Global Storm Resolving Models & EarthCare

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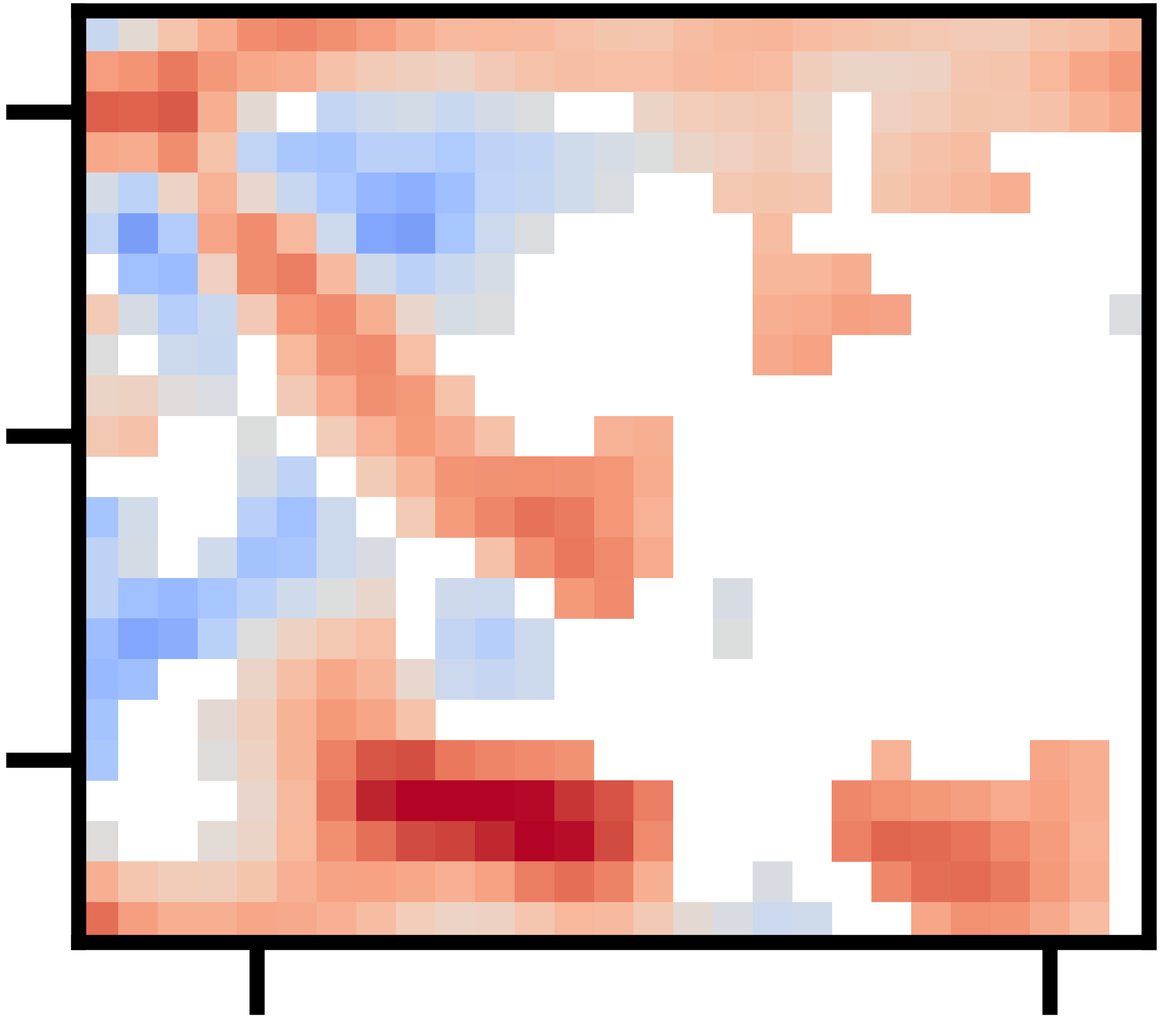
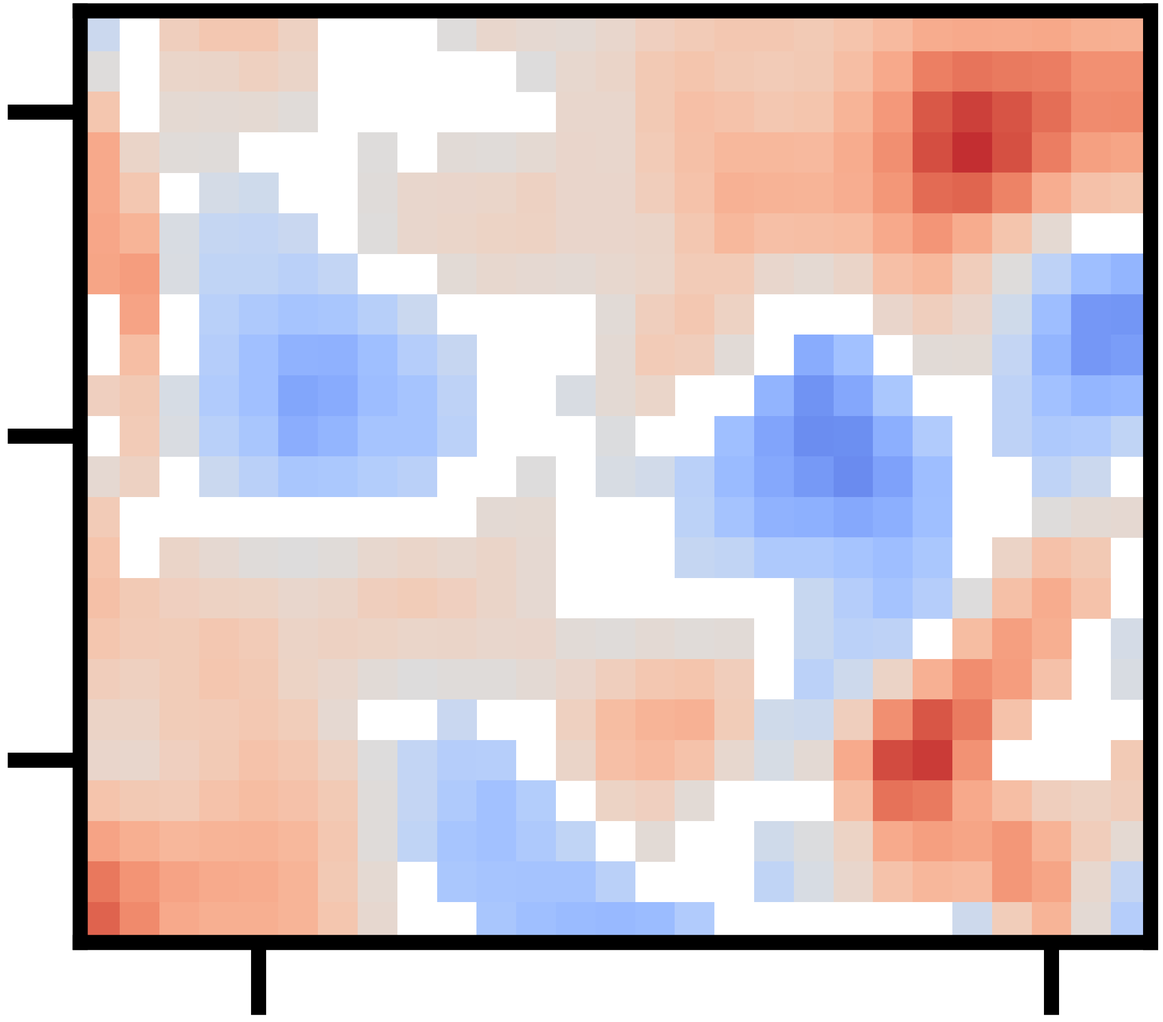
clouds couple to circulation … we can now observe and simulate both — globally.

02.02T12 | 0.59

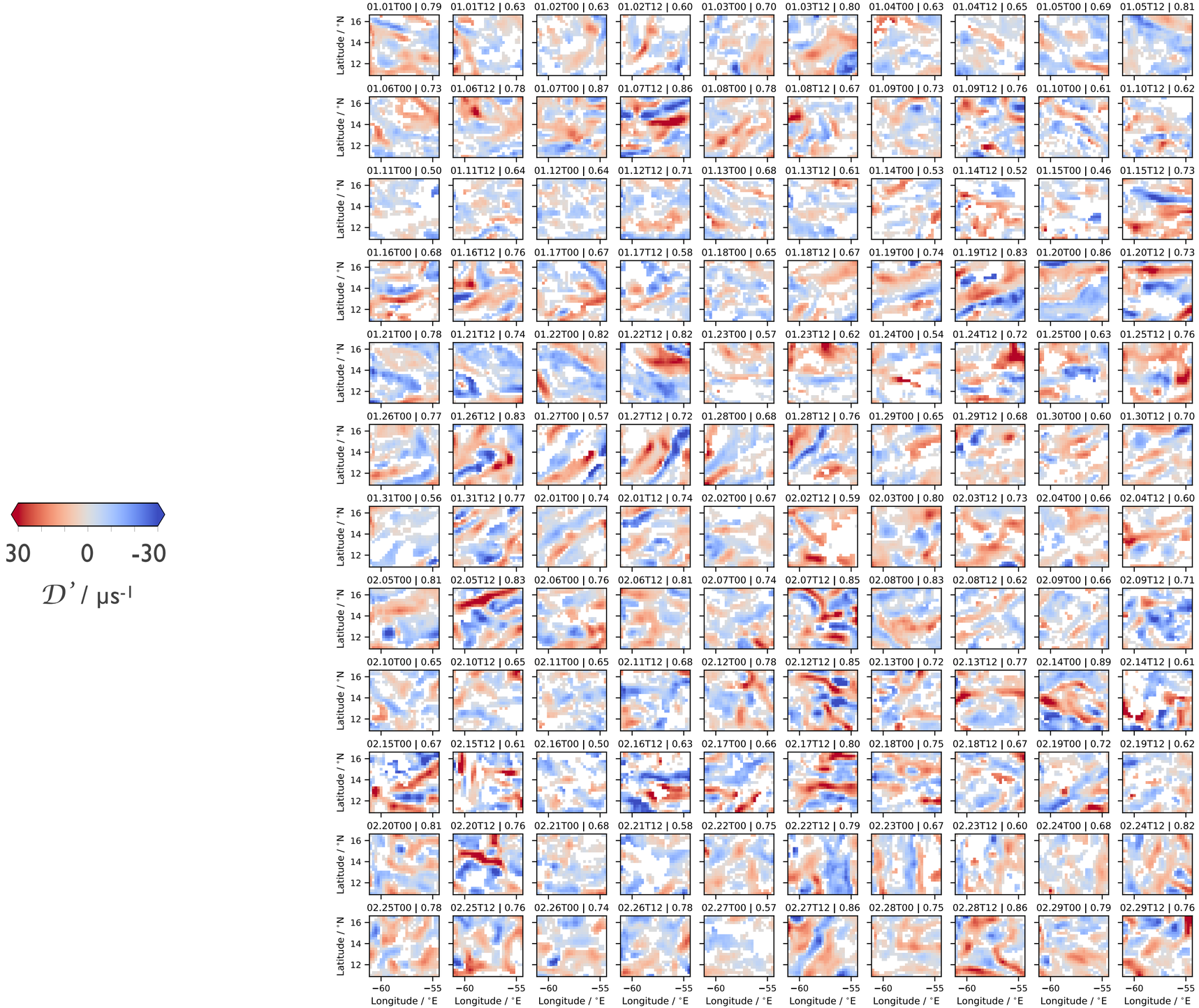


02.03T00 | 0.80



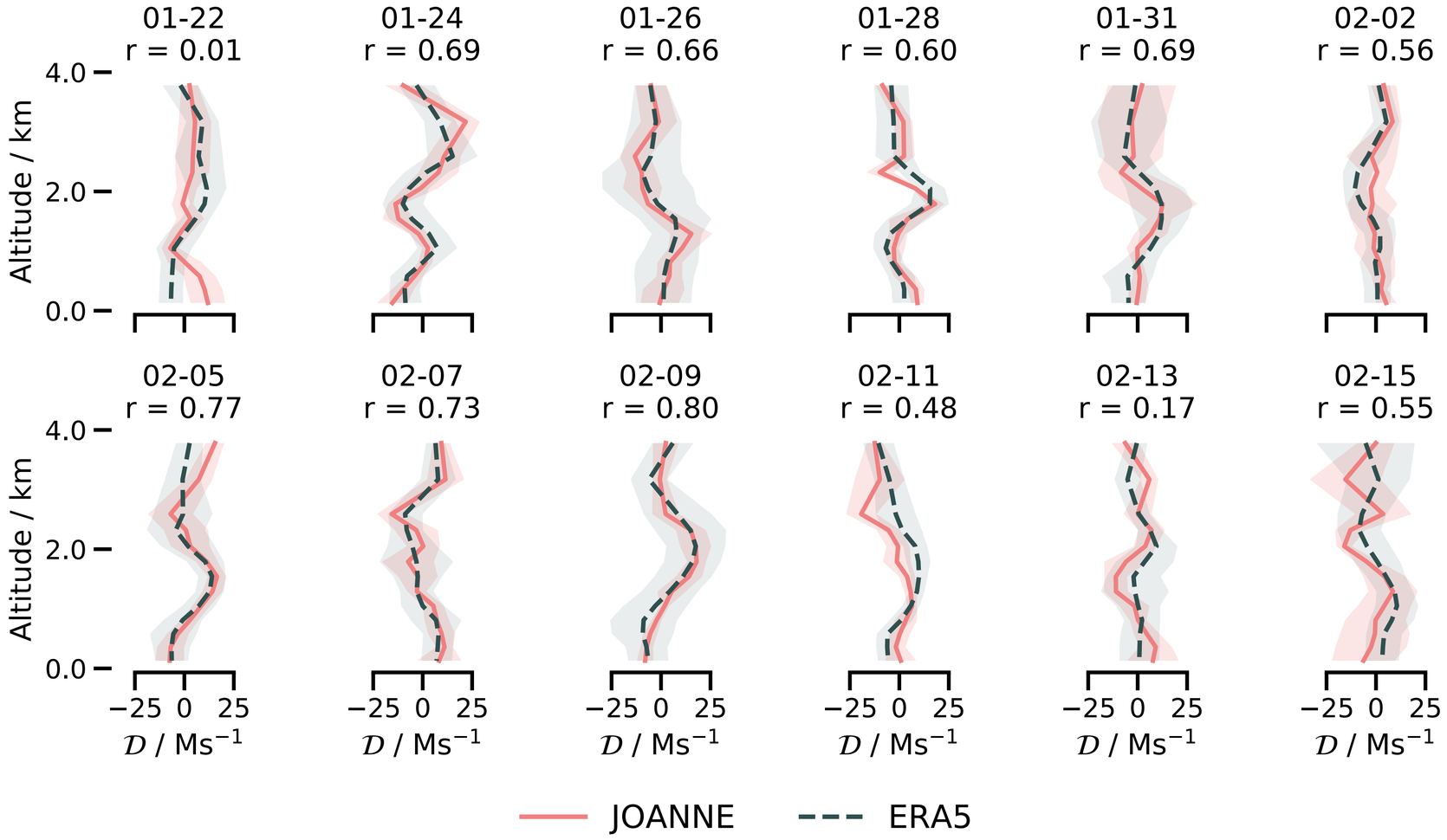
02.07T12 | 0.85

02.08T00 | 0.83



Geet George, B. Stevens, S. Bony, AK Naumann, R. Vogel, in preparation (2022)

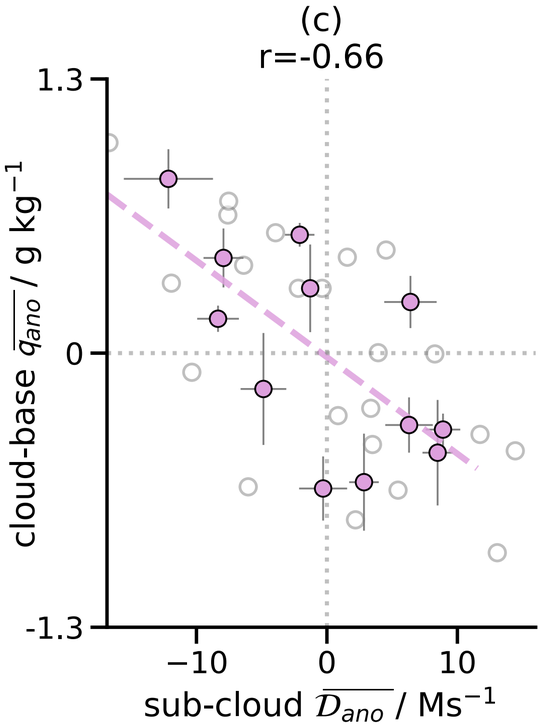
JOANNE vs ERA Divergence Profiles on EUREC⁴A Flight Days

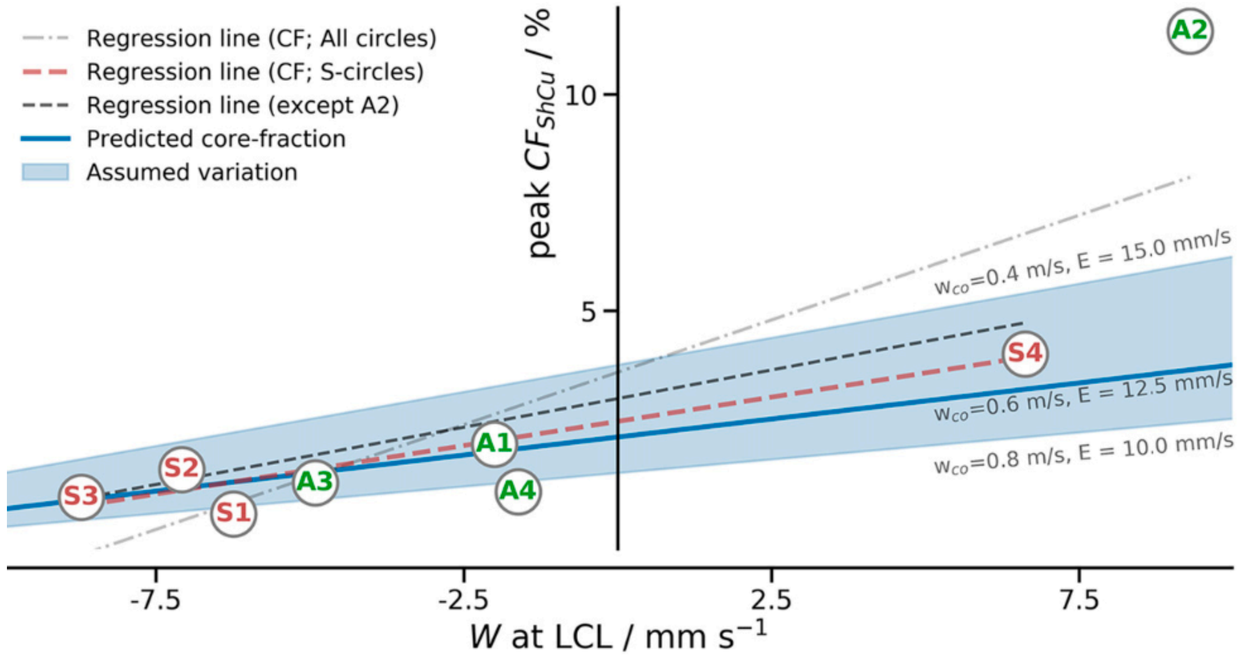


These seem real, constrained perhaps from Scatterometer winds ?

Geet George, B. Stevens, S. Bony, AK Naumann, R. Vogel, in preparation (2022)

The circulations are covary with moisture and cloudiness



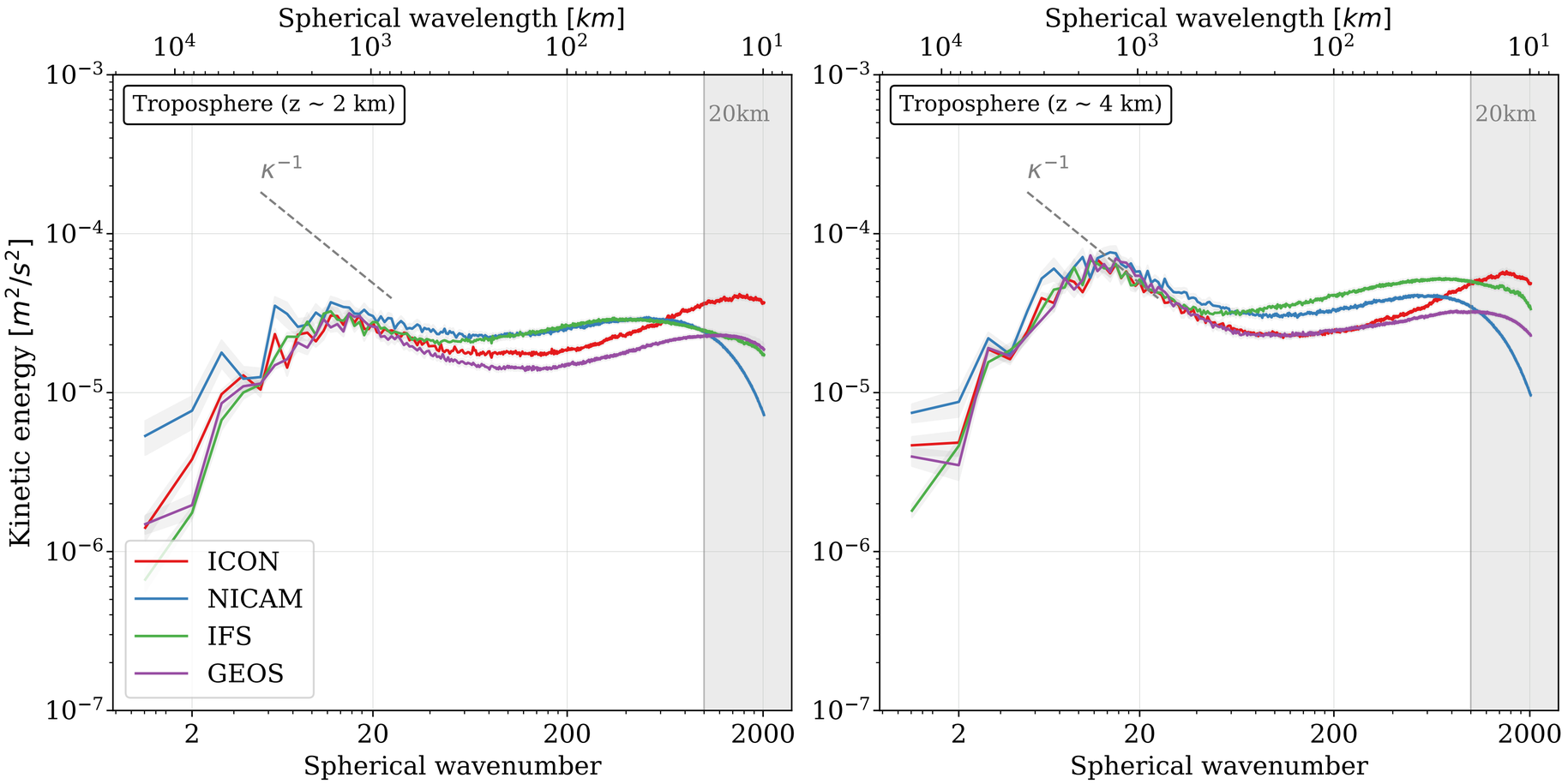


We claim causality (circulations as driving), but also find evidence for coupling between cloud/moisture anomalies and the circulations.

Geet George, B. Stevens, S. Bony, AK Naumann, R. Vogel, in preparation (2022), George, Stevens, Bony, Klingebiel, and Vogel (2021)

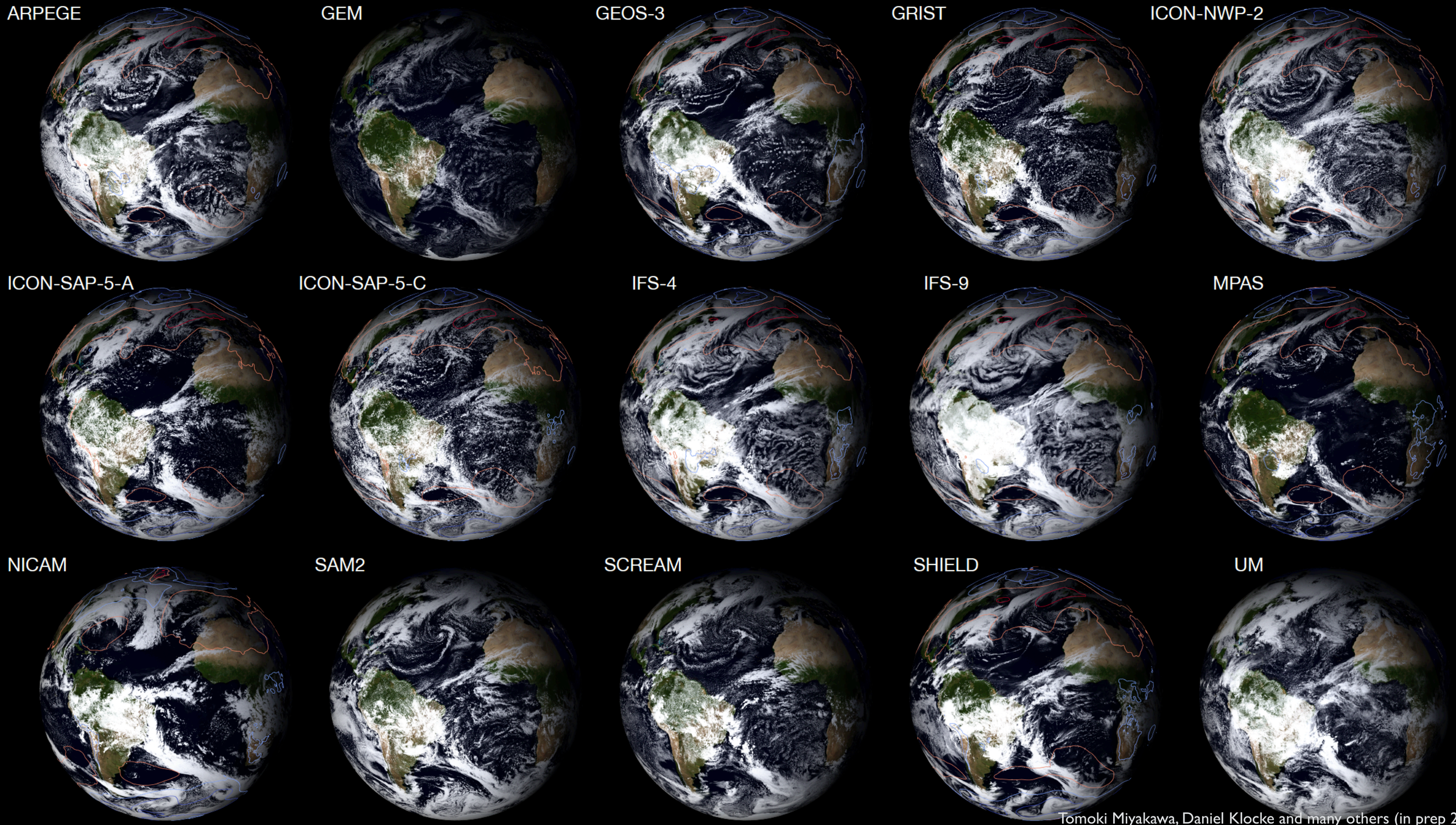
clouds couple to circulation … we can now observe and simulate both — globally.

The dark energy of the climate system



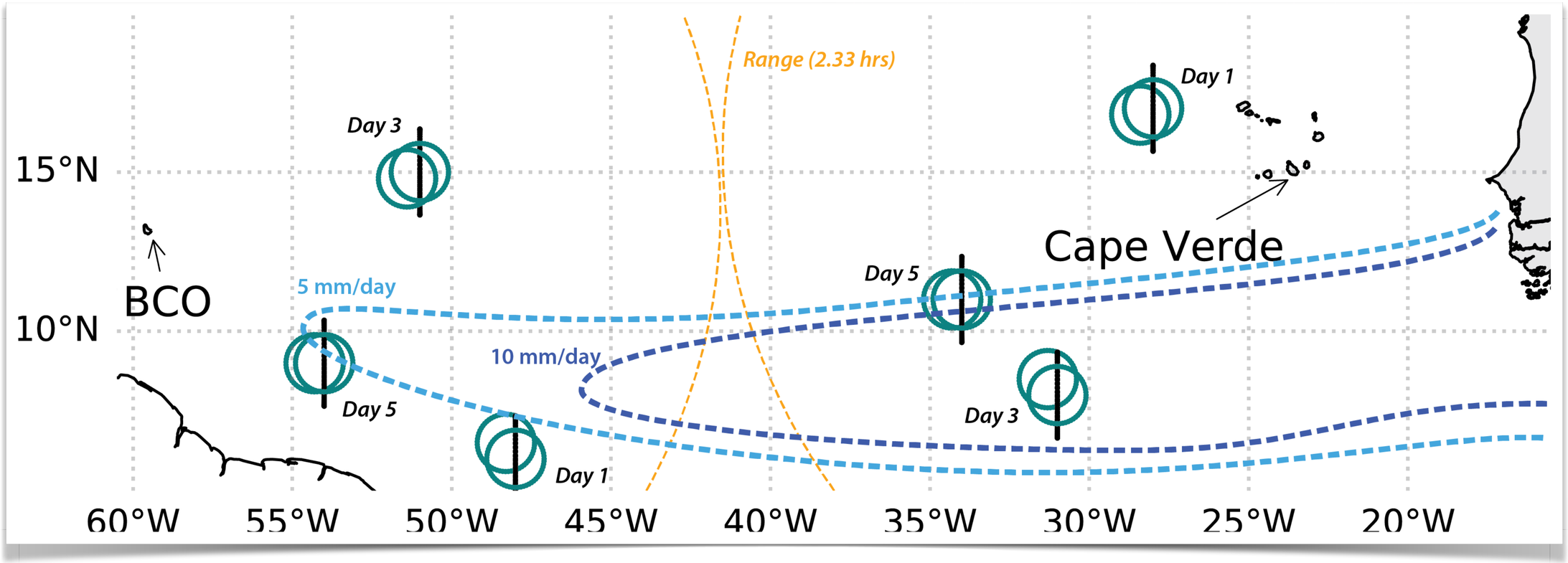
GSRMs are a telescope into previously unseen forms of atmospheric energy

Yanmichel Morfa and Claudia C. Stephan, in preparation (2022)



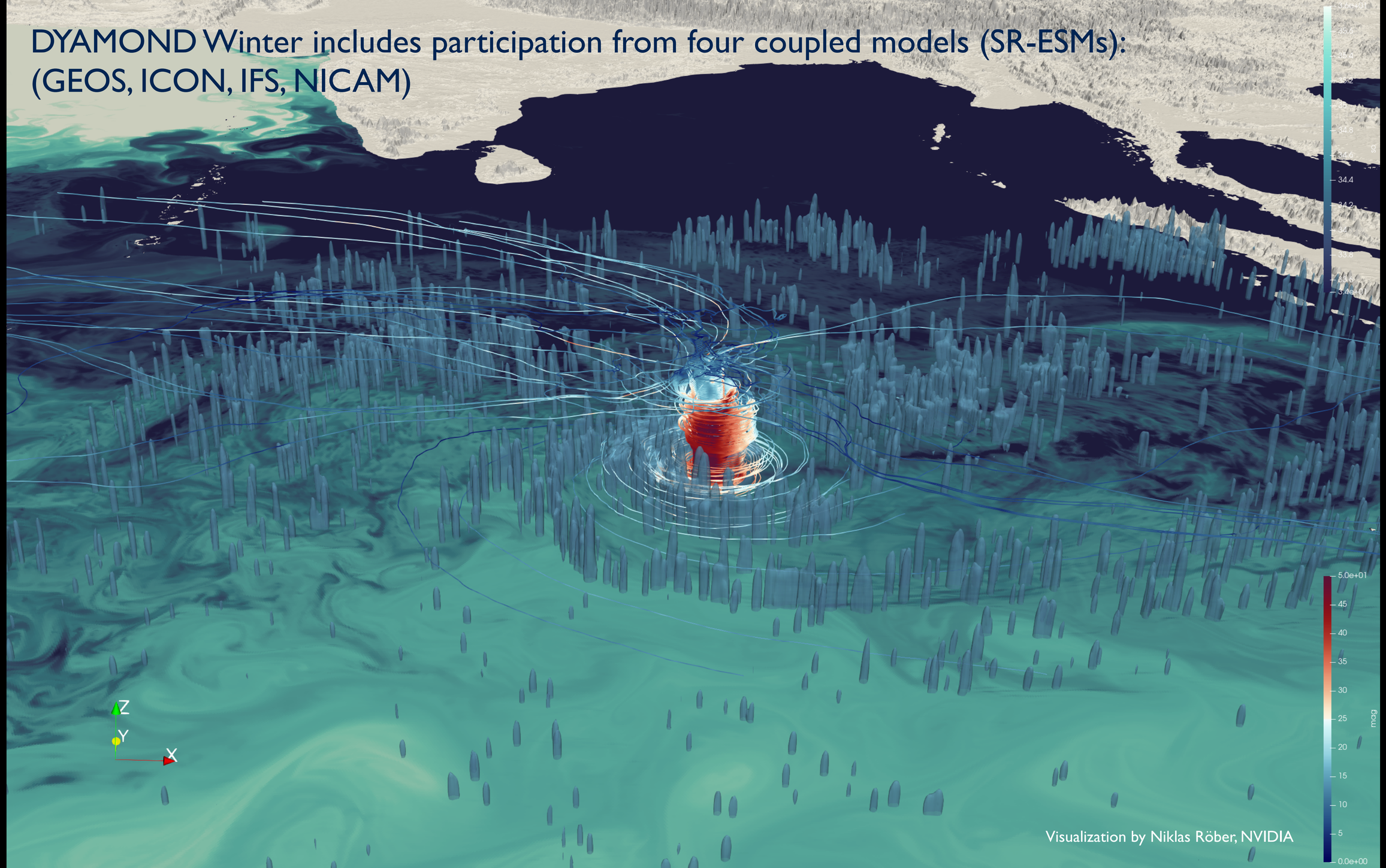
Tomoki Miyakawa, Daniel Klocke and many others (in prep 2022)

EarthCARE — Tropical Oceans and Organized Convection



We hope it will teach us how to use EarthCARE data more generally

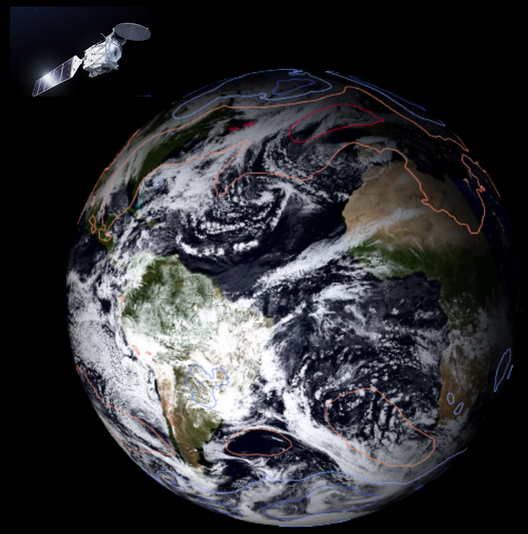
DYAMOND Winter includes participation from four coupled models (SR-ESMs): (GEOS, ICON, IFS, NICAM)



Visualization by Niklas Röber, NVIDIA

2024

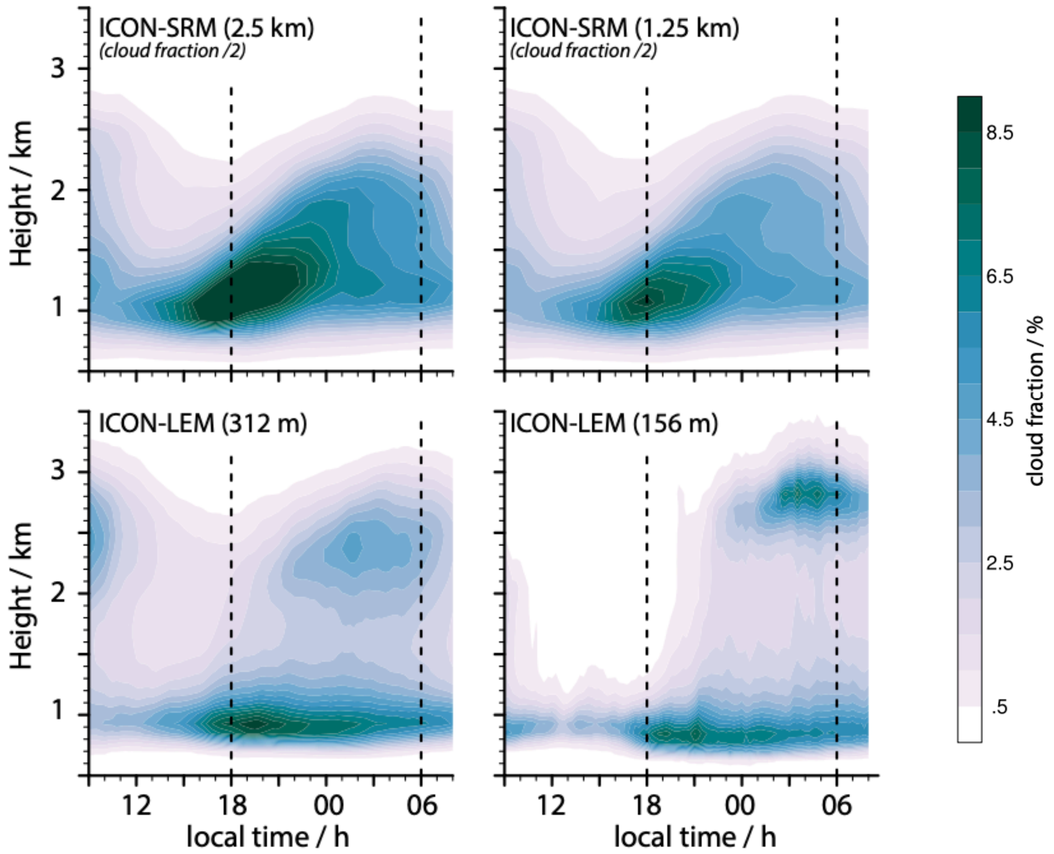
- Calling GSRMs high resolution climate models is like calling ice very cold water.
- One of the important differences is their ability to bring modeling and observations together in the same space… they simulate what we observe; this makes both more interesting and helps avoid overfitting.
- The degree of synergy can be transformative… and might validate our long wait for EarthCARE; but JAXA and ESA need to play a more active role:
  - *early release of data (radar data really only after 9 months?!)*
  - *greater ambition in supporting and exploiting field and modelling studies*



EC-TOOC, like EUREC4A provides a timely opportunity to bring our best technologies to bear on the most interesting and important questions in climate science

For the EC in TOOC see following talk by Silke Groß

Biased, but physical, responses of shallow clouds to circulation



Stevens et al. (The Added value paper), *JMSJ* **98,** 2020