

Name of research institute or organization:

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**Institute for Atmospheric and Climate Science, ETH Zurich**

Title of project:

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Field measurements of atmospheric ice nuclei and properties of mixed phase clouds

Project leader and team:

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Dr. Olaf Stetzer, Dr. Berko Sierau, and Prof. Ulrike Lohmann, project leaders  
Cédric Chou, Jan Henneberger

Project description:

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The cloud physics group at ETH Zurich has developed various instruments to measure ice nucleation and the properties of ice nuclei, ambient aerosols, and ice crystals. The holographic microscope for cloud droplets and ice crystals HOLIMO has already been deployed at Jungfraujoch during the CLACE campaign in summer 2010 as a proof of the concept experiment. HOLIMO, at the time of CLACE 2010, was designed for laboratory measurements. With the experience of the CLACE 2010 campaign and further lab tests and fluid dynamics calculations a completely new instrument has been developed in 2011 with the purpose to perform reliable and meaningful cloud microphysical measurements at Jungfraujoch. The new instrument is very robust to cope with the harsh environmental conditions at Jungfraujoch and consists of the following three components:

- The main supply box with pumps, heating, electronics and the illuminating laser (fiber coupled) and a sampling and control computer.
- The inlet with the optical components, which is mounted on a 2-axis antenna rotor to always point the inlet into the wind in order to avoid particle losses due to curved flow trajectories. All relevant (mostly optical) parts are equipped with thermocouples and electrical heating to avoid condensation and frost formation.
- A 3D sonic anemometer to sample wind direction and turbulence patterns. The current measured wind direction is used to rotate the inlet into the wind.

It was planned to deploy the new instrument at Jungfraujoch for the first time in December 2011, but due to delays in the manufacturing of some components the start of this campaign had to be postponed until the beginning of January 2012.

The measurements of ice nuclei with PINC from past years resulted in a successful PhD thesis (Cédric Chou) and a research paper in ACP (cf. publications) in 2011.

Key words:

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ice nuclei, heterogeneous nucleation, aerosol particles, clouds, ice crystals, mixed phase clouds

Collaborating partners/networks:

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Ernest Weingartner, Martin Gysel, Nicolas Bukowiecki, PSI

Scientific publications and public outreach 2011:

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**Refereed journal articles and their internet access**

Chou, C., Stetzer, O., Weingartner, E., Jurányi, Z., Kanji, Z., and Lohmann, U., Ice nuclei properties within a Saharan dust event at the Jungfraujoch in the Swiss Alps, *Atmospheric Chemistry and Physics*, DOI 10.5194/acp-11-4725-2011 , **11**(10), 4725-4738, 2011.

<http://www.atmos-chem-phys.net/11/4725/2011/acp-11-4725-2011.html>

**Theses**

Chou, C., Investigation of Ice Nucleation Properties onto Soot, Bioaerosol and Mineral Dust during Different Measurement Campaigns, PhD Thesis, ETH Zürich, 2011.

Address:

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Institute for Atmospheric and Climate Science  
ETH Zurich  
Universitätsstrasse 16, CHN O16.3  
CH-8092 Zürich

Contacts:

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Olaf Stetzer  
Tel.: +41 44 633 6161  
Fax: +41 44 633 1058  
e-mail: [olaf.stetzer@env.ethz.ch](mailto:olaf.stetzer@env.ethz.ch)  
URL: <http://www.iac.ethz.ch/>