

## Anmeldung eines Themas für ein/e

**Forschungsseminar**   
**Methodenseminar**   
**Masterarbeit**  (bitte eines oder mehrere ankreuzen)

Thema Datum	Characterization of bioaerosols with a holographic fluorescence spectrometer at a rural background station.
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ggf. weitere Kontaktperson	Dr. Markus Hartmann, „Hauptkontakt“ für dieses Projekt Leibniz Institute für Troposphärenforschung (TROPOS) Permoserstr. 15, 04318 Leipzig markus.hartmann@tropos.de, Tel.: 0341 2717 7354
Zweitgutachter/In	Dr. Markus Hartmann
Kurzbeschreibung:	<p>Primary biological aerosol particles (PBAP), such as bacteria, fungal spores, and pollen, play a vital role in the Earth's atmosphere. These particles have a profound effect on human health, particularly for individuals who experience hay fever and asthma. Additionally, they have the potential to impact weather patterns by serving as ice nucleating particle (INP) or cloud condensation nuclei (CCN). Furthermore, these particles can significantly impact agriculture by causing the destruction of crops through fungal diseases.</p> <p>With the Poleno Jupiter (Swisens AG), TROPOS has obtained a new state-of-the-art instrument for the measurement of PBAP. The Poleno Jupiter combines light-induced fluorescence measurements with a machine-learning based holographic system that allows real-time measurement of PBAP, including identification of specific pollen types. The Poleno Jupiter is installed at the Tropos-owned rural background station in Melpitz, where several other instruments continuously record aerosol properties.</p> <p>As the Poleno Jupiter is a new instrument, there are several tasks, from the analysis of the measurements made so far to laboratory measurements that characterize the instrument and ensure its quality, and the focus of the work can be shifted according to the interests and talents of the candidate.</p> <p>The tasks at hand include:</p> <ul style="list-style-type: none"> <li>• Comparison of Poleno Jupiter measurements with filter-derived INP measurements and other available meteorological and aerosol property measurements, including assessment of air mass history.</li> <li>• Characterization of local pollen types with the Poleno Jupiter in the laboratory and training of its machine learning algorithm.</li> </ul>

	<ul style="list-style-type: none"> <li>Evaluation of similarities and differences in pollen identification between the Poleno Jupiter and an offline pollen identification method (Hirst pollen trap).</li> </ul>
Literatur:	<p>Augustin, S., H. Wex, D. Niedermeier, B. Pummer, H. Grothe, S. Hartmann, L. Tomsche, T. Clauss, J. Voigtlaender, K. Ignatius, and F. Stratmann. 2013. 'Immersion freezing of birch pollen washing water', <i>Atmospheric Chemistry and Physics</i>, doi:10.5194/acp-13-10989-2013.</p> <p>Erb, S., Berne, A., Burgdorfer, N. <i>et al.</i> Automatic real-time monitoring of fungal spores: the case of <i>Alternaria</i> spp.. <i>Aerobiologia</i> (2023).  <a href="https://doi.org/10.1007/s10453-023-09780-z">https://doi.org/10.1007/s10453-023-09780-z</a></p> <p>Huffman, J. A., Perring, A. E., Savage, N. J., Clot, B., Crouzy, B., Tummon, F., ... &amp; Pan, Y. (2020). Real-time sensing of bioaerosols: Review and current perspectives. <i>Aerosol Science and Technology</i>, 54(5), 465-495. <a href="https://doi.org/10.1080/02786826.2019.1664724">10.1080/02786826.2019.1664724</a></p> <p>Pratt, K., DeMott, P., French, J. <i>et al.</i> <i>In situ</i> detection of biological particles in cloud ice-crystals. <i>Nature Geosci</i> 2, 398–401 (2009).  <a href="https://doi.org/10.1038/ngeo521">https://doi.org/10.1038/ngeo521</a></p> <p>Seifried, T. M., P. Bieber, A. T. Kunert, D. G. Schmale, K. Whitmore, J. Frohlich-Nowoisky, and H. Grothe (2021), Ice Nucleation Activity of Alpine Bioaerosol Emitted in Vicinity of a Birch Forest, <i>Atmosphere</i>, 12(6), 20, doi: 10.3390/atmos12060779.</p>