

Name of research institute or organization:

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**Departement Umweltwissenschaften, Universität Basel**

Title of project:

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Biological ice nucleators at tropospheric cloud height

Project leader and team:

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Dr. Franz Conen, project leader  
Mr. Emiliano Stopelli  
Mr. Lukas Zimmermann  
Ms. Corinne Baudinot

Project description:

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The vast majority of precipitation over continents comes from clouds that contain ice (Mülmenstädt et al., Geophys. Res. Lett, DOI: 10.1002/2015GL064604, 2015). Over land the ice phase seems important for the formation of hydrometeors. At temperatures between 0 and about -15 °C a majority of ice formation is probably catalysed by biological particles in the atmosphere, or by particles that carry at least some organic material on their surface, such a soil dust associated with organic matter. Through this project we aim to contribute to a better understanding of the role of biological ice nucleators in the terrestrial water cycle.

In previous years we have been collecting and analysing precipitation samples on Jungfraujoch. Also we analysed ice nucleators that had been collected on PM<sub>10</sub> filters by NABEL (Empa and BAFU). In 2015, we have concentrated on analysing and publishing some of these data. Our publication of results on the microphysical processing of ice nucleators (Stopelli et al., 2015) have led to constructive discussions with colleagues around the world, providing us with ideas for future investigations of this issue. Although in 2015 this project has been relatively quiet in terms of experimental work on Jungfraujoch, we are planning and keen to do more work at the station in 2016 and, if successful with a grant application, even more in 2017 and 2018.

Since our capability to quantify the influence of recent land contact on air masses around Jungfraujoch has been re-established through the re-location of our radon-222 detector (see our other contribution to this report), we now have a further tool at hand to investigate the influence of recent land contact on the density and composition of populations of ice nucleating particles at tropospheric cloud height.

Key words:

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Ice nucleation, biological, snow, PM<sub>10</sub>

Internet data bases:

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<https://umweltgeo.unibas.ch/forschung/aktuelle-projekte/biological-nucleators/>

The data published in Conen et al. (2015) will be available through the database:  
<http://www.bacchus.ethz.ch/in/>

Collaborating partners/networks:

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Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, Villigen, Switzerland  
Laboratory for Air Pollution/Environmental Technology, Swiss Laboratories for Material Science and Technology (Empa), Dübendorf, Switzerland  
Institut national de la recherche agronomique (INRA), Pathologie végétale, Montfavet, France

Scientific publications and public outreach 2015:

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**Refereed journal articles and their internet access**

Conen, F., S. Rodriguez, C. Hüglin, S. Henne, E. Herrmann, N. Bukowiecki, and C. Alewell, Atmospheric ice nuclei at the high-altitude observatory Jungfraujoch, Switzerland, *Tellus B*, **67**, 25014, doi: 10.3402/tellusb.v67.25014, 2015.

<http://dx.doi.org/10.3402/tellusb.v67.25014>

Stopelli, E., F. Conen, C.E. Morris, E. Herrmann, N. Bukowiecki, and C. Alewell, Ice nucleation active particles are efficiently removed by precipitating clouds, *Scientific Reports*, **5**, 16433, doi: 10.1038/srep16433, 2015.

<http://www.nature.com/articles/srep16433>

**Theses**

Baudinot, C., Die Charakterisierung von biologischen Eiskeimen auf der Hochalpinen Forschungsstation Jungfraujoch, MSc Thesis, University of Basel, 2015.

Address:

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Departement Umweltwissenschaften  
Universität Basel  
Bernoullistrasse 30  
CH-4056 Basel

Contacts:

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Dr. Franz Conen

Tel.: +41 61 267 0481

Fax: +41 61 267 0479

e-mail: [franz.conen@unibas.ch](mailto:franz.conen@unibas.ch)

URL: <http://umweltgeo.unibas.ch/team/personen-ugw/profil/person/conen/>