Continuous Solar-induced Chlorophyll Fluorescence and Reflectance Measurement at KAEFS

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Research Highlights

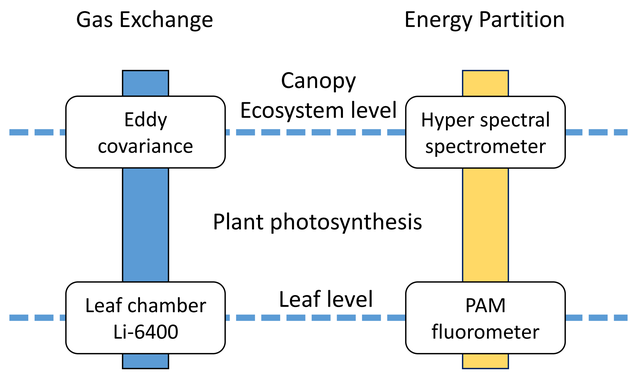
1. We designed the FluoSpec system to continuously measure solar-induced chlorophyll fluorescence at Kessler Atmospheric Ecological Field Station.
2. The FluoSpec system is controlled by a Raspberry Pi microcomputer running Linux operate system.
3. This direct measurement of solar-induced chlorophyll fluorescence can be compared with photosynthesis and fluorescence from multiple sources.

Scientific Basis

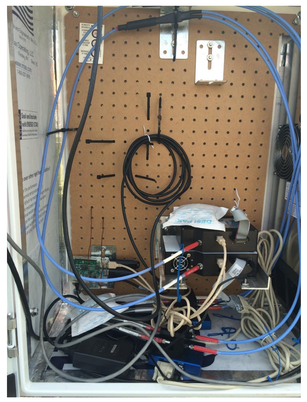
$$SIF = APAR_{chl} \times SIF_{yield}$$
$$\mathrm{GPP} = APAR_{chl} \times LUE$$

$$\mathrm{GPP} = \mathrm{SIF} \times \frac{LUE}{SIF_{yield}}$$

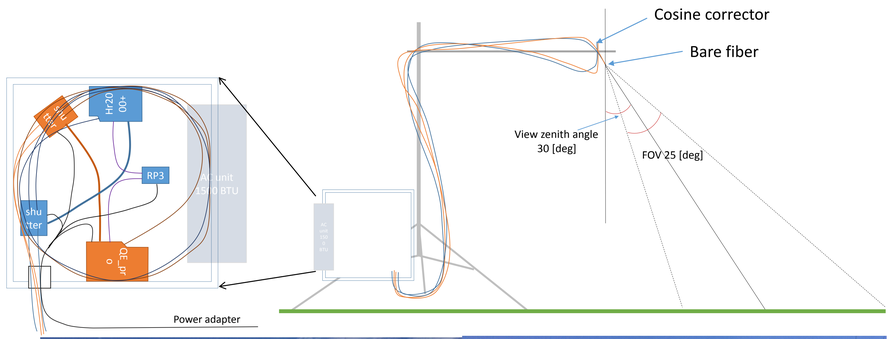
Under mid to high light intensity, SIF_{yield} positively correlated with LUE.



Study Design



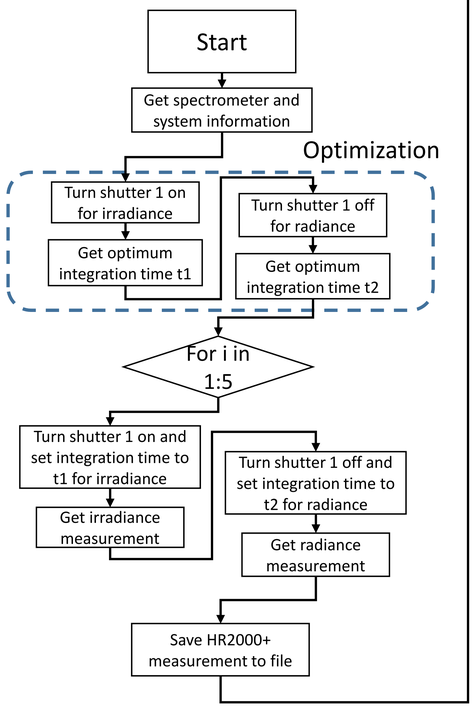
Instrumentation set-up, two spectrometers are QE-Pro and HR-2000+. Each spectrometer were connected with two optical fibers, one pointing down, one pointing up.

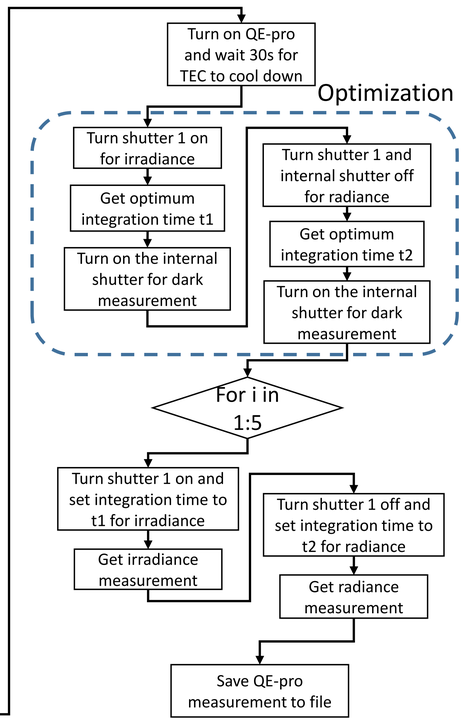


Site Location

The study area and site location of EC tower, FluoSpec, and Mesonet.

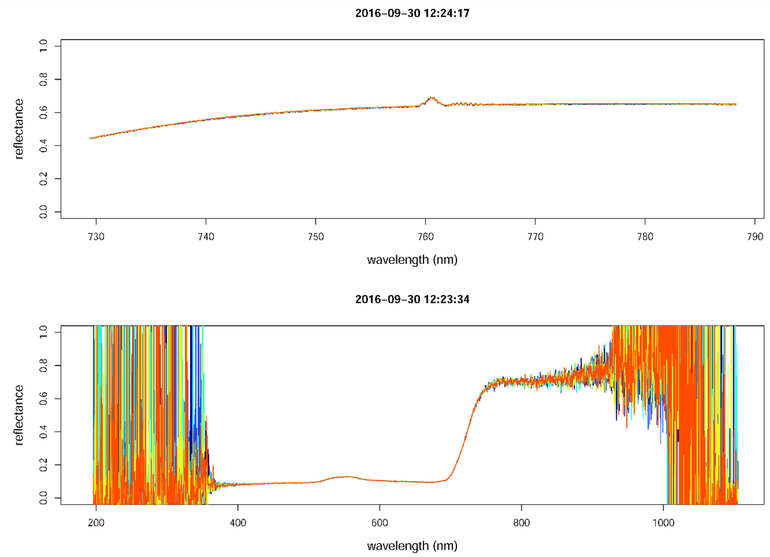
Operation Scheme





Flowchart of the FluoSpec system operations.

Initial Result



Reflectance measurement for QE-Pro and HR-2000+.

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