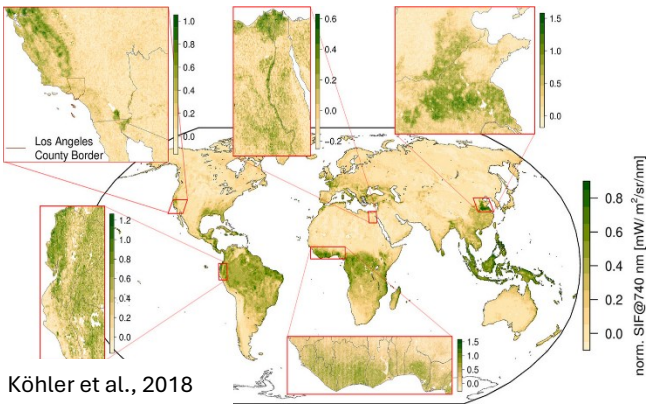
INSTITUT FÜR UMWELTPHYSIK

UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386

Master's Thesis

Quantifying plant fluorescence from small satellites



Köhler et al., 2018

Solar-induced chlorophyll fluorescence (SIF) is linked to plant physiology and reflects both photosynthetic activity and plant stress. Thus, remote sensing measurements of SIF provide a tool to better constrain the global terrestrial carbon fluxes and study and monitor ecosystem behavior. Current spaceborne spectrometers have provided SIF measurements with unprecedented spatial and temporal coverage. However, these instruments are still expensive, complex, and their accuracy and precision remain fundamentally limited by the currently used spectroscopic techniques.

This master's thesis aims to advance the quantification of SIF from air- and spaceborne platforms through the development of a novel spectroscopic technique to optimize SIF remote sensing measurements. The proposed approach is based on Fabry-Perot interferometers, which combine high spectral resolution with high optical throughput in compact instruments - showing strong potential for future satellite missions to improve the monitoring of vegetation activity and ecosystem health from space.

As a member of the dynamic and collaborative **Atmosphere and Remote Sensing** research group at the **Institute of Environmental Physics**, you will contribute to the development and evaluation of a novel technique for remote SIF measurements. Depending on your skills, interests, and start date, the thesis may include: (1) theoretical considerations on optimum SIF retrieval techniques; (2) prototype design and implementation; (3) development of numerical instrument models for data evaluation; (4) design and execution of first field experiments in Heidelberg.

A strong motivation to engage in pioneering, interdisciplinary, and methodologically diverse research, together with a full-time commitment to the project, is essential. Prior coursework or practical experience in optical spectroscopy, environmental and atmospheric physics, remote sensing, and radiative transfer are preferred.

Contact

Dr. Jonas Kuhn
jkuhn@iup.uni-heidelberg.de
INF 229, office 402, (06221) 54 6353

Prof. Dr. André Butz
andre.butz@uni-heidelberg.de
INF 229, office 424, (06221) 54 63 10

10.06.2026