Looking inside Hurricane Humberto with EarthCARE & ICON-LAM

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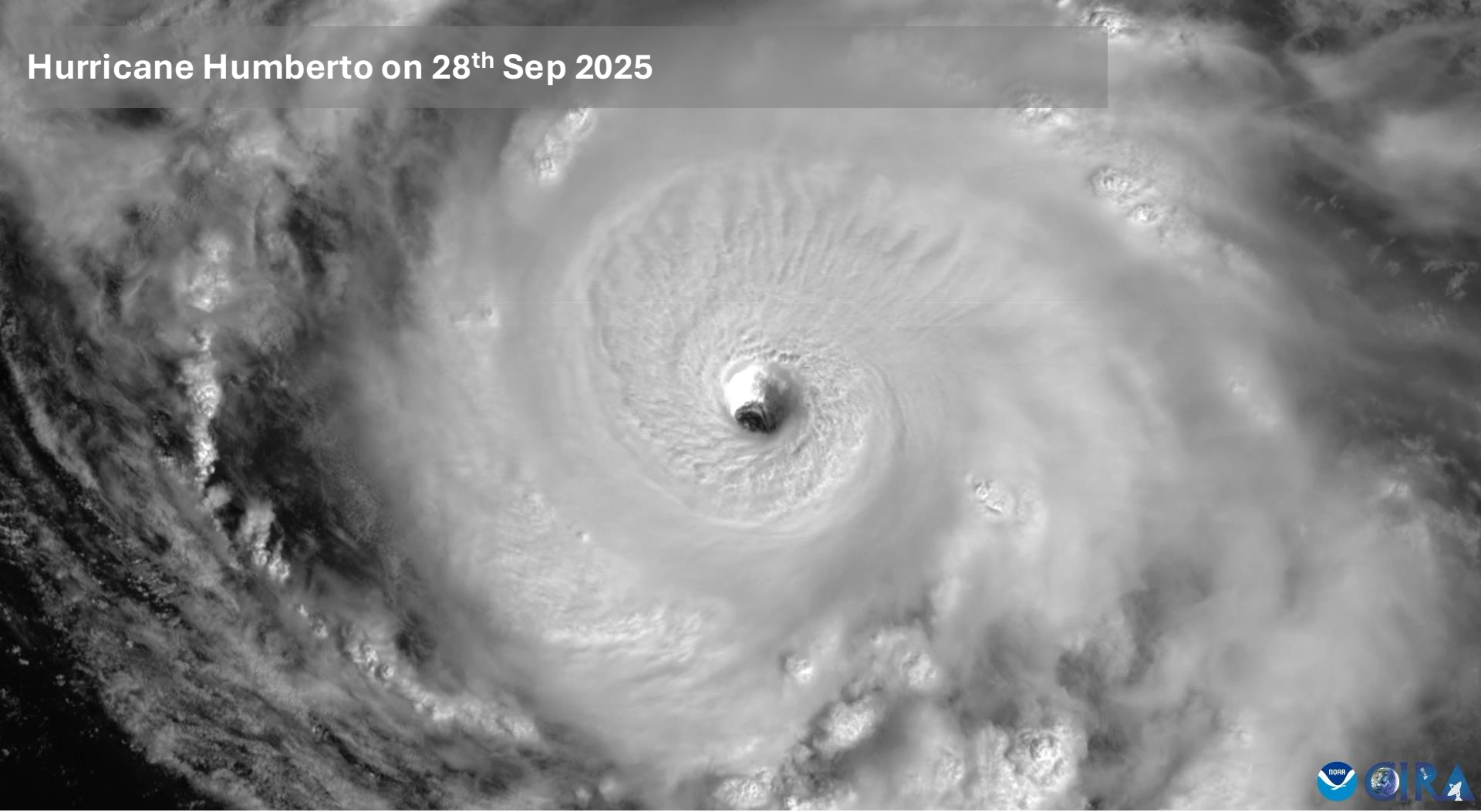
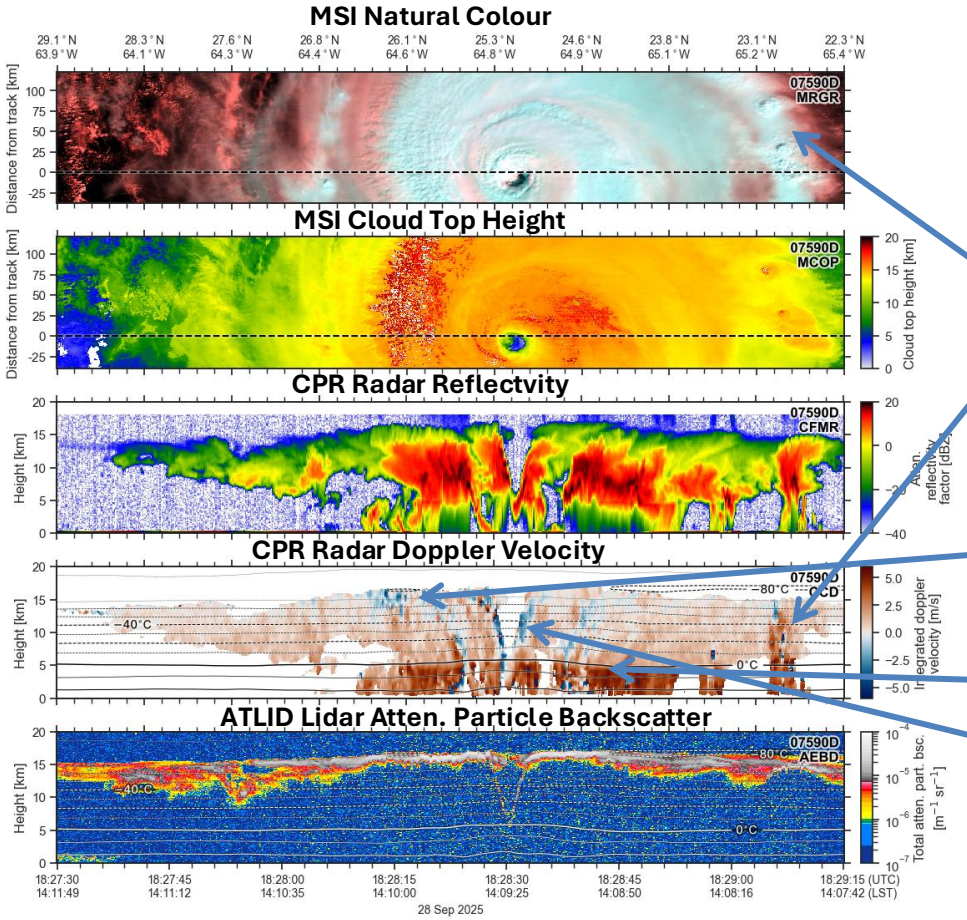

Hurricane Humberto on 28th Sep 2025
2025-09-27 | 14:10 UTC | GOES-19 | ABI | Visible (Band 2)

Hurricane Humberto on 28th Sep 2025

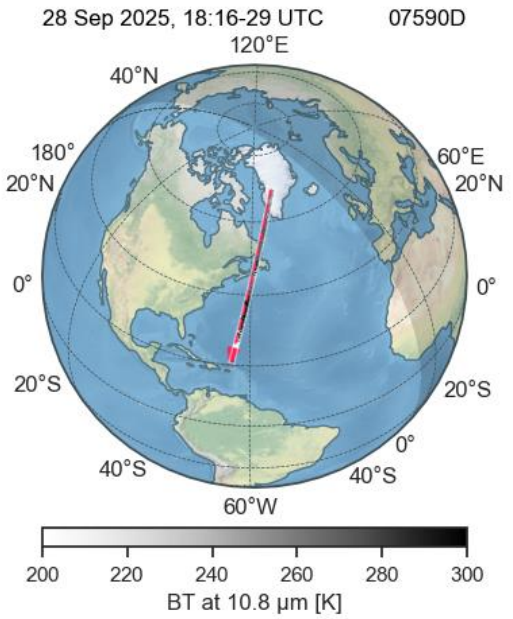


Convective rainband

Visible turbulence at the top of the clouds

Rain and snow

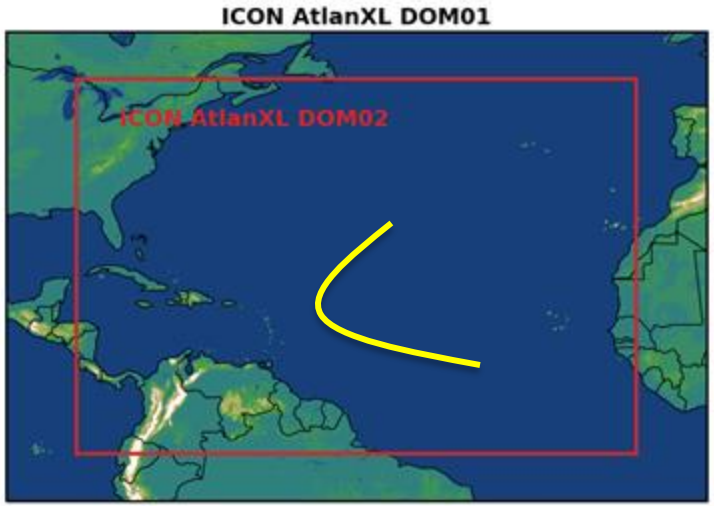
Upwards transport at the inner wall

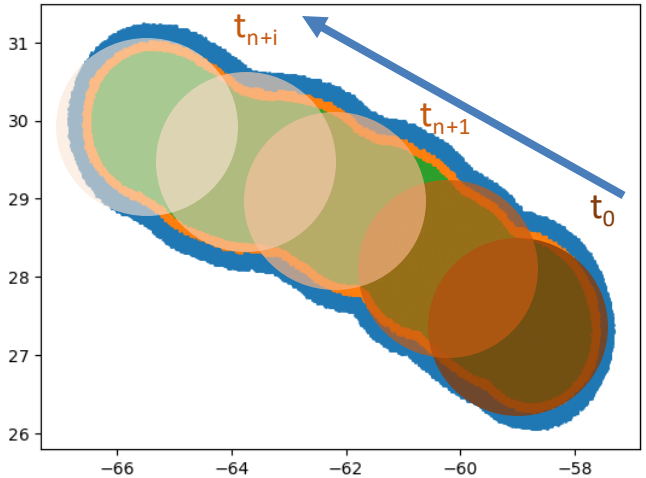


TROPOS

Setup in ICON-LAM to a hurricane centric modelling approach

- 5km (DOM01), 2.5km (DOM02) Limited Area Mode of ICON, starting 24th Sep 2025 00 UTC
- 1.2km hurricane centric setup, segments shifted every 12 hours, 25th Sep 2025 12 UTC
- 15 perturbations in fall velocities of the hydrometeors (graupel, snow, ice), CCN concentration and freezing processes





Senf and Cremer, 2026, Preprint
https://egusphere.copernicus.org/preprints/2026/egusphere-2026-1412/egusphere-2026-1412.pdf

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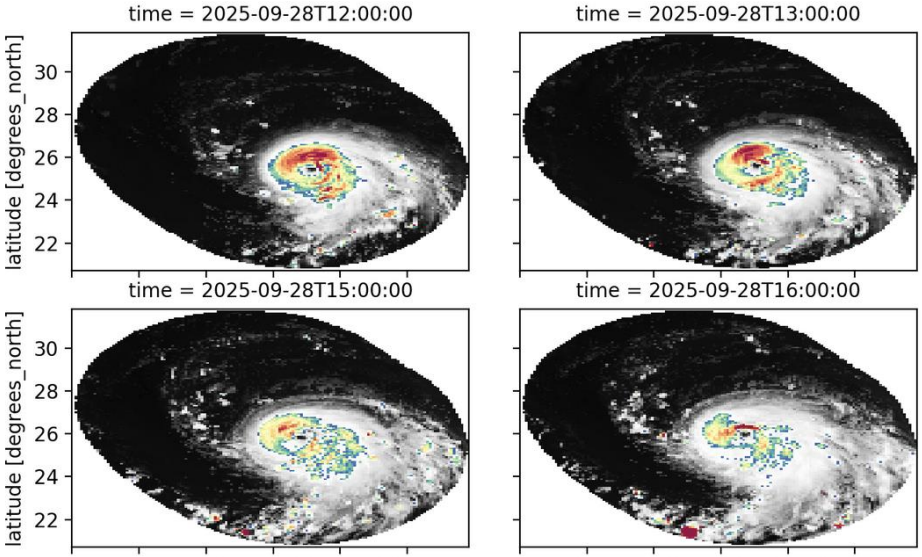

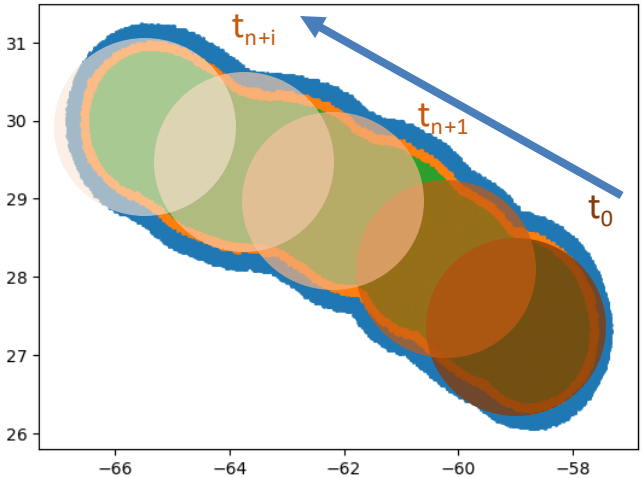

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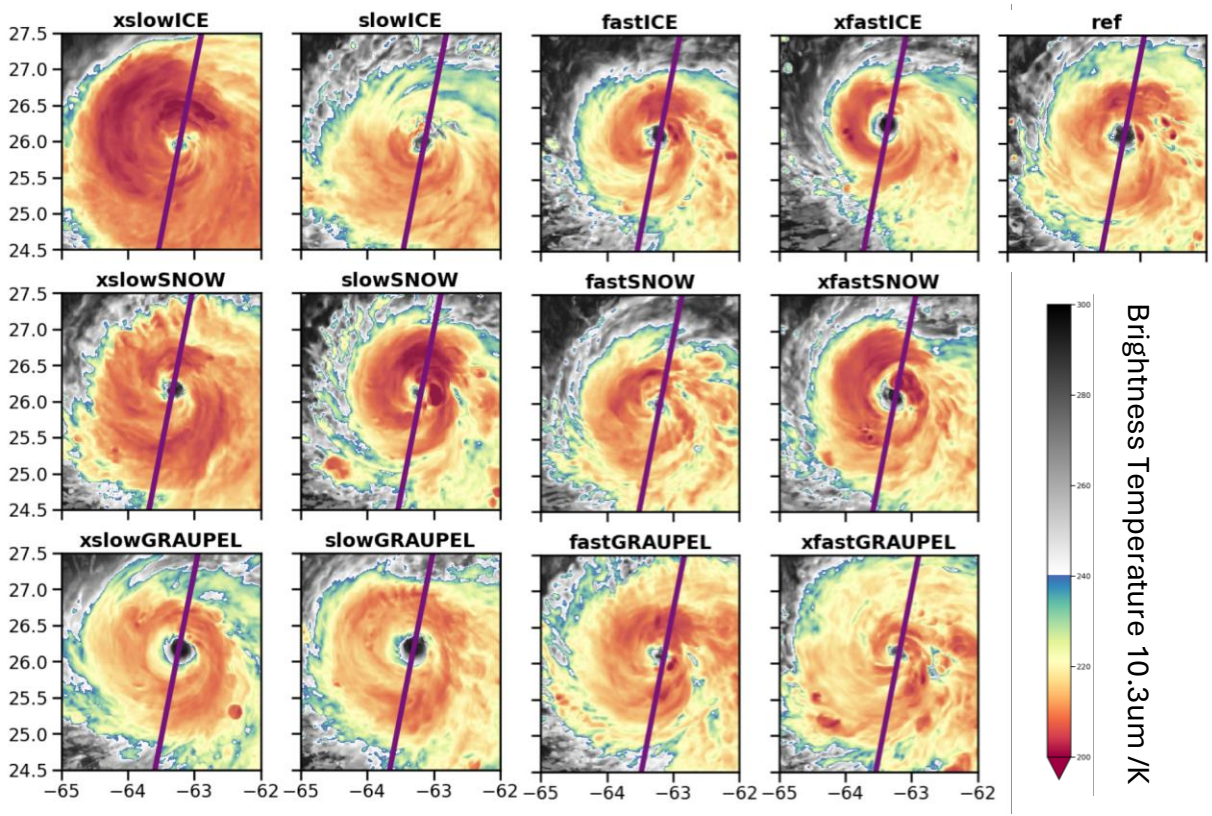
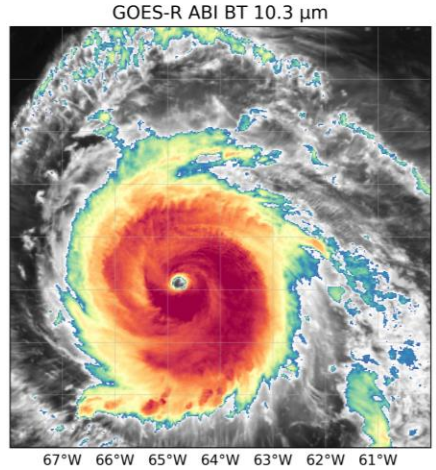
TROPOS

First look on ICON ensemble: Brightness Temperature 10.3um /K

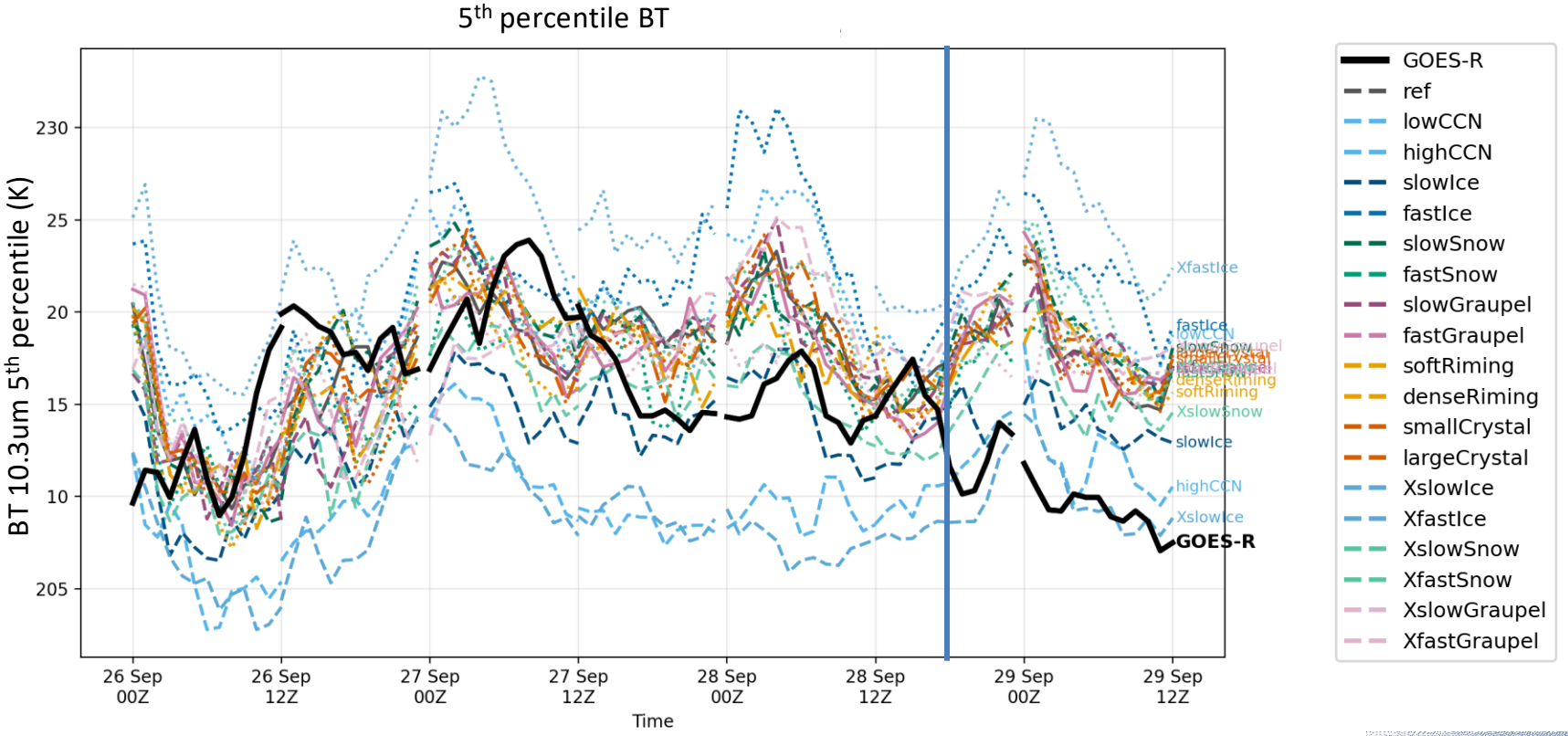




Selection from the ensemble:
1&4 col: +/- 60% falling velocity
2&3 col: +/- 30% falling velocity

TROPOS

Brightness Temperature 10.3um /K



- XslowIce (60% slower ice fall velocity) and high CCN (3200 # cm^{-3}) fit best

TROPOS

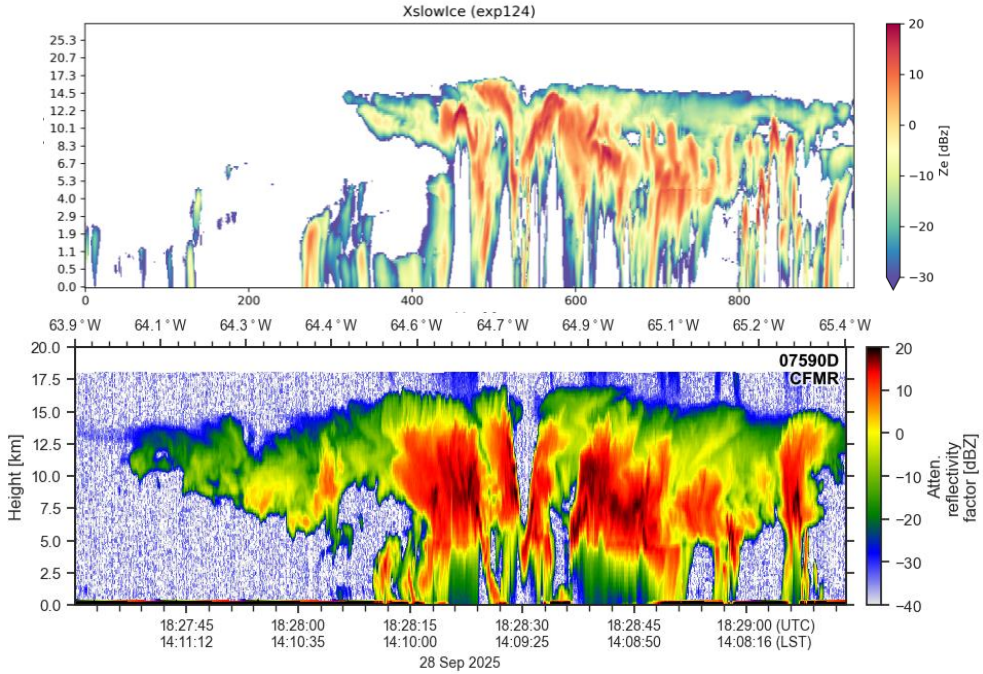
Comparison model vs satellite products

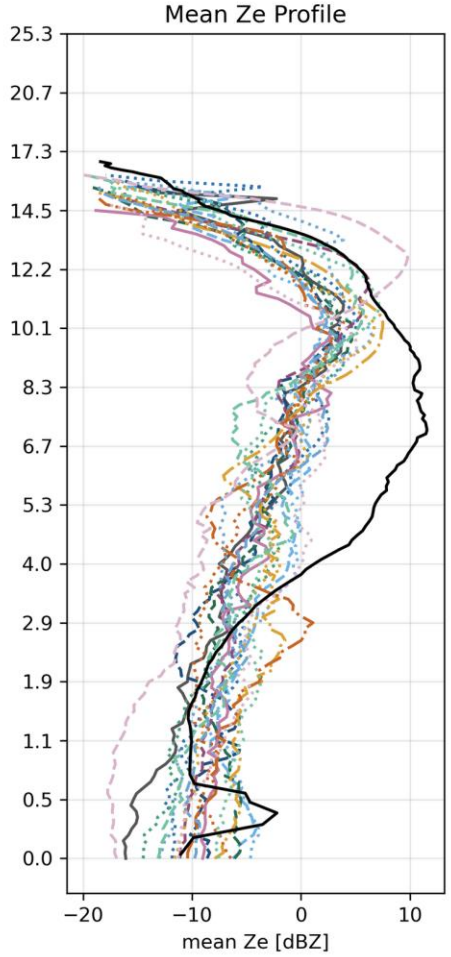
- model sensitive to graupel and ice fall velocity
- less pronounced peak and slightly higher in the model
- underestimation of reflectivity

→ leading to underestimation of storm system

Xslow Ice

EarthCARE

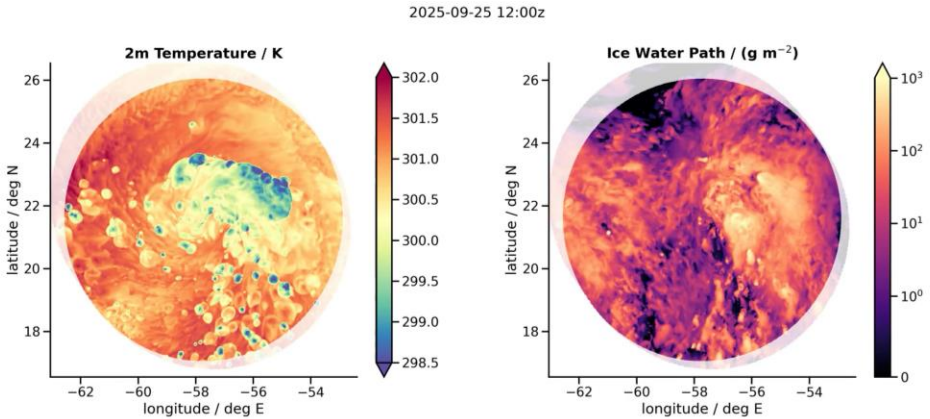




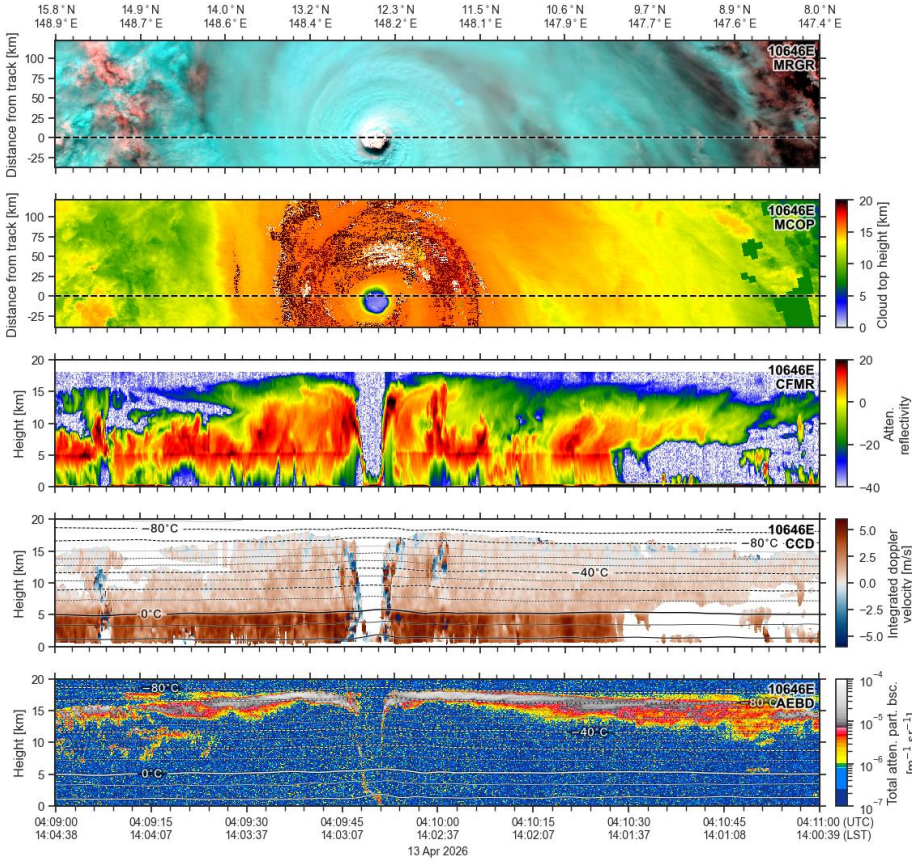
Conclusion & Outlook

- model sensitivity to ice physics,
  but hard to capture and account for
  to simulate the storm accurately
- high resolution model give amazing insides,
  but limited by computational costs &
  large amount of data produced

Poster upstairs by Sebastian Bley

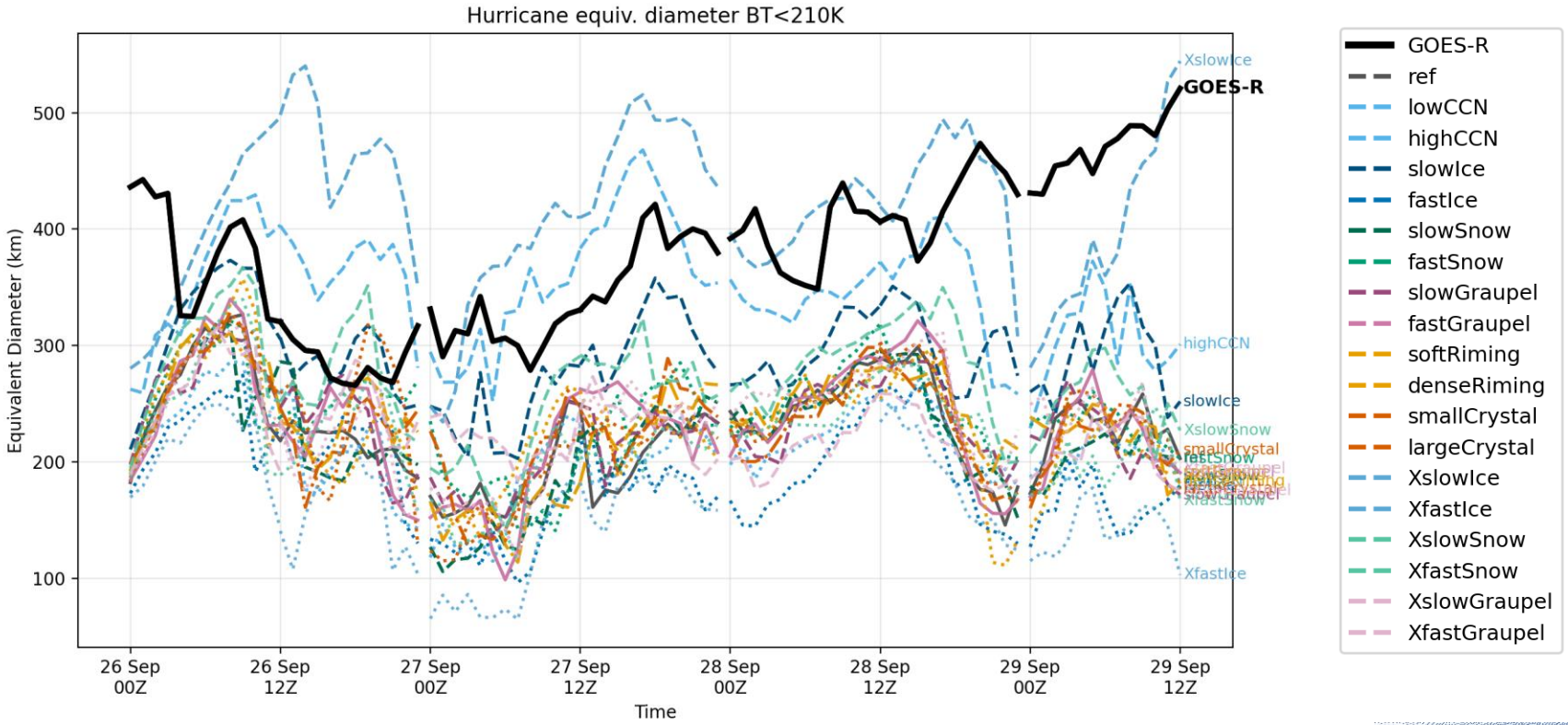


Super Typhoon Sinlaku on 13 April 2026



cremer@tropos.de

Hurricane equiv. diameter



TROPOS