APPLICATION OF A DISPLACED BEAM LASER SCINTILLOMETER IN NIGHTTIME STABLY STRATIFIED FLOWS

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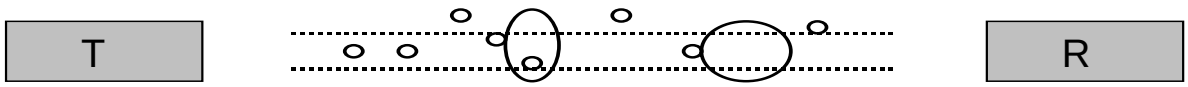
Motivation:

Surface-flux measurements in night-time SSFs troublesome with EC:

- SSFs can be very shallow → measurements close to the surface → EC averaged out smallest turbulent scales
- Flows can be intermittent → short averaging intervals needed → EC needs minimum averaging period to reduce statistical error

Displaced-Beam Laser Scintillometer:



Specifications (selection):

- Optical source → Temperature fluctuations
- Eddy size seen → $F = \sqrt{\lambda L}$ ~ 1 cm
- Intensity fluctuations ~ T-spectrum = f(C_T^2, I_0)
- C_T^2 and I_0 → Monin-Obukhov Similarity → H and u_*

Advantages over EC:

- One eddy-size vs integrating all eddy sizes → close to the surface
- Time AND path-averaging vs time averaging alone → short intervals

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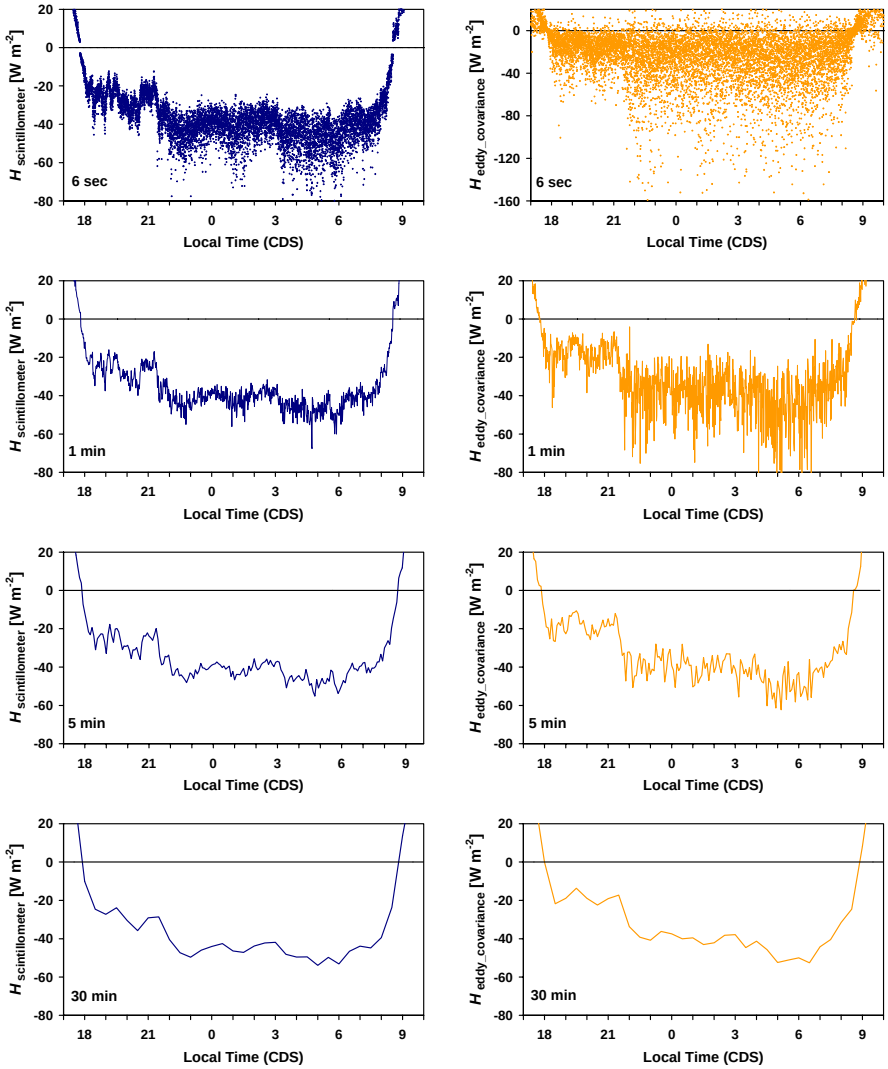
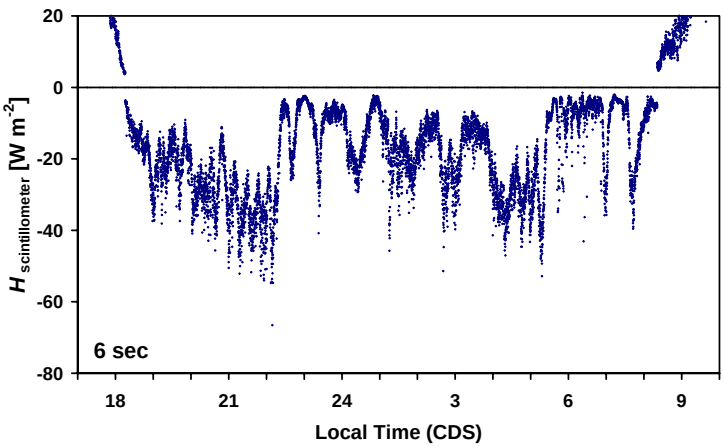
Scintillometer Path and Time averaging - Illustration 1



Scintillometer Path and Time averaging - Illustration 2



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