Mercury Transport in Cook Inlet, from the Glacier to Knik Arm

Presented by Dr. Birgit Hagedorn

Abstract: Towards understanding biogeochemical cycling of Mercury in glacial environments and potential influence on Gulf of Alaska: A Case study, Matanuska Glacier, Alaska.

Mercury (Hg II) and especially methylmercury (MeHg) is increasing in a number of marine species in the Arctic. In addition to modern atmospheric mercury deposition there is evidence that Glacier have accumulated atmospheric derived gaseous pollutants over time making them to a potential source for mercury. This talk presents first data that towards a better understanding of mercury deposition, biogeochemical cycling export and in a Glacier - Estuary system.

We choose the Matanuska Glacier for a case study to investigate the biogeochemical cycling of mercury in Glaciers. The glacier is located in the Chugach Mountains in south central Alaska about 138 km north of Anchorage. It is a large valley glacier that flows north from the Ted Stevens Ice Field and is approximately 45 km long and ranges in width from approximately 3 km near the equilibrium line to about 5 km at the terminus. The glacier features over-deepening creating super-cooled subglacial water which outbursts in vents and crevasses on glacier surface along the terminus. This water resembles meltwater that is routed through subglacial cavities and distributed and channelized systems and can be easily sampled from the glacier surface in spring and throughout the summer.

Samples of snow, surface meltwater and subglacial water and suspended sediment were analyzed for total mercury concentration and monomethylmercury (MeHg) in combination with water quality and microbial DNA analysis. We also collected samples along Matanuska River and Cook Inlet to identify potential sources and sinks of total mercury and methylmercury in this connected system. A first order mercury cycling model is developed based on mass balance and microbial data.

Biography: Birgit Hagedorn is a geochemist and is currently employed as a term assistant professor in the Chemistry Department and leading an interdisciplinary analytical research laboratory at UAA. She has 25+ years of research experience in the Arctic and Antarctic studying permafrost stability, pattern ground formation, and biogeochemical cycling underneath glacier and ice sheets.