Forest – maize transition: first results

Myrtille GRULOIS – 21/06/2023

Many thanks to Z. Avajon-Dosiere, J-M. Bonnefont, C. Garrigou and S. Lafont for their help with the installation of sensors and recuperation of data.

RÉPUBLIQUE FRANÇAISE
Liberté Égalité Fraternité

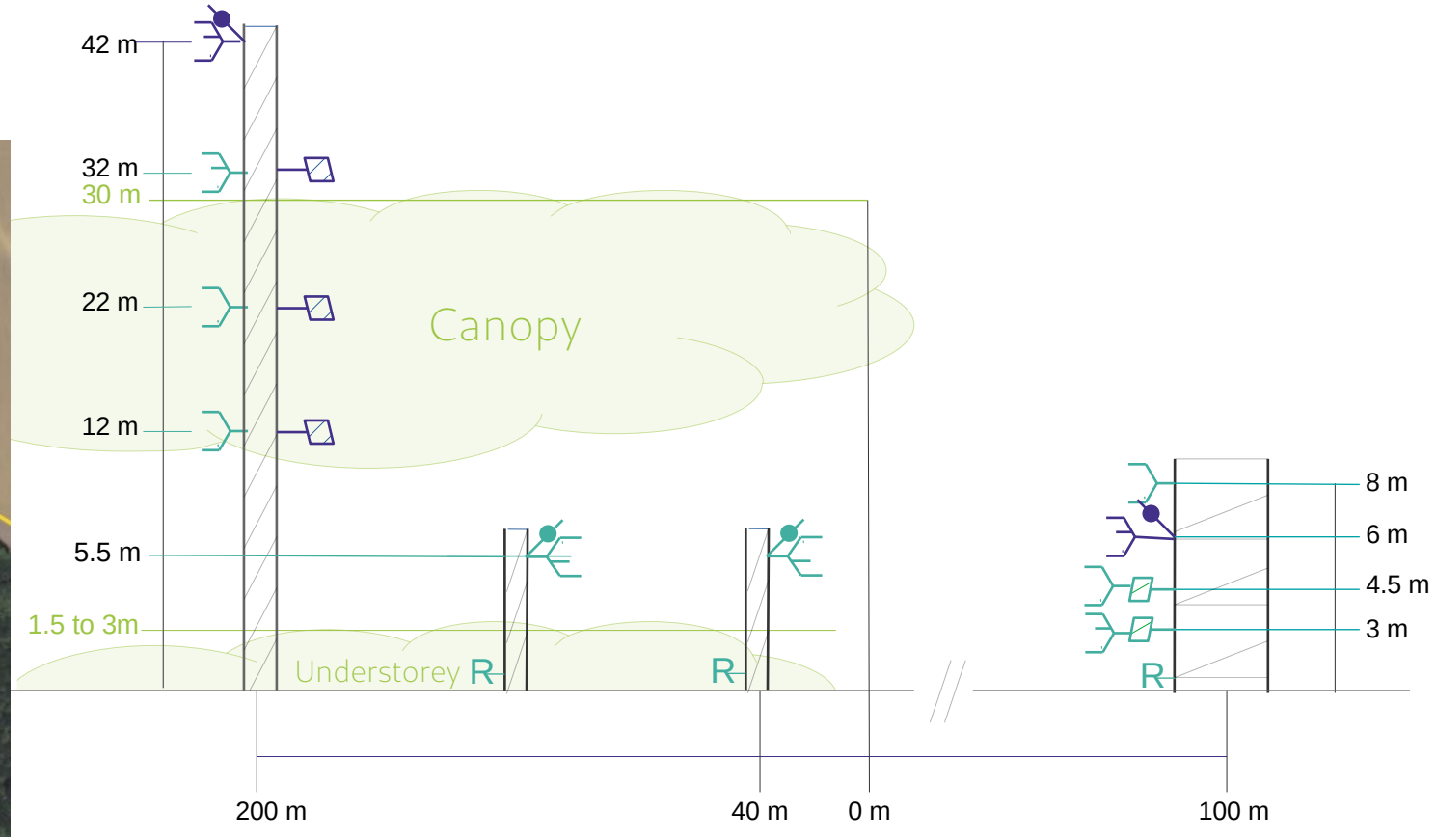
INRAE

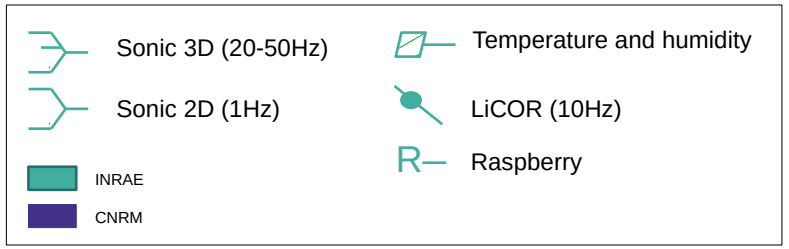
Configuration

CNRM Mast
and INRAE small forest mast

Edge mast

Maize scaffolding

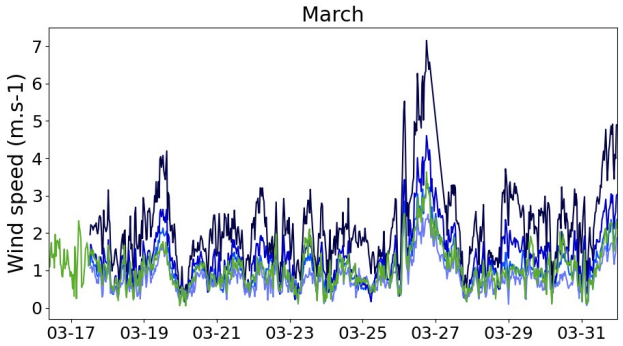


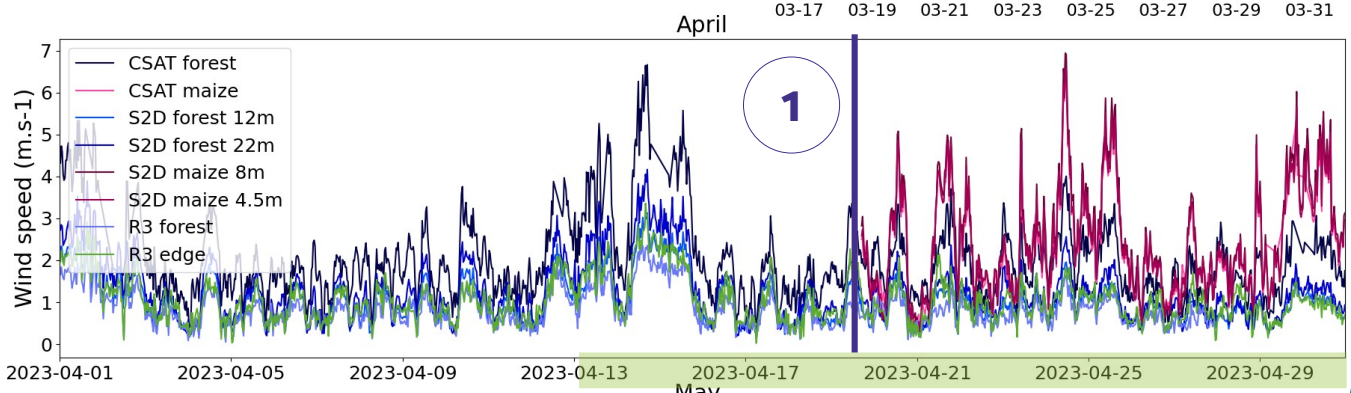


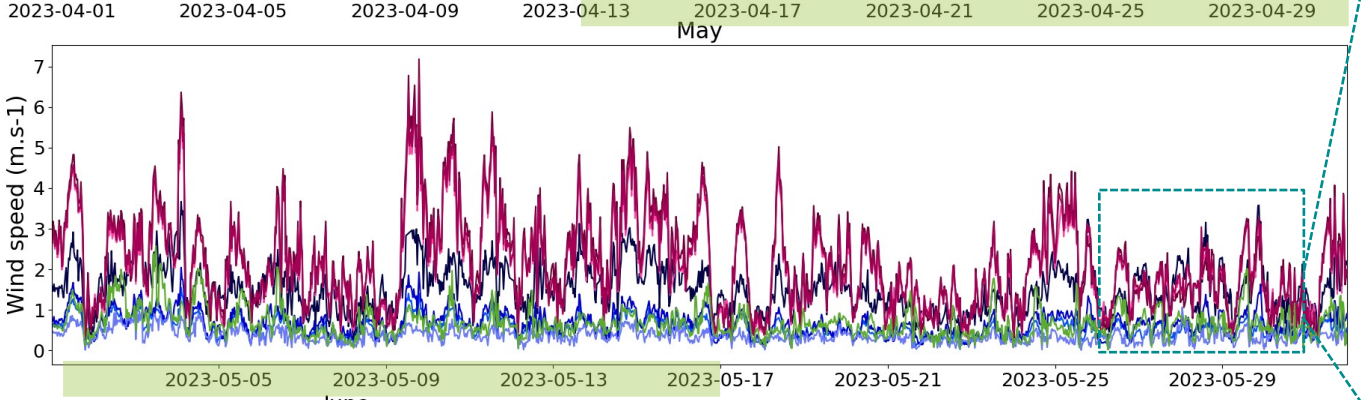
Wind speed time series

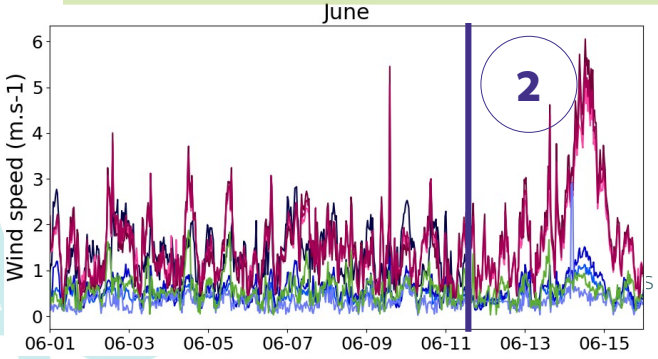
Development of leaves

1. 19/04 Installation maize station
2. 11/06 Lost connection with CSAT forest

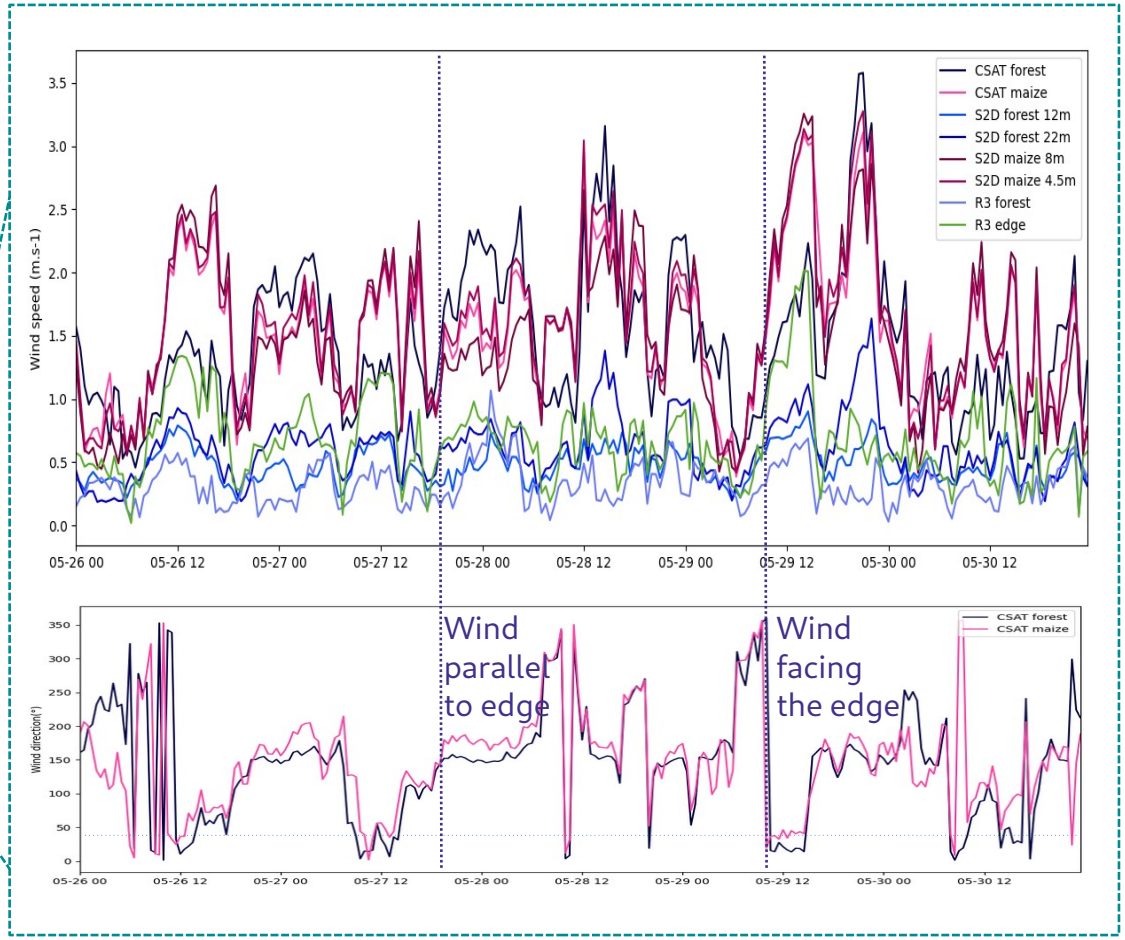






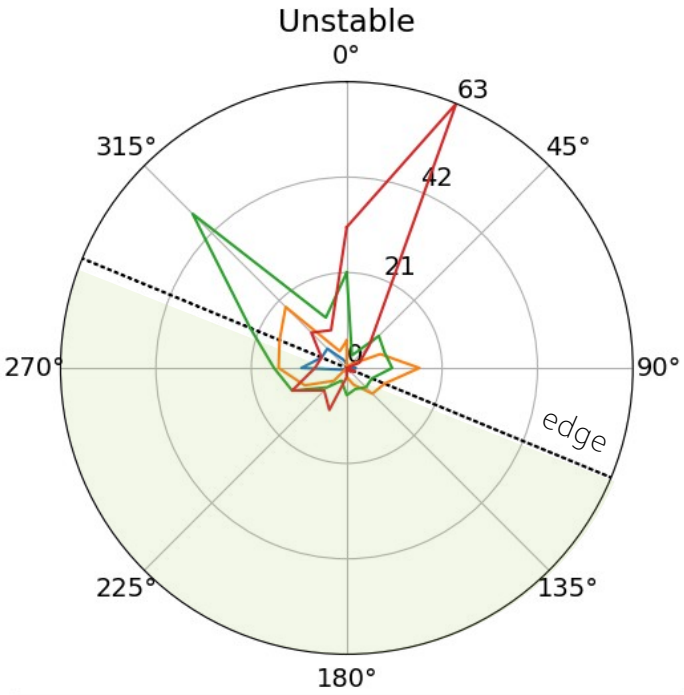


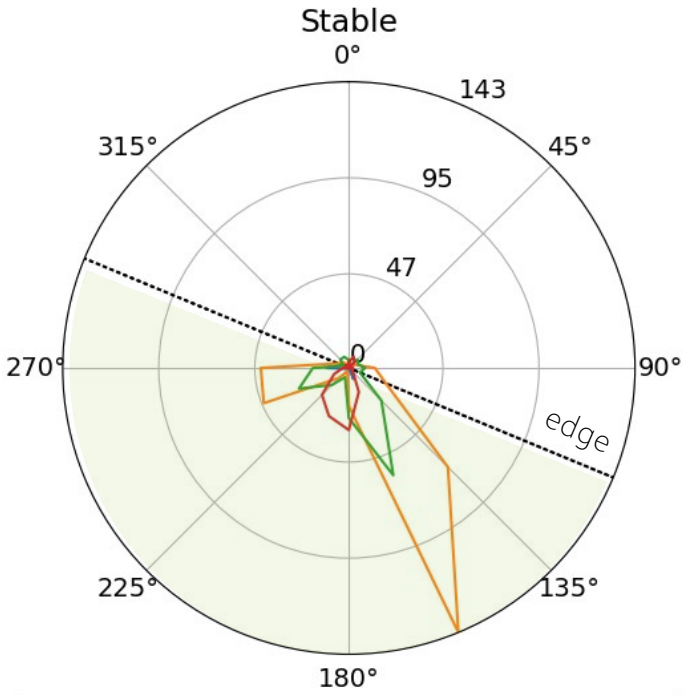
› Zoom on period from 26/05 to 30/06



Atmospheric stability according to wind direction

- With leaves: period from 15/05 to 12/06





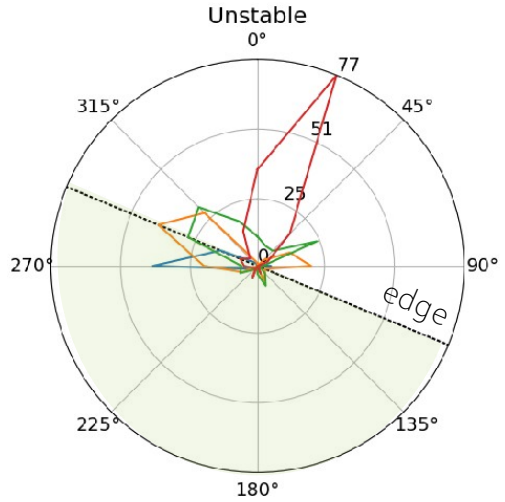
Growing instability

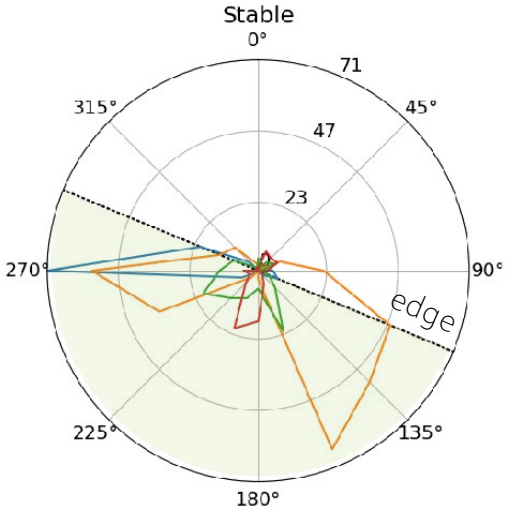
- NNU Near Neutral Unstable
- FOC FOrced Convection
- TFC Transition to Free Convection
- FRC FRee Convection

Growing stability

- NNS Near Neutral Stable
- TST Transition to STable
- STA STAble
- VST Very STable

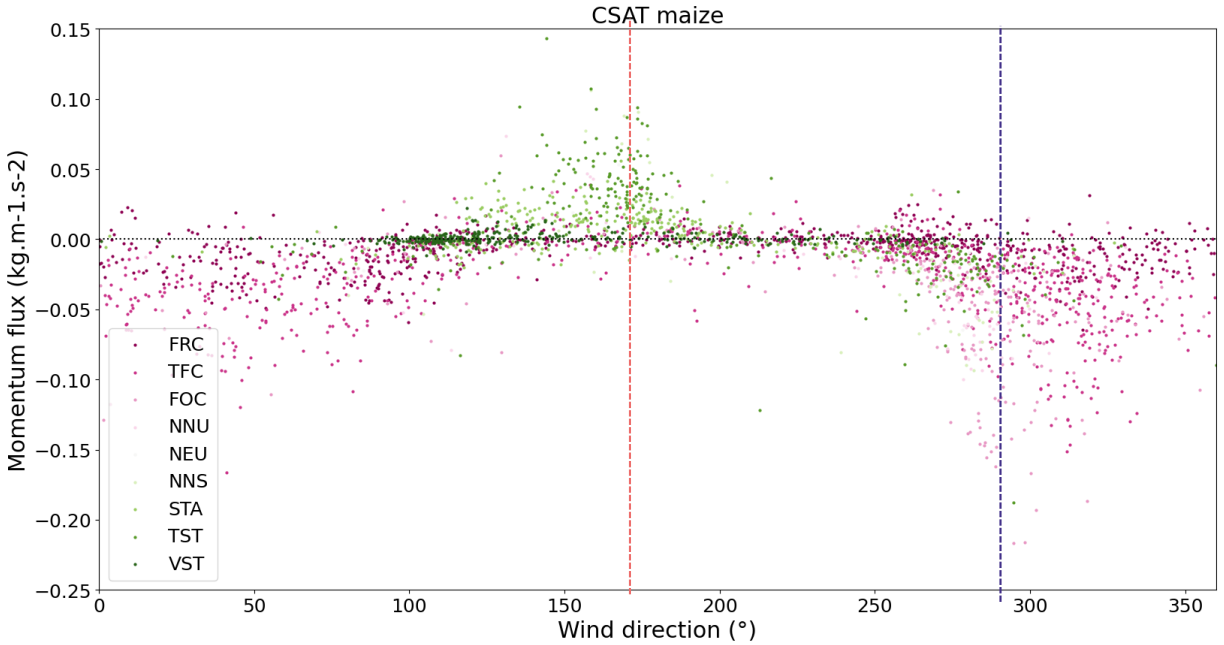
- Without leaves

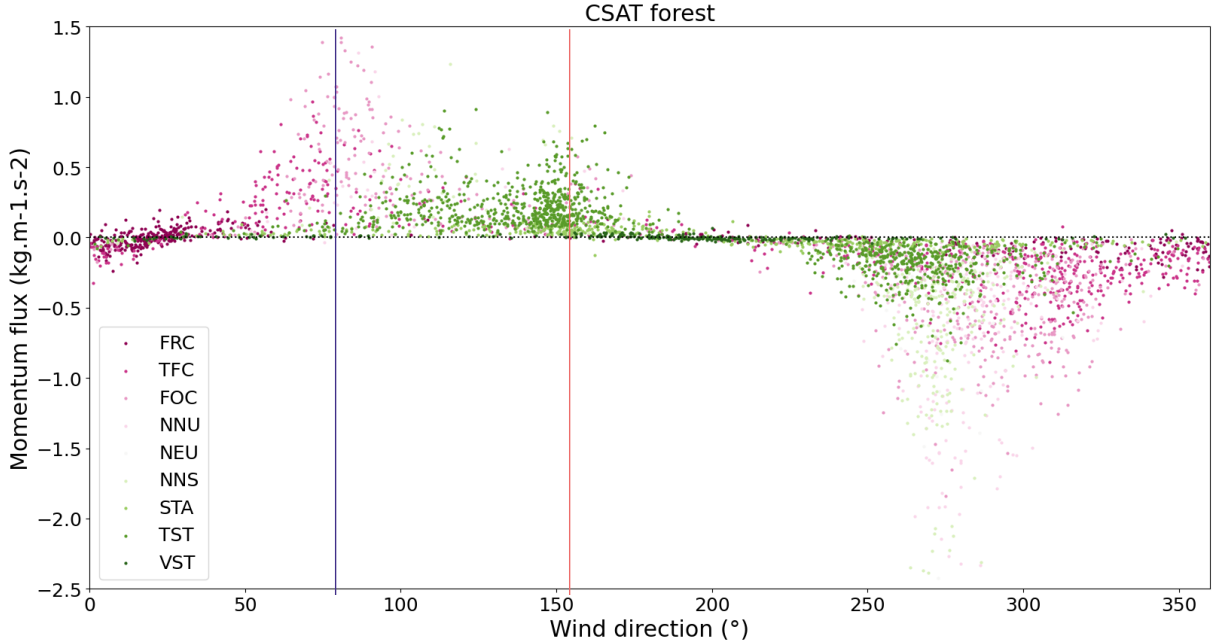




Momentum flux according to wind direction and thermal stability

$$\tau = \rho \overline{u'w'}$$



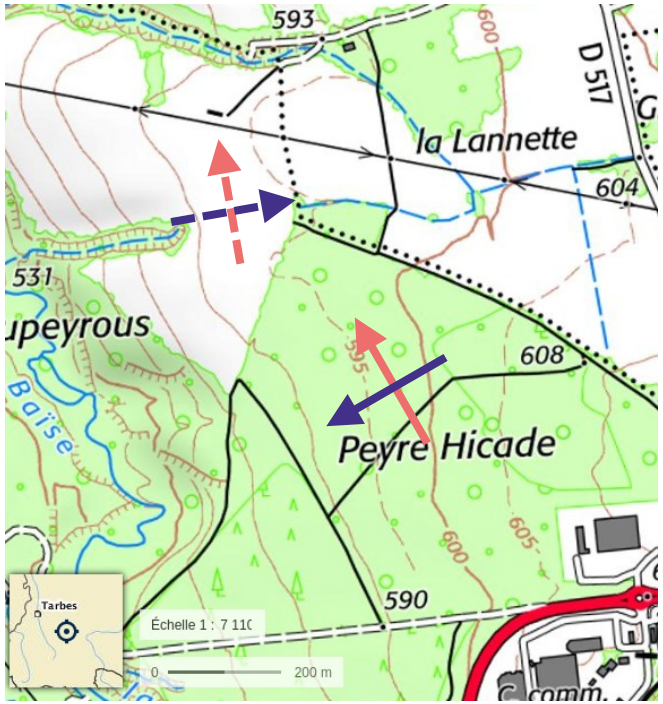


Unstable

Stable

Forest mast

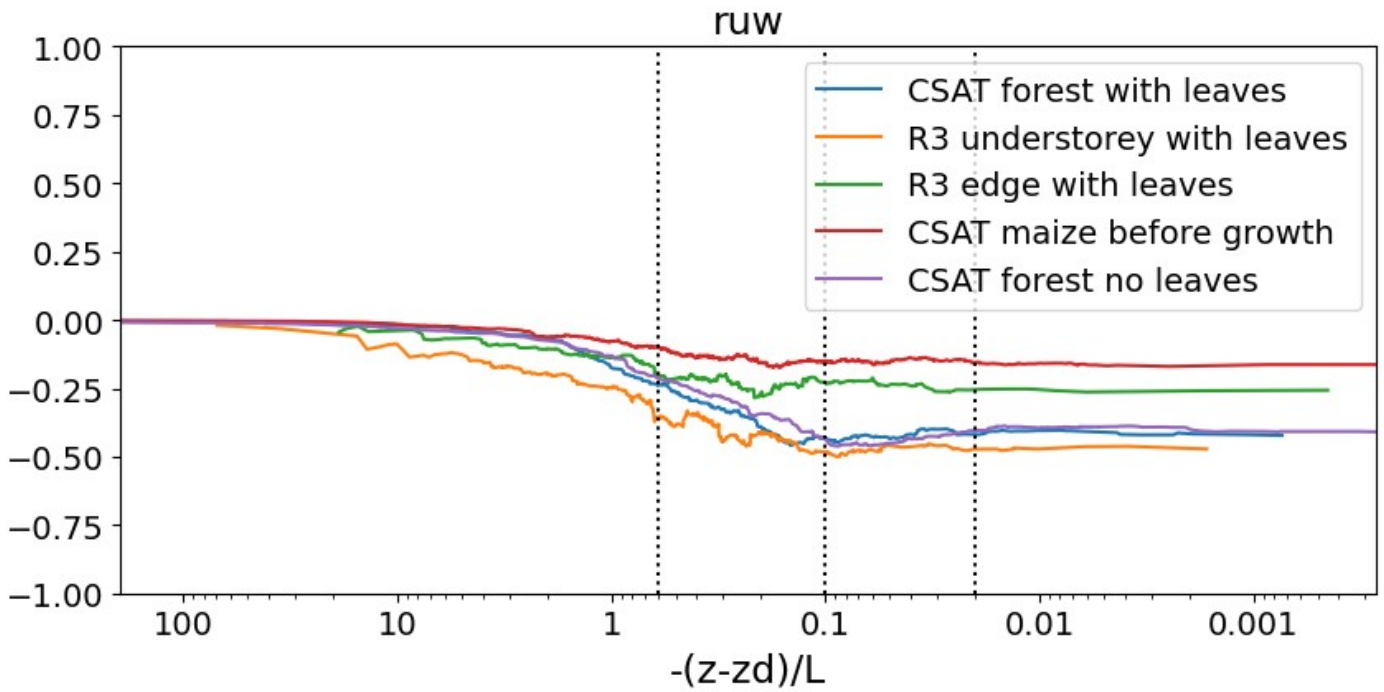
Maize scaffolding

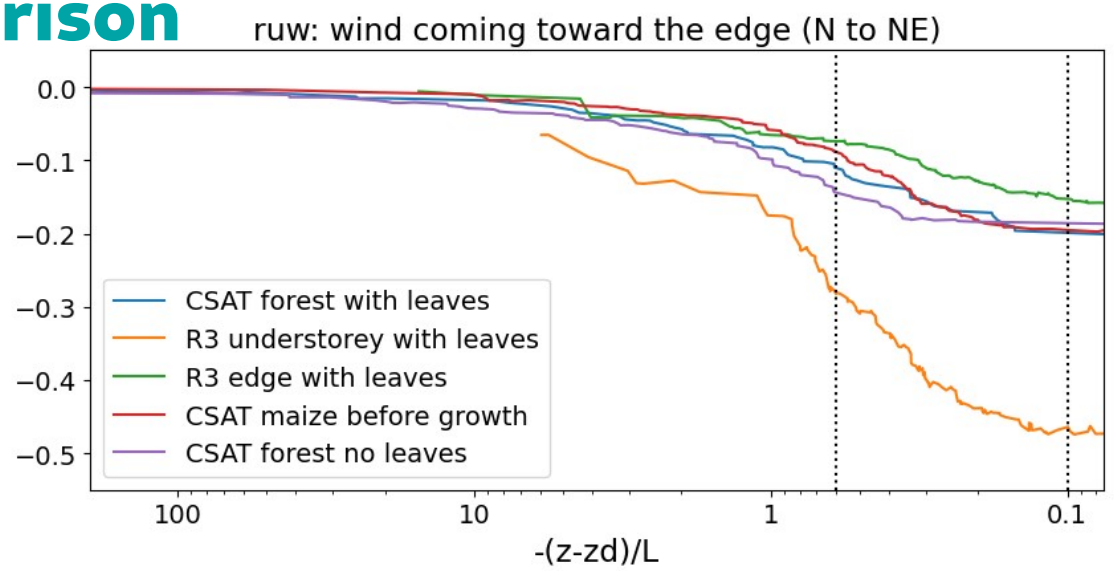


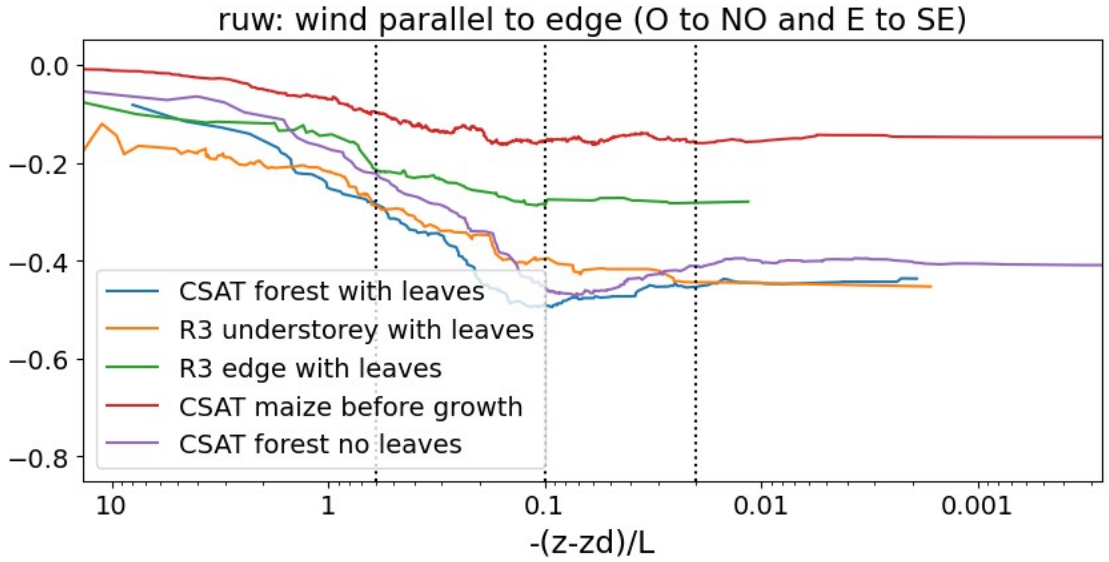
Cross correlation coefficient comparison

- Efficiency of momentum transport regarding turbulence

$$r_{uw} = \frac{\overline{u'w'}}{\sigma_u \sigma_w}$$

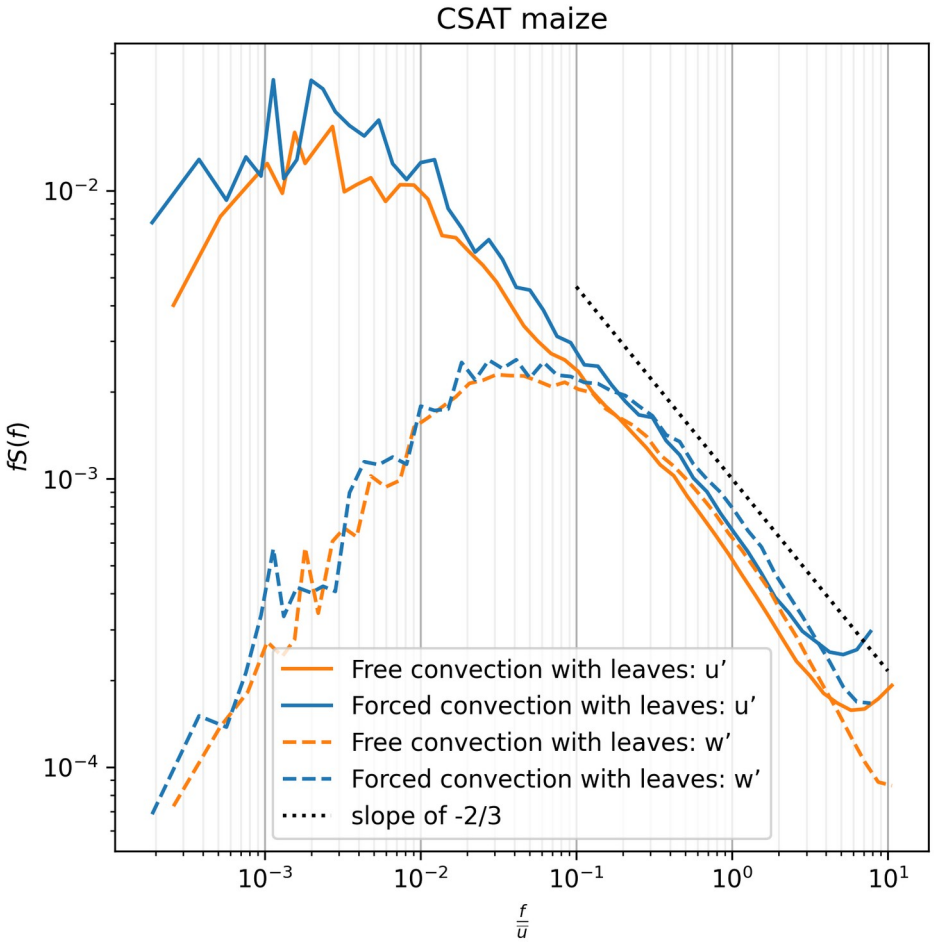


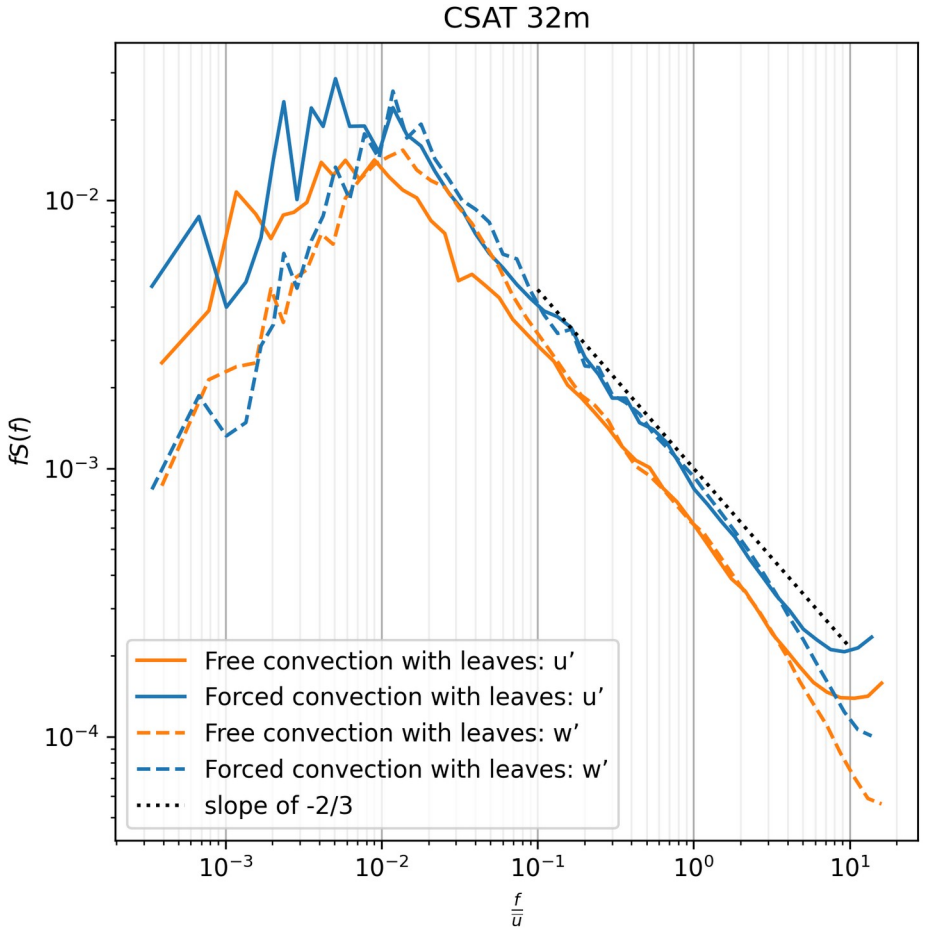




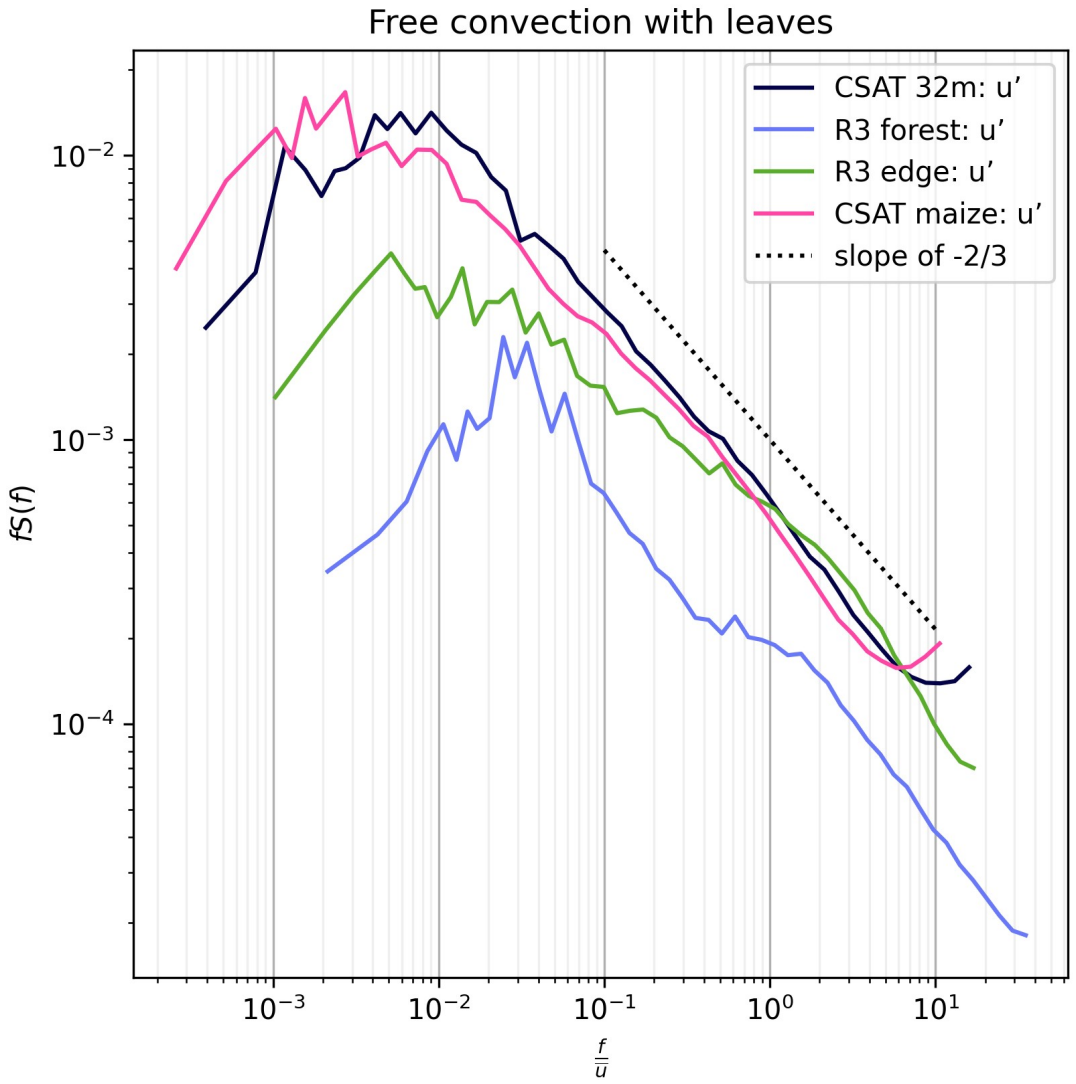
Spectrum analysis

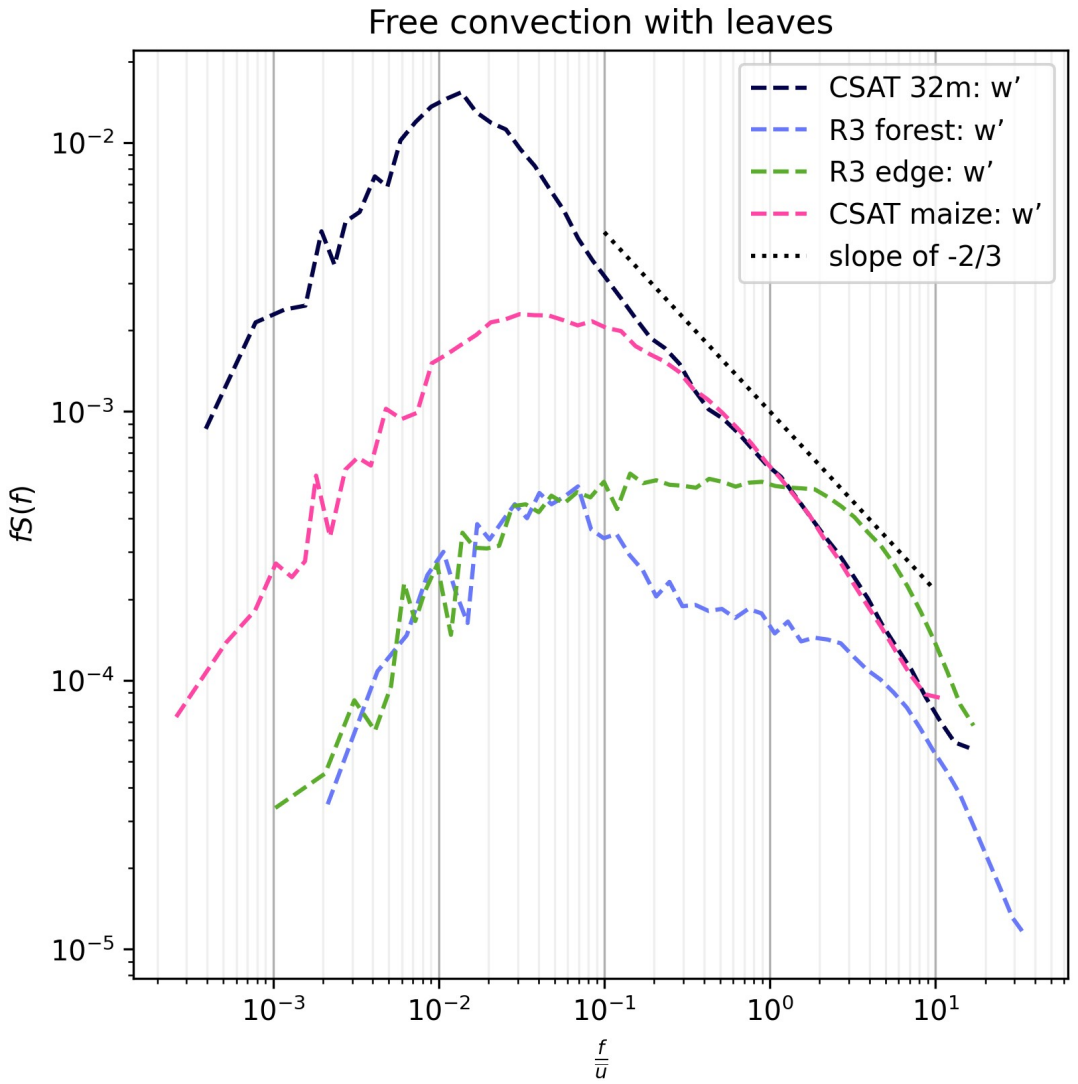
- Average ensemble on 12 half hours (3 days of the chosen stability class between 1pm and 3pm.





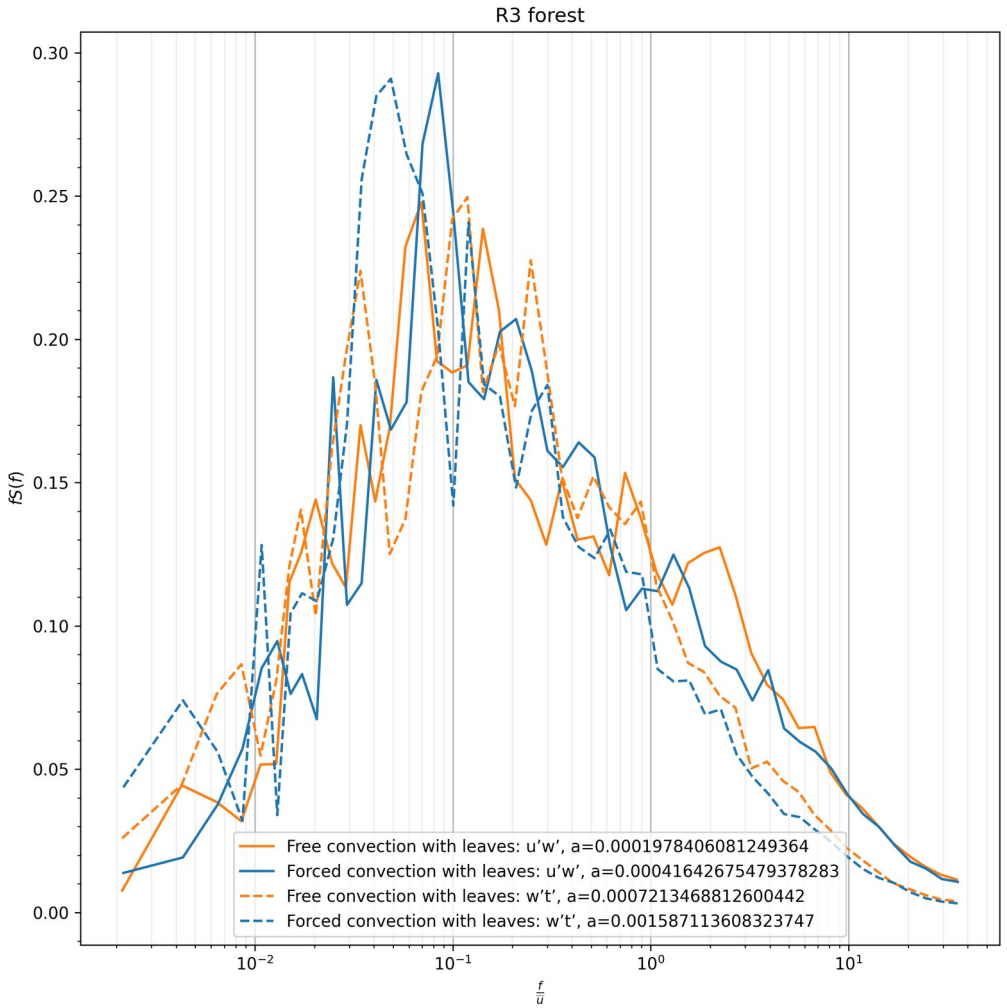
Spectrum analysis

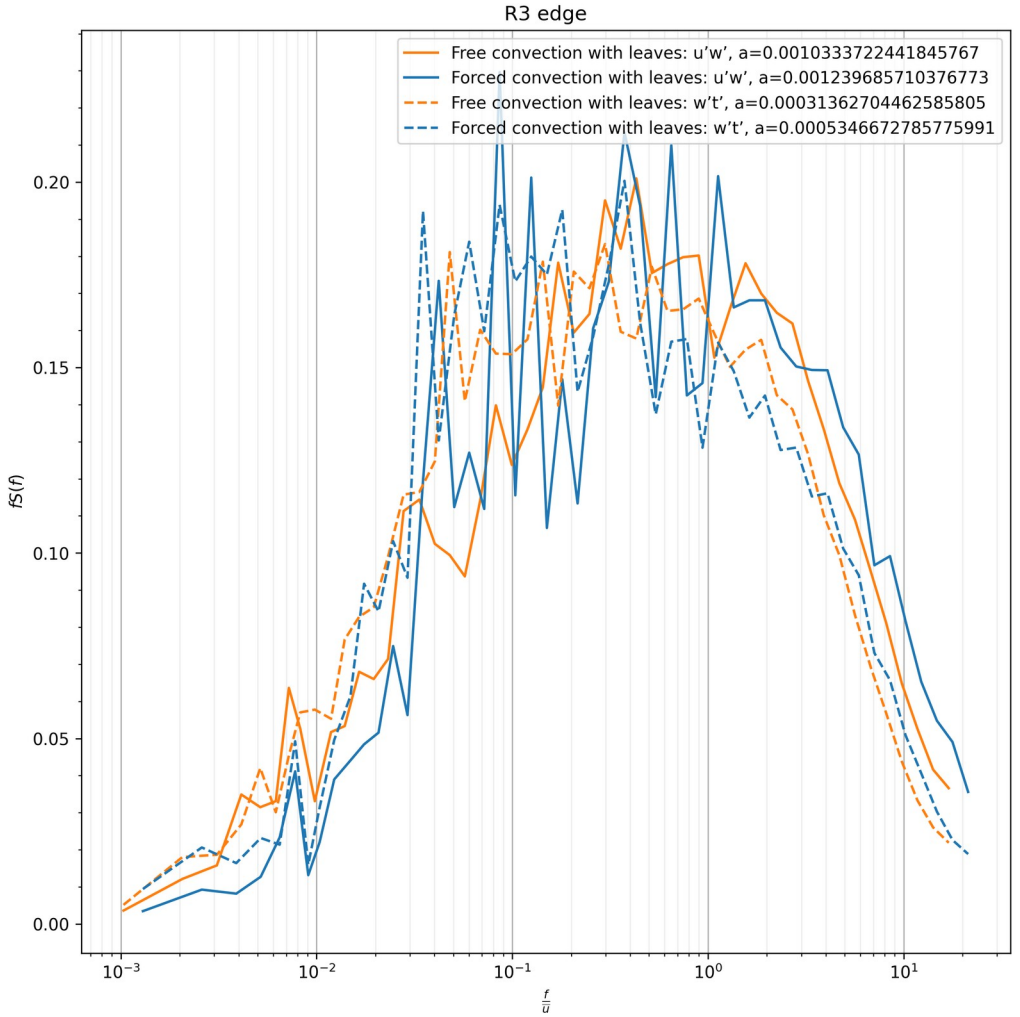




Spectrum analysis

- Spectra are normalized by ***a*** the area under the curve.





First conclusions and perspectives

- Compare these data with other data of the site
  - 60m CRA mast
  - top of 42m CNRM forest mast
  - 6m level on maize scaffolding
- Try to link spectra and peaks with PBL height
- Modelling of the site with ARPS-Musica and validation with measurements

Sorting of the dataset according to leaves development

	Without leaves (17/03 - 13/04)		With leaves (15/05 - 11/06)	
	Day (at 13:30 CET)	Wind direction	Day (at 13:30 CET)	Wind direction
$FRC (free convection)	06/04	25° (NNE)	26/05	32° (NNE)
	07/04	19° (NNE)	27/05	55° (NE)
	08/04	26° (NNE)	29/05	27° (NNE)
FOC (forced convection)	19/03	285° (ONO)	17/05	315° (NO)
	04/04	299° (ONO)	24/05	303° (ONO)
	10/04	288° (ONO)		

- Separation between leaves and no leaves based on LAI measurements