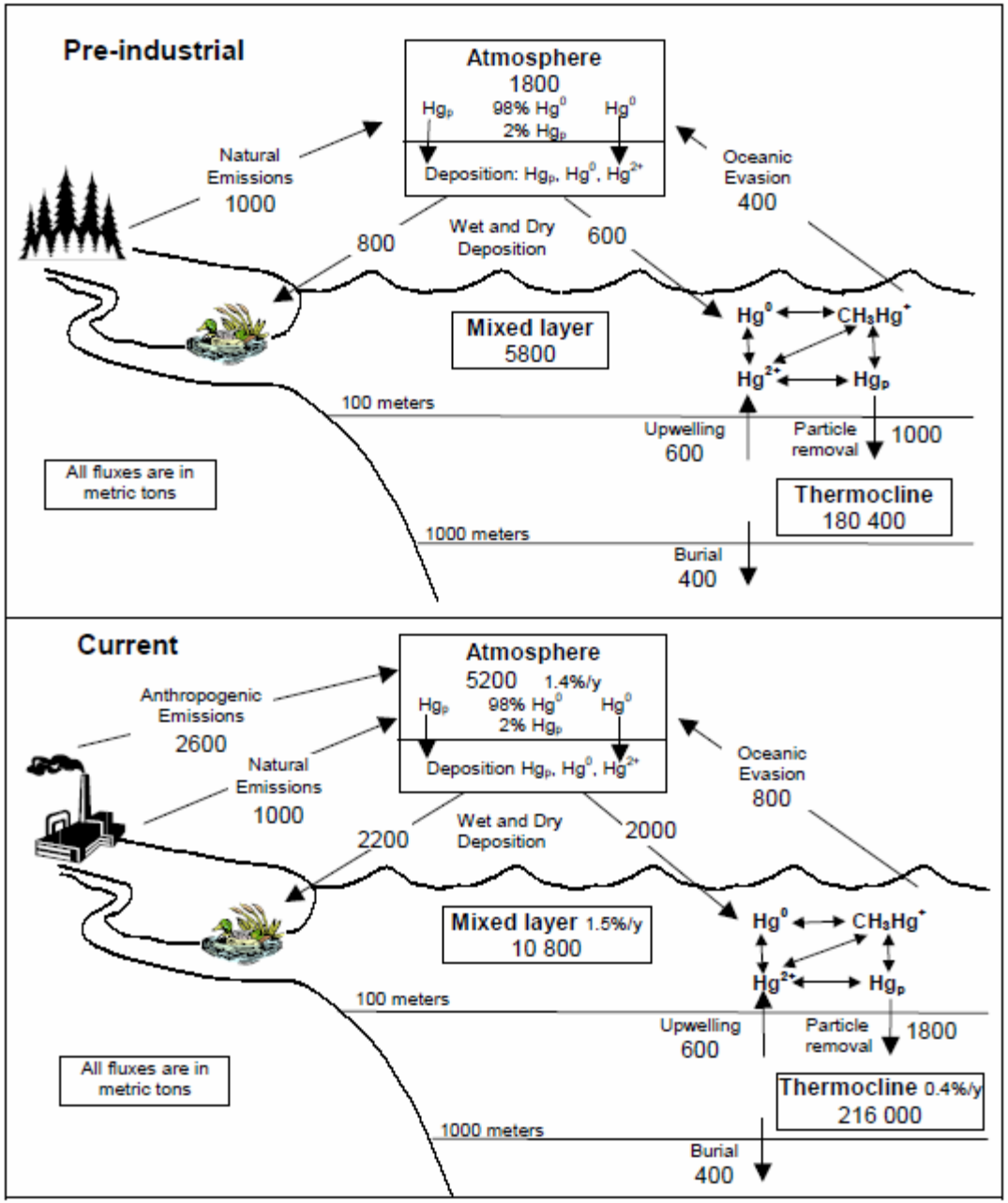


Figure 6.3 *Comparison of estimated pre-industrial and current mercury budgets and fluxes. All fluxes (arrows) and pools (in frames) in metric tons (adapted from Lamborg et al. (2002); the original authors note that the cycle is seen as unsteady.)*

The Global Atmospheric Mercury Assessment: Sources, Emissions and Transport, UNEP (2008)