

Analysis of Large-Scale Environmental Features during Maximum Intensity of Tropical Cyclones Using Reanalysis Data

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#Supporting information include Figure S1 – S5 and Table S1 – S2.

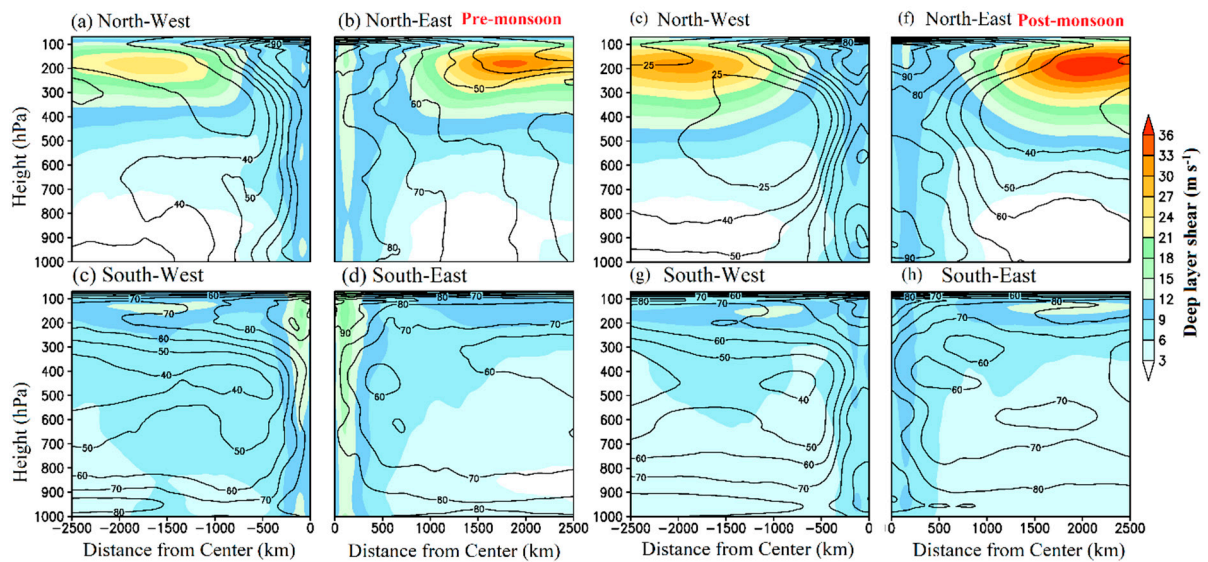


Figure S1. Radial-height cross-section of azimuthally averaged divergence (shaded, $\times 10^{-5} \text{ s}^{-1}$) and wind fields (streamlines) shown in each quadrant of the north-west (NW), north-east (NE), south-west (SW), and south-east (SE) from the vortex center using ERA5 data for pre-monsoon (a-d) and post-monsoon (e-h).

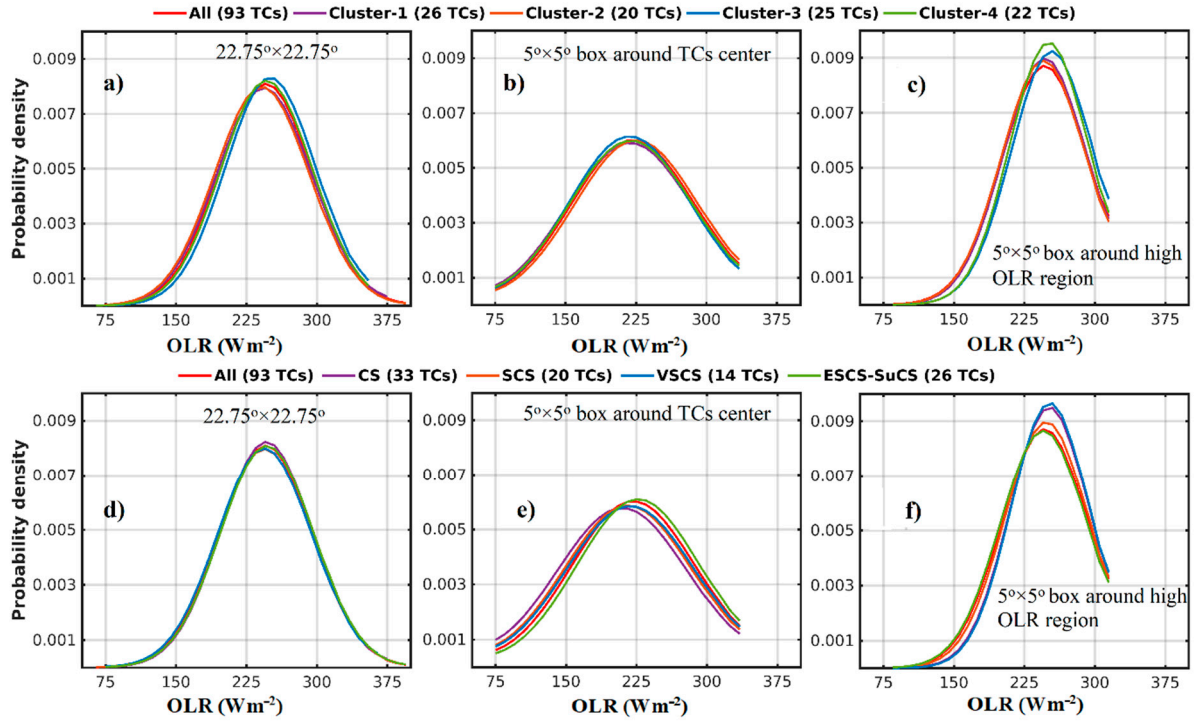


Figure S2. Probability density distribution of outgoing longwave radiation (OLR, Wm^{-2}) based on (a,b,c) Movement (clusters) and (d,e,f) Intensity (Categories: Cyclonic systems (CS), Severe cyclonic systems (SCS), Very severe cyclonic systems (VSCS) and Extremely severe and Super cyclonic systems (ESCS-SuCS)).

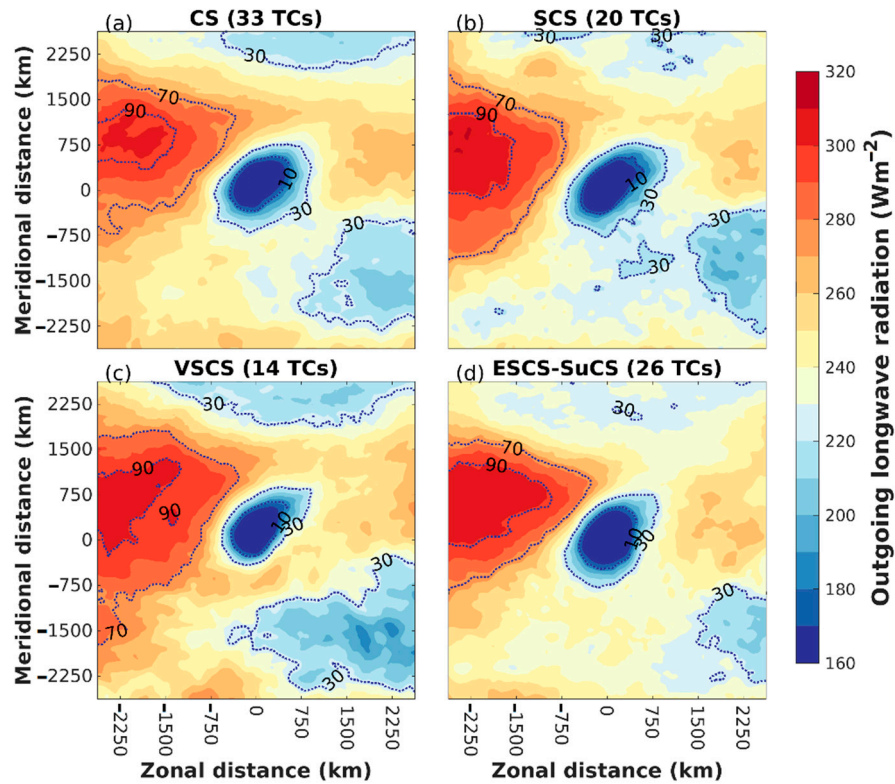


Figure S3. Composites of outgoing longwave radiation (OLR, Wm^{-2}) for a) Cyclonic systems (CS), b) Severe cyclonic systems (SCS), c) Very severe cyclonic systems (VSCS), and d) Extremely severe and Super cyclonic systems (ESCS-SuCS). The dotted contours represents percentile values. The value in the parenthesis represents the number of tropical cyclones obtained of each category.

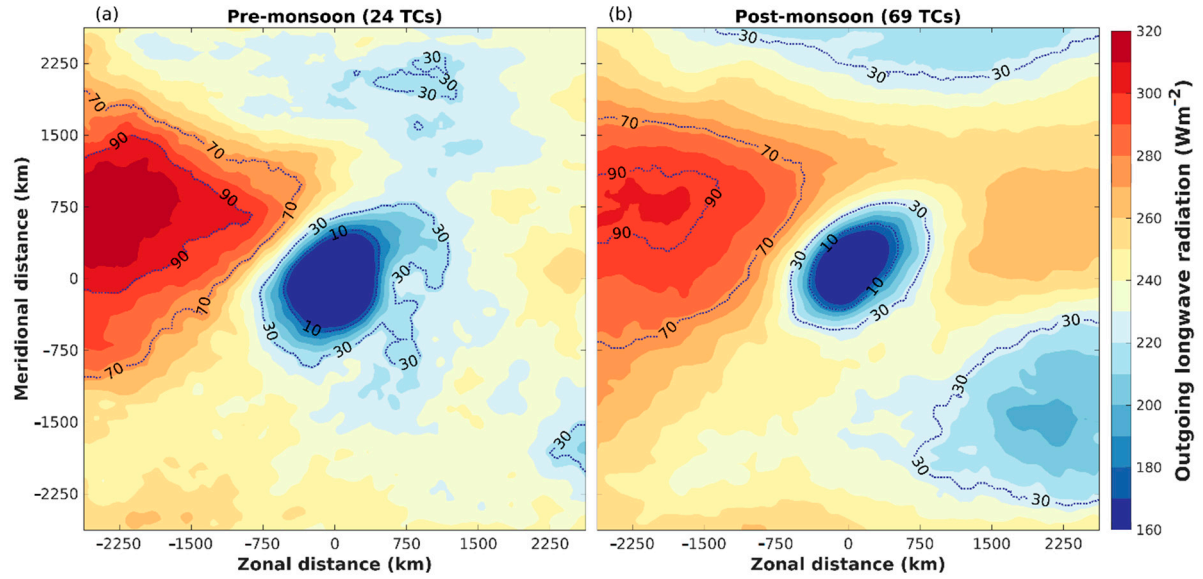


Figure S4. Composites of outgoing longwave radiation (OLR, Wm^{-2}) for a) Pre-monsoon TCs, b) Post-monsoon TCs. The dotted contours represents percentile values. The value in the parenthesis represents the number of tropical cyclones obtained during each season.

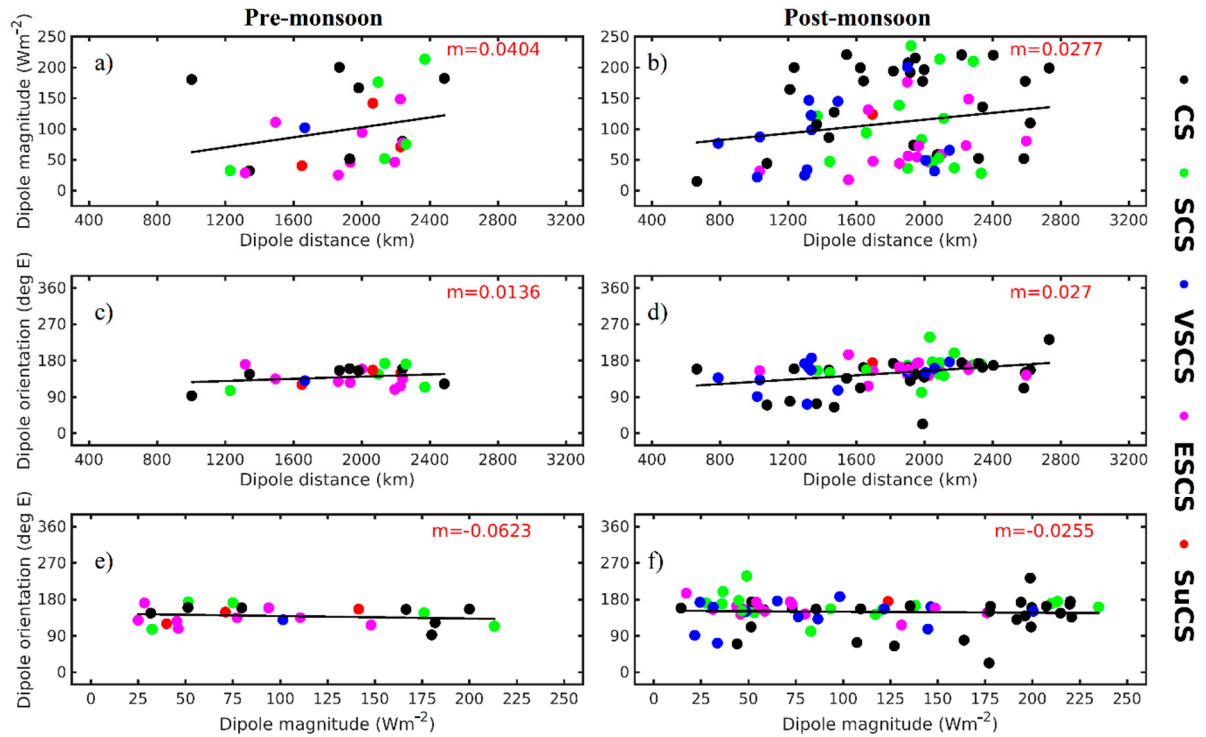


Figure S5. Scatterplot represents the linear variation of dipole characteristics (a,b) dipole distance vs dipole magnitude, (c,d) dipole distance vs dipole orientation, and (e,f) dipole magnitude vs dipole orientation between pre- & post- monsoon. Different colours represents the each category of TCs.

Table S1. Frequency of TCs grouped into each cluster showing intensity and seasonal wise.

TC Category	Cluster-1	Cluster-2	Cluster-3	Cluster-4	Pre-monsoon	Post-monsoon
CS	10	4	10	9	7	26

SCS	5	4	5	6	5	15
VSCS	1	4	5	4	1	13
ESCS	10	5	5	2	8	14
SuCS	0	3	0	1	3	1
Total	26	20	25	22	24	69

Table S2. Seasonal wise mean and standard deviation (SD) of Outgoing longwave radiation (OLR) dipole metrics from observation (ERA5) data.

Season / Dipole characteristics	Magnitude		Distance		Orientation	
	Mean	SD	Mean	SD	Mean	SD
Pre-monsoon	248	14	1929	422	139	23
Post-monsoon	230	10	1735	506	149	36