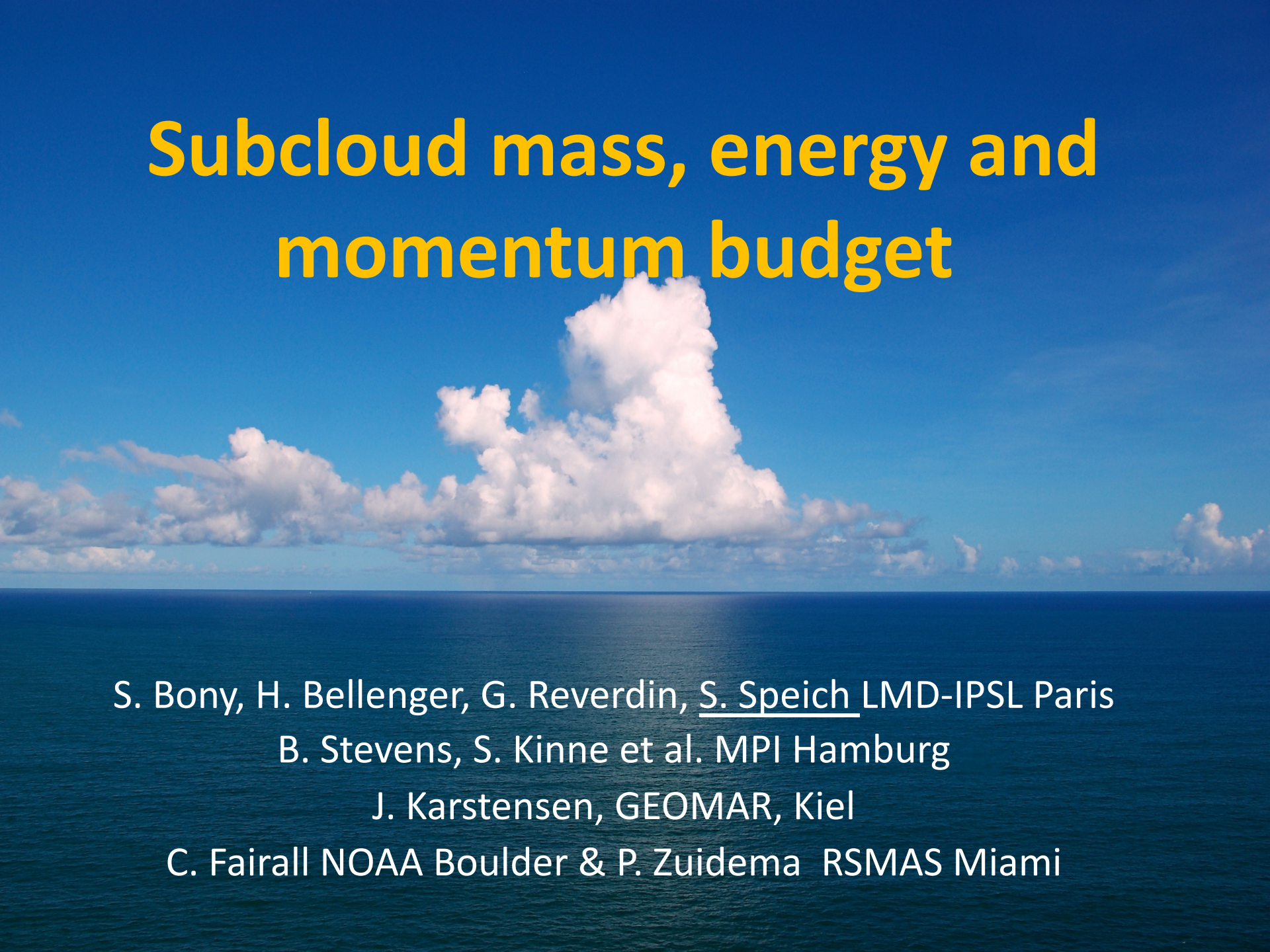
Subcloud mass, energy and momentum budget



S. Bony, H. Bellenger, G. Reverdin, S. Speich LMD-IPSL Paris
B. Stevens, S. Kinne et al. MPI Hamburg
J. Karstensen, GEOMAR, Kiel
C. Fairall NOAA Boulder & P. Zuidema RSMAS Miami

Can we measure the large-scale vertical motion?

NARVAL2 airborne field campaign (Stevens et al., BAMS, 2019)

- 8-28 Aug 2016, near Barbados

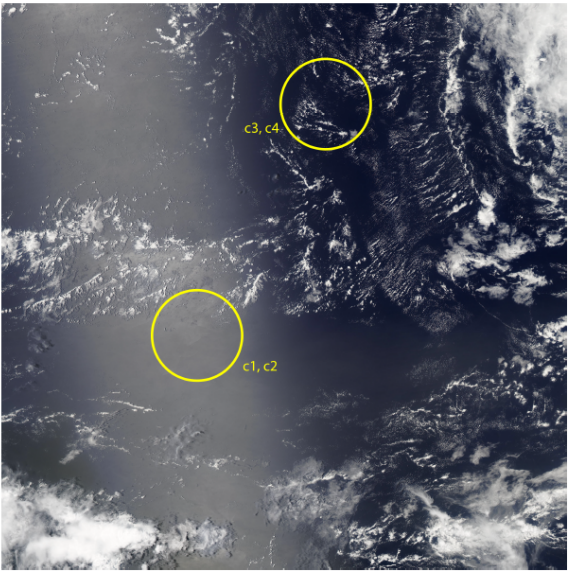
Test the possibility to measure divergence profiles by using dropsondes (Bony & Stevens, JAS, in press)

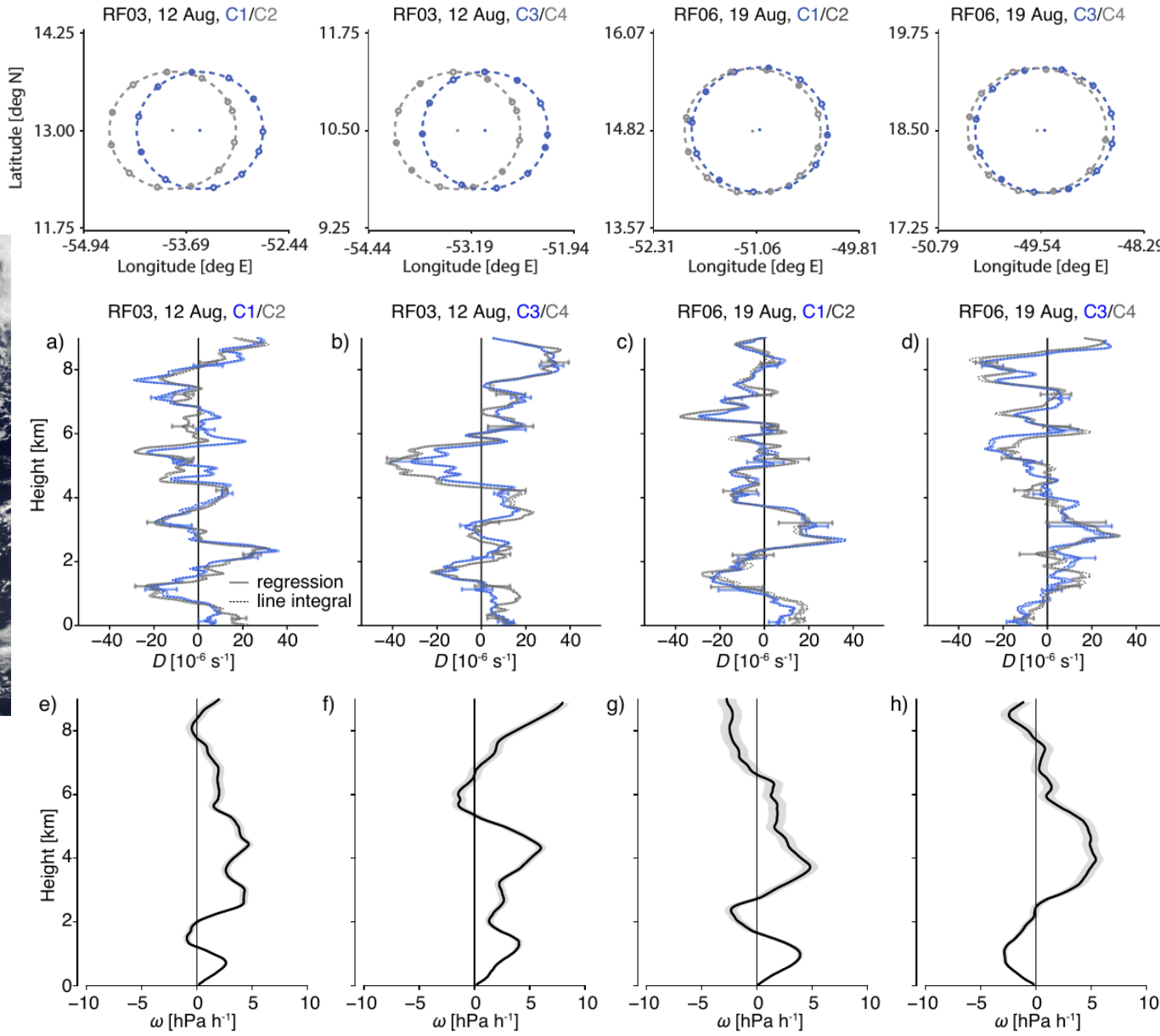
- HALO aircraft, circular flights, radius ~80-90 km, 45-50 min
- 12 dropsondes along each circle (i.e. one every 4 min)
- Wind profiles measured by GPS dropsondes

NARVAL
next-generation aircraft remote-sensing for validation studies

Divergence and area-averaged vertical velocity measurements

RF06, 19 Aug 2016



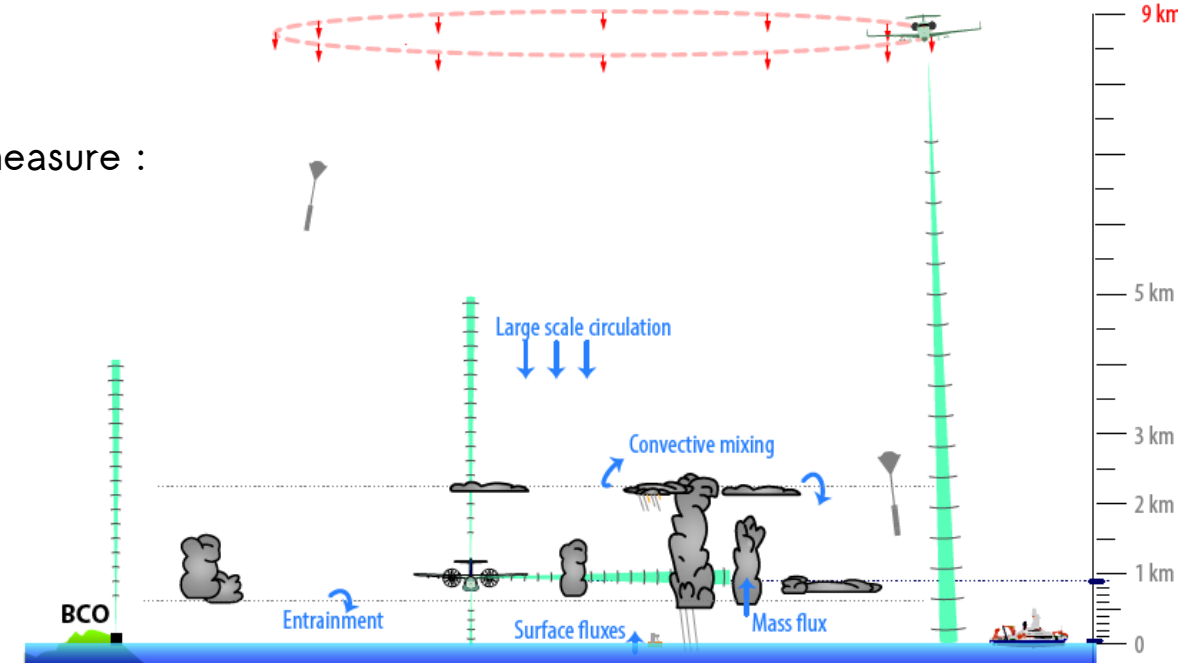


Bony and Stevens, JAS (in press)

New methodologies

The experimental strategy rests on the premises that it is possible to measure :

- Large-scale vertical motion
- Cumulus mass flux
- Cloud fraction at cloud base

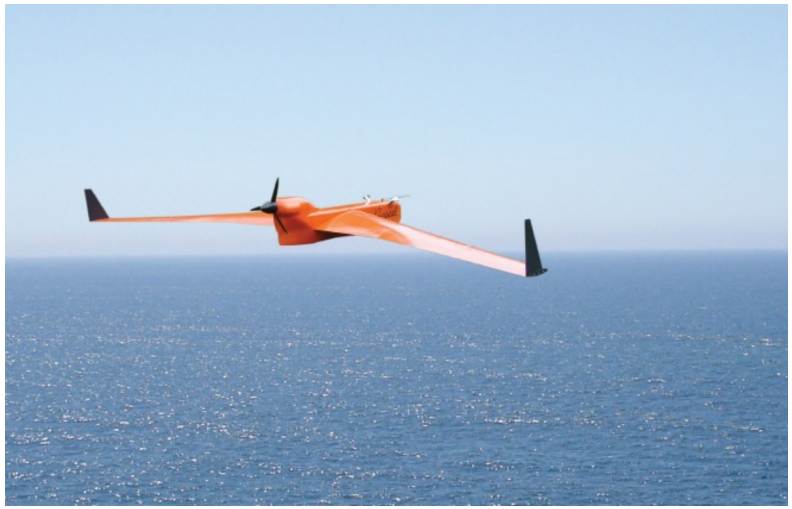


These premises have been, or are currently being tested using past field campaigns (NARVAL2), LES simulations, instrument simulators and experimentation with an ultralight aircraft.

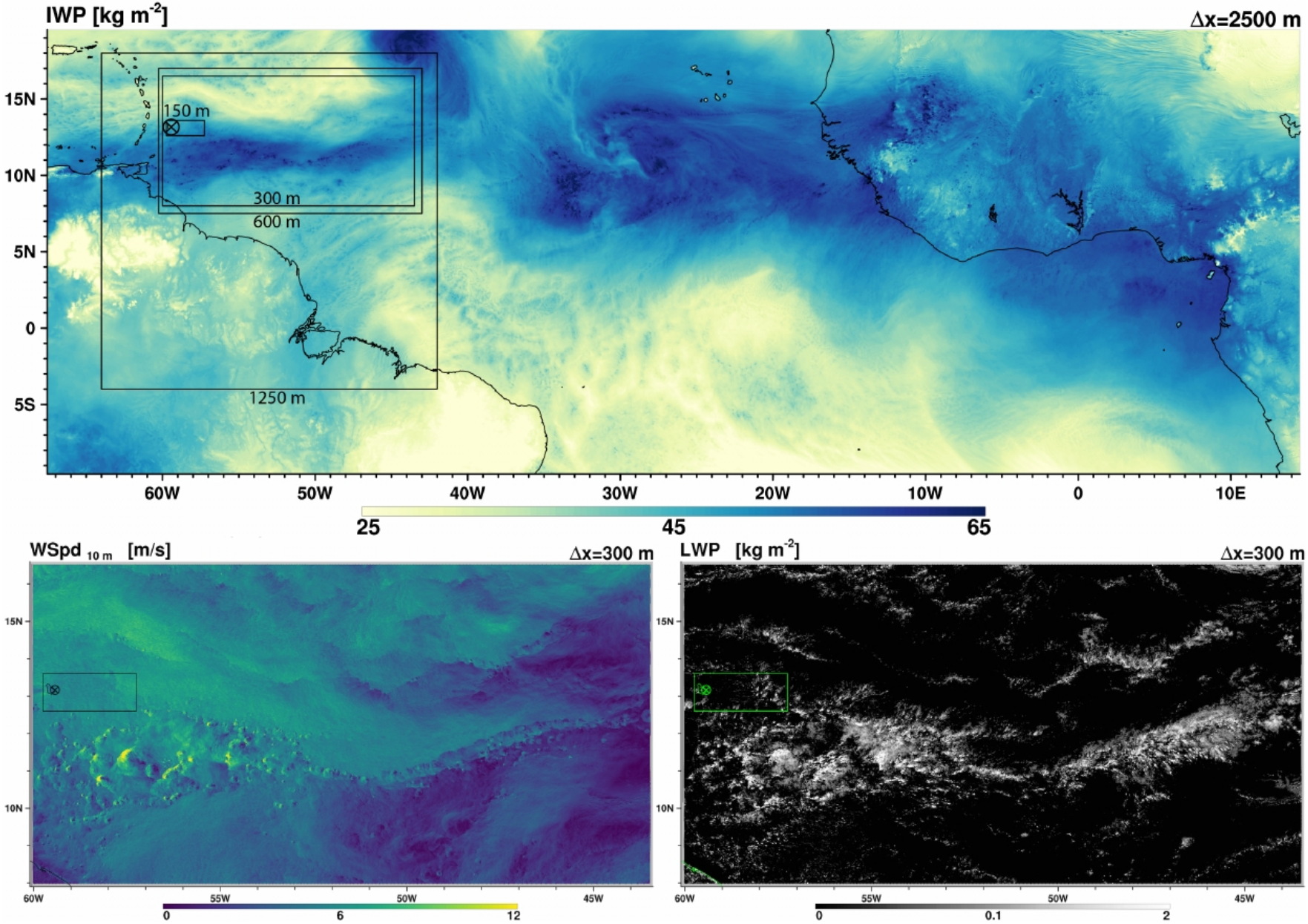
Mesoscale variability of T, q, turbulence, radiation in the subcloud layer

- aircraft data (HALO dropsondes, ATR in-situ)

- Boreal UAV (CNRM)



High-resolution atmospheric modeling (CRM, LES)



Stevens et al., BAMS (in press)


Thank you