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Materials Science & Technology

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Empa is a Swiss Science and Technology Institution of the ETH-Domain. The Laboratory for Air Pollution / Environmental Technology has an opening for a

PhD Candidate on Real-time atmospheric measurements of N₂O isotopomers to identify sources and hot spots in northern Switzerland

Nitrous oxide (N₂O) is a strong greenhouse gas and the most important anthropogenic ozone depleting substance emitted this century. Its global budget is rather uncertain due to a very limited understanding of the dominant N₂O sources. These sources can be better understood based on the study of their isotopic signature. Recent instrumental progress in our laboratory enables for the first time direct and continuous analysis of the different atmospheric N₂O isotopomers (¹⁴N¹⁴N¹⁶O, ¹⁵N¹⁴N¹⁶O, ¹⁴N¹⁴N¹⁸O, ¹⁴N¹⁵N¹⁶O) using quantum cascade laser spectroscopy. This technique can be used to identify relevant microbial and industrial source processes, and to develop efficient mitigation strategies.

The PhD project is embedded in multi-disciplinary research, in co-operation with the KIT in Garmisch-Partenkirchen (Dr. Ralf Kiese, Prof. Dr. Klaus Butterbach Bahl), which aims at the identification of N₂O source regions and processes in northern Switzerland. The PhD candidate at Empa will focus on real-time analysis of N₂O isotopomers by laser spectroscopy. In an initial laboratory phase, the student will improve the performance of our analytical technique with respect to sensitivity and precision at ambient mixing ratios. In an extended field campaign, N₂O isotope measurements at the Beromünster tall tower will be made for the first time. The on-site applicability of the instrument to distinguish N₂O production processes will be demonstrated at different spatial scales. The results will be combined with atmospheric modelling to determine the temporal and spatial variability of N₂O source strengths and isotopic signatures in northern Switzerland. In a complementary bottom-up approach, N₂O isotope measurements will be used to validate biogeochemical soil models developed in a coordinated PhD project at KIT.

We are looking for a highly motivated PhD candidate with a Master's degree in chemistry, environmental sciences or a related discipline, and a strong interest in isotope analysis, instrumental development and data analysis. We expect excellent English language skills, knowledge of German would be advantageous.

For further information contact Dr. Joachim Mohn, phone +41 58 765 4687, e-mail: joachim.mohn@empa.ch

Applications should be accompanied by a CV, a letter of motivation and addresses of two referees.

All applications must be submitted online at www.empa.ch/job