

Program: Photo-Spec: Comprehensive Ground-Based Studies of Solar-Induced Chlorophyll Fluorescence - tracking seasonal, diurnal and fine spatial variability

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Brief summary of progress to date

The PhotoSpec development advanced rapidly in this final year of funding. After initial testing of a PhotoSpec prototype at Stunt Ranch in the Santa Monica Mountains, the team was ready to finalize the design concept after taking lessons learned from this long-term field deployment of the prototype into account.

During the testing period in the Santa Monica Mountains as well as at the UCLA campus directly, the entire end-to-end chain from data acquisition, observation strategy using the 2D scanning telescope as well as the retrieval has been successfully tested, including the first red fluorescence retrievals purely based on Fraunhofer lines.

The remaining PhotoSpec systems are now finalized as well using the updated design. One of the systems has been installed in March 2017 in La Selva (Costa Rica) and plans have been finalized to deploy the other 4 at Niwot Ridge (in the front range at 10,000 feet near Boulder, Colorado) as well as corn and soy fields in Iowa near Ames. The JPL system will be installed at an agricultural test facility called Russel Ranch (near UC Davis).

Within a few months from now, we will have 5 fully working PhotoSpec systems running continuously at a very diverse set of biomes, including tropical rainforest, evergreen needle-leaf forest and C3 as well as C4 crops. We are excited about the performance characteristics of the spectrometer systems and look forward to the scientific datasets and analysis for years to come.

Status of Collaborations (Campus/JPL/External)

The coordination between the Campus, JPL and external partners has usually been very informal with spontaneous telecons to discuss topics at hand as well as frequent visits at UCLA to discuss the instrument development progress. We have also been lucky that a NASA NPP PostDoc (Troy Magney) was funded through a fellowship and helped in various ways to test and install the PhotoSpec system.

Papers / Technical Reports to date

The PhotoSpec instrument paper is currently in its final writing stage and will be submitted within the next 2 months.

Presentations / Conferences to date

AGU meetings 2015 and 2016
OCO-2 Science team meetings in 2015/2016
Fluorescence Workshop in Frascati, Italy (2017)
IEEE Remote Sensing workshop in Beijing, 2016

Undergraduate students, graduate students and postdocs working on project

PostDocs:

Katja Grossmann (working at UCLA, key developer of the instrument)
Troy Magney (NPP fellowship)

Graduate students:

Not yet applicable but Liyin He will work with PhotoSpec data (1st year ESE Caltech graduate student)