Announcement of a topic for:

Seminar Research ☐
Seminar Methods ☐
Master Theses **x** (please mark one or more)

Thema Datum	A Novel Analytical Framework for Advancing Brown Carbon Aerosol Characterization 10.10.2025
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Kurz-beschreibung:	Light-absorbing aerosols such as black carbon (BC) and brown carbon (BrC) are critical components of atmospheric particulate matter due to their capacity to alter the Earth's radiative balance. While BC is well-characterized as a potent absorber across the near-ultraviolet, visible, and near-infrared wavelengths, BrC optical properties remain poorly characterized. BrC is a complex and chemically diverse subset of organic aerosols, primarily absorbing in the UV and short visible wavelengths. Despite growing recognition of its climatic significance, BrC is still poorly represented in field observations and Earth system models, largely due to challenges in its measurement, classification and large regional variabilities. The key objectives of this study are: (1) Reassess the wavelength-dependent BrC absorption and constrain its uncertainties by using a combination of novel and traditional online and offline techniques, including a newly developed dual-wavelength (405 nm and 658 nm) OC-EC analyzer, a UV-Vis spectrophotometer, and multi-wavelength filter-based absorption photometers. (2) Evaluate the thermogram-based BrC identification: analyze OC-EC thermograms to trace the evolution of BrC absorption across different thermal steps.
Literatur:	1. Massabò et al., Two-wavelength thermal–optical determination of light-absorbing carbon in atmospheric aerosols, Atmos. Meas. Tech., 12, 3173–3182, 2019. doi.org/10.5194/amt-12-3173-2019. 2. Sun et al., Single-particle volatility and implications for brown carbon absorption in Beijing, China. Science of the Total Environment, 854, 2023. dx.doi.org/10.1016/j.scitotenv.2022.158874. 3. Arun et al. Enhanced light absorption by ambient brown carbon aerosols in the eastern Himalayas. Environ. Sci.: Atmos. 2024.