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Sun Induced Fluorescence (SIF) at Tumbarumba

Linking SIF to CO_2 fluxes across scales

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With help from Jacqui Stol, Jess Hodgson, Mark Kitchen, Arko Lucieer, Juliane Bendig and many more

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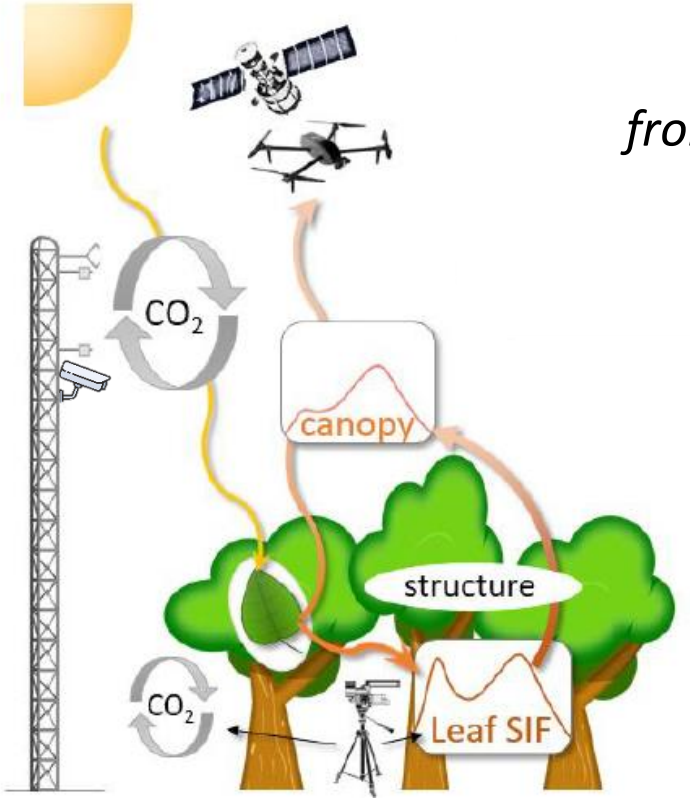
CSIRO

TERN

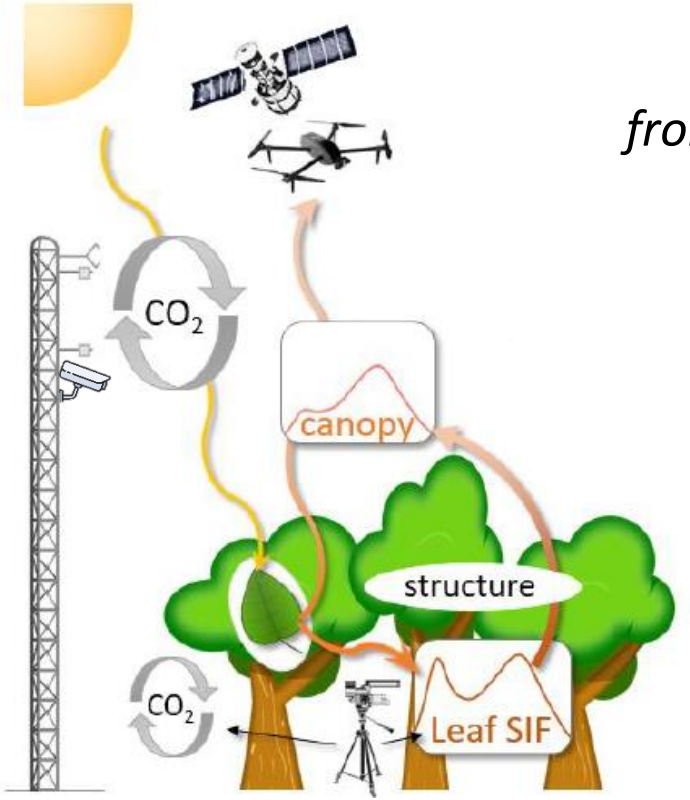
NCRIS National Research Infrastructure for Australia

Experimental design: bridging leaf to canopy scales



To determine the physiological meaning of SIF from the leaf to canopy scale in an Australian system.

Experimental design: bridging leaf to canopy scales



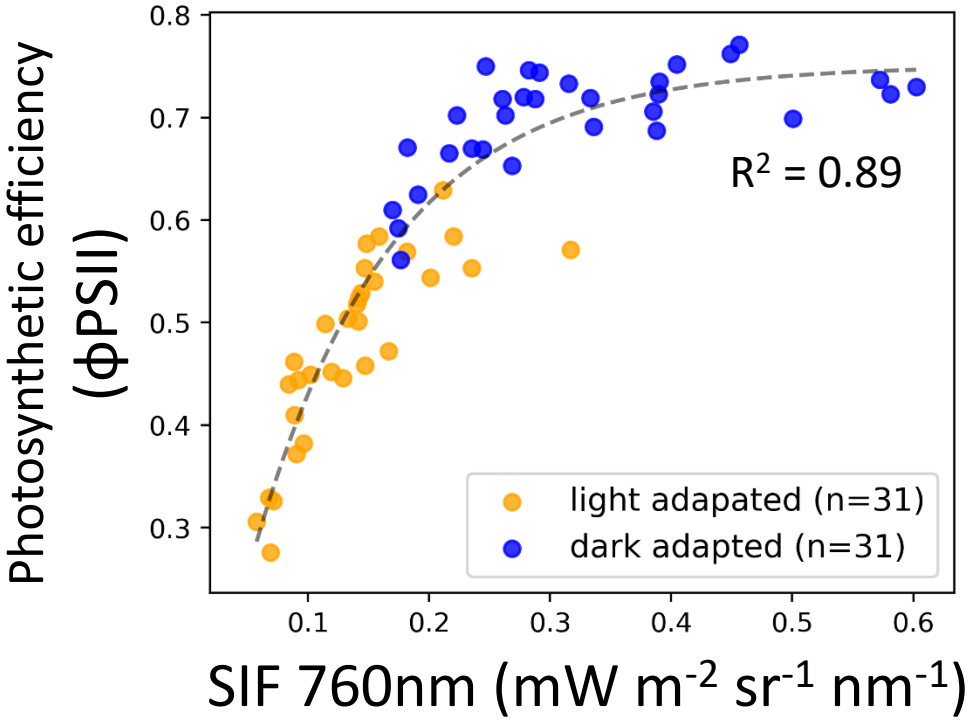
To determine the physiological meaning of SIF from the leaf to canopy scale in an Australian system.

1. Can *leaf-level* SIF be used to track photosynthetic efficiency?
2. Does *canopy* SIF linearly track GPP fluxes across *time scales*?
3. How can SIF be used with other complementary vegetation function optical indices (e.g. NDVI, EVI, PRI etc.)?
4. Can SIF be used to identify early stages of stress? And the stress type?

Tumbarumba site location

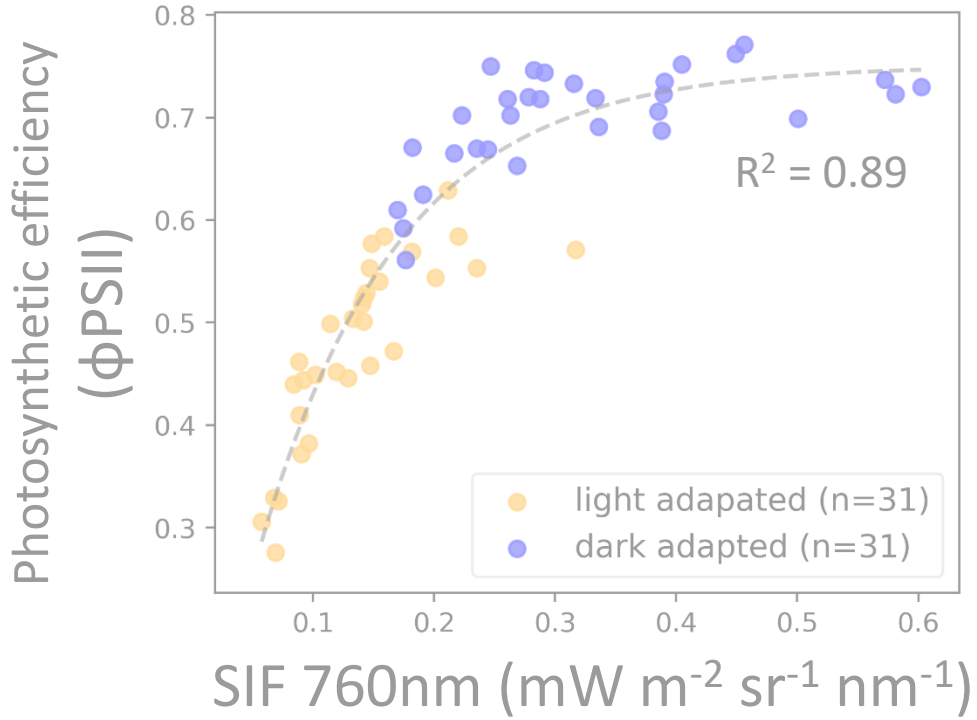
4th Sept. 2019 (bottom), 10th Sept. 2019 (top)

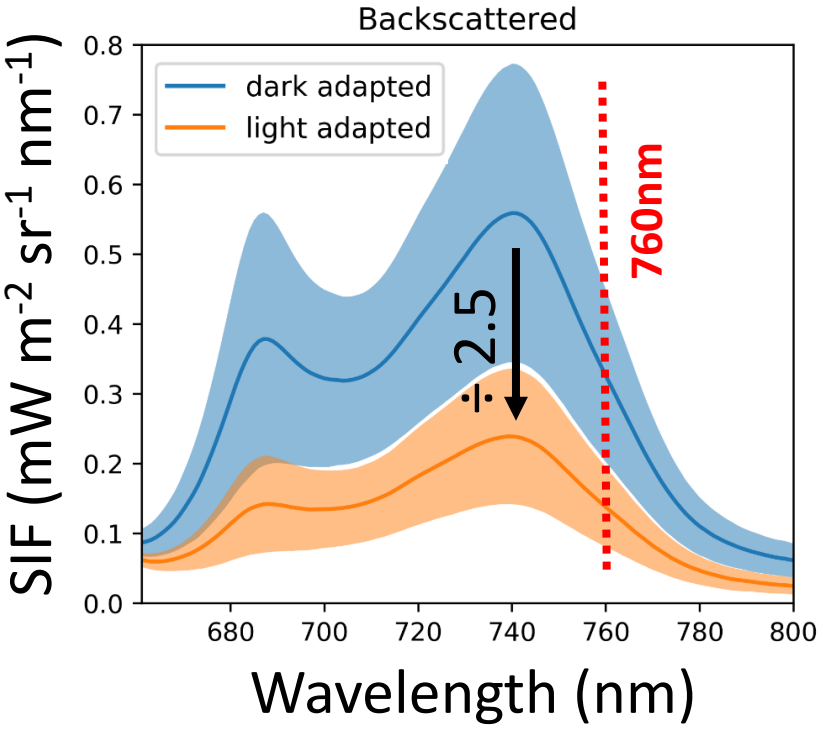
Leaf level results: SIF and photosynthetic efficiency



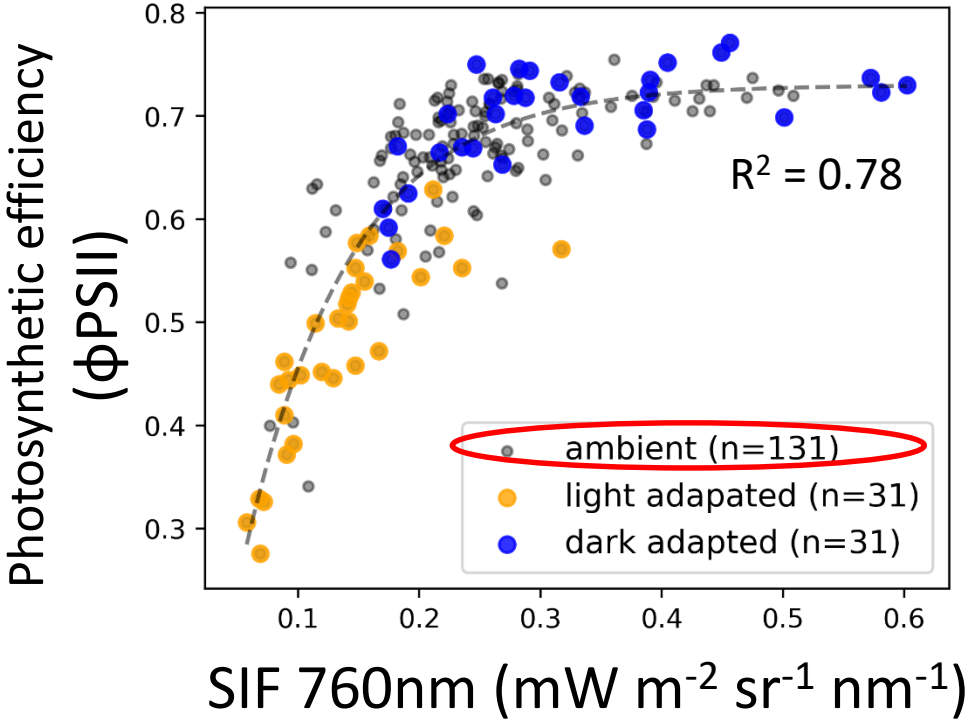
Fluowat leaf clip

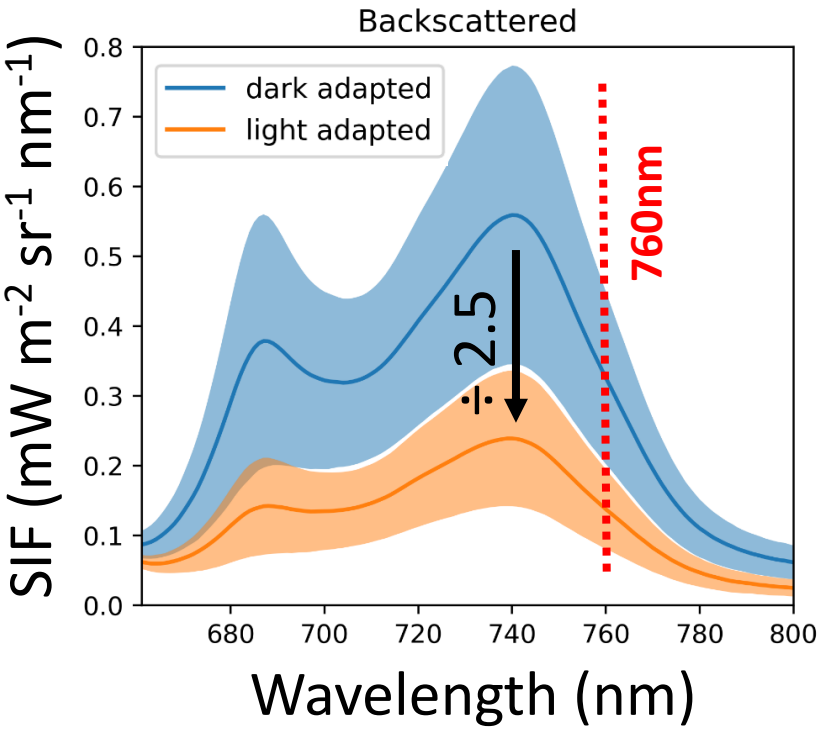
Leaf level: SIF and photosynthetic efficiency



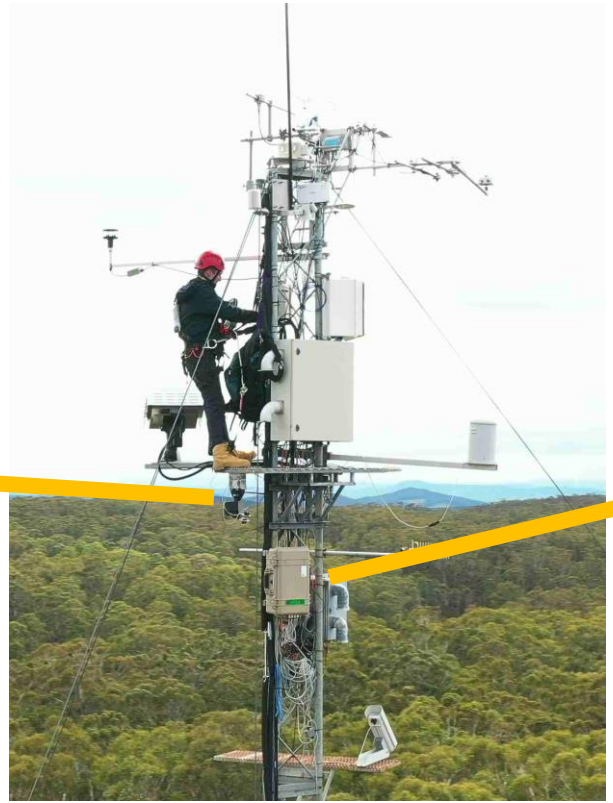


Leaf level: SIF and photosynthetic efficiency





Tower SIF at Tumba (Sept. 2019)

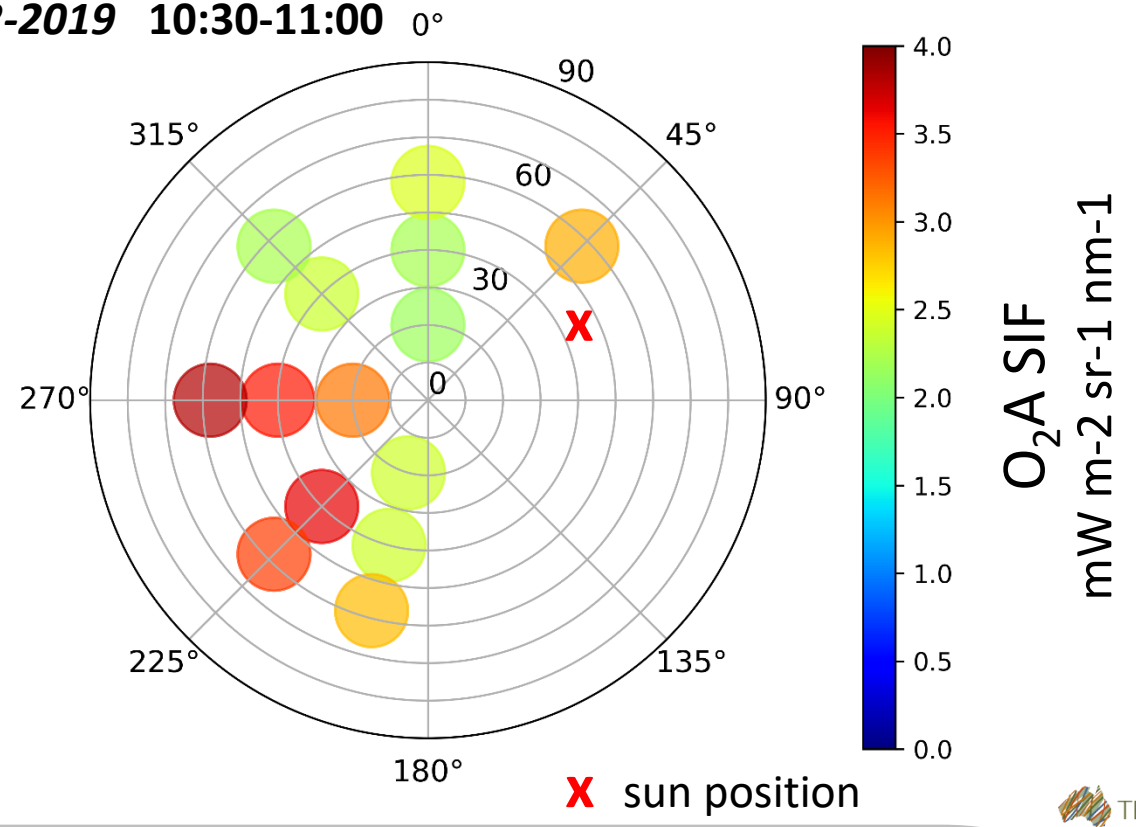


Tower image courtesy Lenny Hambrecht (UTas)

Tower SIF at Tumba

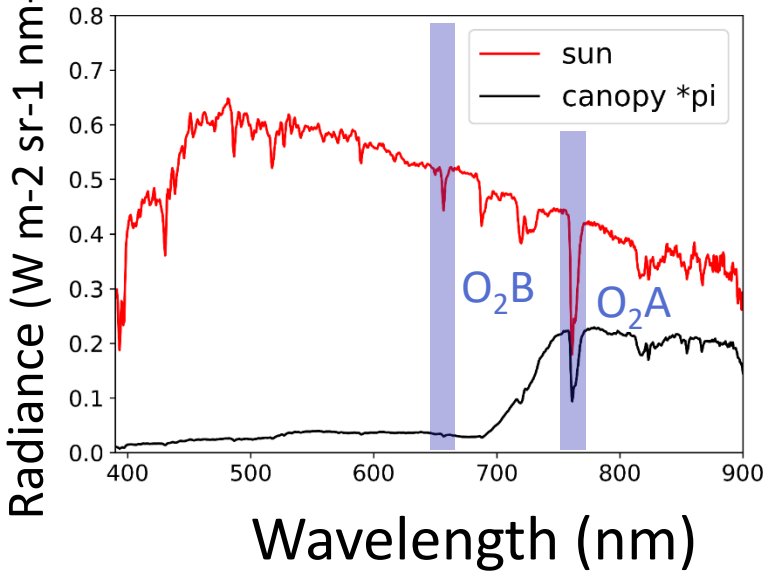
Polar plot

- 14 view angles per half hour

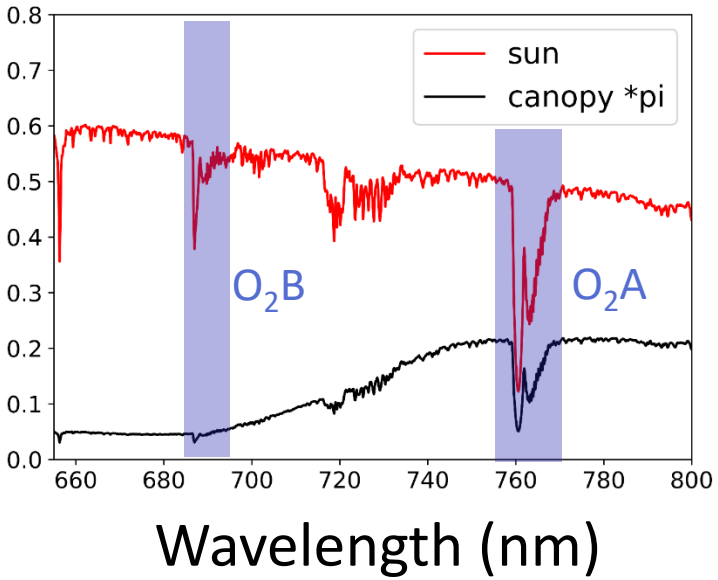


Tower SIF at Tumba

Spectrometer #1
Broad spectrum

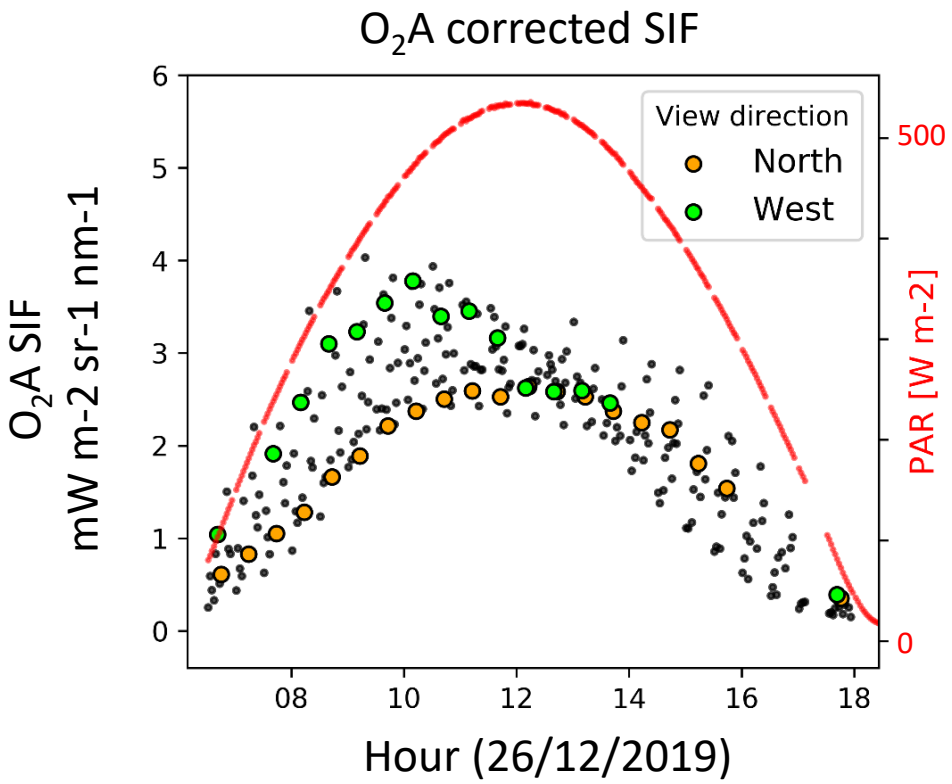


Spectrometer #2
High spectral res



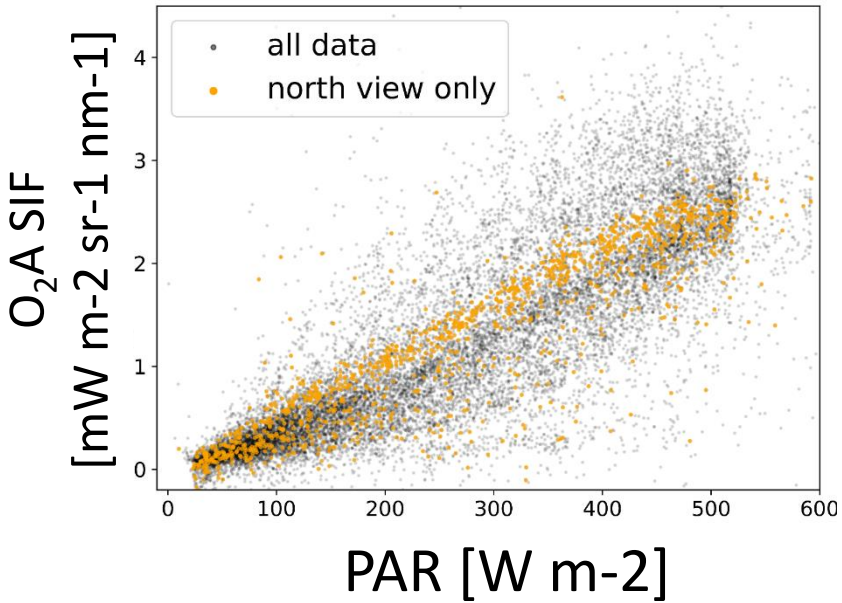
Spectra taken 26/12/2019 at midday

Tower SIF at Tumba



Tower SIF at Tumba

All data Oct-Dec, 2019



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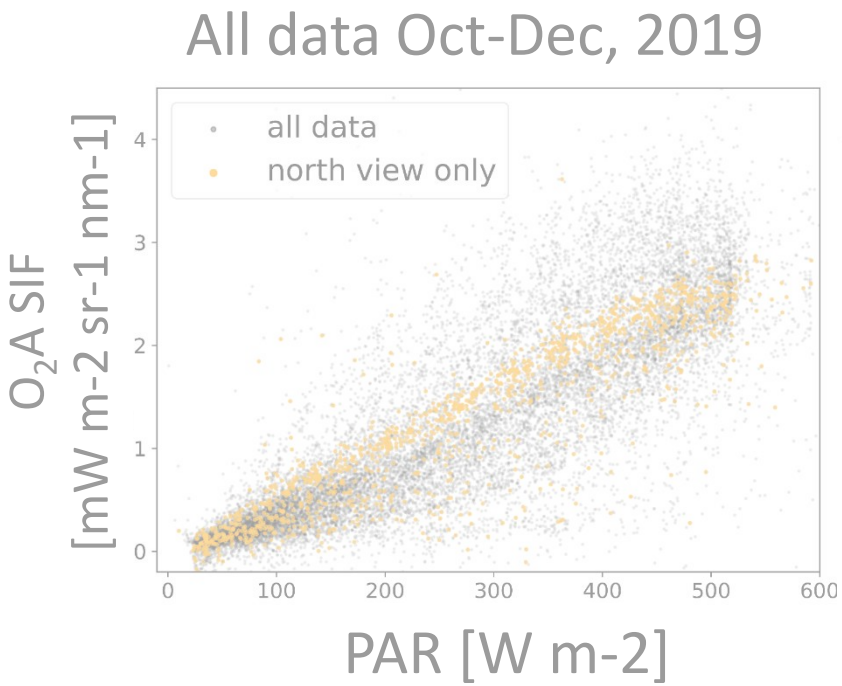

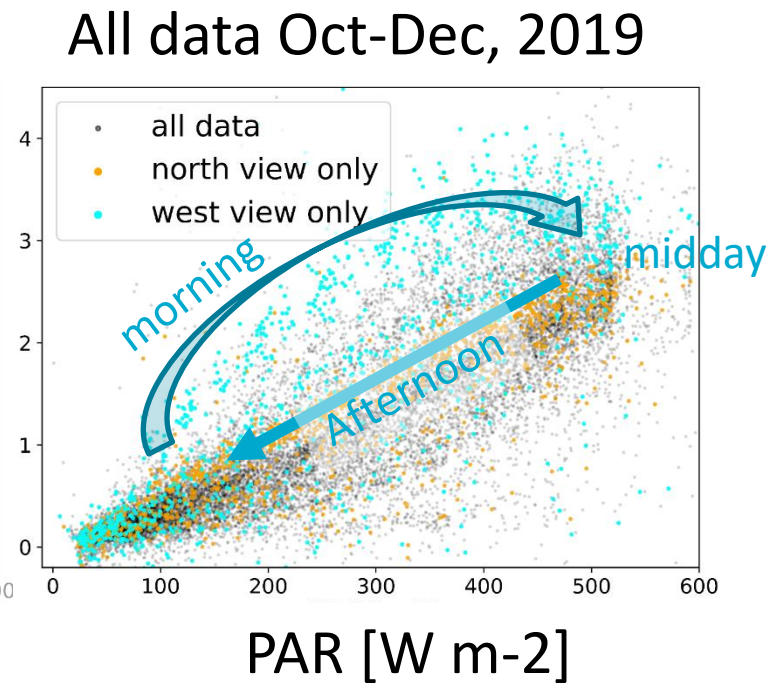

Future work and opportunities

- More leaf-level data across seasons and stress conditions (VPD, temperature, light intensity etc.)
- Link observations with models (RTMs and biogeochemical)
- Canopy-level SIF retrieval algorithm selection/comparison
- Disturbance (fire) recovery

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Thank you

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CRICOS code 00025B