

MSc thesis topic

In this MSc thesis FT spectrometry will be used to measure emitted radiation from the atmosphere in the thermal infrared. The measurements will be evaluated for:

1. Cloud parameters of thin clouds

Clouds play a major role in climate and weather. Thin clouds, e.g. cirrus clouds created by airplanes, are difficult to measure, but have a strong influence on climate and weather. Important parameters of the clouds, like the liquid and frozen water contained in the cloud will be determined from IR Spectra in the thermal infrared [Rathke2000].

2. Aerosols

Aerosols are a part of particular matter, which is known to have adverse health effects. Infrared spectra can be used to determine the type and amount of aerosols in elevated altitudes [Rathke 2002].

3. Dust

Especially in summer dust from the north African deserts are occasionally blown to northern Europe. The amount and type of dust can be determined from infrared spectra [Turner, 2008].

What you will do and learn in this thesis:

- A FT spectrometer will be setup in Bremen and calibrated to measure thermal emission calibration. The calibration will be performed using black-body radiators, which are built and characterized in this MSc thesis.
- The spectra will be evaluated using the retrieval code SFIT4
- The results will be put in a greater context.

What you need:

- An interest to work with electronics and small computers (Arduino, Raspberry Pi)
- An interest in experimental work

References

Rathke, C.; Armbruster, W.; Fischer, J.; Becker, E. & Notholt, J. Comparison of stratus cloud properties derived from coincident airborne visible and ground-based infrared spectrometer measurements, *Geophys Res Lett*, 2000, 27, 2641-2644

Rathke, C.; Notholt, J.; Fischer, J. & Herber, A. Properties of coastal Antarctic aerosol from combined FTIR spectrometer and sun photometer measurements, *Geophys Res Lett*, 2002

Turner, D. D. Ground-based infrared retrievals of optical depth, effective radius, and composition of airborne mineral dust above the Sahel, *Journal of Geophysical Research*, 2008, 113

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