



Supplement of

Regime-based aerosol–cloud interactions from CALIPSO-MODIS and the Energy Exascale Earth System Model version 2 (E3SMv2) over the Eastern North Atlantic

Xiaojian Zheng et al.

Correspondence to: Xiaojian Zheng (zhengx@anl.gov)

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Table S1. Regime-based precipitation status from Satellite and E3SMv2

Mean \pm Std	Regime 1	Regime 2	Regime 3	Regime 4
Satellite (CloudSat)				
Drizzle* Fraction (%)	21.09 \pm 22.89	21.79 \pm 22.38	21.19 \pm 23.35	18.73 \pm 20.15
Light Rain** Fraction (%)	13.50 \pm 19.93	11.86 \pm 16.55	10.77 \pm 17.55	13.75 \pm 18.52
Rain*** Fraction (%)	12.39 \pm 22.96	11.85 \pm 21.72	7.80 \pm 18.54	14.34 \pm 23.71
(Drizzle + Light Rain + Rain) Fraction (%)	46.98 \pm 36.11	45.49 \pm 35.01	39.76 \pm 36.37	46.81 \pm 36.02
E3SMv2				
In-cloud Rain† Fraction (%)	50.25 \pm 29.86	42.63 \pm 29.37	34.27 \pm 32.58	43.81 \pm 26.52
In-cloud Rain LWP (g m2)	84.46 \pm 205.62	43.23 \pm 121.03	17.99 \pm 95.99	118.84 \pm 215.23

*CloudSat drizzle fraction as the number of points with $-15 \leq \text{maximum dBZ} \leq -7$ and CTH < 3 km divided by total number of CTH < 3 km, within each ~ 25 km domain.

**CloudSat light rain fraction as the number of points with $-7 \leq \text{maximum dBZ} \leq 0$ and CTH < 3 km divided by total number of CTH < 3 km, within each ~ 25 km domain.

***CloudSat rain fraction as the number of points maximum dBZ > 0 and CTH < 3 km divided by total number of CTH < 3 km, within each ~ 25 km domain.

†E3SM fractional rain area within each grid (~ 110 km).

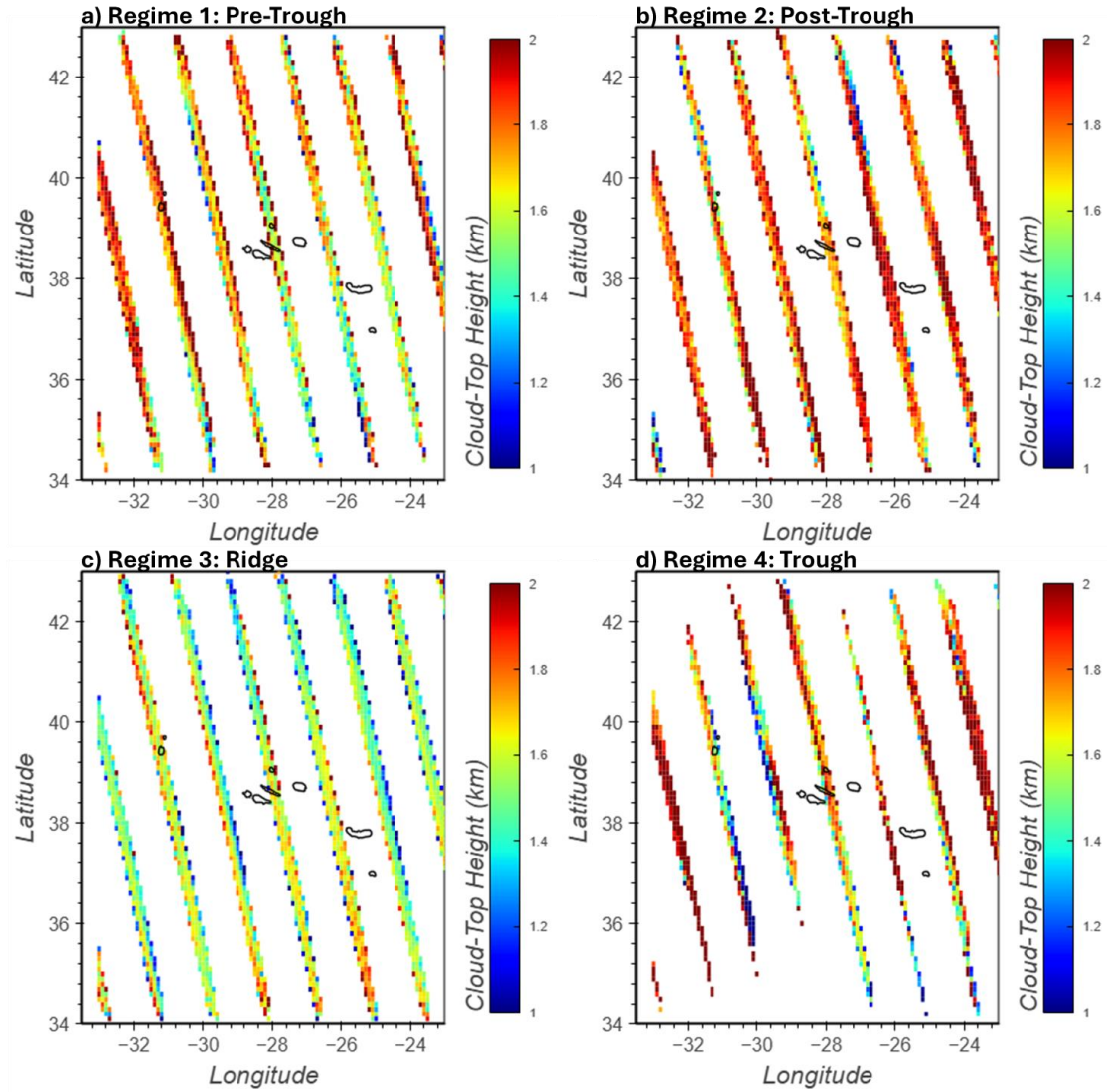


Figure S1. Regime-based composite map of cloud-top height derived from satellite (MODIS) for a) Regime 1, b) Regime 2, c) Regime 3 and d) Regime 4. The raw 25km grids along the granule are further aggregated into 100km grid-cells in producing this plot to ensure the composite sample sizes and a better visualization.

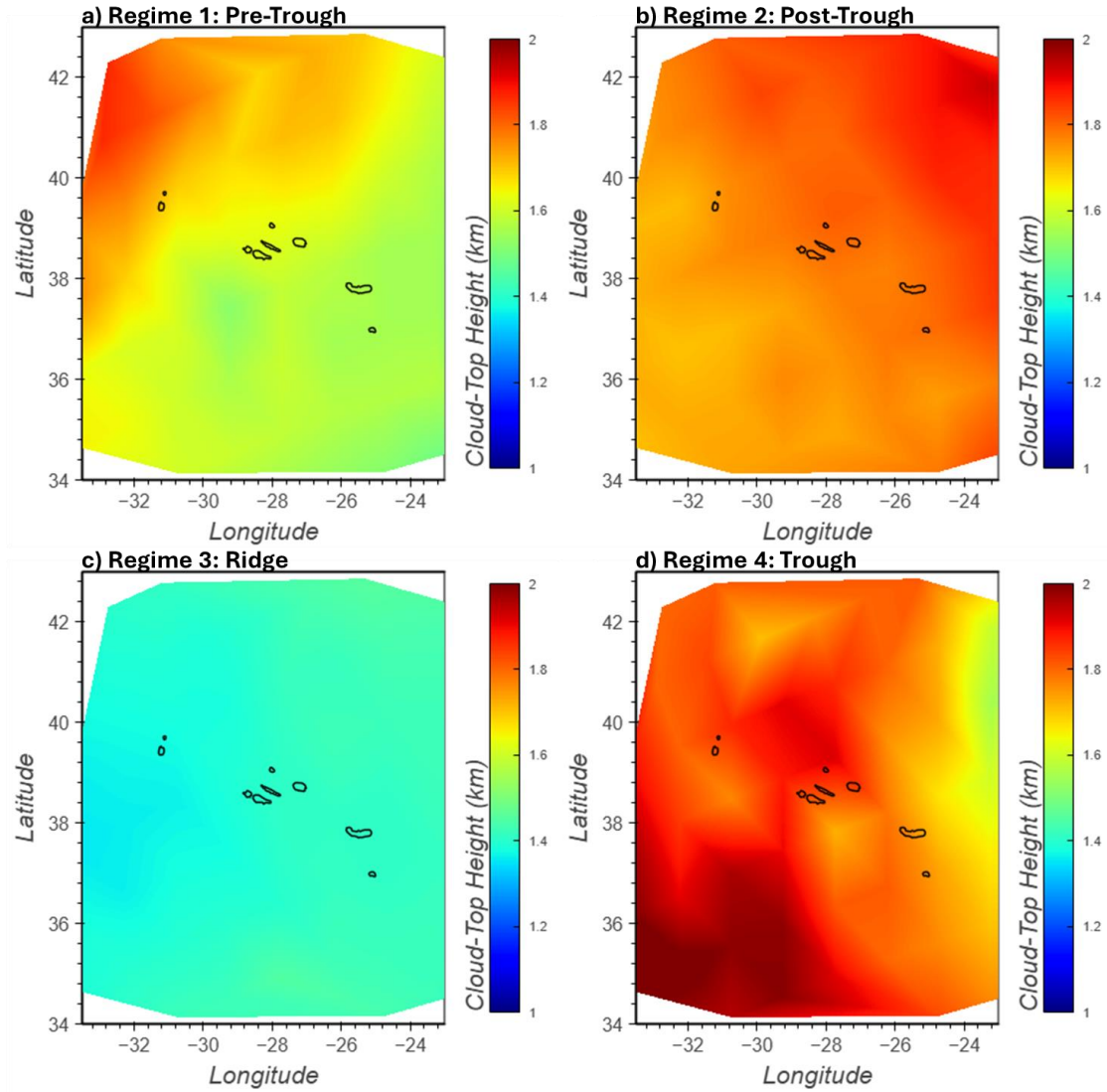


Figure S2. Regime-based composite map of cloud-top height derived from E3SMv2 for a) Regime 1, b) Regime 2, c) Regime 3 and d) Regime 4. The raw irregular model grid cell data is triangularly-smoothed and rasterized for better visualization.