

On EDGARv4 gridded anthropogenic mercury emissions: evaluation and lessons learned for further update

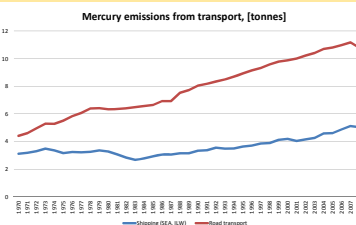
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MERCURY: The global mercury emission inventory EDGARv4.tox2 (ongoing work) includes time series from 1970 to 2010 for gaseous elemental mercury (Hg^0), gaseous oxidised mercury (Hg^{2+}) and particle bound mercury ($Hg-P$). In this new version, the global mercury emissions from key emitting sources are updated until 2010; emissions from shipping and road transport sectors were added and activity data (AD) for artisanal and small-scale gold production (mercury used in this subsector) was revised considering the new information from UNEP (2013) and <http://www.mercurywatch.org/>. Here we present preliminary results for mercury emissions from transport sector and revised activity data for artisanal and small-scale gold production.

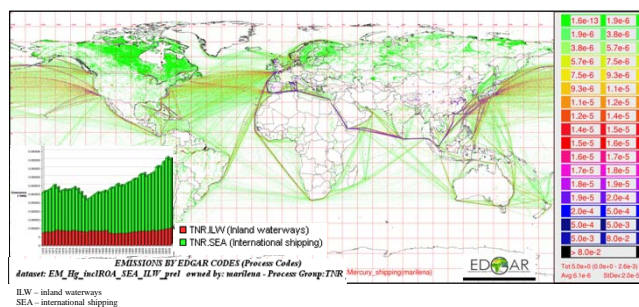
Transport: new sources added to EDGARv4.tox

The share of mercury emission from road transport in global total is small but – it shows increasing trend and could be important in agglomerated areas where mercury emission from this sector may possibly act in chemical mixtures with increased toxic exposure to citizens.

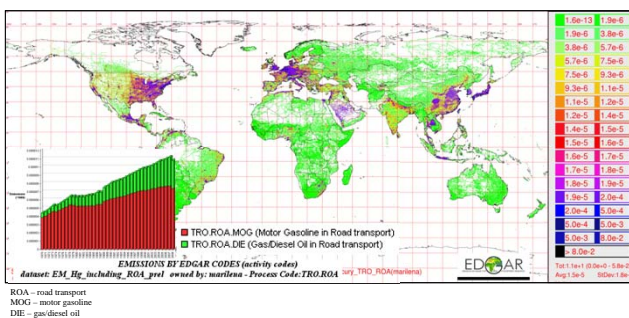
The authors gratefully acknowledge the assistance of **Morten Winther**, Senior Adviser, Department of Environmental Science, Aarhus University - who has given valuable advice regarding the emission factors for transport sector.



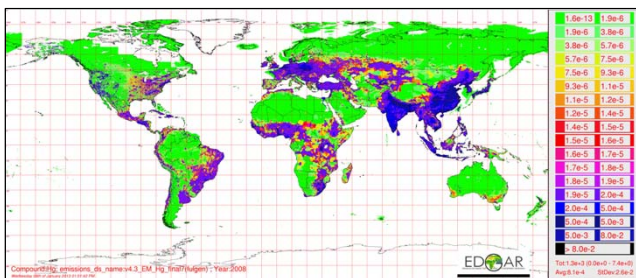
Mercury emissions from international shipping and inland waterways for 2008 [tonne/0.1x0.1 degree grid cell].
Global total: 5 tonnes with a share of 0.4% (0.6% when excl. artisanal small-scale gold production).



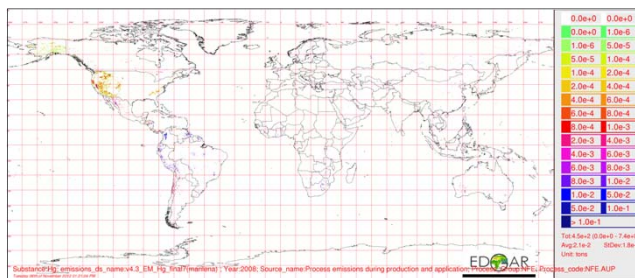
Mercury emissions from road transport for 2008 [tonne/0.1x0.1 degree grid cell].
Global total: 10.8 tonnes with a share of 0.8% (1.2% when excl. artisanal small-scale gold production).



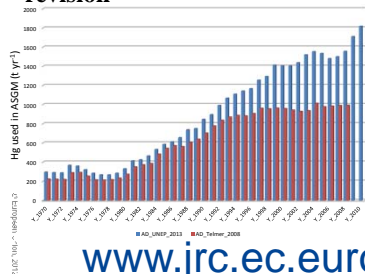
Mercury emissions (excl. emissions from transport: ROA, SEA, ILW) for 2008 [tonne/0.1x0.1 degree grid cell].
Global total: 27% power generation, 40% non-ferrous industry including artisanal and small-scale gold production, 11% cement production.



Mercury emissions from gold production (including artisanal and small-scale gold production) for 2008 [tonne/0.1x0.1 degree grid cell]. Proxy data used for emissions distribution from USGS (2010).



Artisanal and small-scale gold production (ASGM): AD revision



This subsector is a key mercury source with large uncertainty in emission estimations and with limited information on activity data.

EDGAR approach to reproduce activity data time series back in time uses the gold market demand as the driver.

The revised AD(t) using new information from UNEP (2013) and a comparison: EDGARv4.tox1 (Telmer, 2008) vs EDGARv4.tox2 (UNEP, 2013) are illustrated on this graph.

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Lessons learned for further updates:

1. Key sources bound by large uncertainty to be revised and updated back in time based on the latest information in the field e.g. artisanal and small-scale gold production.
2. Given the fact that mercury species have impact at either global or local scales new sources have been added: shipping and road transport.
3. Extended documentation on the global mercury emission inventory EDGARv4.tox1 together with an evaluation of this inventory using GEOS-Chem model, which explores if we can reproduce large scale features and temporal trend of mercury atmospheric observations, are presented in the "Trend analysis from 1970 to 2008 and model evaluation of EDGARv4 global gridded anthropogenic mercury emissions" paper (accepted for publication in Science of the Total Environment Journal).

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