

Subproject: The dynamics of mercury in the Arctic atmosphere

Actual field dates: 15. April – 12. May 2016

Field site: Villum Research Station

Number of man-days in the field: 112

Summary:

A. Measurements of gaseous elemental mercury (GEM) fluxes with a relaxed eddy accumulation (REA) system is performed at the High Arctic site Villum Research Station, Station Nord in Northeastern Greenland. Simultaneously, CO₂ fluxes are determined from a closed path gas analyzer using the eddy covariance (EC) technique. The REA system with a dual-inlets and dual-analyzers gives the opportunity for directly measure fluxes over the snow.

The measurements took place from April 23 to May 12 during polar day during spring, where atmospheric mercury depletions (AMDEs) took place. There was a net emission of 8.9 ng m⁻² min⁻¹, with only few depositional fluxes. This supports the theory that gaseous oxidized form of mercury (GOM) is deposited and GEM being reemitted shortly after AMDEs. Larger fluxes were observed at higher temperature supporting that GEM reemission is temperature dependent. Examination of the results shows a correlation between GEM and CO₂ fluxes that has not been observed before, and further research is needed. This is interpreted as a mutual factor that reduces Hg²⁺ to and in the same traps CO₂.

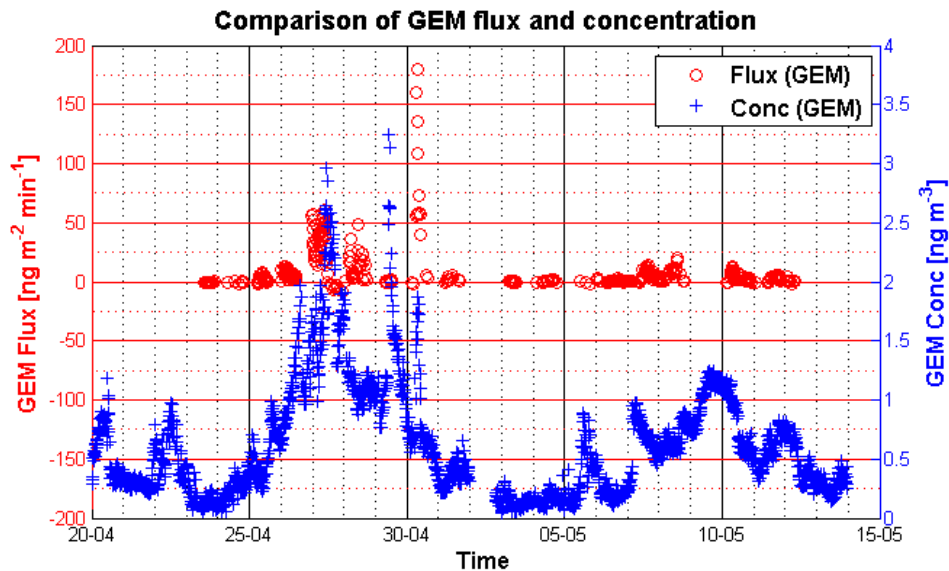
B. As the second part of the project the speciation of atmospheric mercury was measured using a speciation unit from TEKRA (TEKRA 1130/35 with TEKRA 2573 mercury analyser). 2hour average concentrations of gaseous elemental mercury, gaseous oxidized mercury and particulate mercury were measured. Furthermore was a new developed system tested to measure total atmospheric mercury. In the figure is one of the joint results shown.



Photo 1



Photo 2



Photos:

Photo 1: Caption: Princesse Ingeborgs peninsula. Red dot is the location of Villum Research Station

Photo 2: Credit: Henrik Skov
Caption: Indoor setup of mercury speciation system. On the picture is Jesper Baldtzer Liisberg

Photo 3: Credit: Bjarne Jensen
Caption: The outdoor setup of the flux system to measure CO₂ and gaseous oxidized mercury fluxes. On the picture is Jesper Kamp Jensen



Photo 3

Participants:

AU: Students : Jesper Kamp Jensen, Jesper Liisberg,
Project leader Henrik Skov, Technician: Bjarne Jensen

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