

Tropical Cyclone Internal Dynamics and its Influence on the Intensity Changes: WRF Idealized Simulation in a Quiescent Environment and GOES-R IR case study.



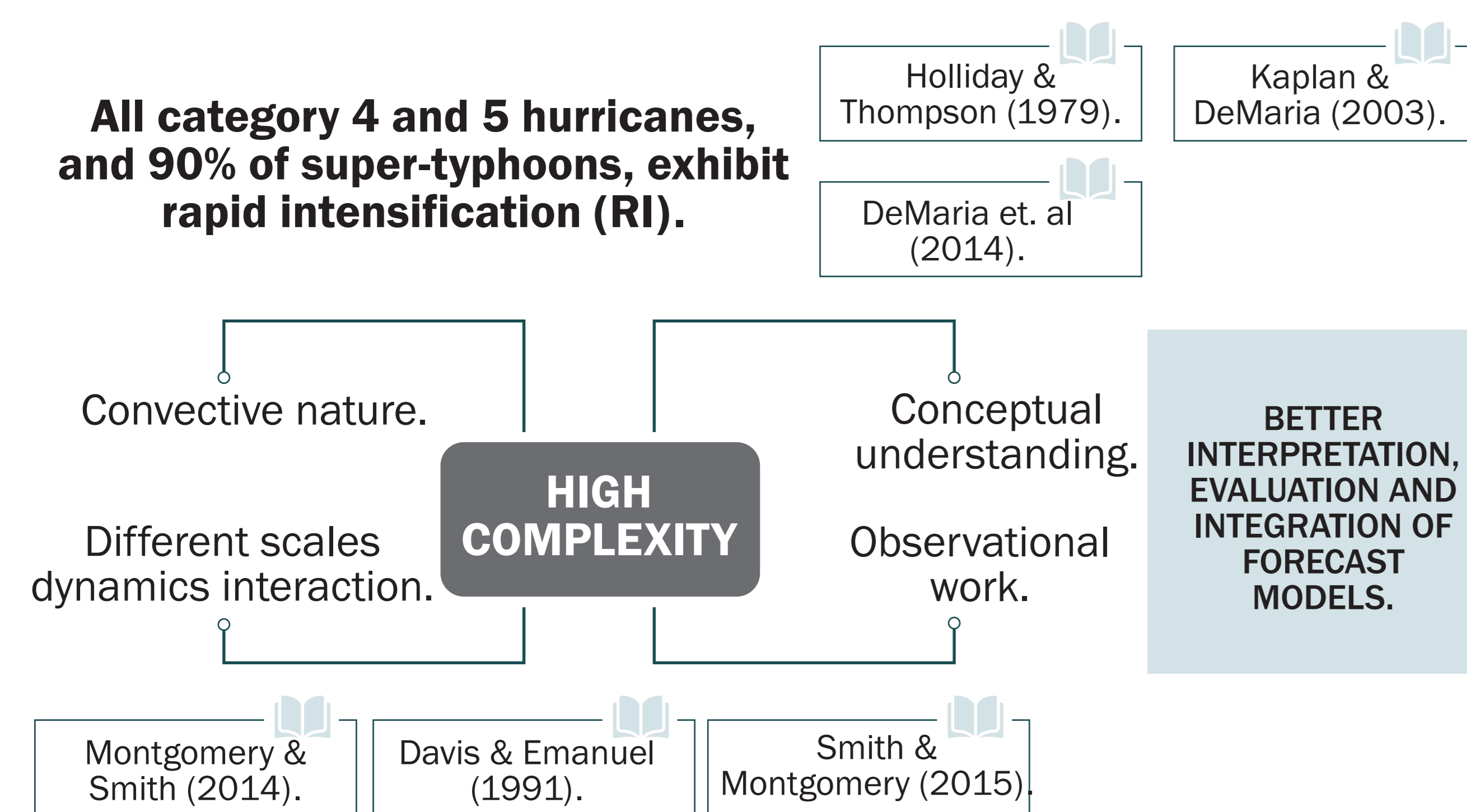
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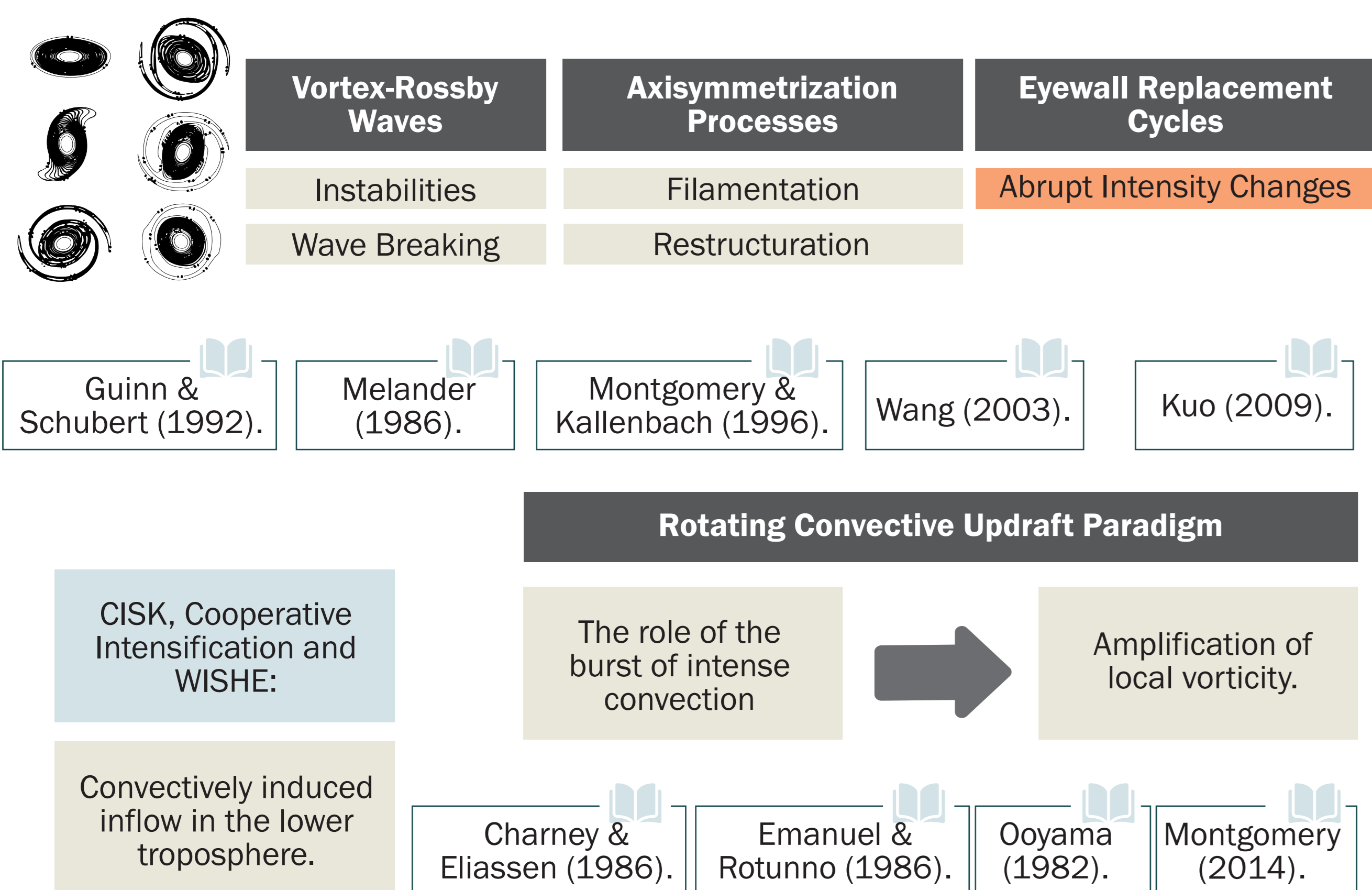
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Motivation



Theoretical framework



Numerical Experiments Setup

INITIAL TROPICAL CYCLONE-LIKE VORTEX CONDITIONS.

Coriolis Parameter: $5e-5$ [1/s]
SST: 28°C
Time step: 120 s.
Outputs: Each 5 minutes.
Spatial resolution: $2x2$ km.

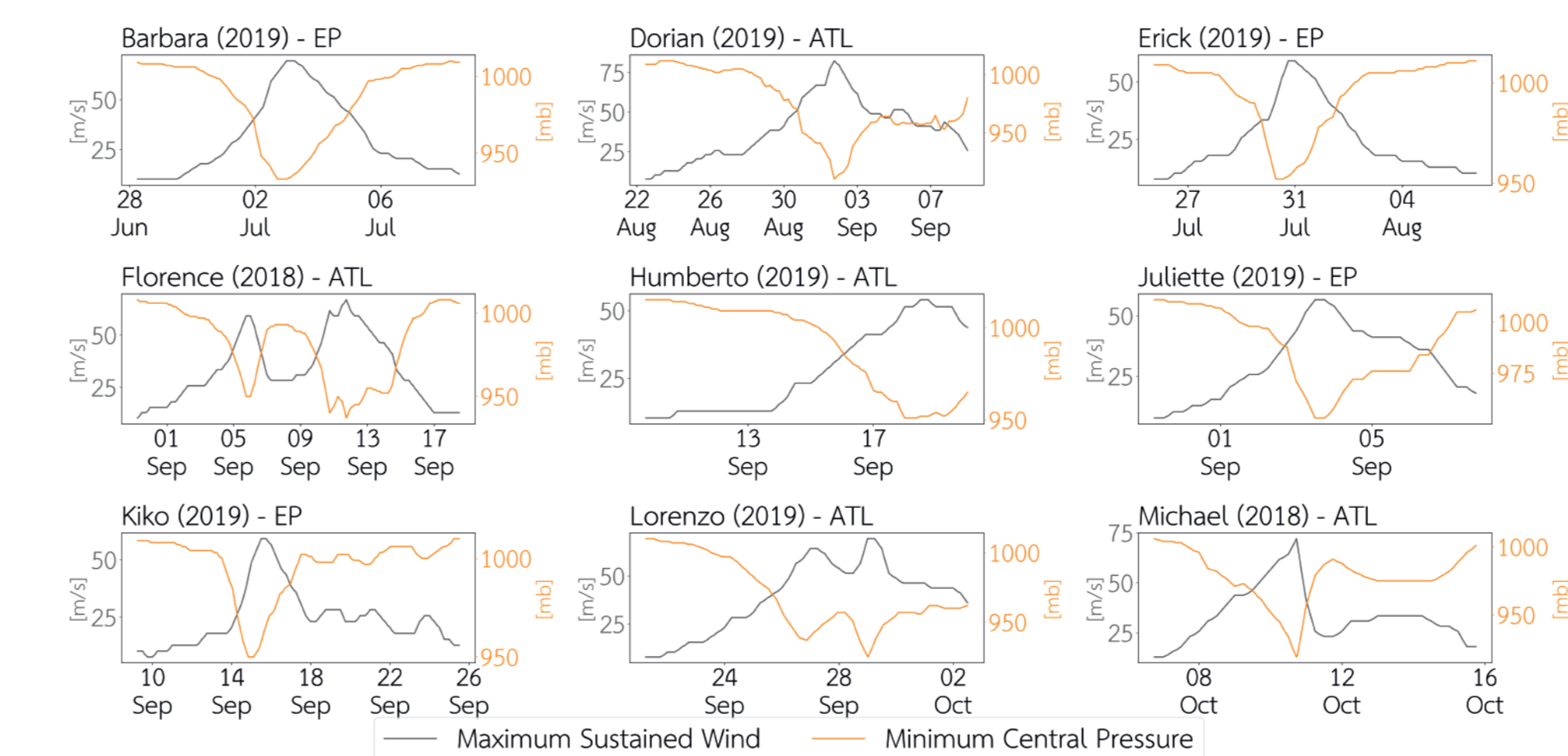
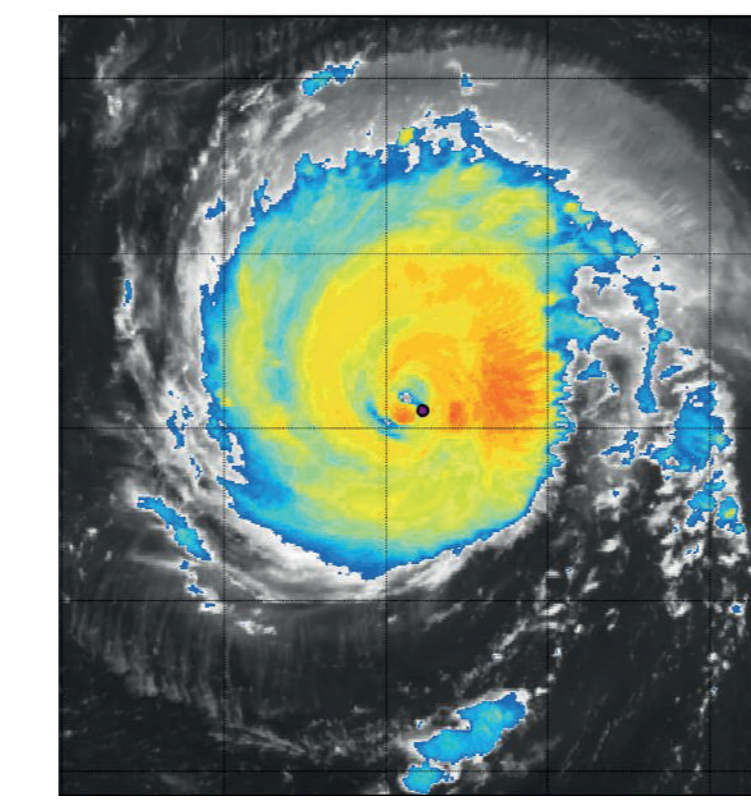
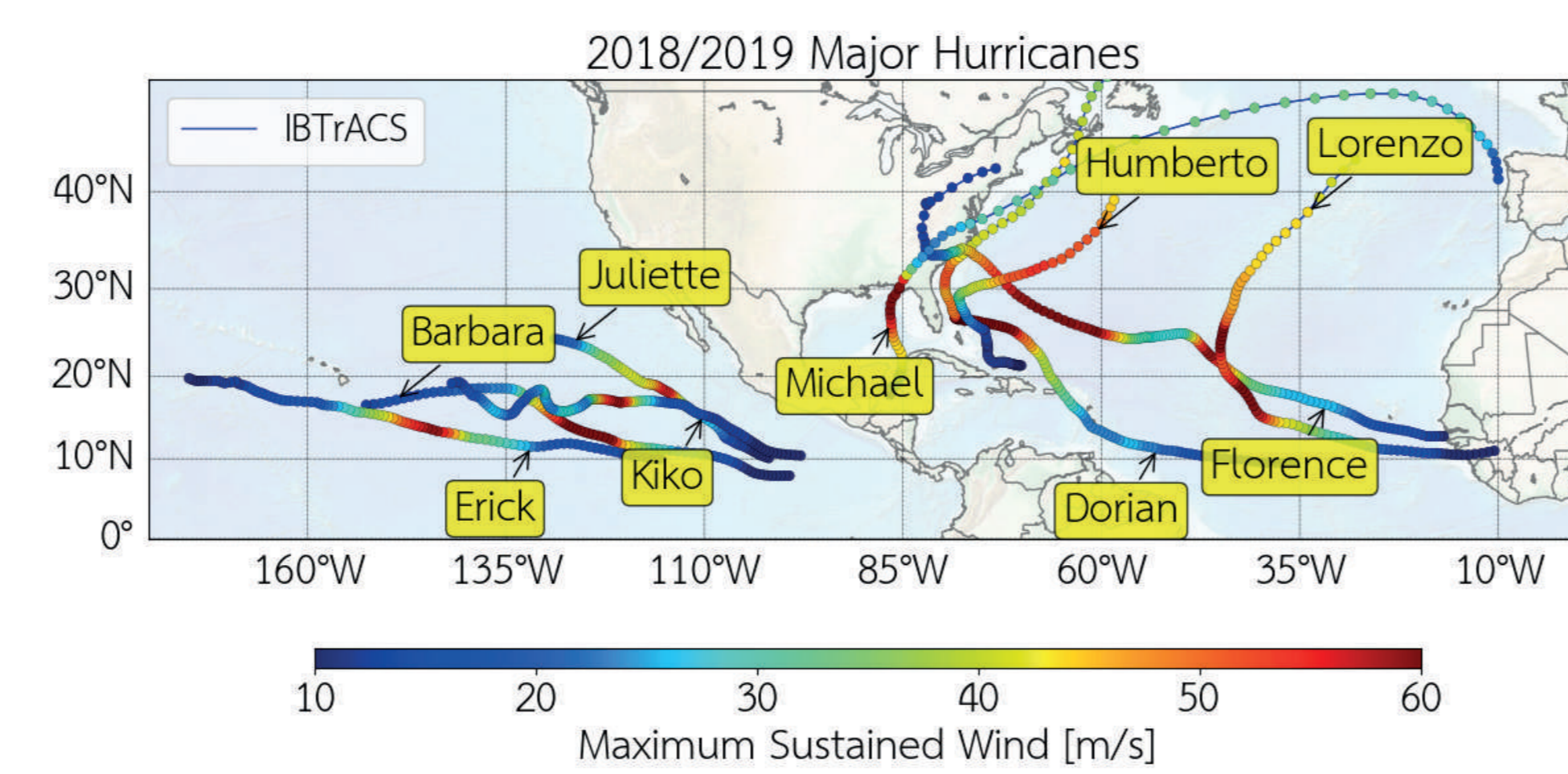
Rotunno and Emanuel (1987).



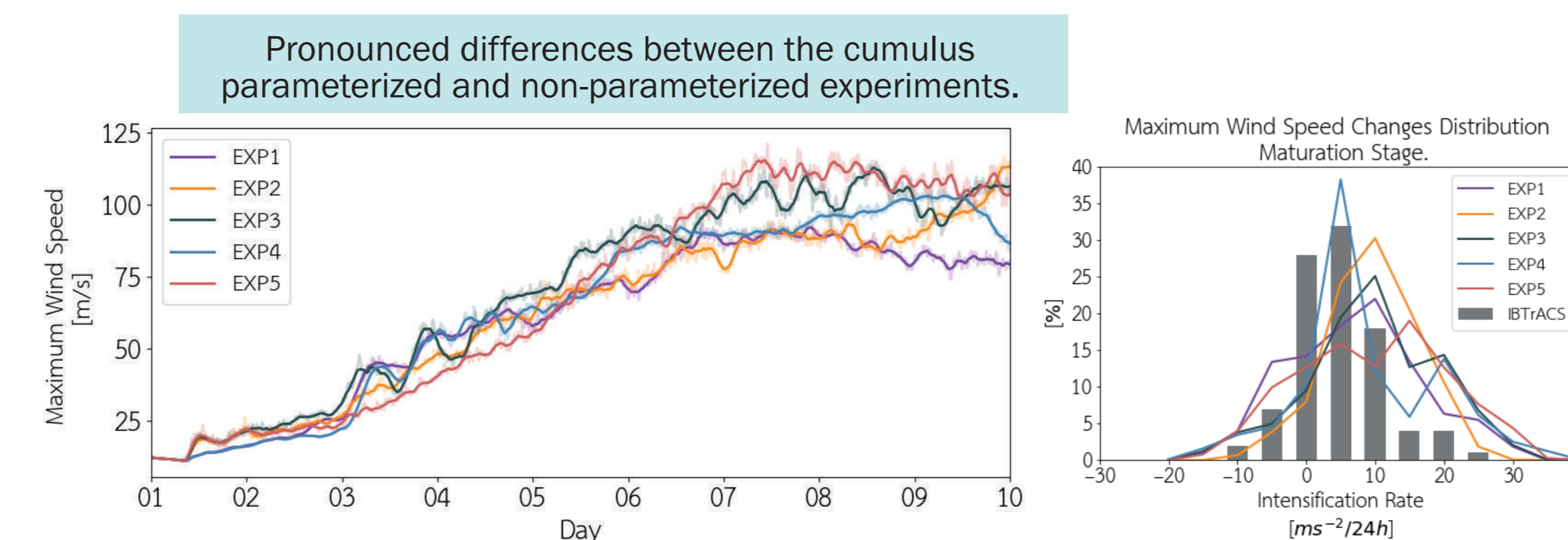
Experiments

Parameterizations:	1	2	3	4	5
Microphysics.	Lin	Lin	Kessler	Kessler	Lin
Surface Layer.	M-O	M-O	M-O	M-O	M-O
PBL.	YSU	YSU	YSU	YSU	MYNN 2.5
Cumulus.	KF			KF	

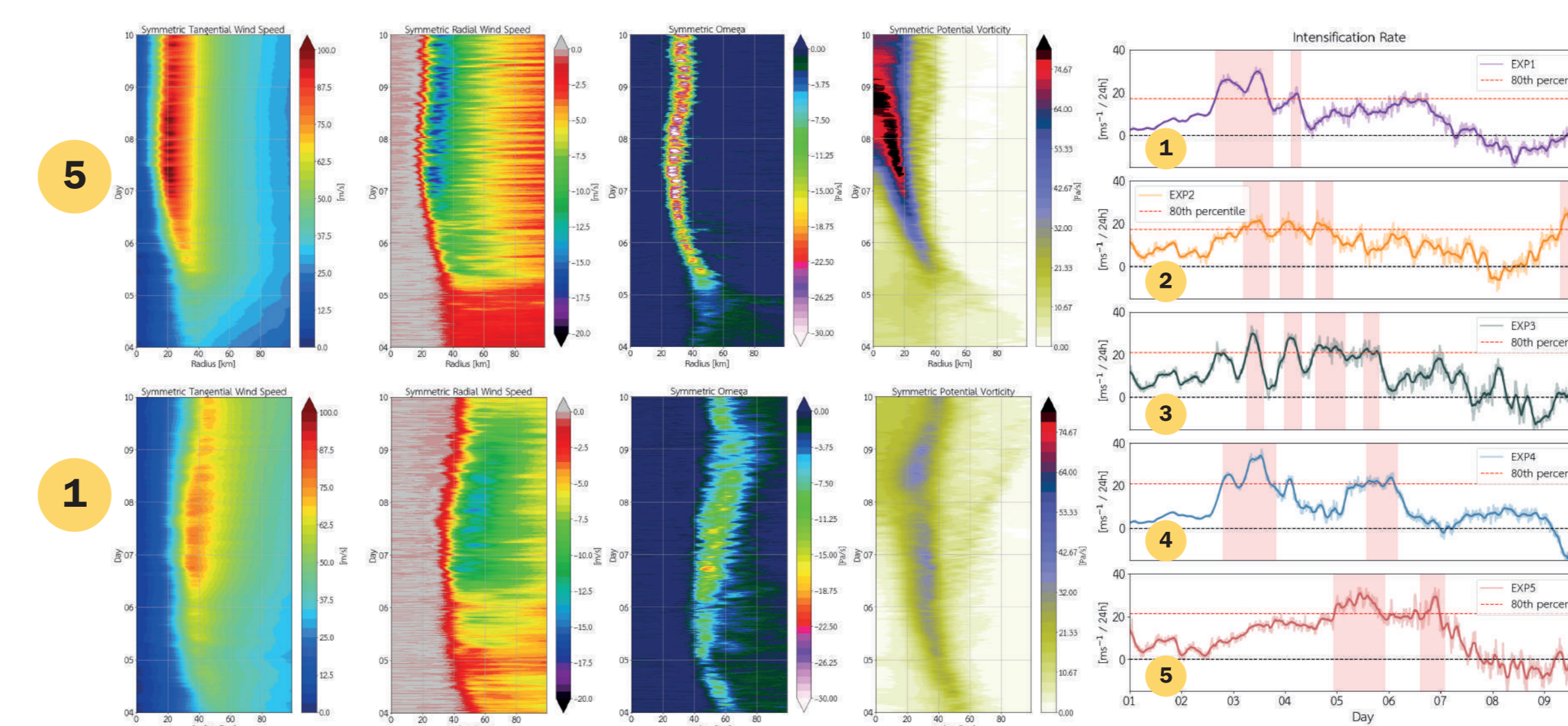
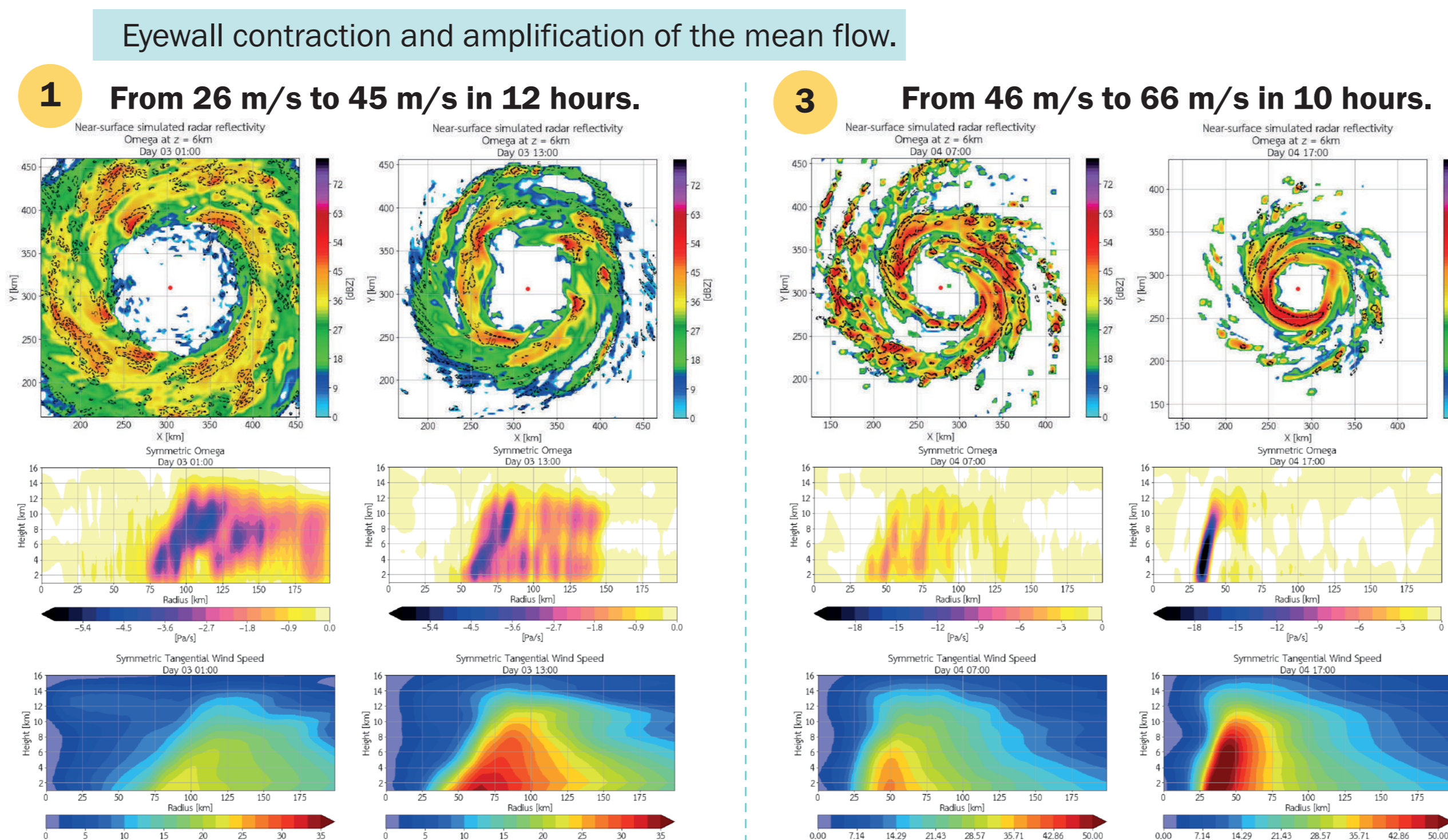
IBTrACS and GOES-R DATA



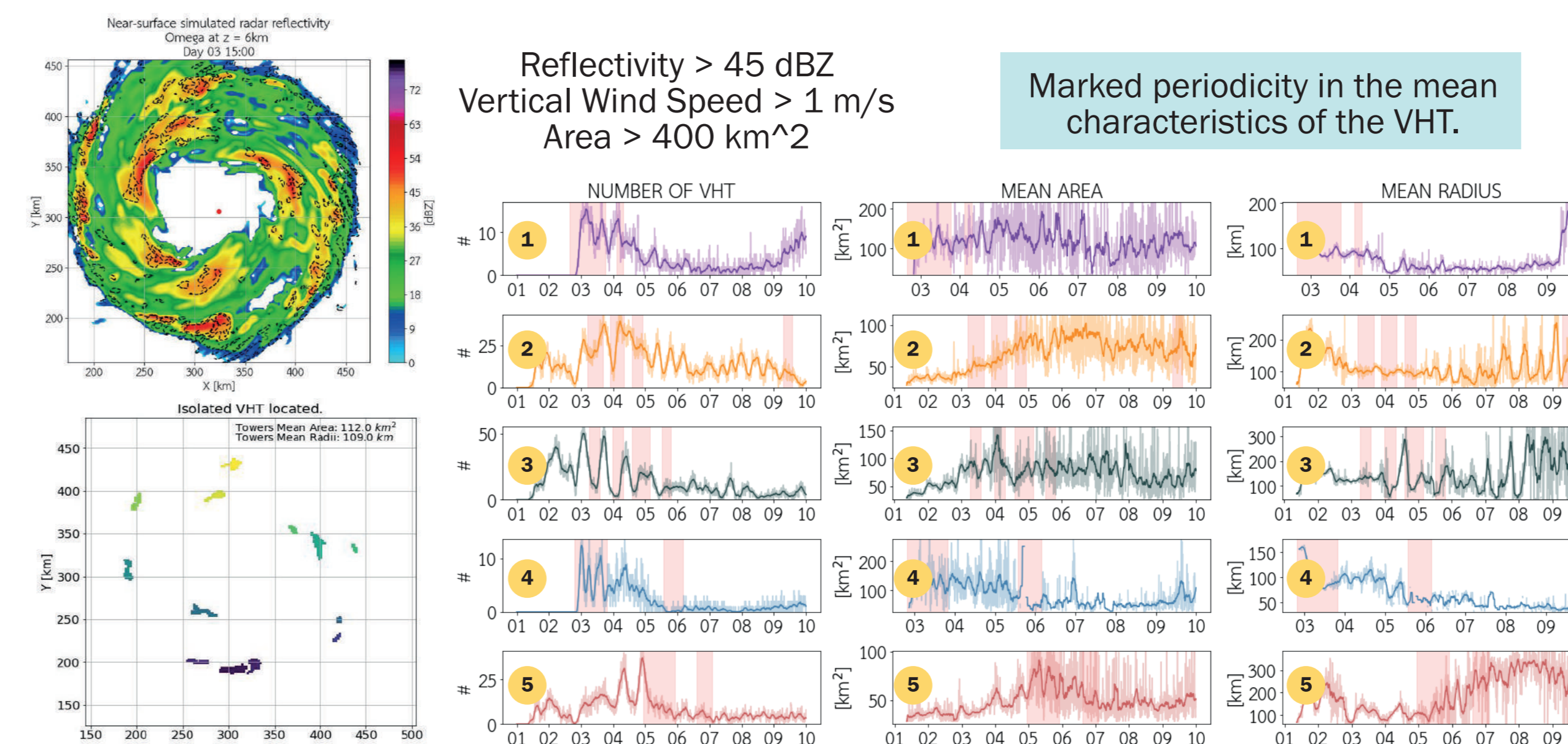
Simulation results



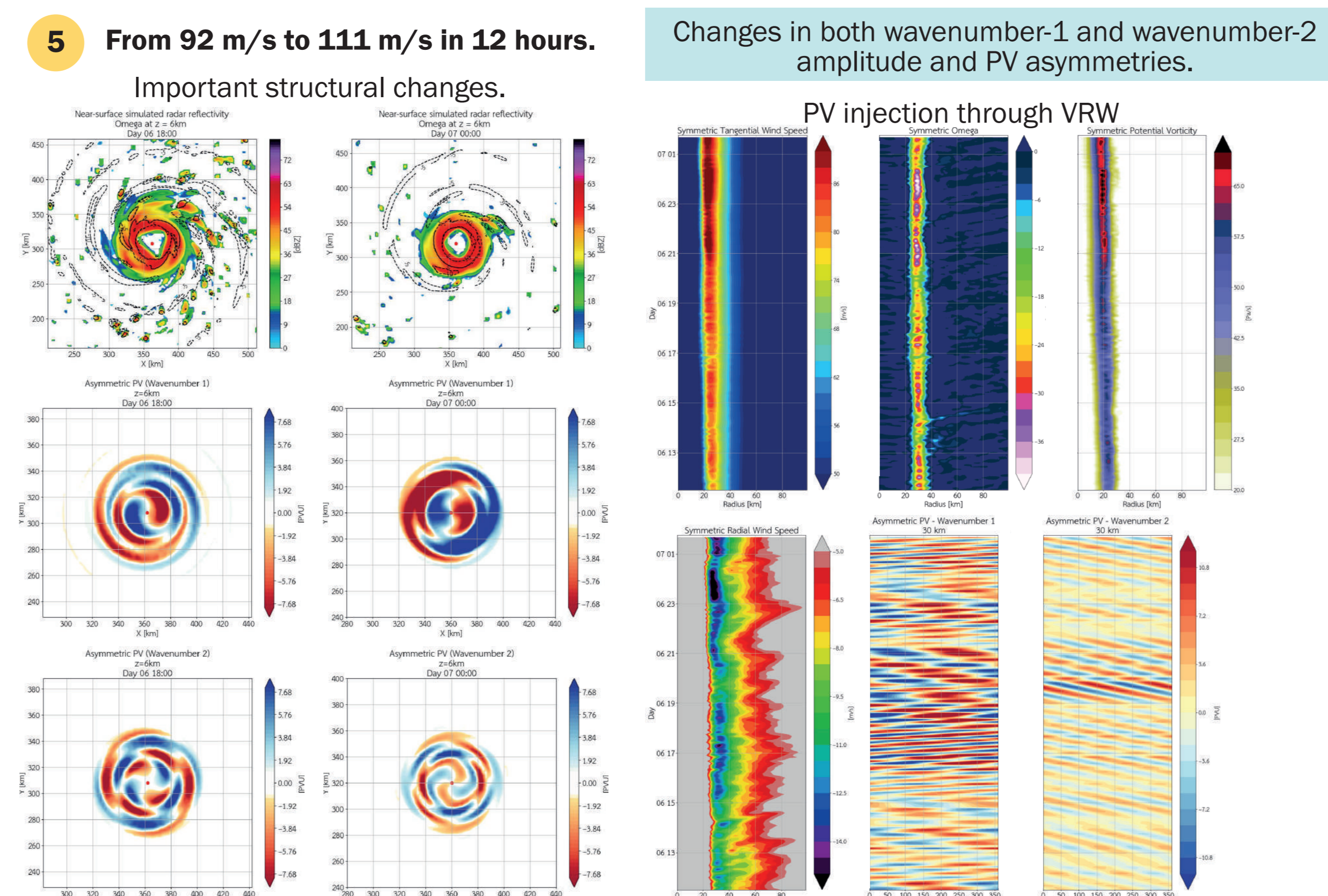
Convection structure and intensification



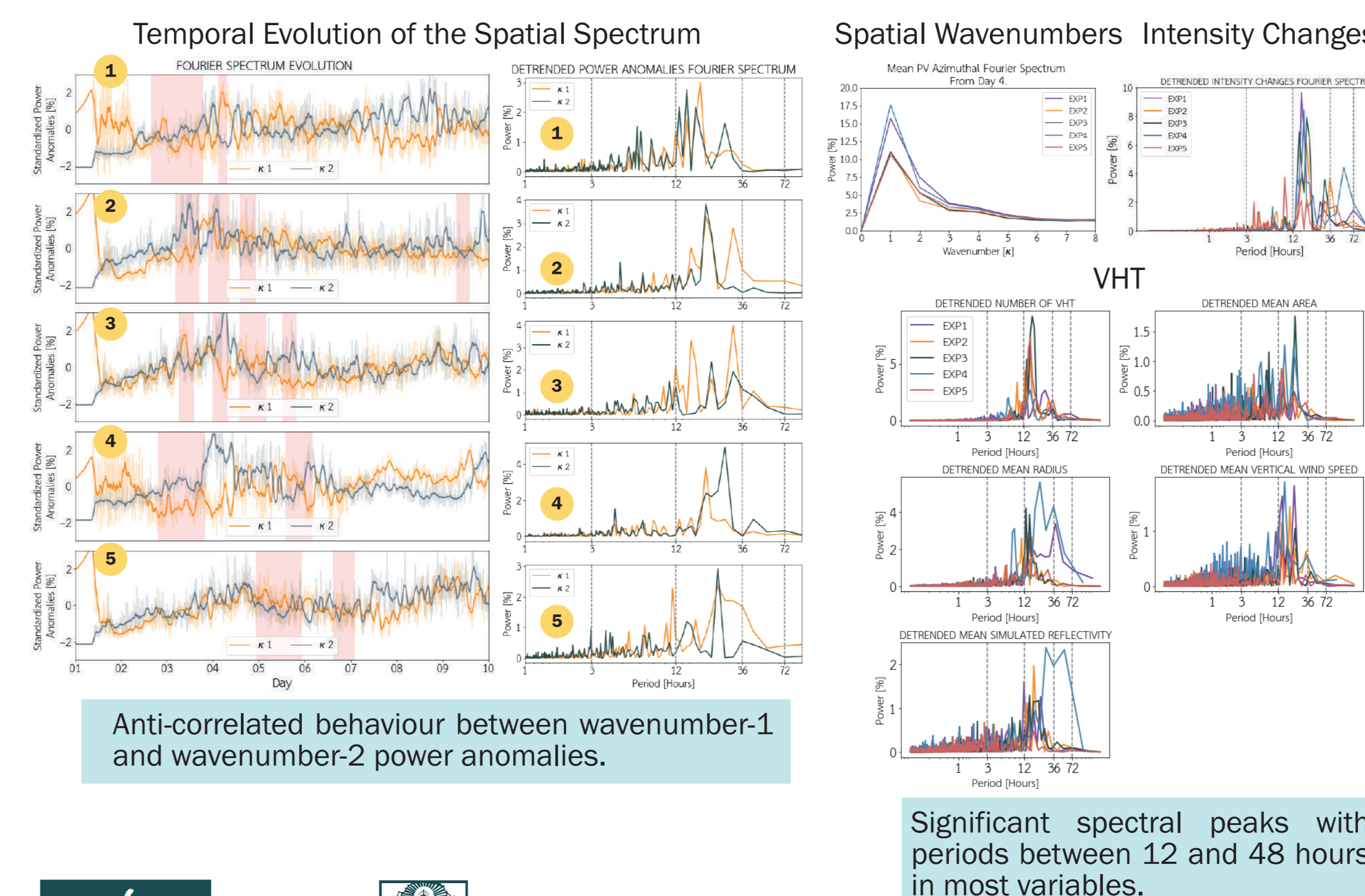
Vortical Hot Towers (VHT)



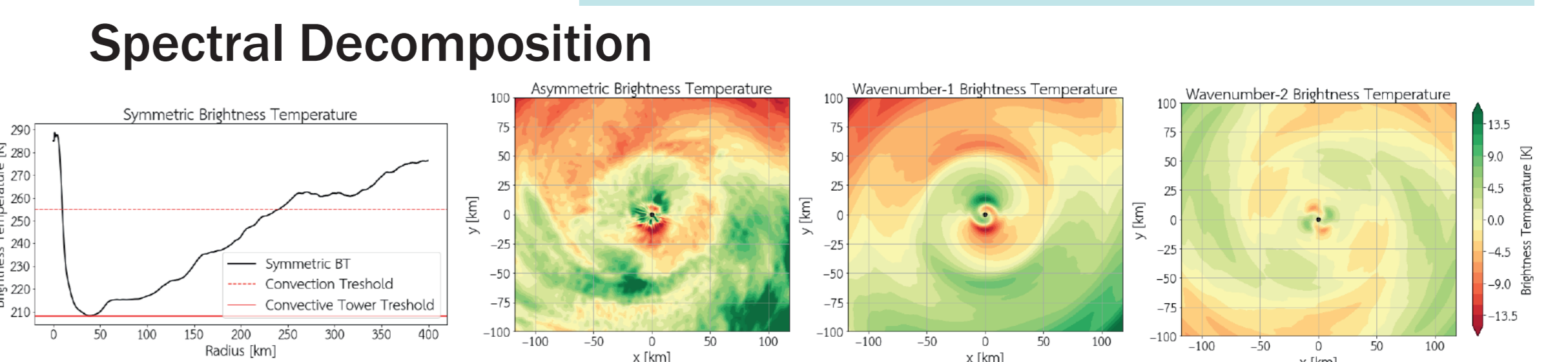
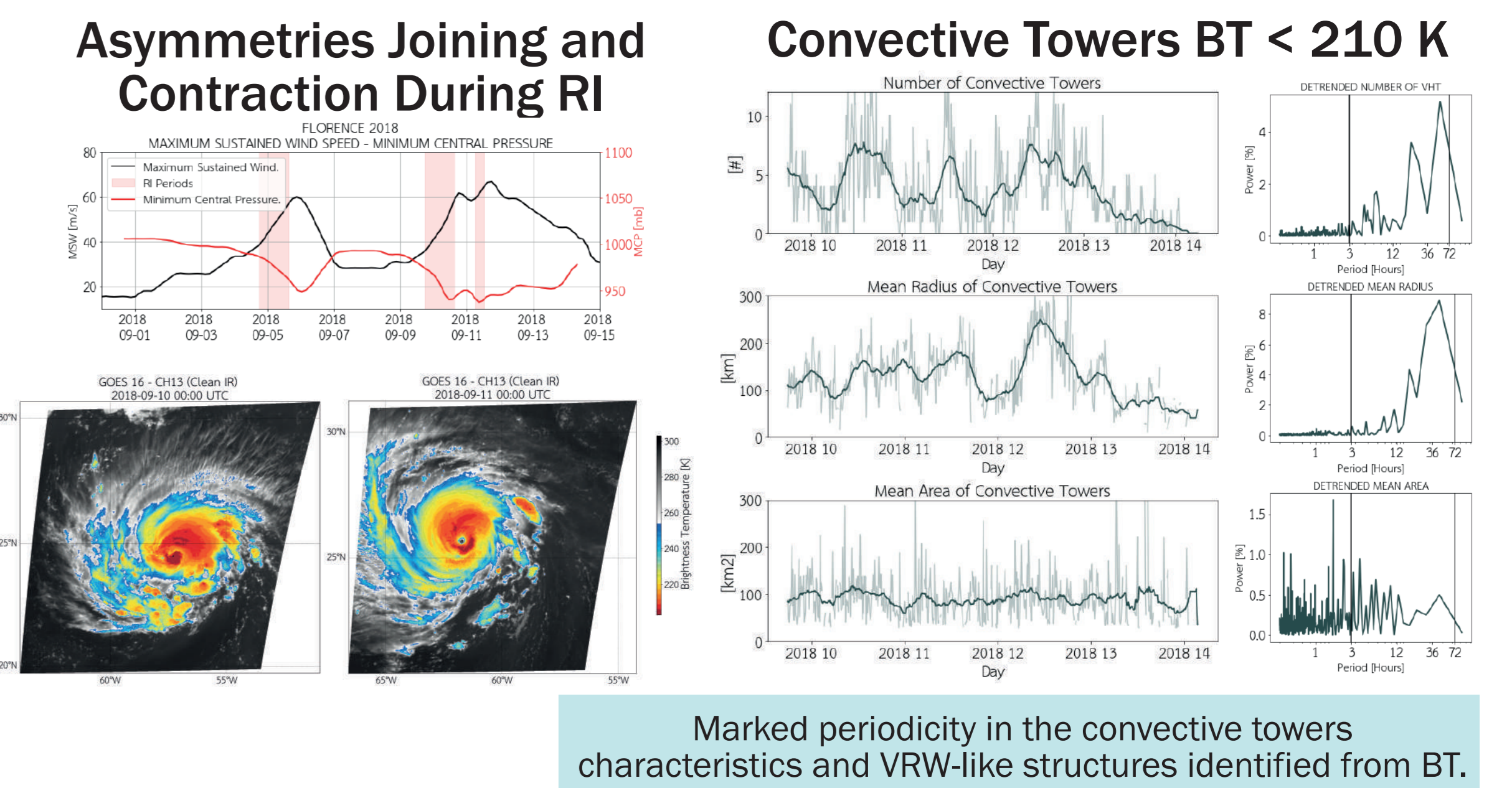
PV Dynamics and VRW



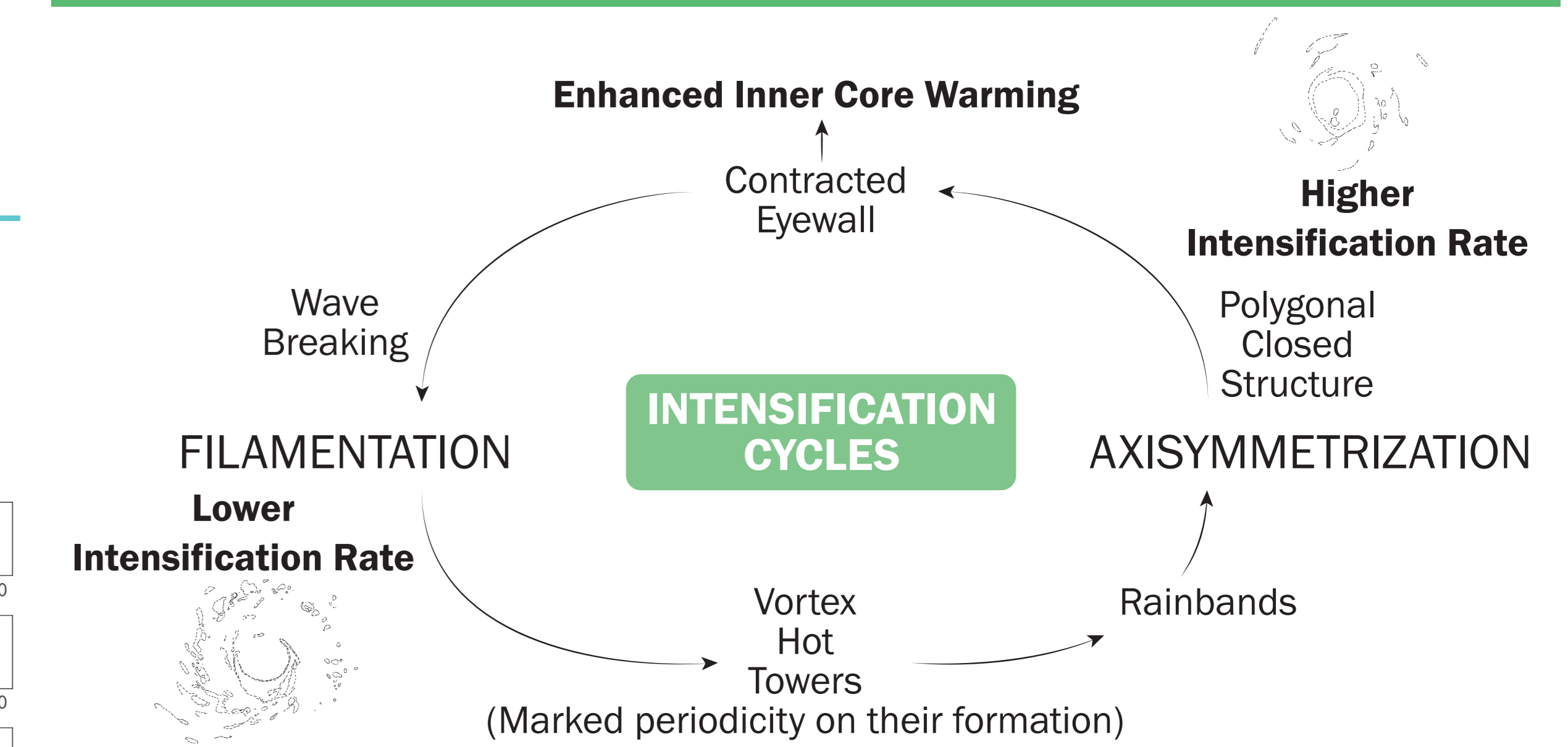
Wave activity



GOES-R Analysis



Conclusions



◦ RI stages: Inner core contraction from axisymmetrization of convective towers leading to an organized structure, until the filamentation processes and rainbands formation start again.

◦ The injection of PV into the center of the TC is preceded by changes in the amplitude and structure of the wavenumber 1 and 2 VRW.

◦ Evident differences between the cumulus parameterized and non-parameterized experiments regarding the convection, wind, PV and omega fields and the characteristics of VHT.

◦ Anticorrelated behaviour between the wavenumber-1 and wavenumber-2 PV power anomalies.

◦ Marked temporal periodicity between 6 and 48 hours at the intensification rate, spectral power anomalies of wavenumber-1 and wavenumber-2 PV, number and distance from the center of VHT. Further analysis on the spectral coherence of these variables is required to fully understand the interaction between variables and its role in the intensification processes.

◦ GOES-R imagery demonstrate great potential for characterizing and understanding wave activity in hurricanes. VRW-like structure and temporal periodicity in the characteristics of VHT was found in the case studied.

Acknowledgements

This work was supported by Area Metropolitana de Medellín y del Valle de Aburrá, Municipio de Medellín, Grupo EPM, and ISAGEN under the contract CCT504 of 2019. This work was also supported by Universidad Nacional de Colombia, Facultad de Minas.

