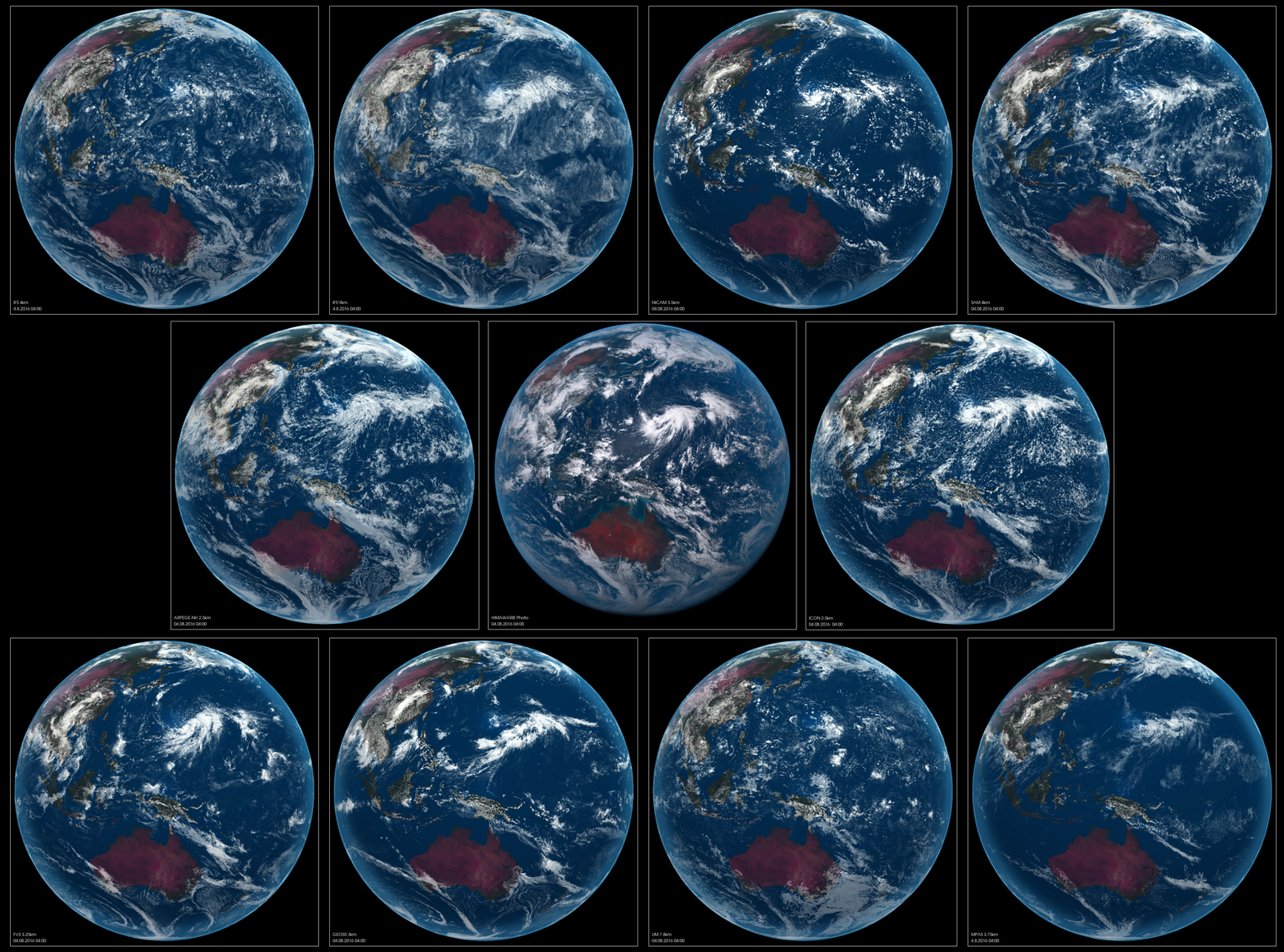
Global Storm Resolving Simulations are becoming more common place



Stevens, Satoh et al., *PEPS*, 2019

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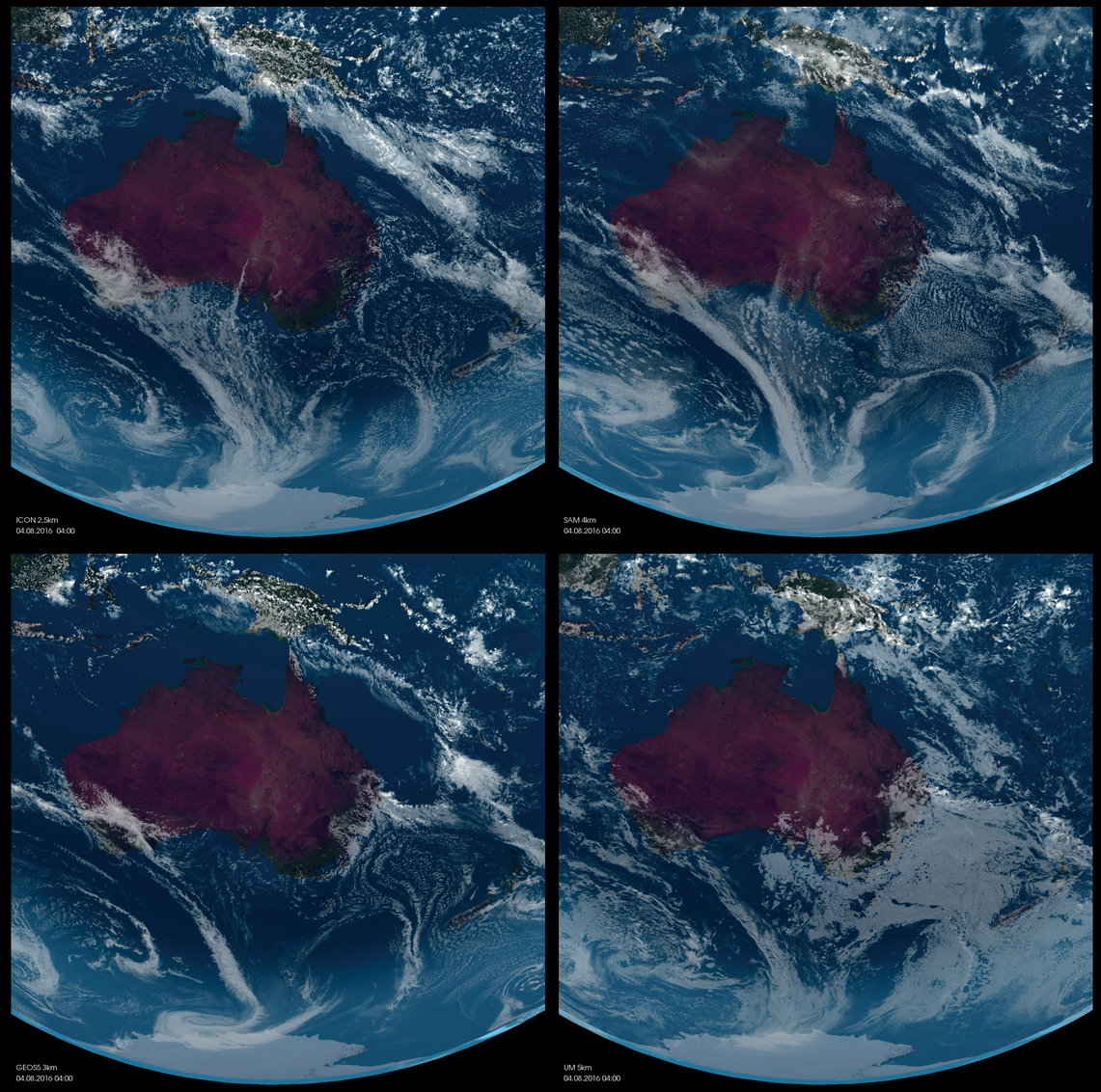
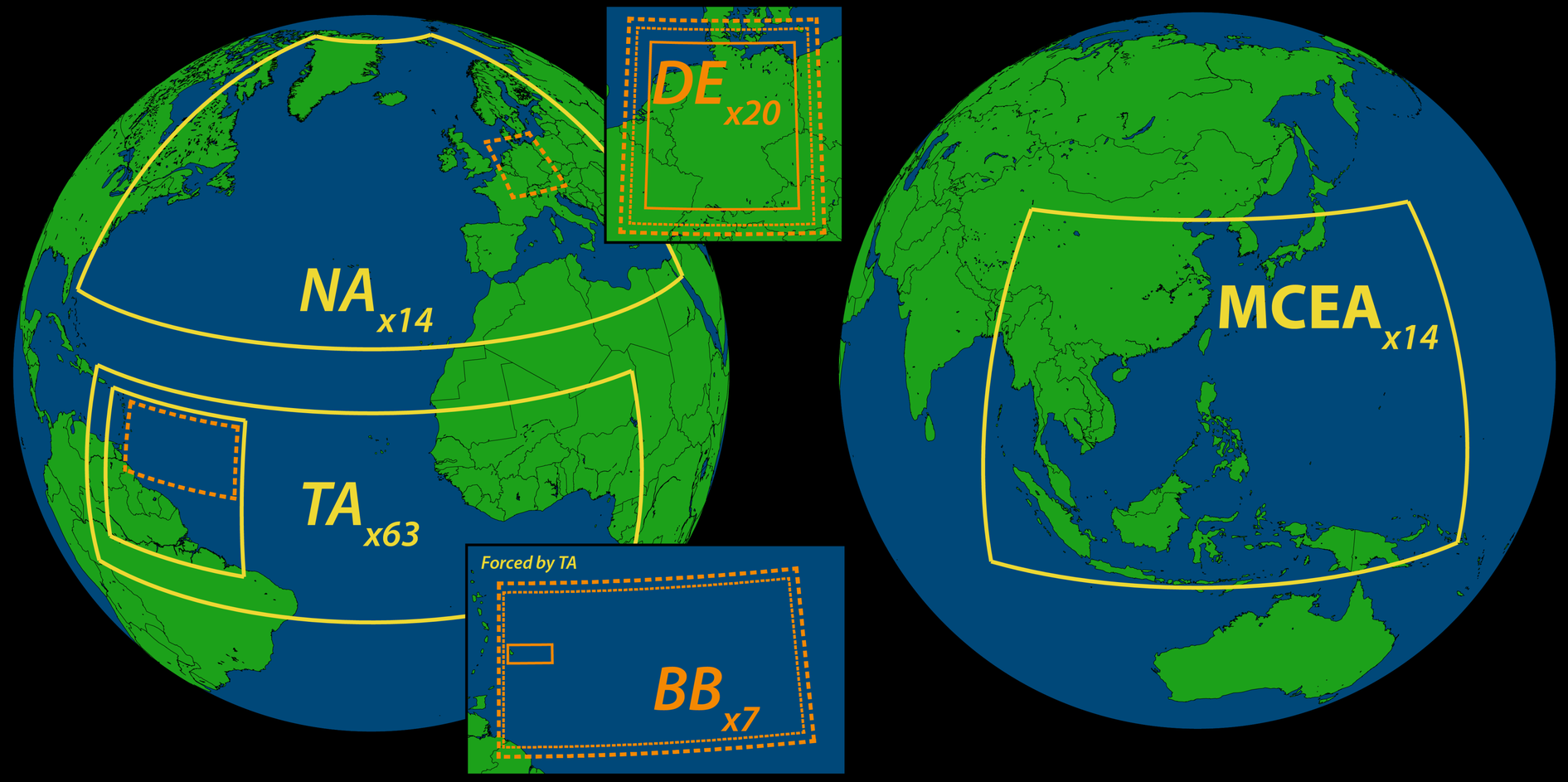


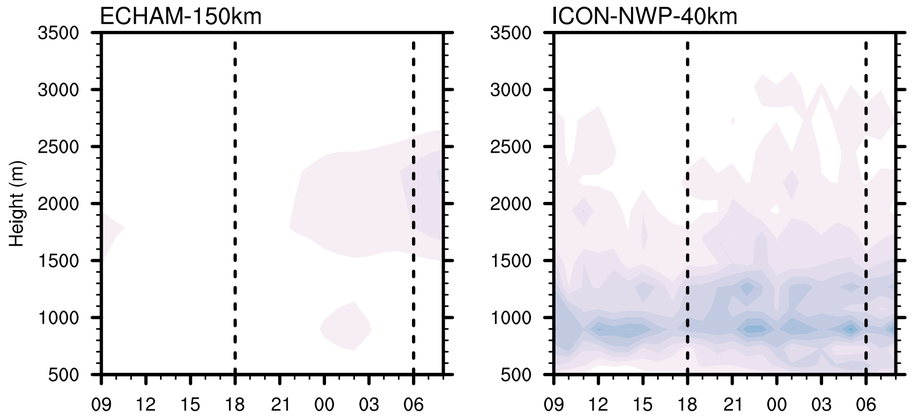
Stevens, Satoh et al., *PEPS*, 2019

The hierarchical HD(CP)² domains:



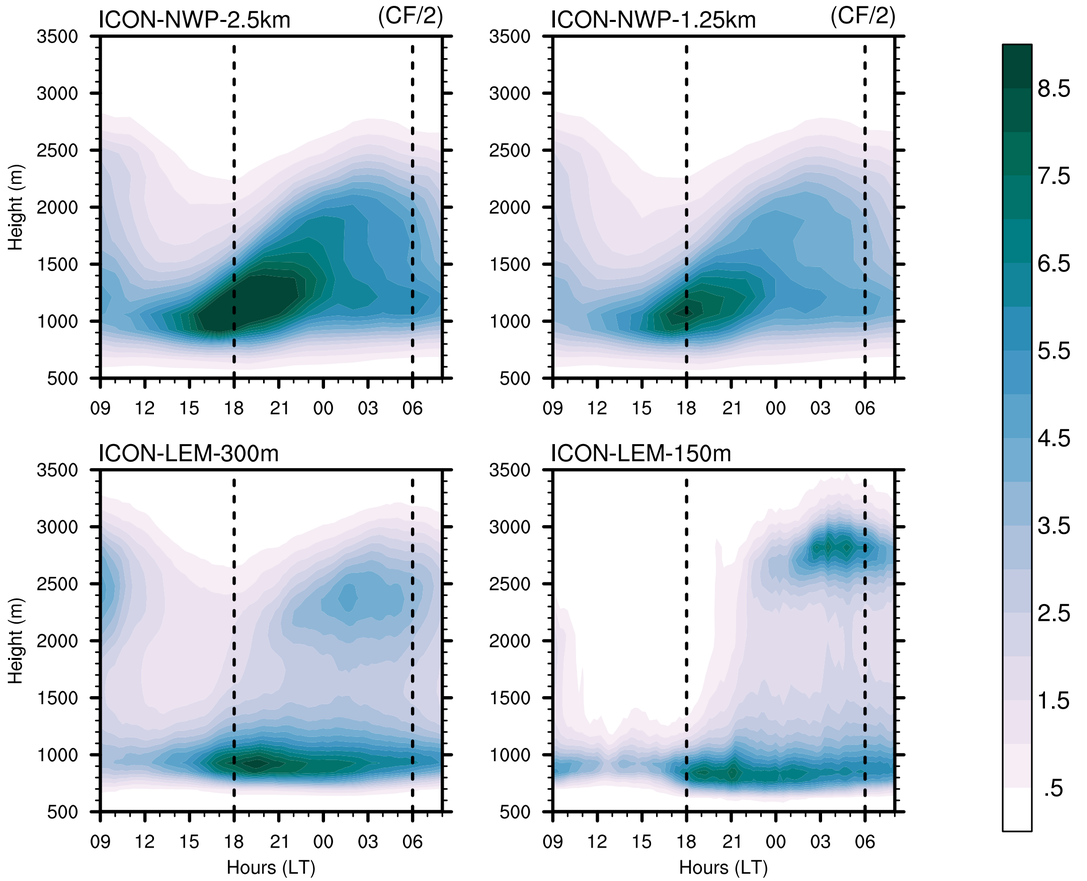
Cloud fraction simulated over Barbados

Parameterized Convection



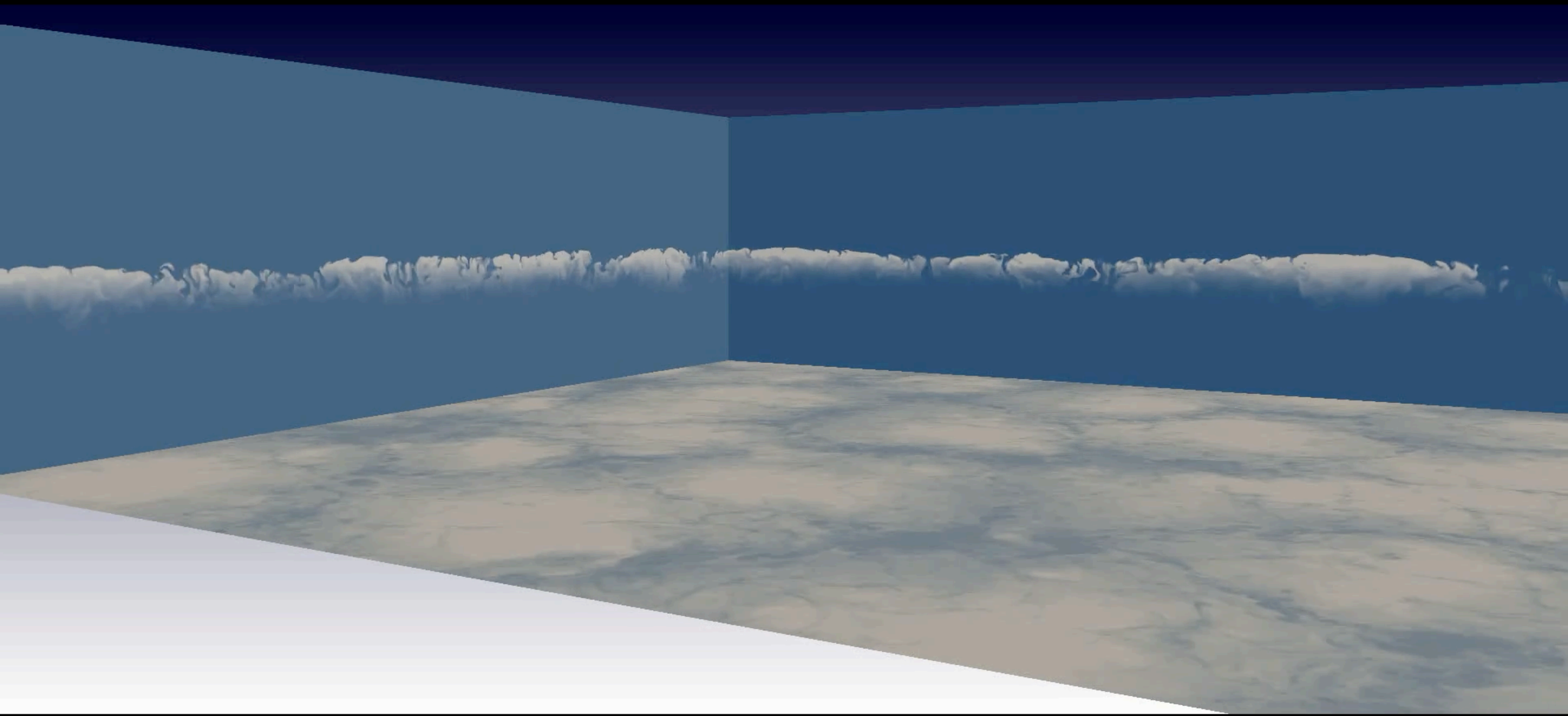
Storm Resolving Model (Δx = 2.5 km)

Large Eddy Model (Δx = O(100 m))



We don't show the observations, but they look more like the LEM

Unpublished analysis by Jessica Vial



Mellado et al., *J. Adv. Model. Earth Syst.* 2918

First full DNS of cloud-topped boundary layer demonstrates convergence at 0.5 m

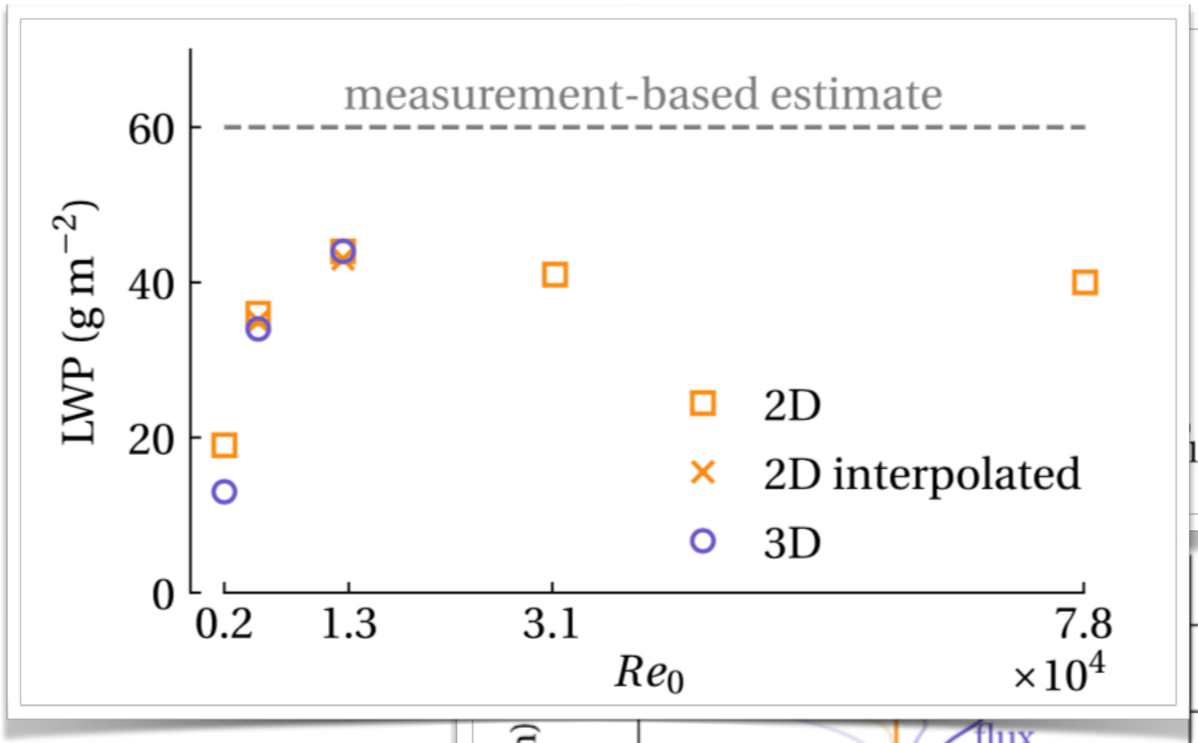
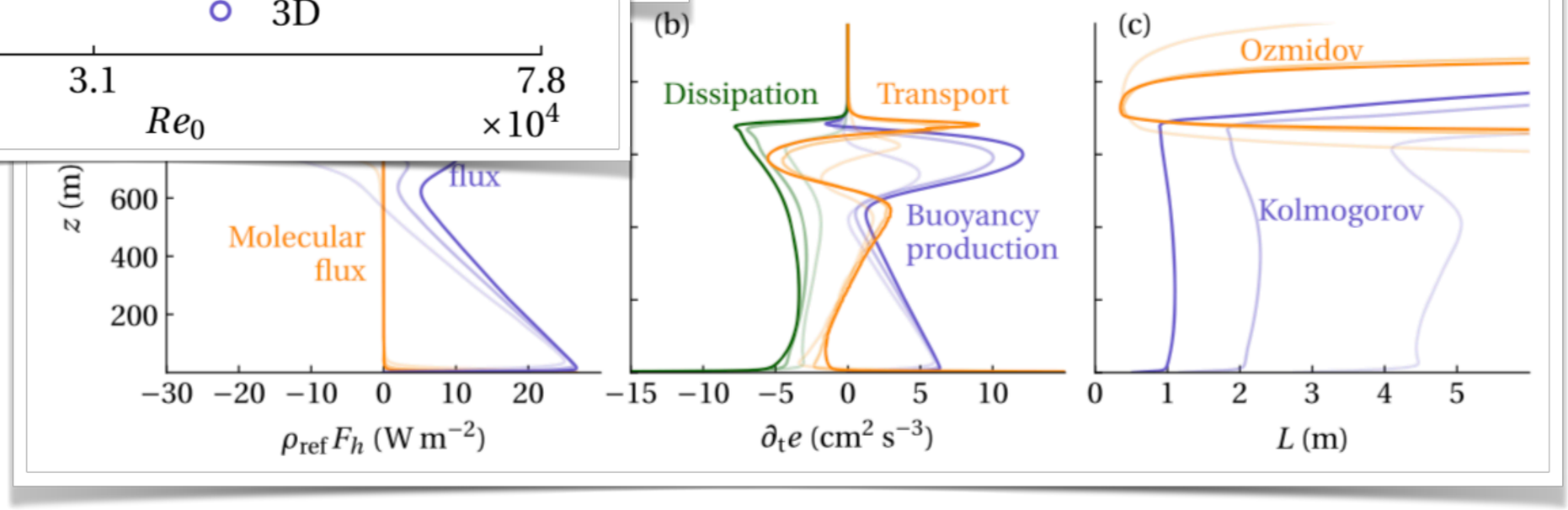


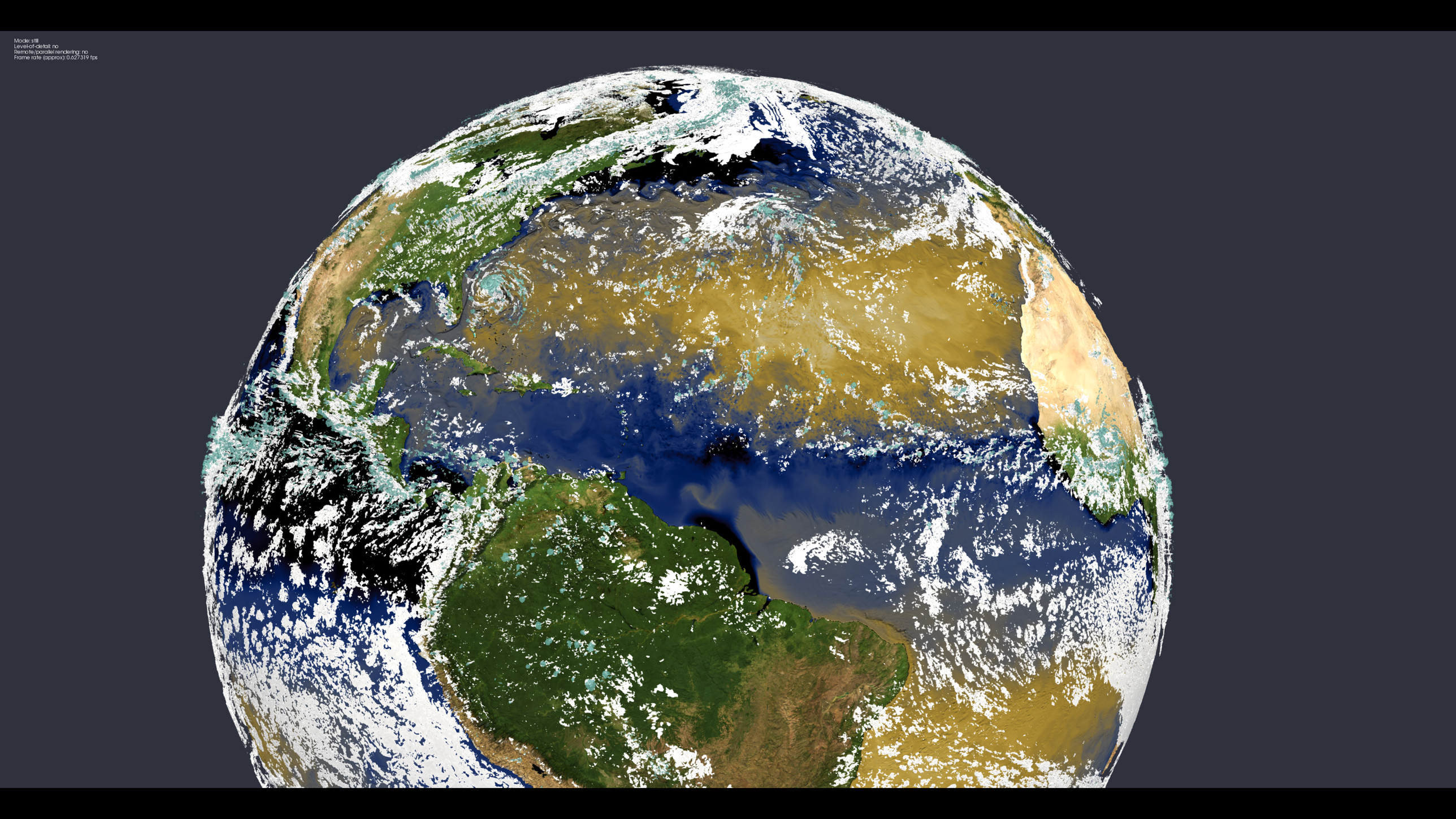
Table 2
Reynolds Number Dependence of the Mean Entrainment Velocity

Re_0	η_0	w_e^{tur}	w_e^{mol}	w_e^{rad}	w_e^{def}	w_e
2000	2.8 m	1.6	1.0	1.0	−1.9	1.7
5000	1.4 m	2.8	1.0	1.4	−0.1	5.1
12500	0.7 m	3.1	0.7	1.2	0.9	5.9

Note. All velocities are in mm/s. Columns 3–5 are averages between $t = 3.4$ and $t = 4.1$ hr.



Mellado et al. *J. Adv. Model. Earth. System.* (2018)


Mode: still
Level-of-detail: no
Remote/parallel rendering: no
Frame rate (approx): 0.627319 fps

EUREC⁴A

- We have the capacity to simulate globally on O(3km) grids for periods of months to years.
- These simulations are being nested and used to drive simulations on O(1km) grids for periods of hours to days.
- We've begun an enterprise focused on coupled global simulations on global 5 km grids, on decadal time-scales.
- I would also like to push this to higher resolution locally to also look at air-sea interaction on the storm scale; here coupling to momentum transport (of the type Jim talked about yesterday) is coming into greater focus.
- We hope that EUREC⁴A can be an example of a 'modern' air-sea interaction experiment and provide a sub-tropical reference point for introducing and further exploring these questions — but here there is also an expertise gap.