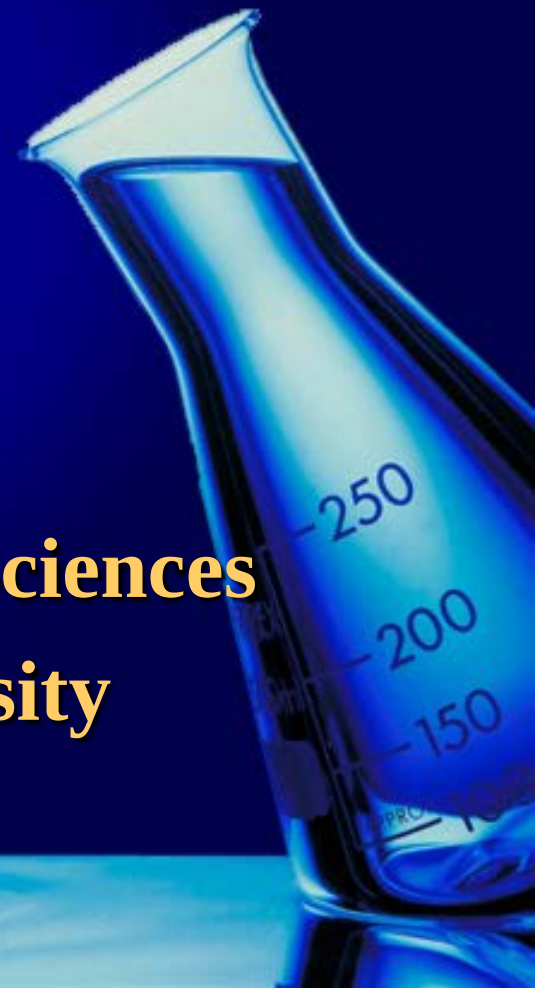


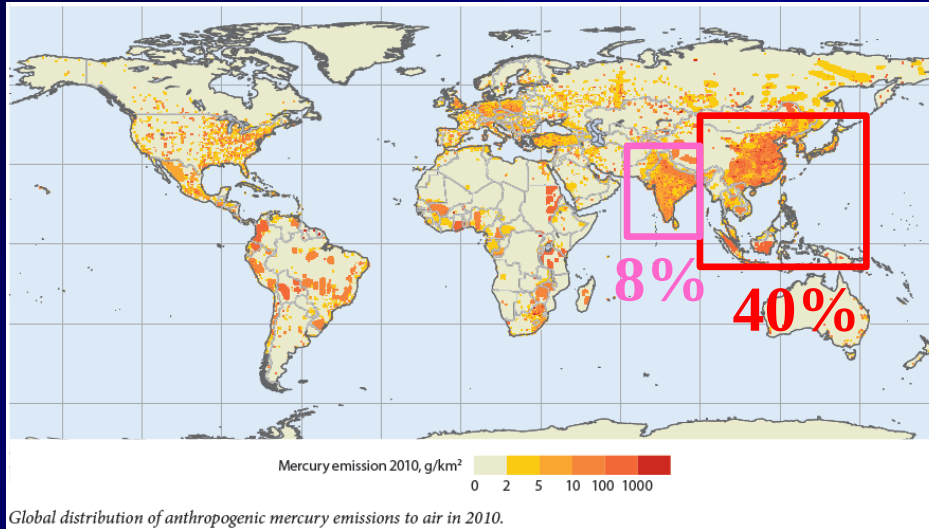
Mercury in East and Southeast Asia

Guey-Rong Sheu

**Department of Atmospheric Sciences
National Central University
Jhong-Li, Taiwan**



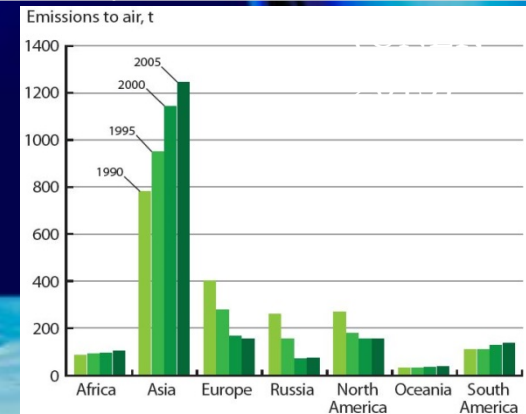
Anthropogenic Hg Emissions in 2010

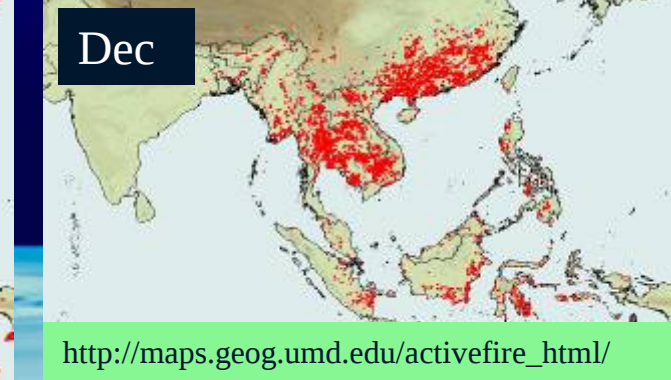
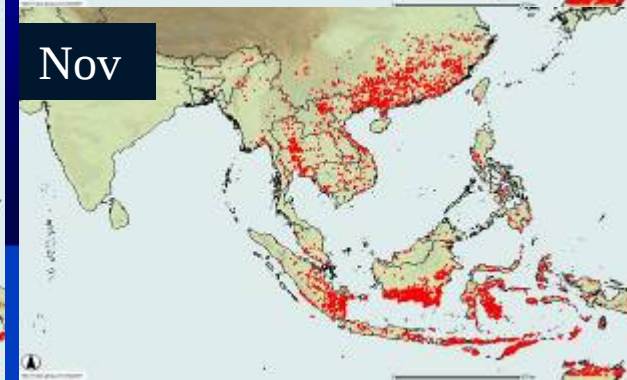
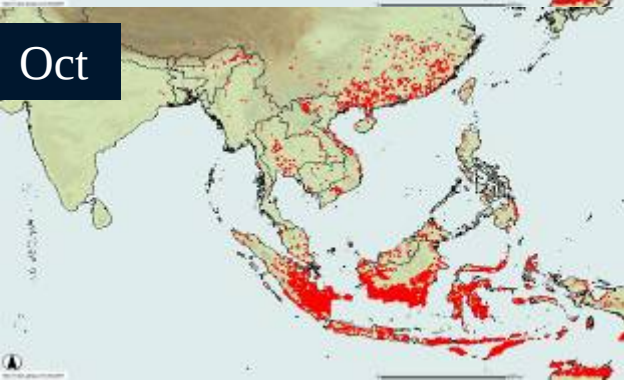
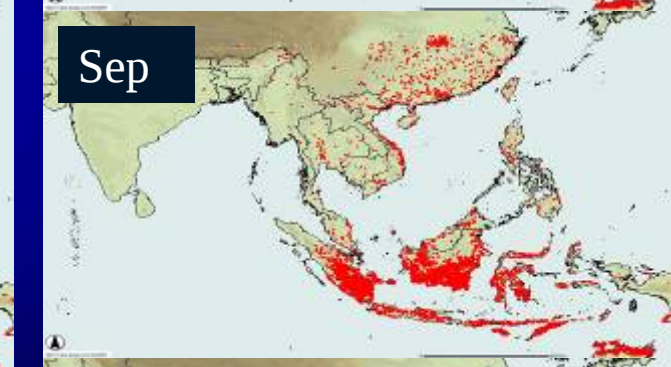
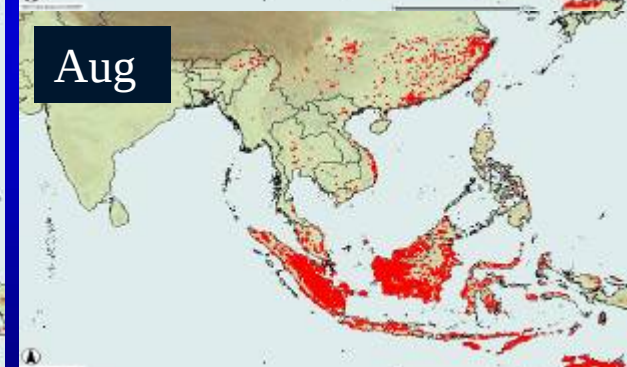
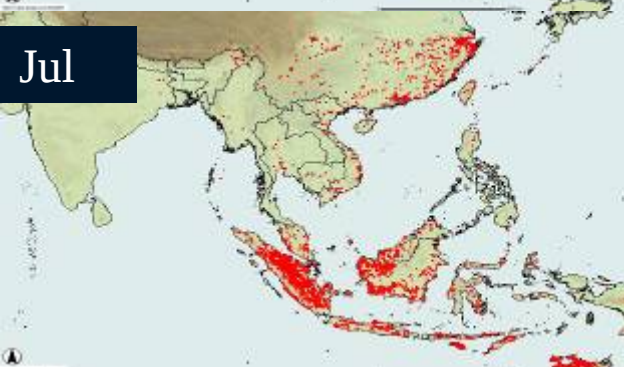
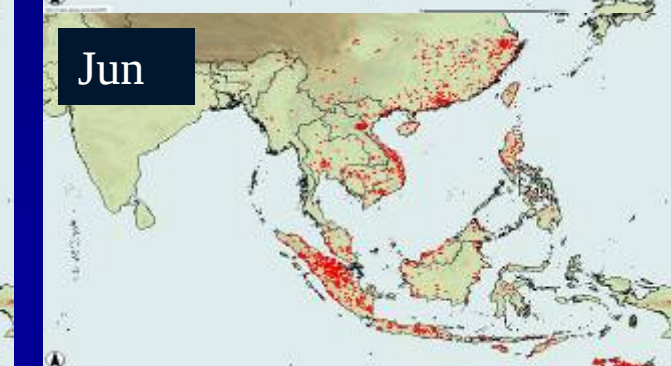
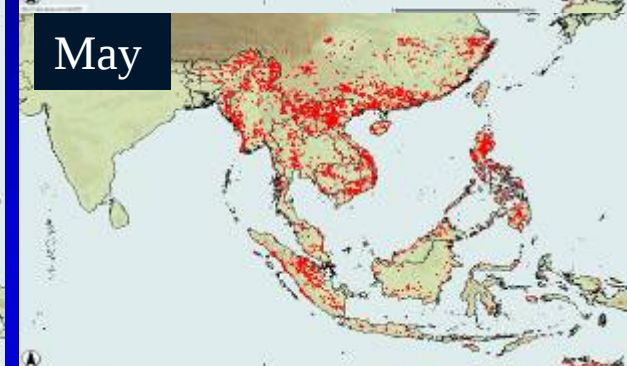
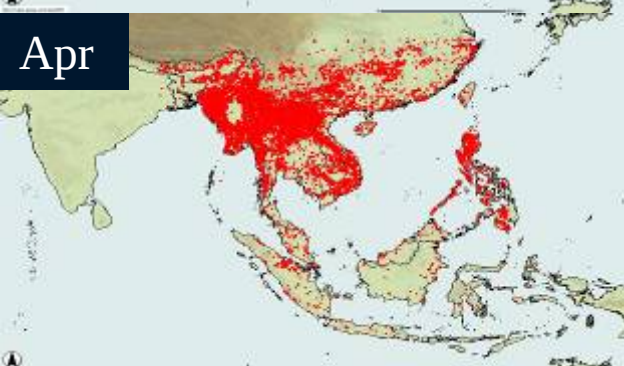
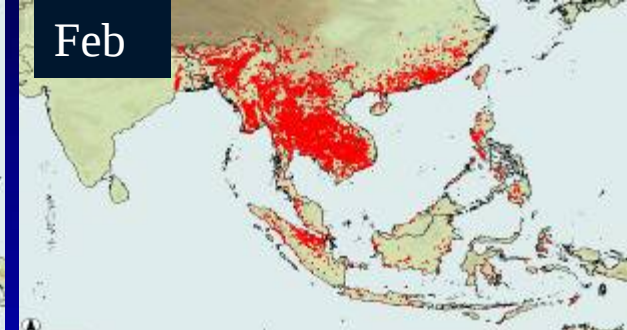


(UNEP, 2013)

Region*	Emission (range), tonnes**	%
Australia, New Zealand & Oceania	22.3 (5.4 - 52.7)	1.1
Central America and the Caribbean	47.2 (19.7 - 97.4)	2.4
CIS & other European countries	115 (42.6 - 289)	5.9
East and Southeast Asia	777 (395 - 1690)	39.7
European Union (EU27)	87.5 (44.5 - 226)	4.5
Middle Eastern States	37.0 (16.1 - 106)	1.9
North Africa	13.6 (4.8 - 41.2)	0.7
North America	60.7 (34.3 - 139)	3.1
South America	245 (128 - 465)	12.5
South Asia	154 (78.2 - 358)	7.9
Sub-Saharan Africa	316 (168 - 514)	16.1
Undefined (global total for emissions from contaminated sites)	82.5 (70.0 - 95.0)	4.2
Grand Total	1960 (1010 - 4070)	100

Country	Emission (tonnes)
China	575.2
Indonesia	78.2
Japan	17.2
Korea	7.1
Laos	1.3
Malaysia	6.1
Philippines	33.1
Taiwan	5.5
Thailand	14.9
Vietnam	11.6

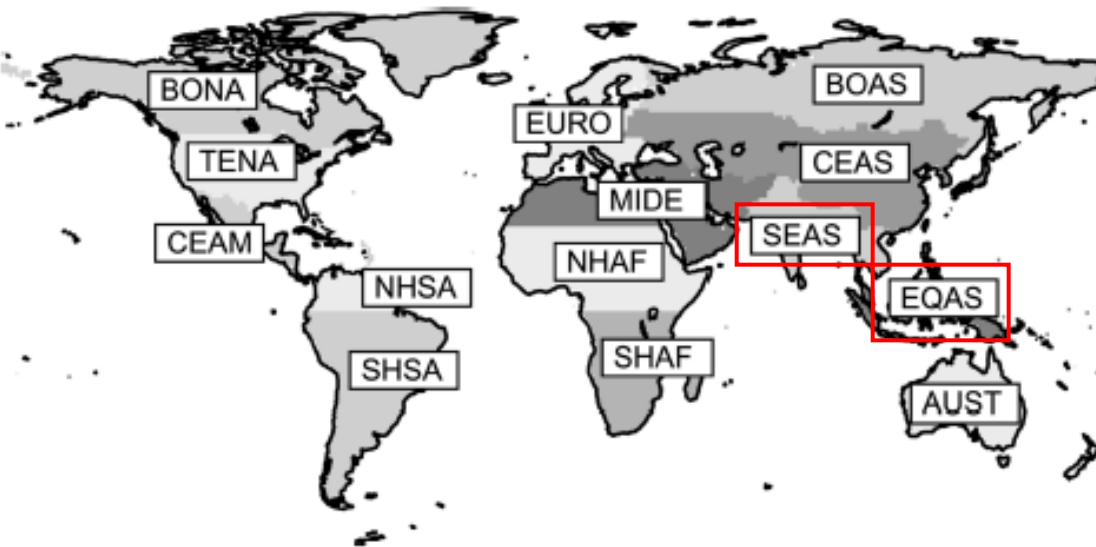




Biomass Burning Hg Emissions in 2005

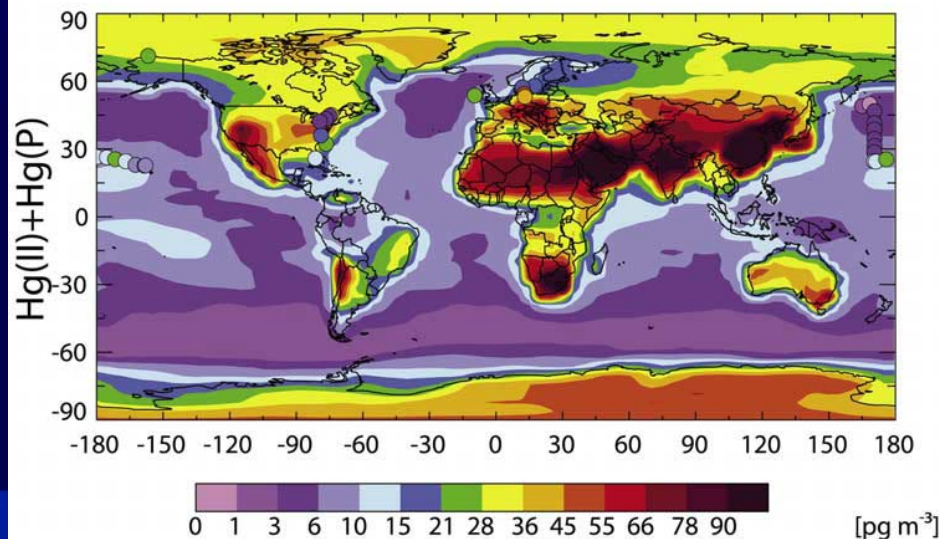
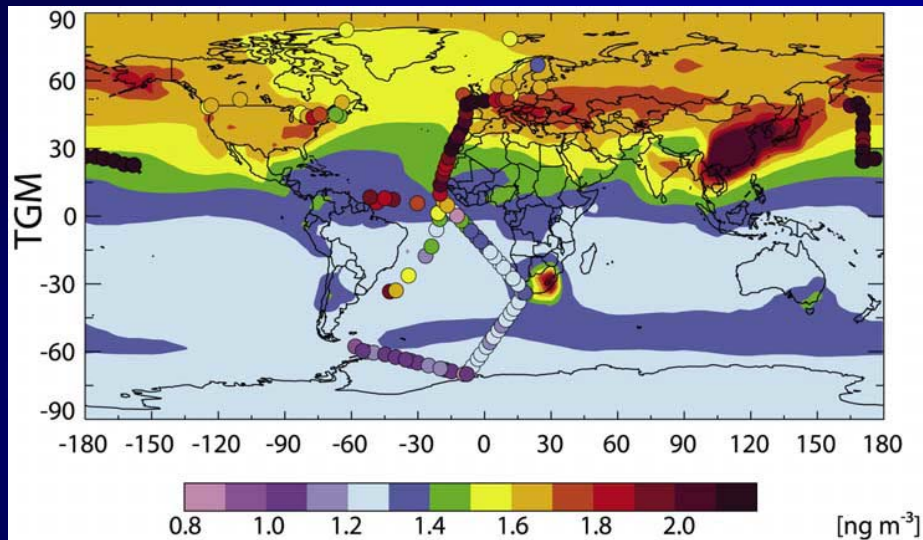


regions	Hg emissions Mg Hg/year	
	mean	SD ^a
BONA	22	16
TENA	6	3
CEAM	22	25
NHSA	13	10
SHSA	95	39
EURO	2	1
MIDE	0	0
NHAF	83	13
SHAF	58	7
BOAS	99	83
CEAS	7	2
SEAS	57	35
EQAS	192	216
AUST	19	9
global	675	240
boreal ^b	121	85
temperate ^c	9	3
ROW ^d	545	224

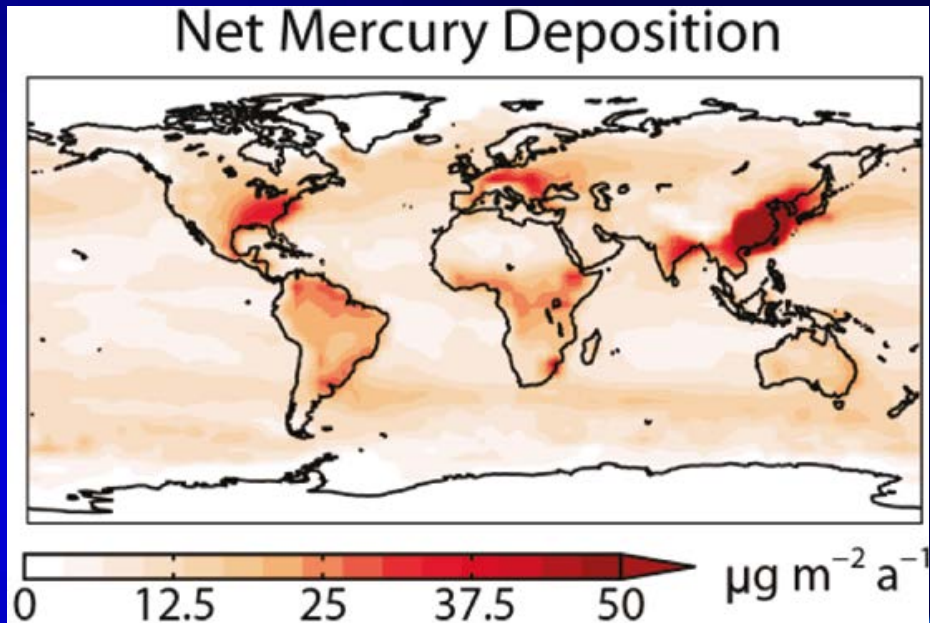


SEAS + EQAS = 249 Mg Hg/year = 37% of global

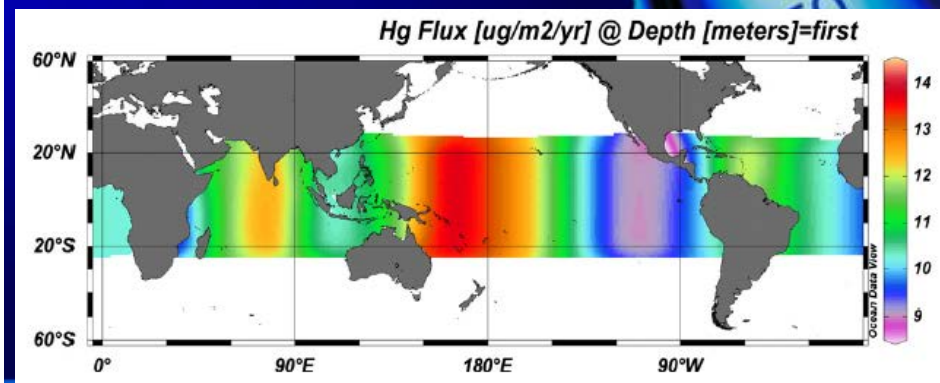
Distribution of Atmospheric Hg Concentrations and Deposition Fluxes: Modeling Results



Selin et al., 2007



Corbitt et al., 2011



Costa et al., 2012

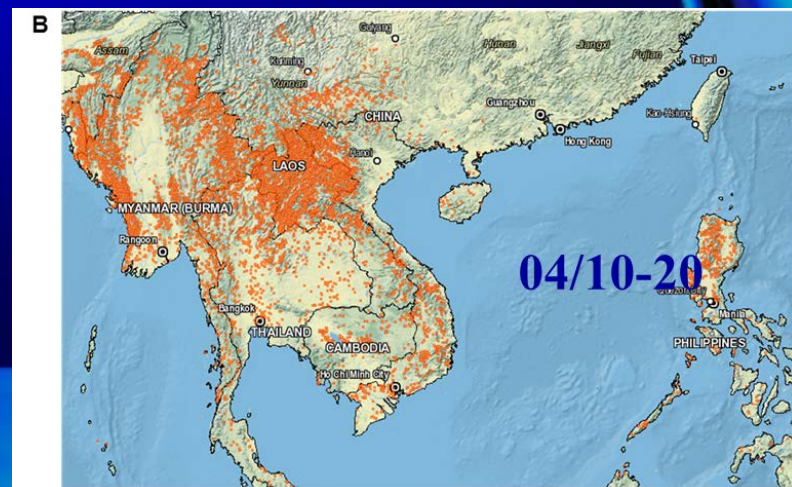
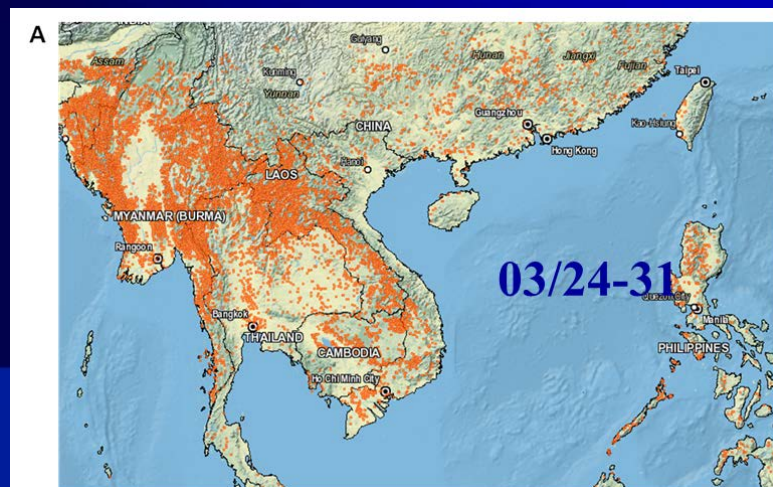
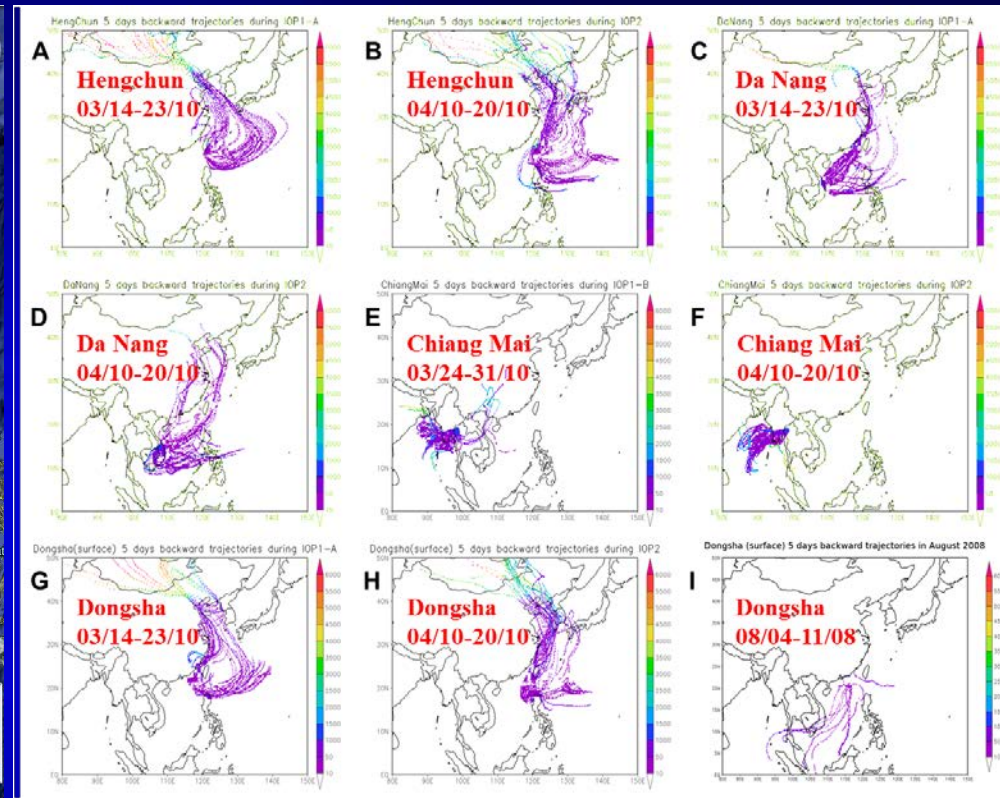
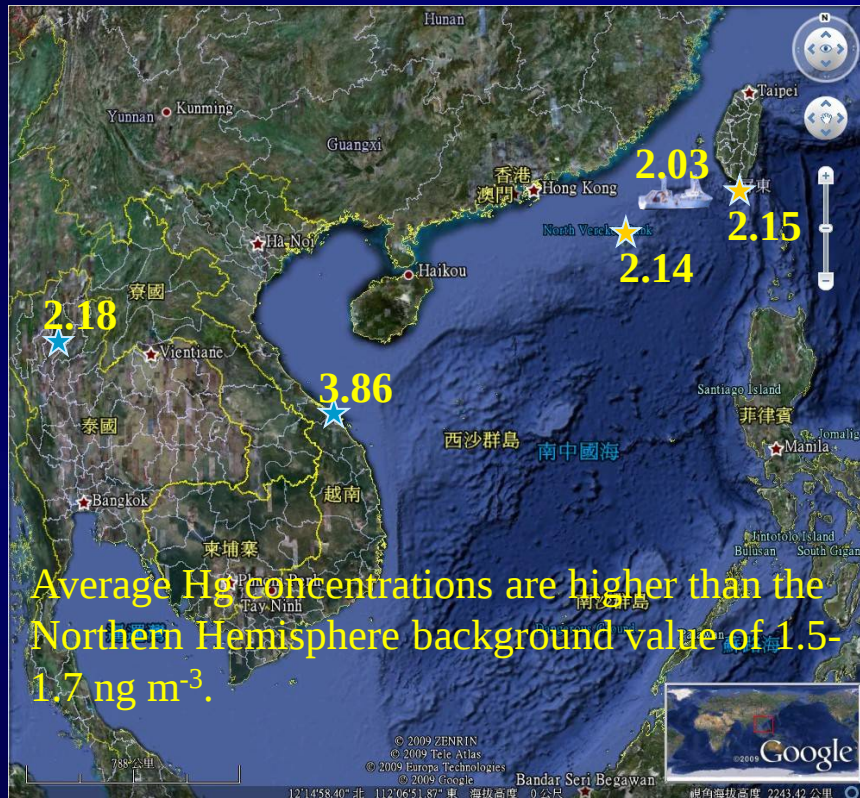
Atmospheric Hg Measurements in SE Asia in Spring



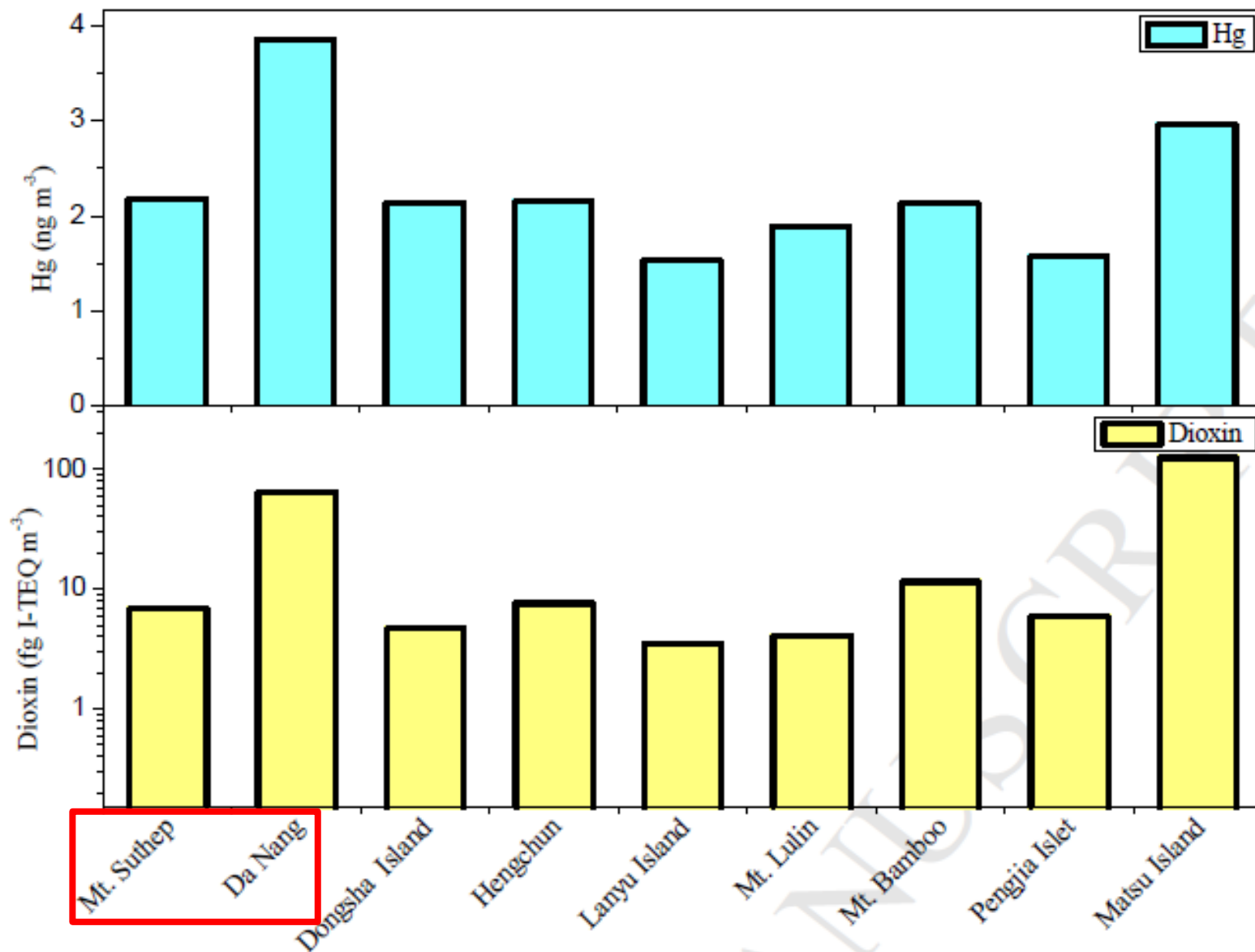
- 2010 Dongsha Experiment (GEM)
- 2011 Son La Experiment (GEM, PHg)
- 2012 Son La Experiment (GEM, PHg)
- 2013 7-SEAS Experiment (GEM, PHg, RGM)
- 2014 7-SEAS Experiment (GEM, PHg, RGM)

	GEM	RGM	PHg
Fugueijiao	2014	2014	2014
Hengchun	2010, 2013, 2014	2013	2013
Dongsha	2010		
SCS	2010		
Da Nang	2010		
Son La	2011, 2012, 2013	2013	2011, 2012, 2013
Doi Suthep	2010		
Doi Ang Khang	2013, 2014	2013, 2014	2013, 2014

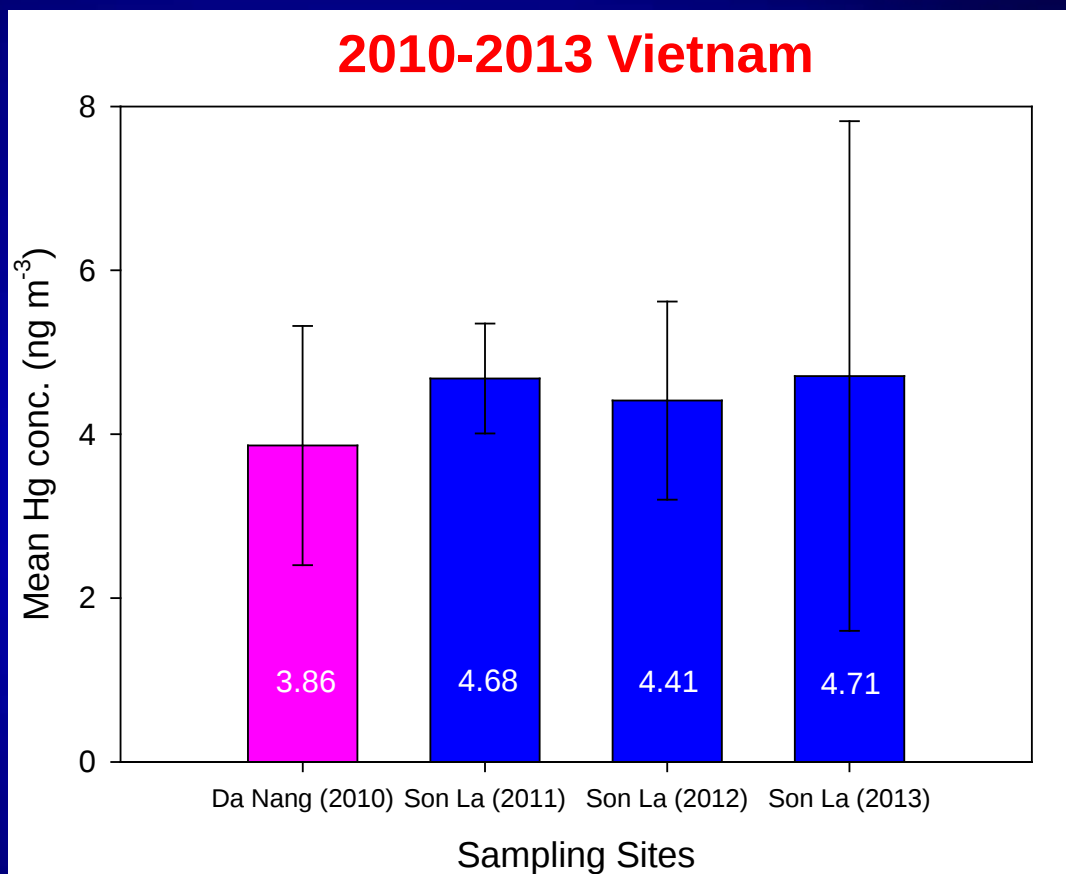
Regional Distribution of Atmospheric Hg in 2010



Atmospheric Hg and Dioxin

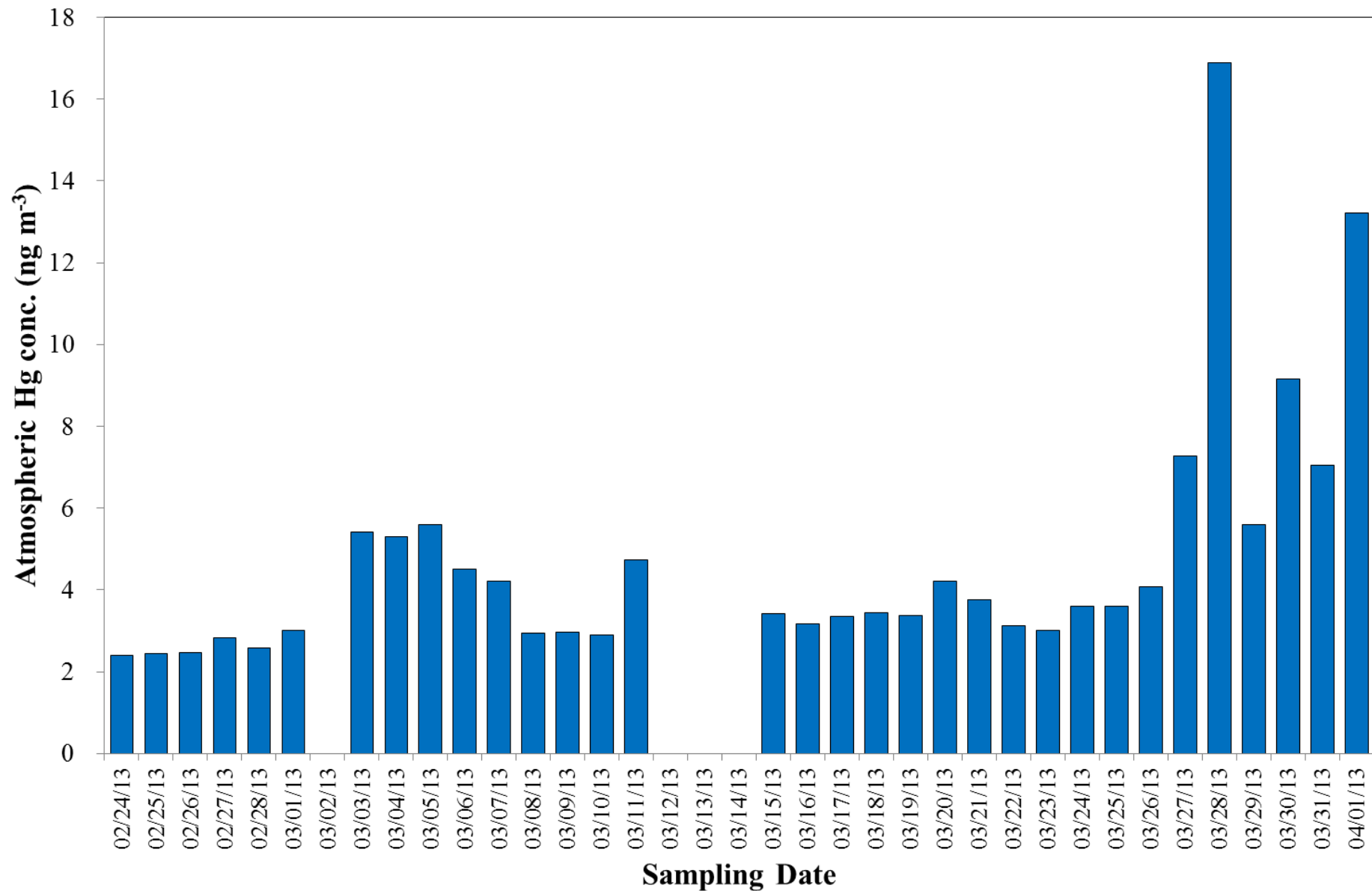


Atmospheric Hg in Vietnam in 2010-2013



Mean values of atmospheric Hg in Vietnam are about 2.3~2.8 times of the Northern Hemisphere background value (1.7 ng m^{-3}), indicating sources other than the background air are influencing these sites.

Atmospheric Hg in Son La in 2013



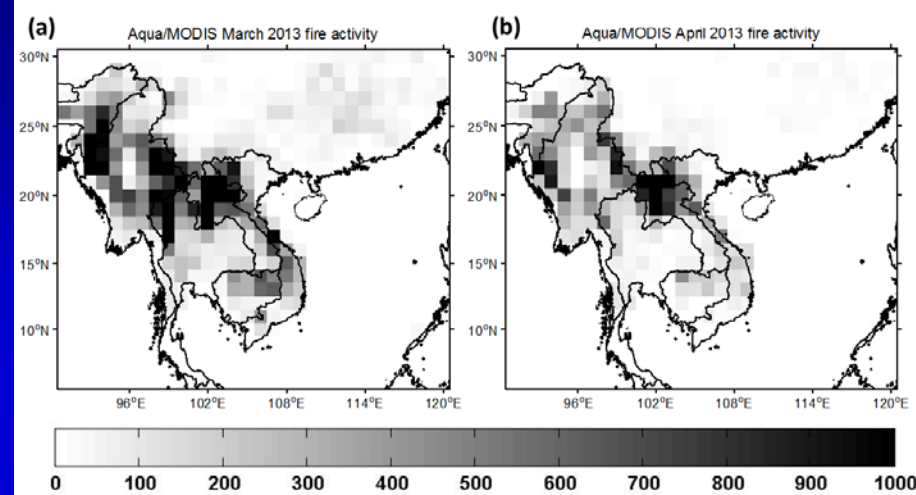
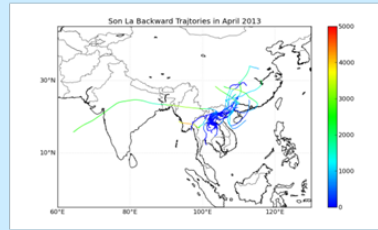
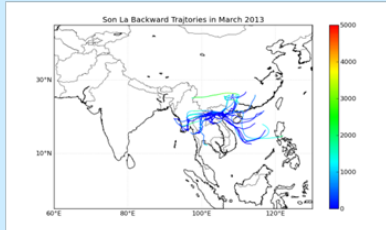
Potential Hg Emission Sources in Vietnam

Backward trajectories

Biomass burning activities

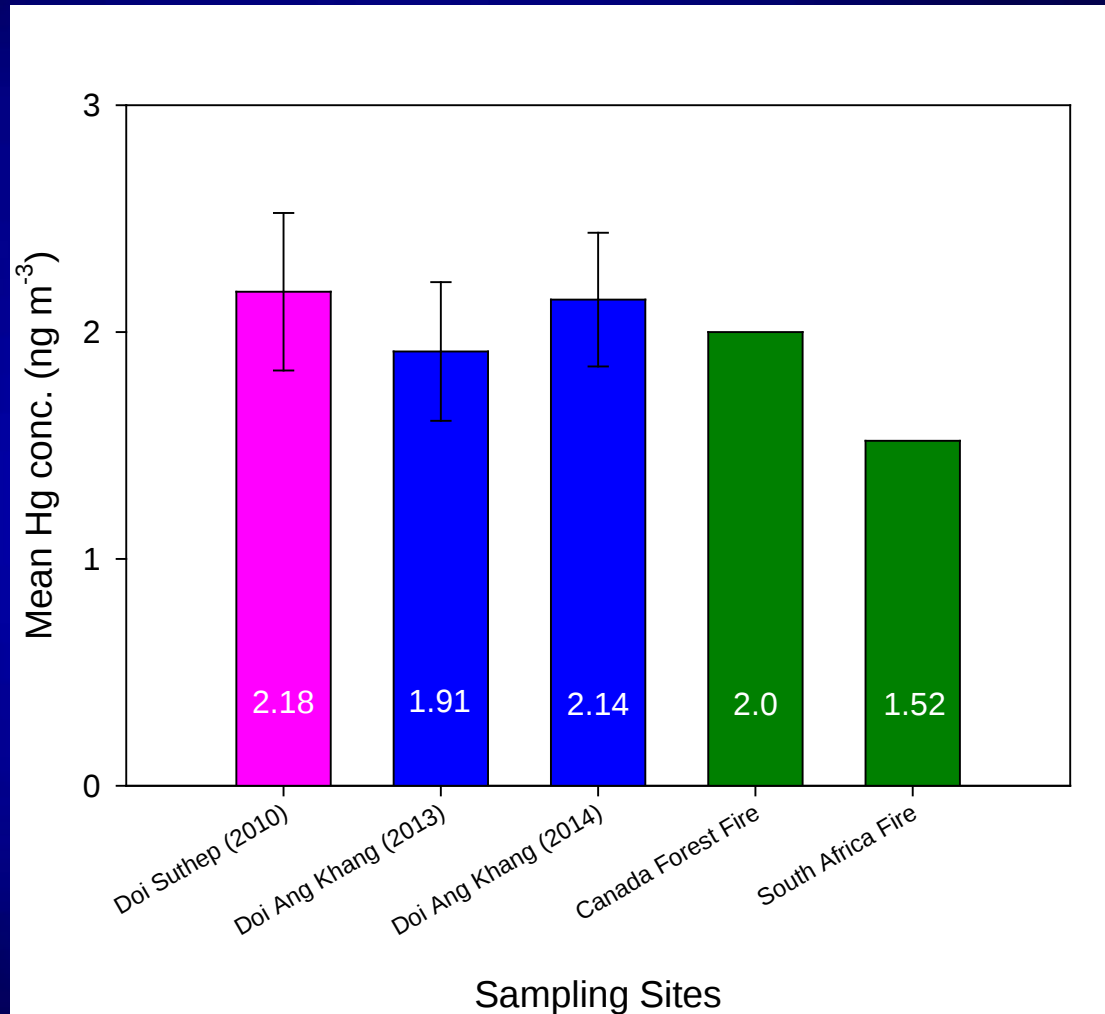
(A) 越南 Son La 3 月氣流後推軌跡

(B) 越南 Son La 4 月氣流後推軌跡



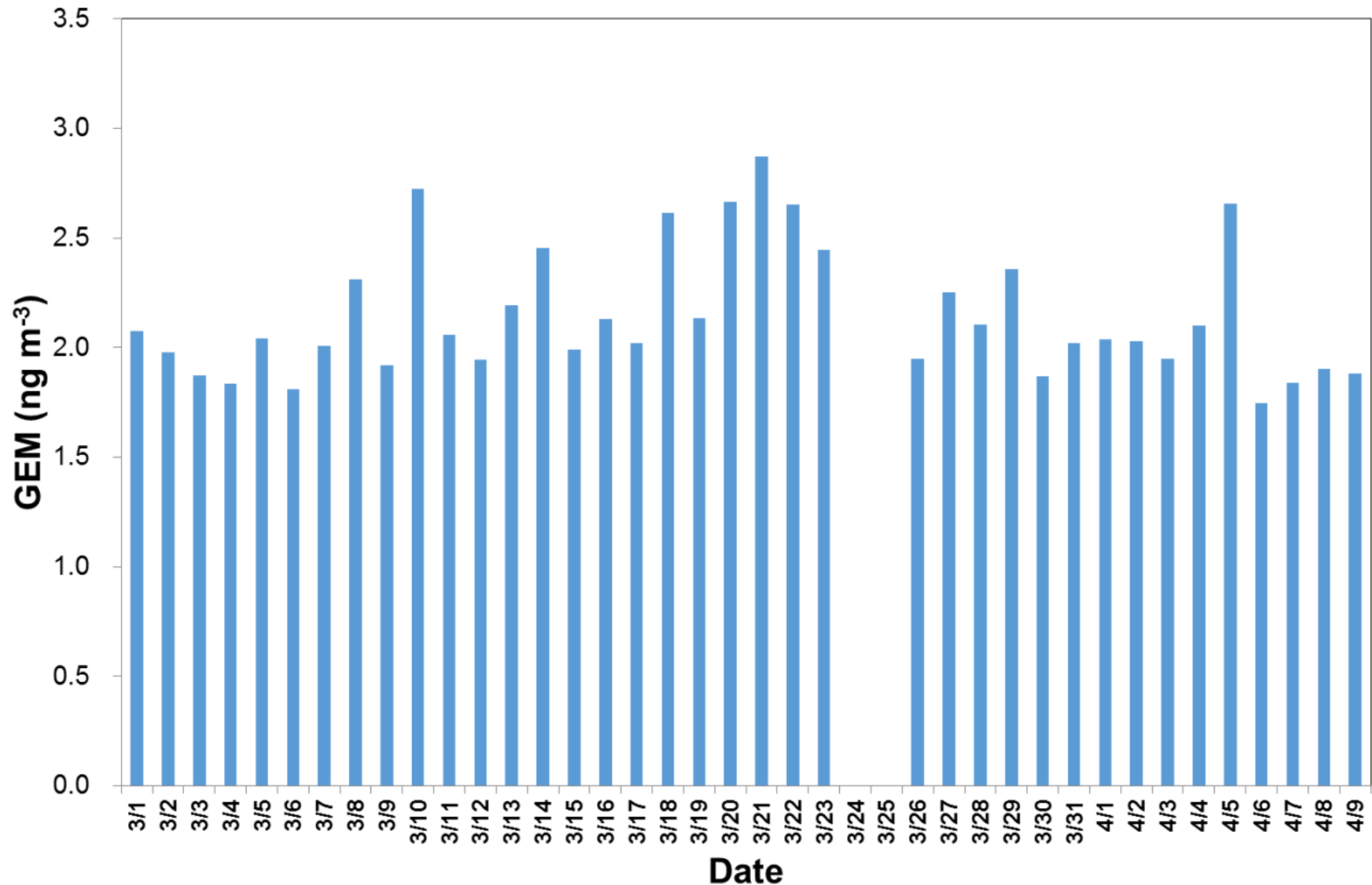
Possible Hg emission sources include biomass burning, cement production, and coal fire power plants.

Atmospheric Hg in Thailand in 2010-2014

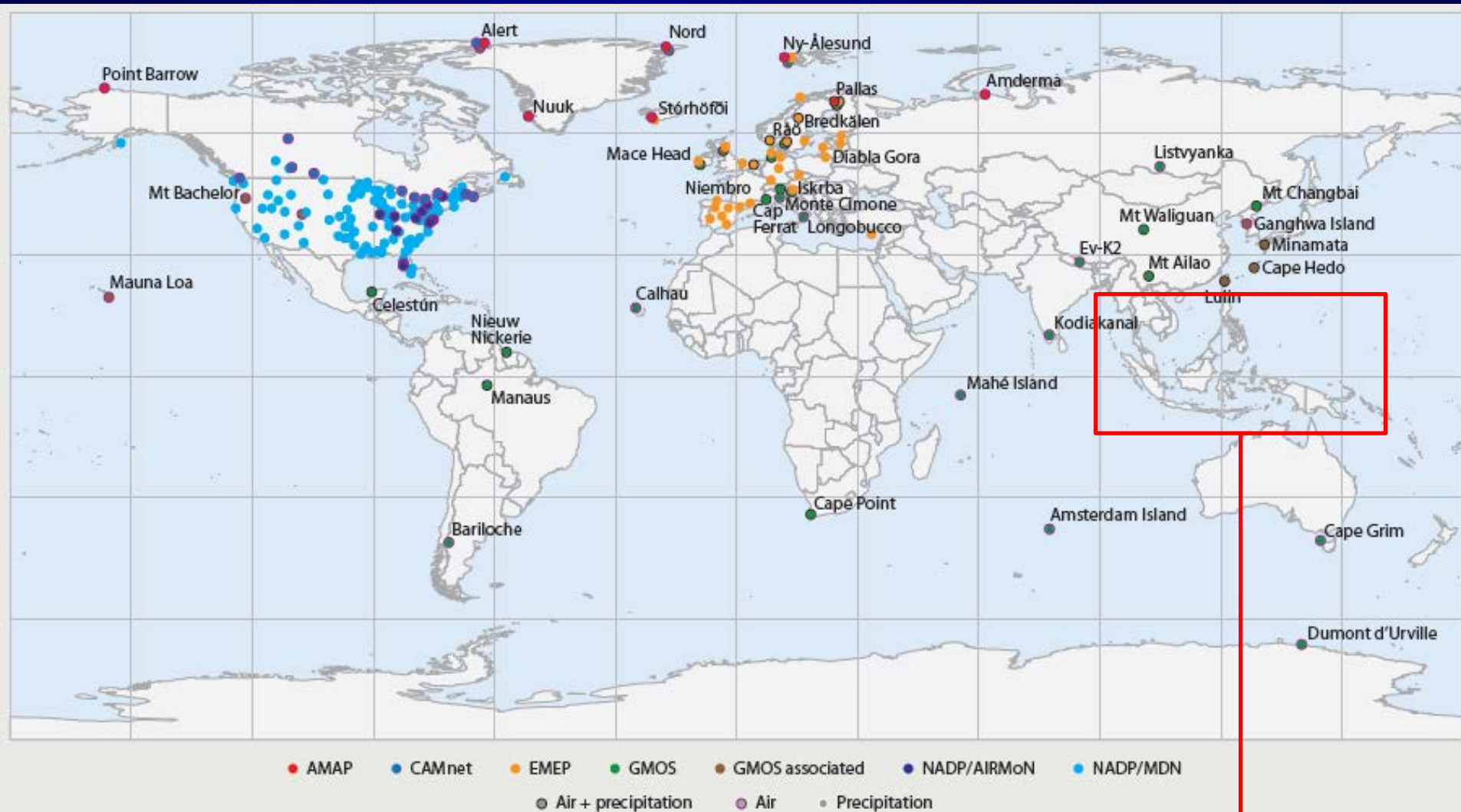


Mean values of atmospheric Hg during biomass burning season in northern Thailand season are comparable to those of other regions.

Atmospheric Hg at Doi Ang Khang in 2014



Atmospheric Hg Monitoring Worldwide



Currently, there is no long-term or background atmospheric Hg monitoring activity in SE Asia.