

## Research Project

### Mercury fluxes and reductive processes in the Alps

#### Third-party funded project

**Project title** Mercury fluxes and reductive processes in the Alps

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**Organisation / Research unit**

Departement Umweltwissenschaften / Umweltgeowissenschaften (Alewell)

**Department**

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Mercury emitted to the atmosphere is a topical issue as it poses a threat to human health and the environment. Recent studies have demonstrated that elemental mercury (Hg<sup>0</sup>) can be emitted in significant amounts not only from anthropogenic sources but also from vegetated terrestrial ecosystems, suggesting that natural sources of mercury are highly underestimated. Other than that, soils are considered effective sinks for atmospheric mercury mainly due to deposition of oxidised mercury species.

Studies with terrestrial soils have indicated that geogenic or deposited mercury can be (re-)emitted to the atmosphere mainly in its elemental form. However, due to the lack of direct measurements the importance of mercury emissions from vegetated soil surfaces is still controversial.

Our gradient measurements of the last five months at Zugerberg indicate slight nocturnal deposition of Hg<sup>0</sup>. The same was observed during another campaign at the Seebodenalp. However, our incubation studies with bare soil from Zugerberg revealed contrasting results. When amended with glucose or dried and rewetted, the incubated soil samples responded with veritable Hg<sup>0</sup> emission boosts. Although this reaction could be largely ascribed to microbiological activity, the role of plants growing on the soil surface is still unclear. We therefore need to investigate how and to which extent Hg<sup>0</sup> exchange between soils and the atmosphere is governed by vegetation. We intend to tackle this question with a combined approach of controlled laboratory experiments with vegetated soil samples and Hg<sup>0</sup> gradient measurements at Zugerberg, Oensingen (SO) and the Stubai Valley in Austria. These studies will enable us to describe and quantify the long-term dynamic of Hg<sup>0</sup> exchange in uncontaminated terrestrial ecosystems.

**Keywords** ecosystem fluxes, elemental mercury emissions, reductive processes, soil chemistry, mercury, alpine grasslands, mercury pollution, stable isotopes, plant emission, emission, Swiss Alps

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Swiss National Science Foundation (SNSF)

**Add publication**

**Published results**

42143, Fritsche, J.; Obrist, D.; Zeeman, M. J.; Conen, F.; Eugster, W.; Alewell, C., Elemental mercury fluxes over a sub-alpine grassland determined with two micrometeorological methods, 1352-2310, AT-

MOSPHERIC ENVIRONMENT, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

52634, Obrist, D; Gustin, MS; Arnone, JA; Johnson, DW; Schorran, DE; Verburg, PSJ, Measurements of gaseous elemental mercury fluxes over intact tallgrass prairie monoliths during one full year, 1352-2310, ATMOSPHERIC ENVIRONMENT, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

86876, Fritsche, J; Wohlfahrt, G; Ammann, C; Zeeman, M; Hammerle, A; Obrist, D; Alewell, C, Summertime elemental mercury exchange of temperate grasslands on an ecosystem-scale, 1680-7316, Atmospheric Chemistry and Physics, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

86877, Fritsche, J.; Obrist, D.; Zeeman, M. J.; Conen, F.; Eugster, W.; Alewell, C., Elemental mercury fluxes over a sub-alpine grassland determined with two micrometeorological methods, 1352-2310, Atmospheric environment, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

95903, Fritsche, Johannes; Obrist, Daniel; Zeeman, Matthias; Conen, Franz; Eugster, Werner; Alewell, Christine, Elemental mercury fluxes over a sub-alpine grassland determined with two micrometeorological methods, 1352-2310, Atmospheric environment, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

95904, Fritsche, Johannes; Wohlfahrt, Georg; Ammann, Christof; Zeeman, Matthias; Hammerle, A; Obrist, Daniel; Alewell, Christine, Summertime elemental mercury exchange of temperate grasslands on an ecosystem scale, 1680-7316, Atmospheric chemistry and physics, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

95919, Johannes Fritsche, Air–Surface exchange of elemental mercury in uncontaminated grasslands, Publication: Thesis (Dissertationen, Habilitationen)

### Add documents

### Specify cooperation partners

ID	Kreditinhaber	Kooperationspartner	Institution	Laufzeit - von	Laufzeit - bis
411056	Fritsche, Johannes	Kevin Bishop	Sveriges Lantbruksuniversitet	01.01.2010	31.12.2012
411057	Fritsche, Johannes	Mats Nilsson	Sveriges Lantbruksuniversitet	01.01.2010	31.12.2012