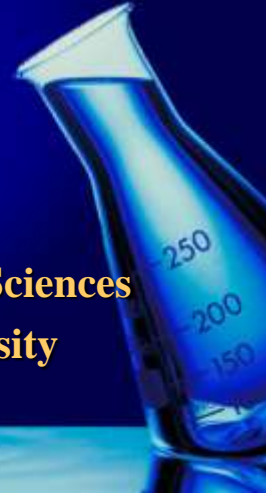


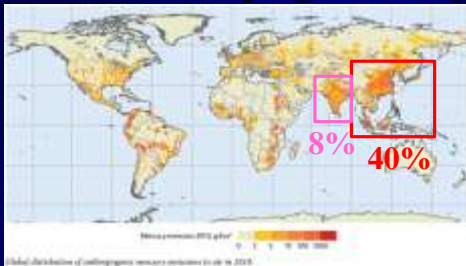
Mercury in East and Southeast Asia

Guey-Rong Sheu

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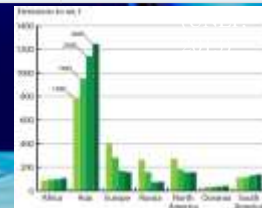
Anthropogenic Hg Emissions in 2010

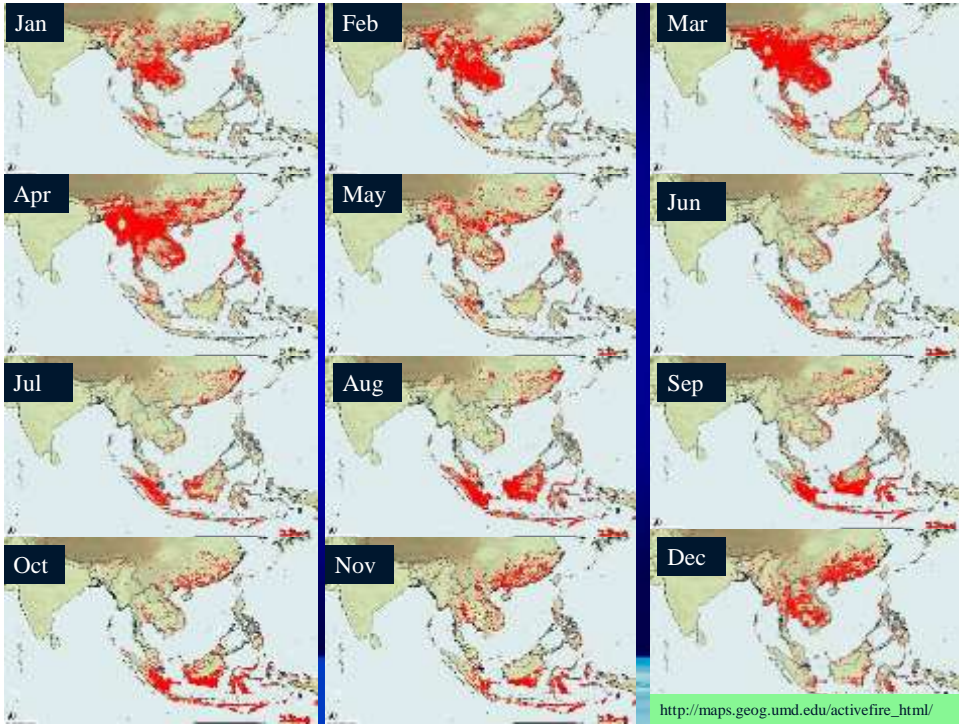


(UNEP, 2013)

| Region* | Emission (range), tonnes** | % |
|---|----------------------------|-------------|
| Australia, New Zealand & Oceania | 22.3 (5.4 - 32.7) | 3.1 |
| Central America and the Caribbean | 45.2 (18.7 - 97.4) | 2.4 |
| CIS & other European countries | 115 (42.6 - 209) | 5.9 |
| East and Southeast Asia | 777 (395 - 1090) | 38.7 |
| European Union (EU27) | 87.5 (46.5 - 236) | 4.5 |
| Middle Eastern States | 37.0 (16.1 - 106) | 1.9 |
| North Africa | 15.6 (4.8 - 41.2) | 0.7 |
| North America | 60.7 (34.5 - 139) | 3.1 |
| South America | 245 (128 - 665) | 12.5 |
| South Asia | 154 (78.2 - 358) | 7.9 |
| Sub-Saharan Africa | 316 (168 - 514) | 16.1 |
| Undefined (global total for emissions from committed sites) | 82.5 (70.0 - 95.0) | 4.2 |
| Grand Total | 2000 (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

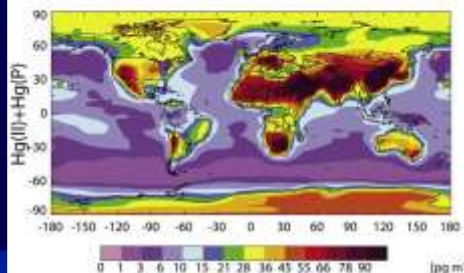
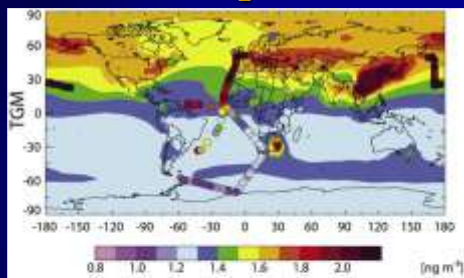


| regions | Hg emissions Mg Hg/year | |
|------------------------|----------------------------|-----------------|
| | mean | SD ^a |
| BONA | 22 | 16 |
| TENA | 6 | 3 |
| CEAM | 22 | 25 |
| NHSA | 13 | 10 |
| SHSA | 95 | 39 |
| EURO | 2 | 1 |
| MIDE | 0 | 0 |
| NHAF | 83 | 13 |
| SHAF | 58 | 7 |
| BOAS | 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 |

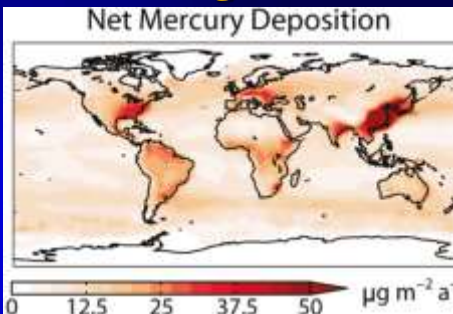
SEAS + EQAS = 249 Mg Hg/year = 37% of global

Friedli et al., 2009

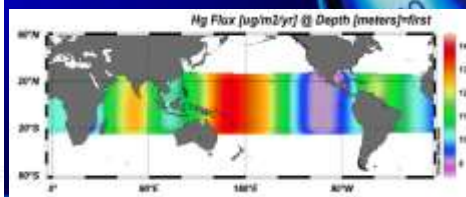
Distribution of Atmospheric Hg Concentrations and Deposition Fluxes: Modeling Results



Selin et al., 2007



Corbitt et al., 2011



Costa et al., 2012

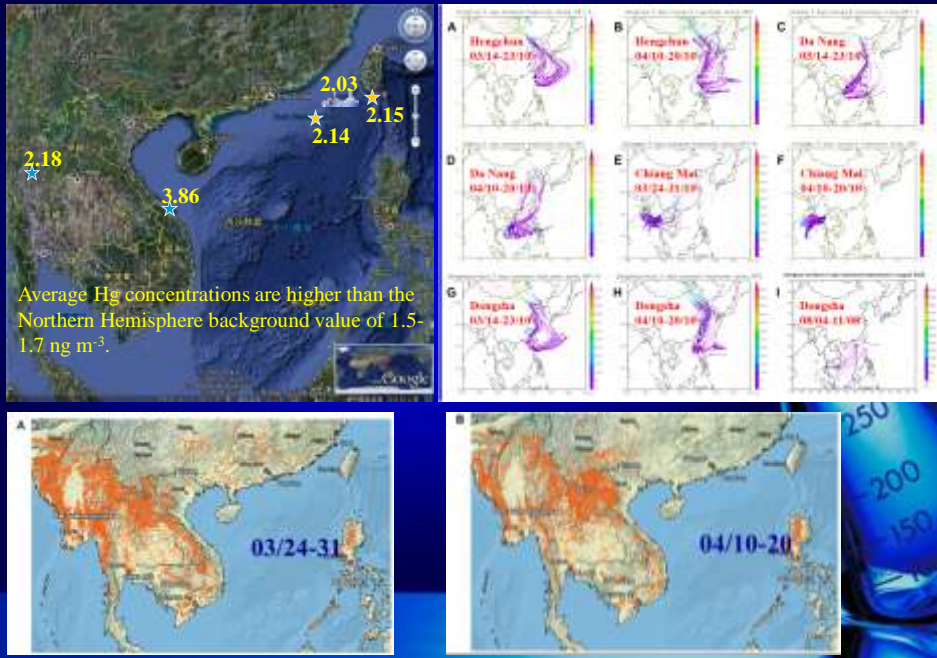
Atmospheric Hg Measurements in SE Asia in Spring



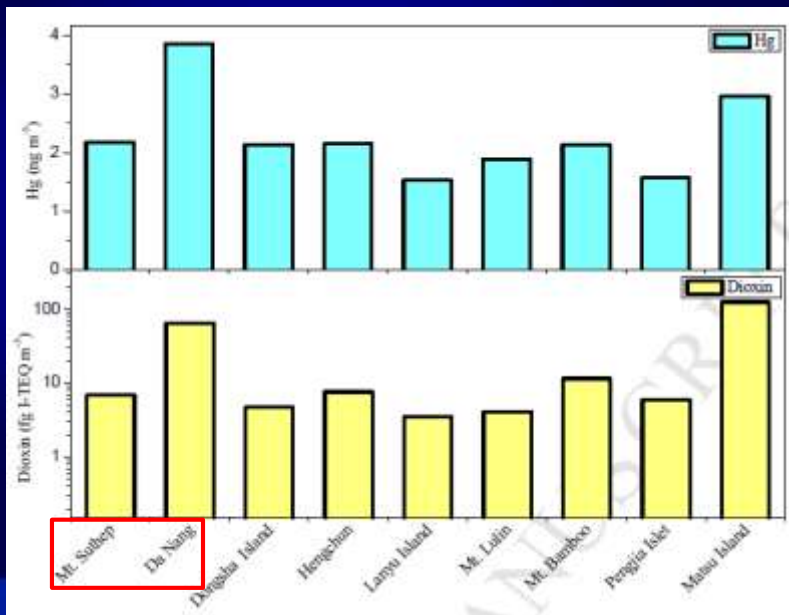
- 2010 Dongsha Experiment (GEM)
- 2011 Son La Experiment (GEM, PHg)
- 2012 Son La Experiment (GEM, PHg)
- 2013 7-SEAS Experiment (GEM, PHg, RGM)
- 2014 7-SEAS Experiment (GEM, PHg, RGM)

| | 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 |

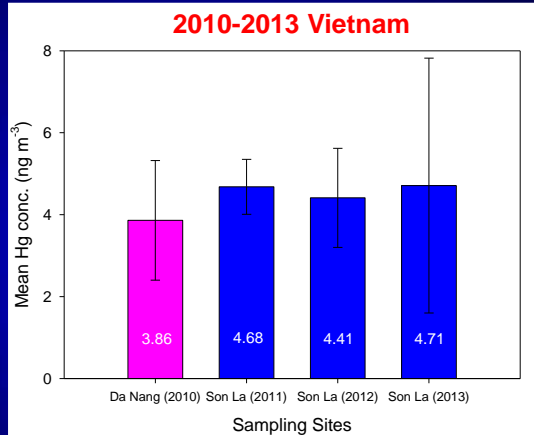
Regional Distribution of Atmospheric Hg in 2010



Atmospheric Hg and Dioxin

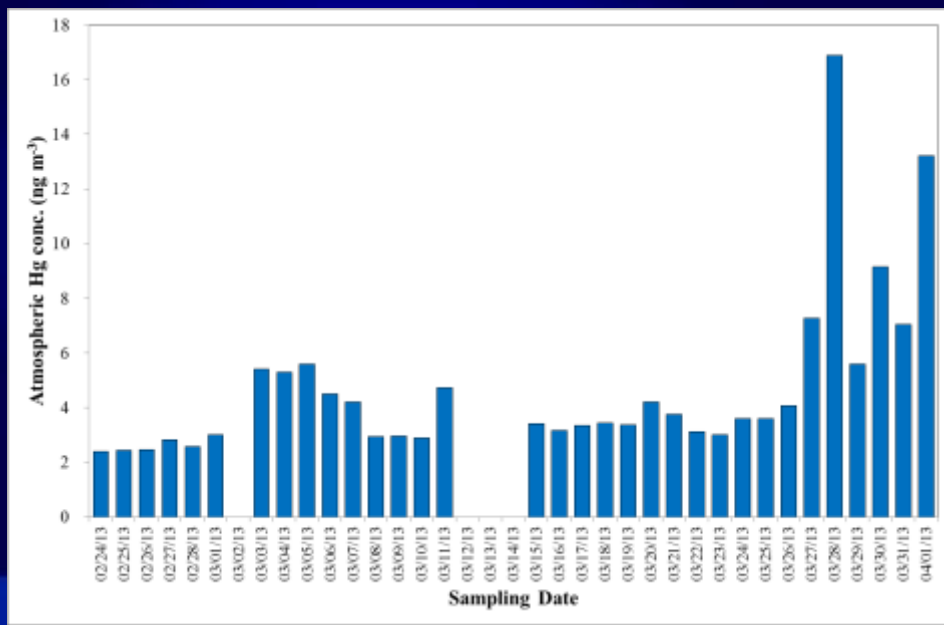


Atmospheric Hg in Vietnam in 2010-2013



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.

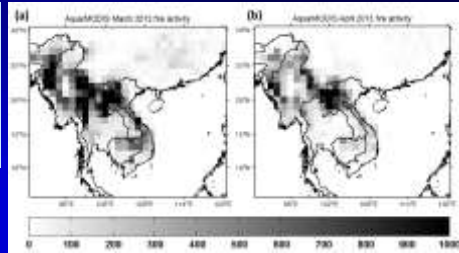
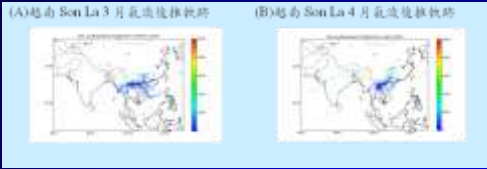
Atmospheric Hg in Son La in 2013



Potential Hg Emission Sources in Vietnam

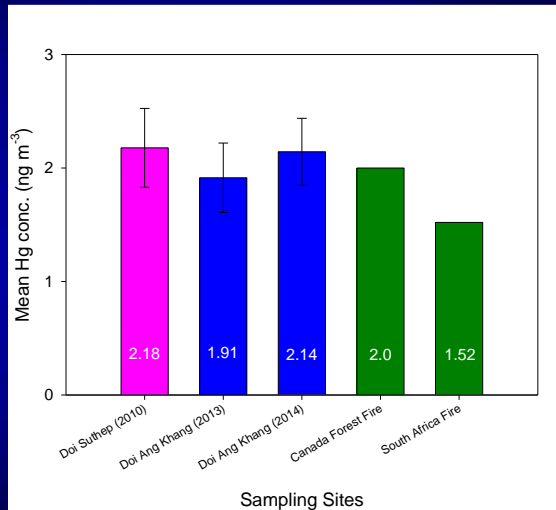
Backward trajectories

Biomass burning activities



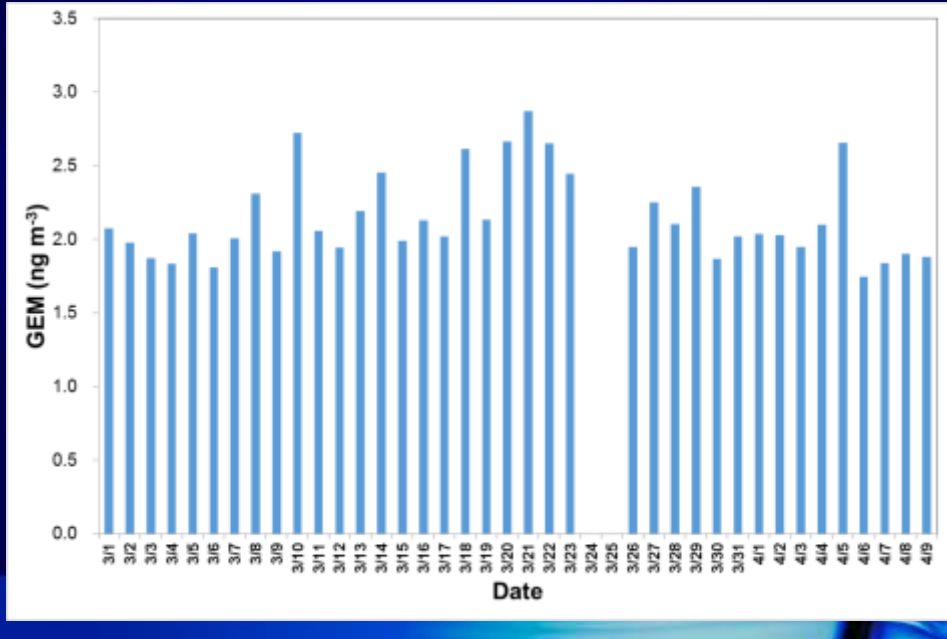
Possible Hg emission sources include biomass burning, cement production, and coal fire power plants.

Atmospheric Hg in Thailand in 2010-2014

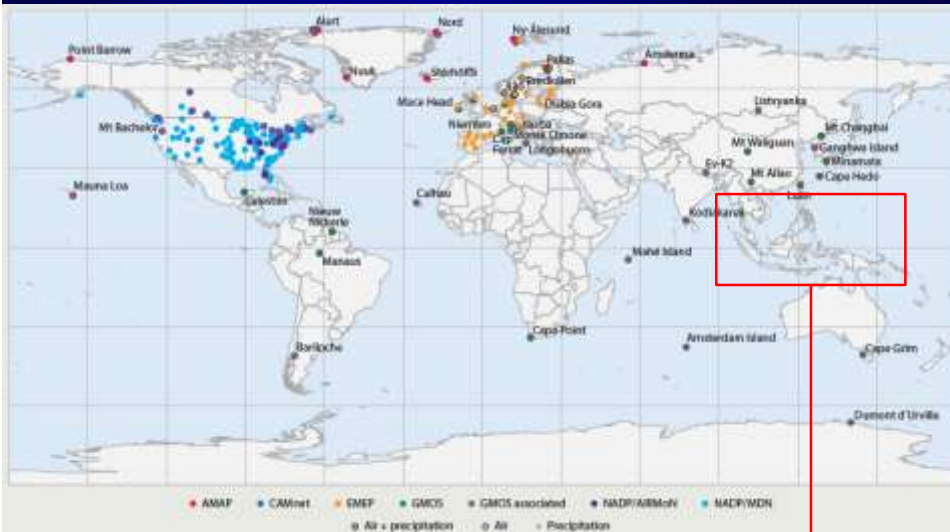


Mean values of atmospheric Hg during biomass burning season in northern Thailand season are comparable to those of other regions.

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.



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