Ensemble forecasts of Hurricane Isaac (2012)

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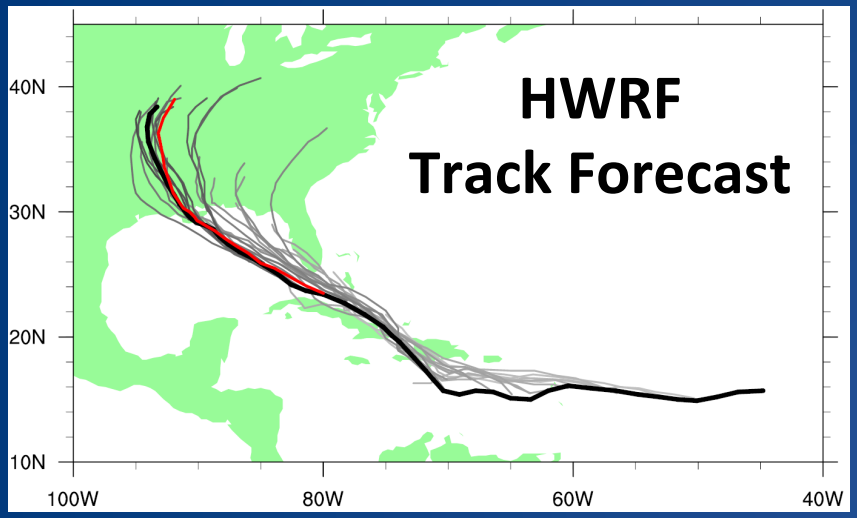
Acknowledgements : Zhan Zhang (EMC)
Frank Marks, Ghassan Alaka , Stanley Goldenberg (HRD)

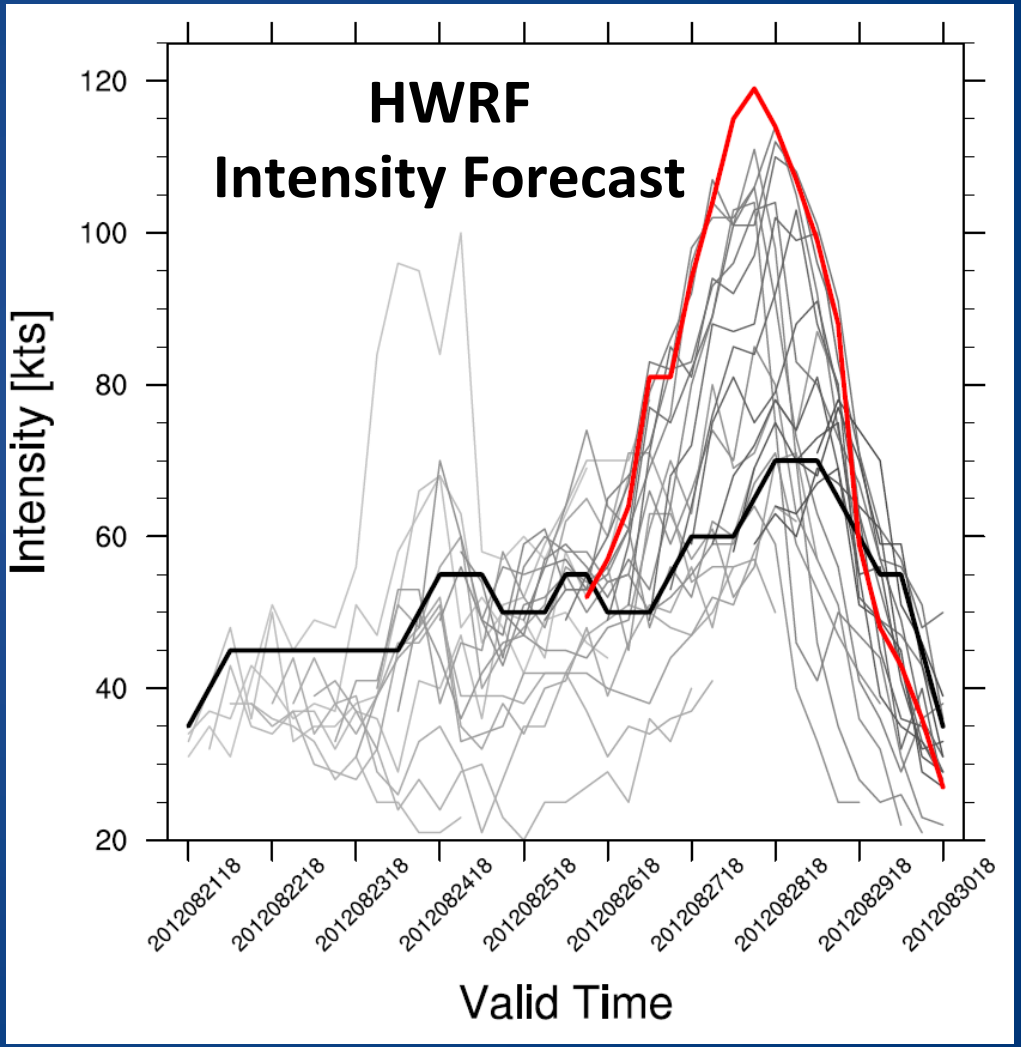
MOTIVATION

Model false alarm for RI (e.g. Isaac 2012)



NHC advisory on 26 AUG 2012

….CONDITIONS APPEAR FAVORABLE FOR STEADY INTENSIFICATION AS THE CYCLONE MOVES ACROSS THE FLORIDA STRAITS AND INTO THE EASTERN GULF OF MEXICO….



METHODOLOGY

Ensembles based on the operational HWRF ensemble system:

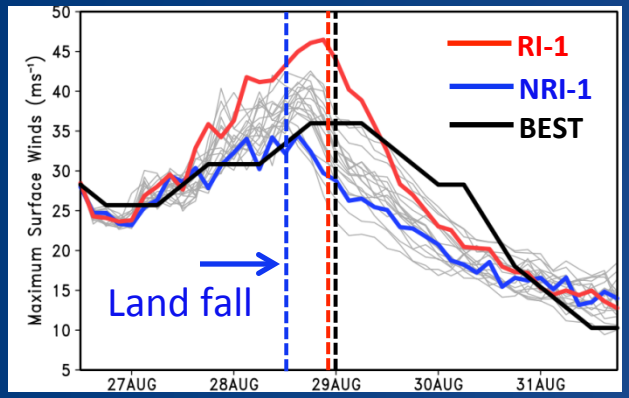
HWRFE(GEFS): 20 HWRF ensemble forecasts driven by 20 GEFS ensemble members

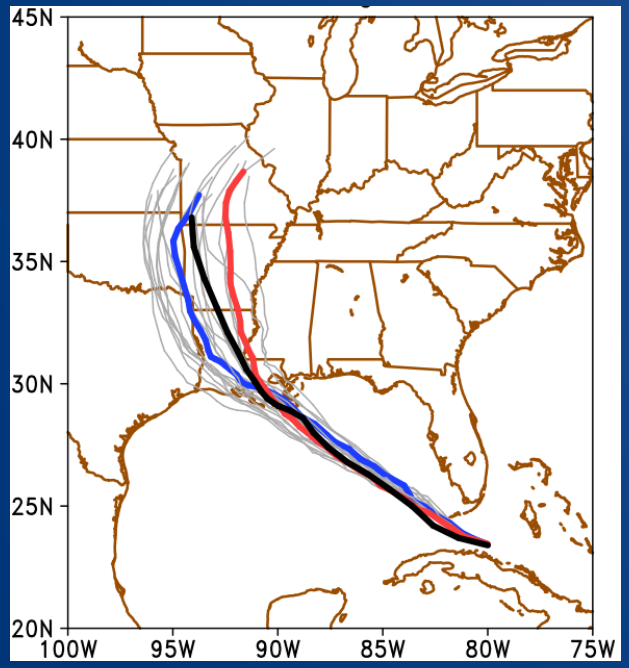
HWRFE(GEFS+PBL): 20 HWRF ensemble forecasts driven by 20 GEFS ensemble members with boundary layer perturbation

HWRFE(GEFS+SAS): 20 HWRF ensemble forecasts driven by 20 GEFS ensemble members with SAS (Simplified Arakawa-Schubert scheme) perturbation

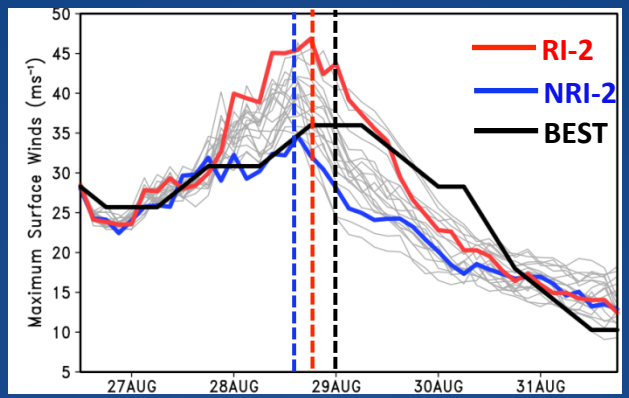
METHODOLOGY

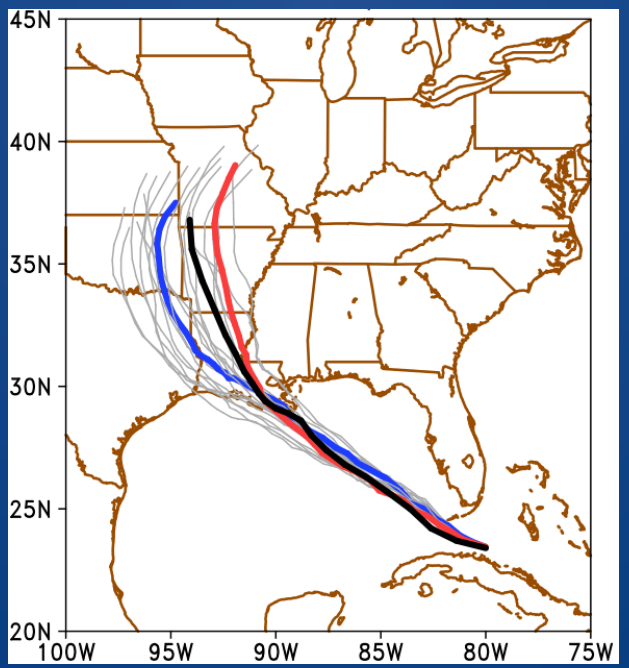
HWRFE(GEFS)



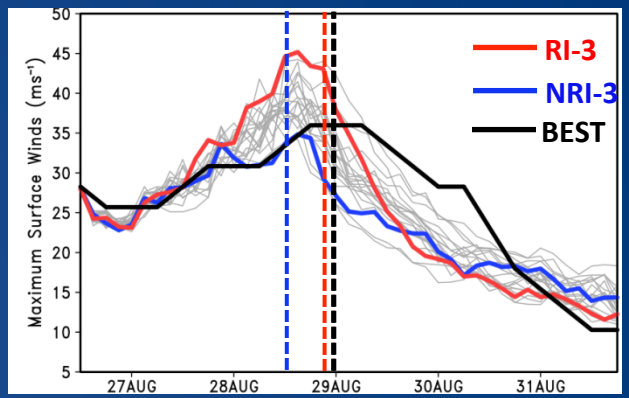


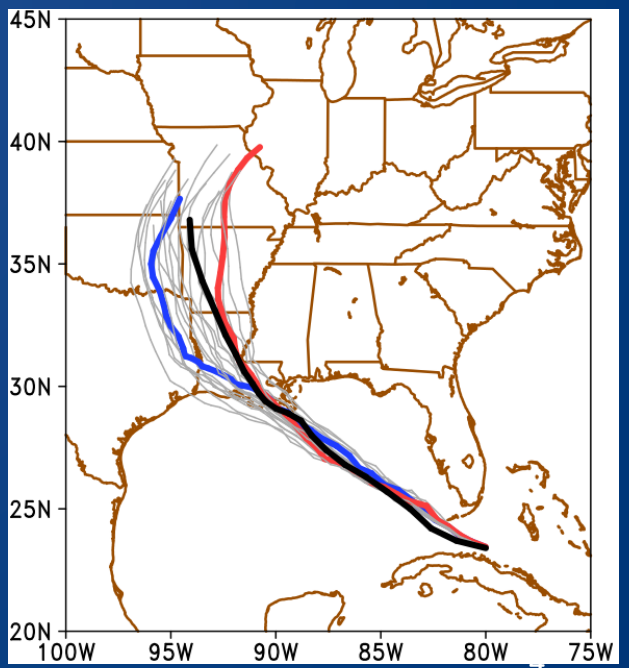
HWRFE(GEFS+PBL)



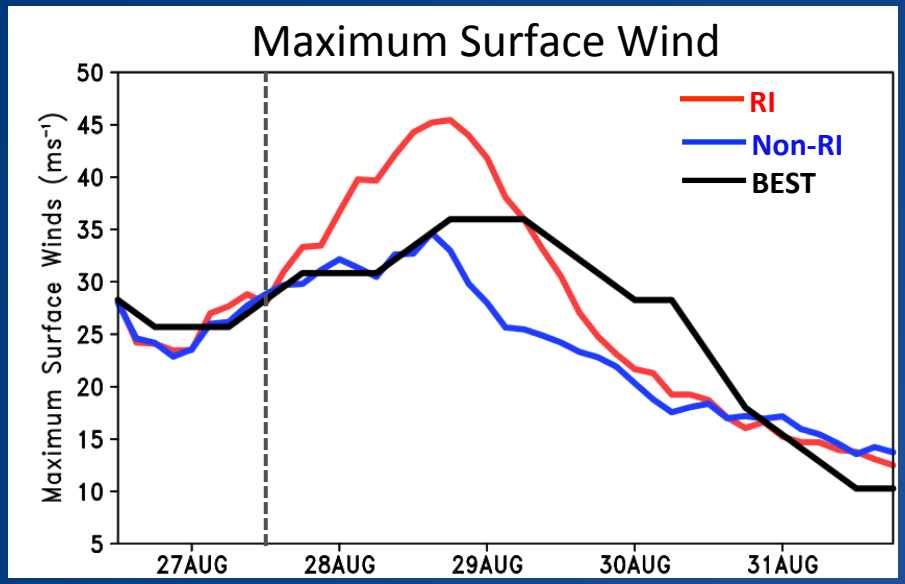


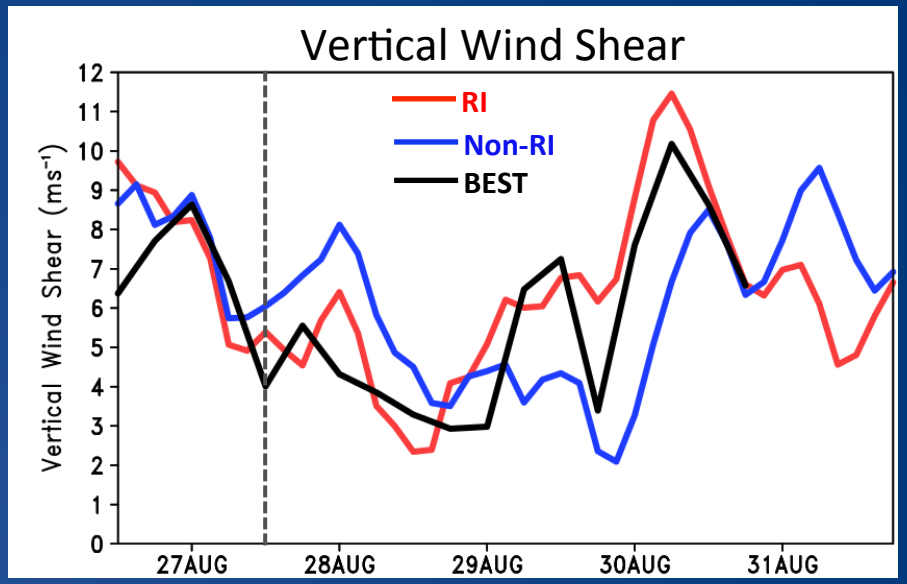
HWRFE(GEFS+SAS)

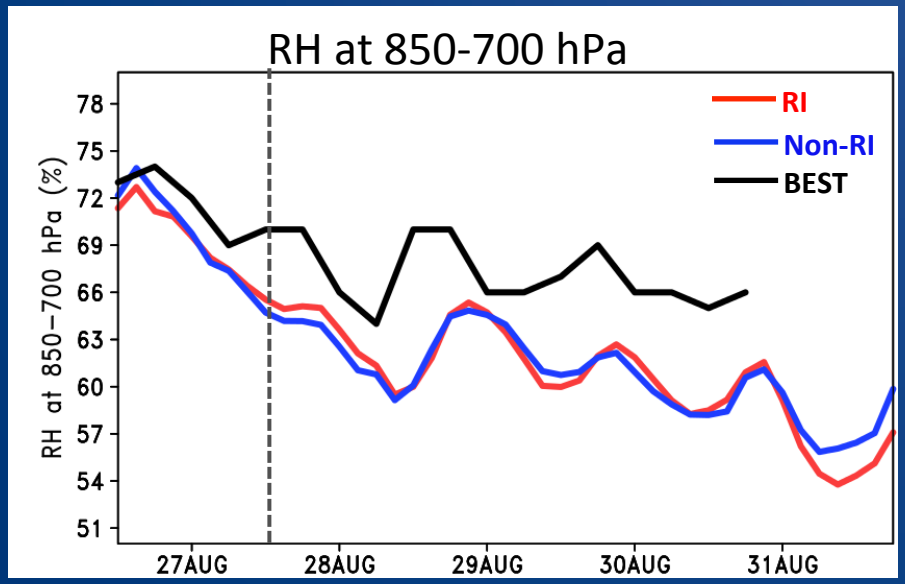


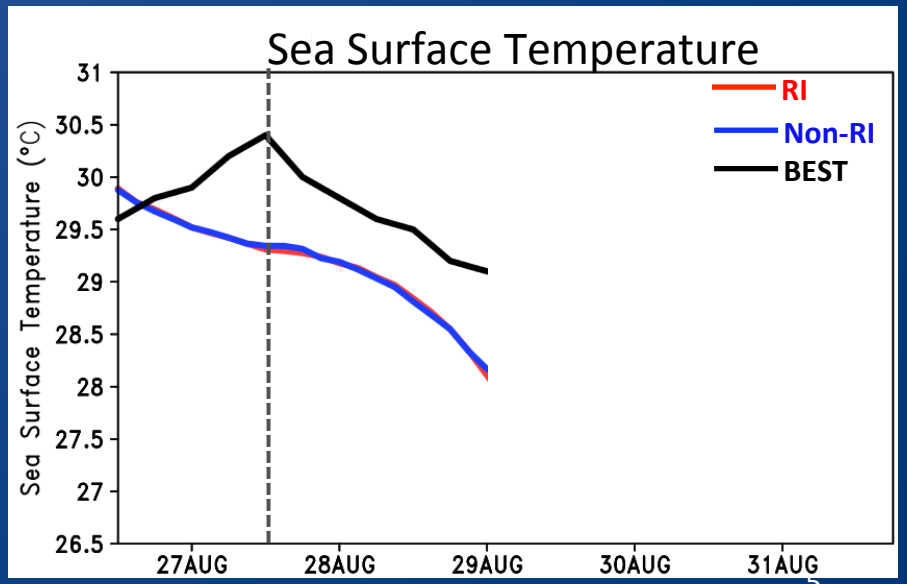


COMPOSITED INTENSITY & ENVIRONMENTAL FACTORS: RI MEMBERS & NON-RI MEMBERS

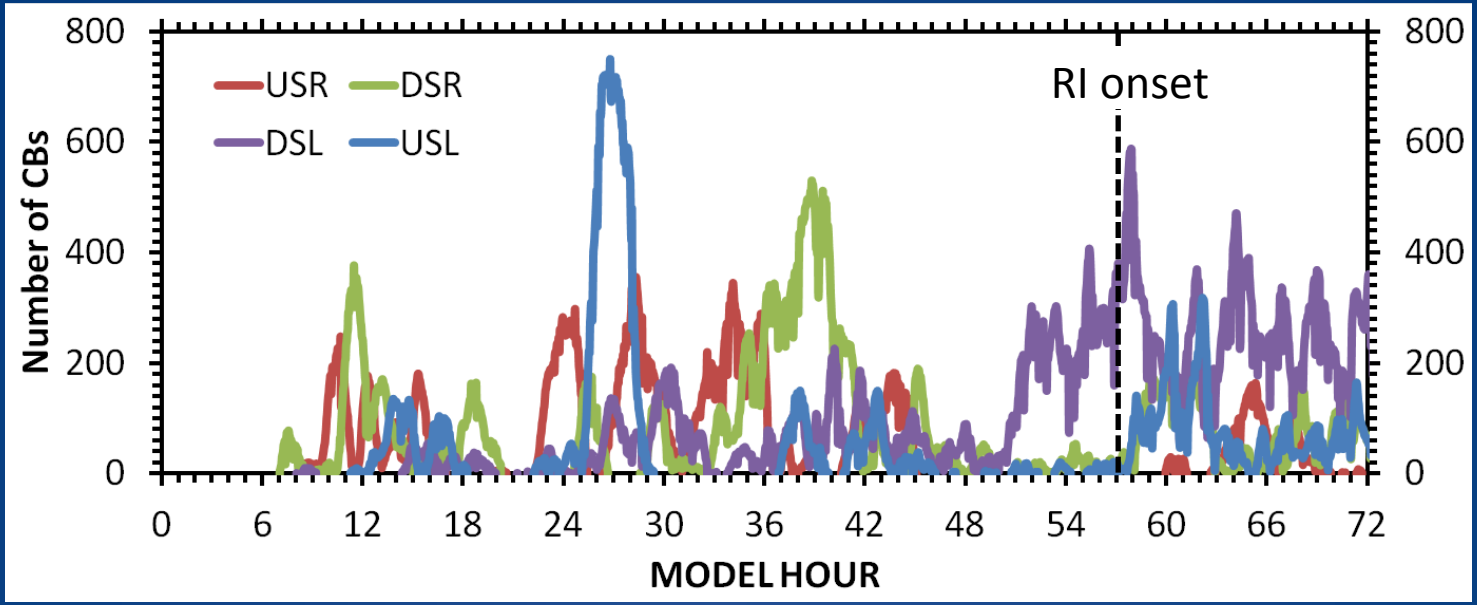




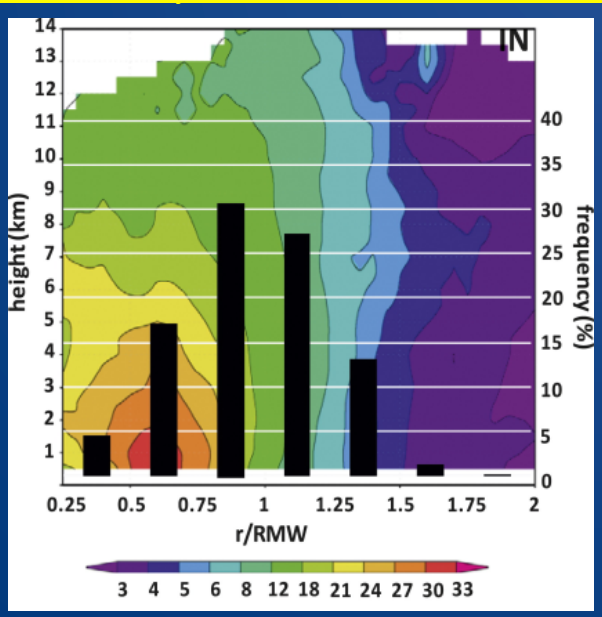


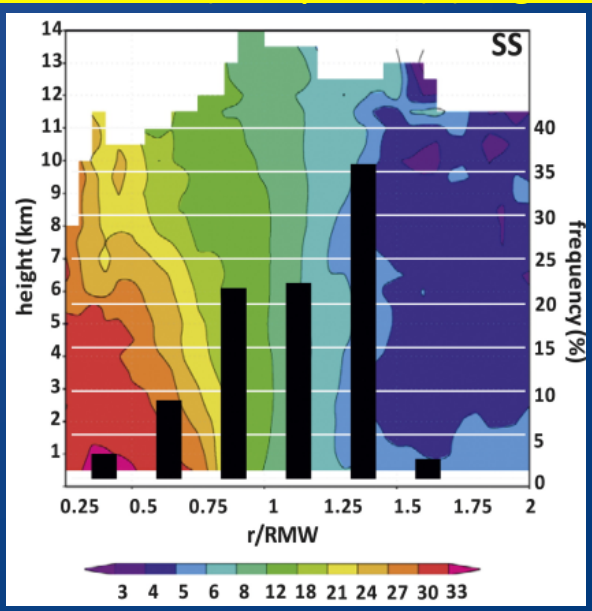


Azimuthal distribution of convective bursts in Hurricane Earl (Chen & Gopal 2015)



Axisymmetric vorticity and distribution of convective bursts (composite) (Rogers et al. 2013)



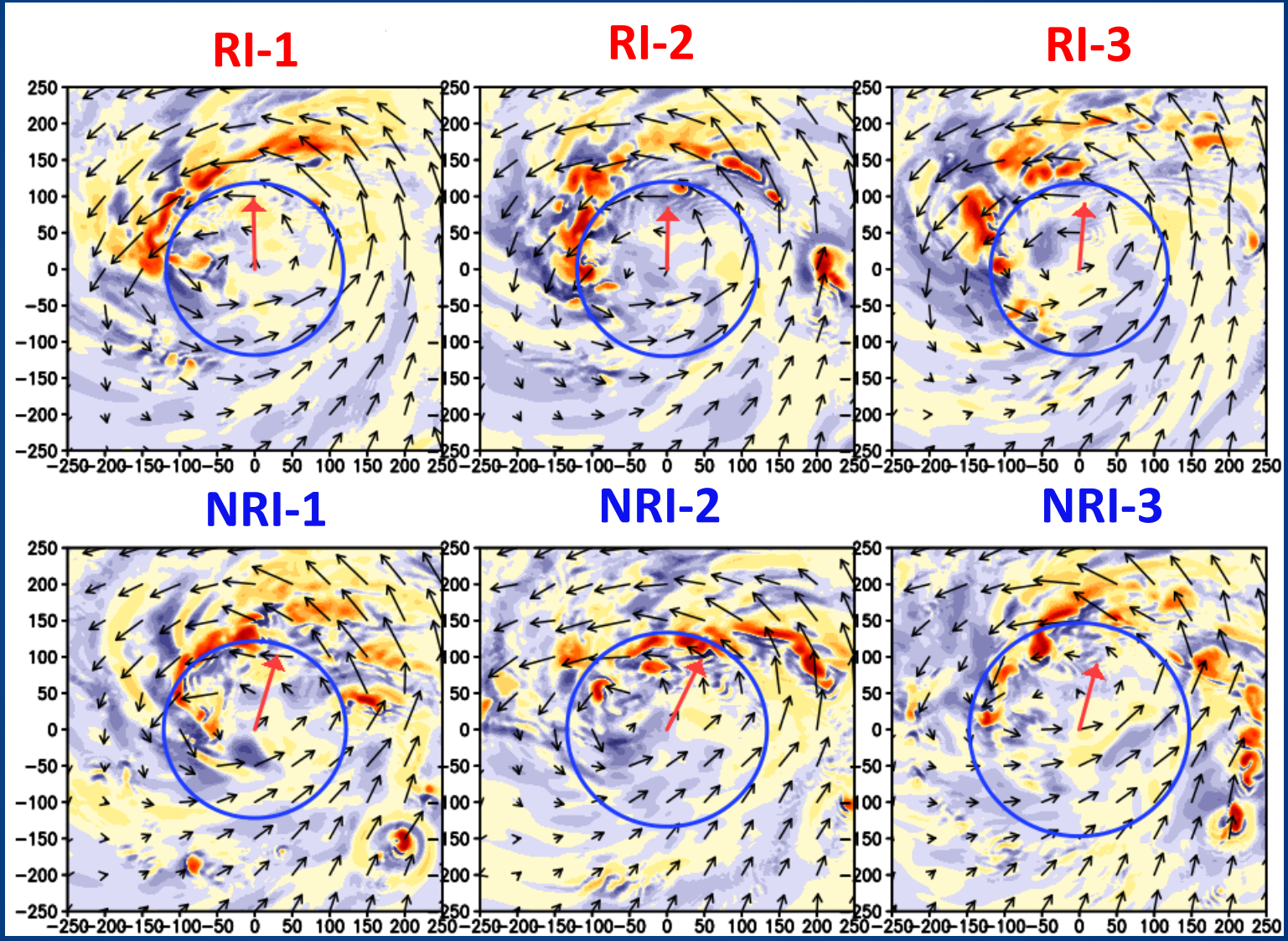


DISTRIBUTION OF DEEP CONVECTION: RI MEMBERS AND NON-RI MEMBERS

27 AUG 12Z

RI

Non-RI



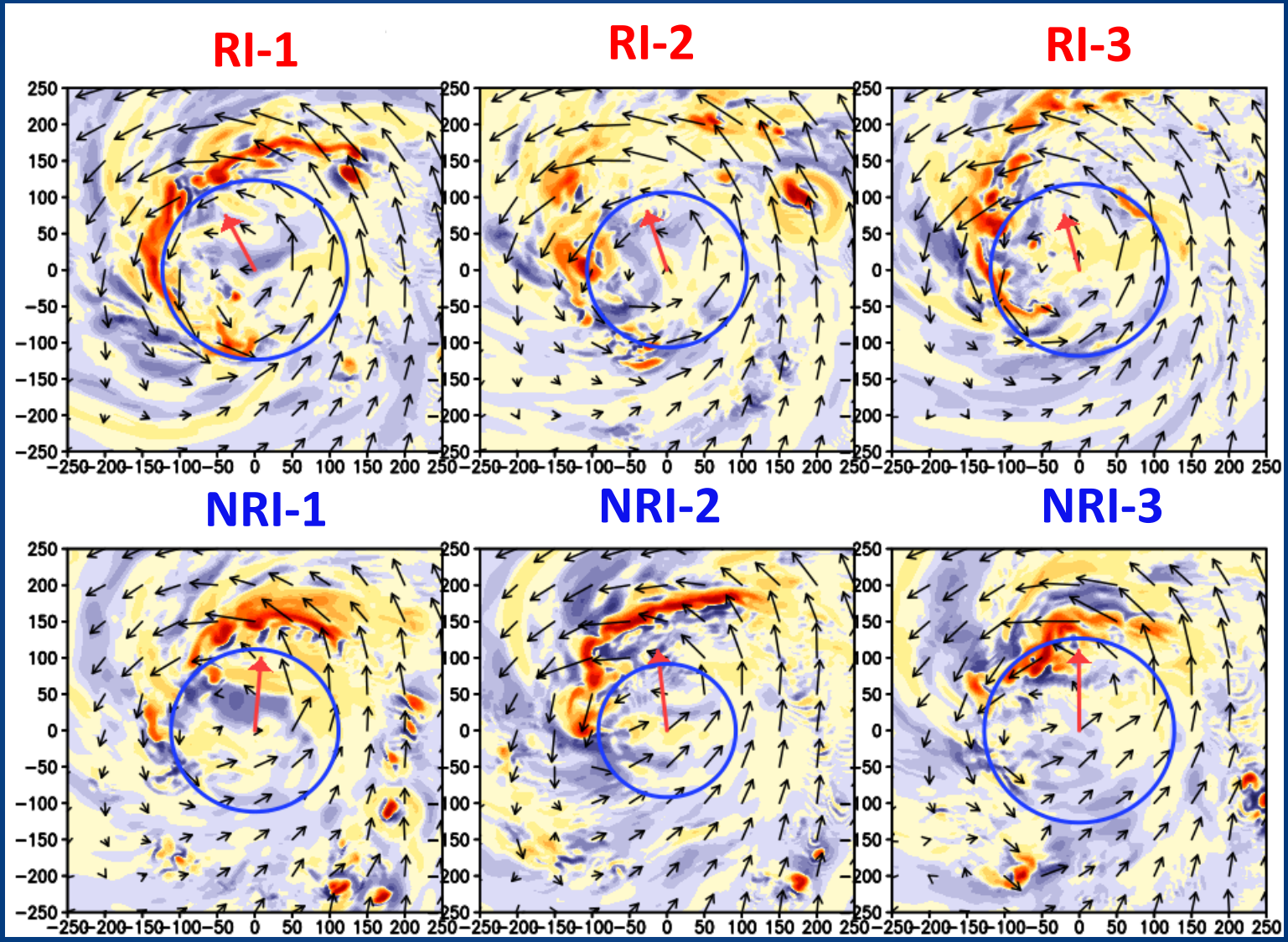
w(Shading) RMW at 2km (BLUE circle) shear vector (RED arrow)

DISTRIBUTION OF DEEP CONVECTION: RI MEMBERS AND NON-RI MEMBERS

27 AUG 15Z

RI

Non-RI



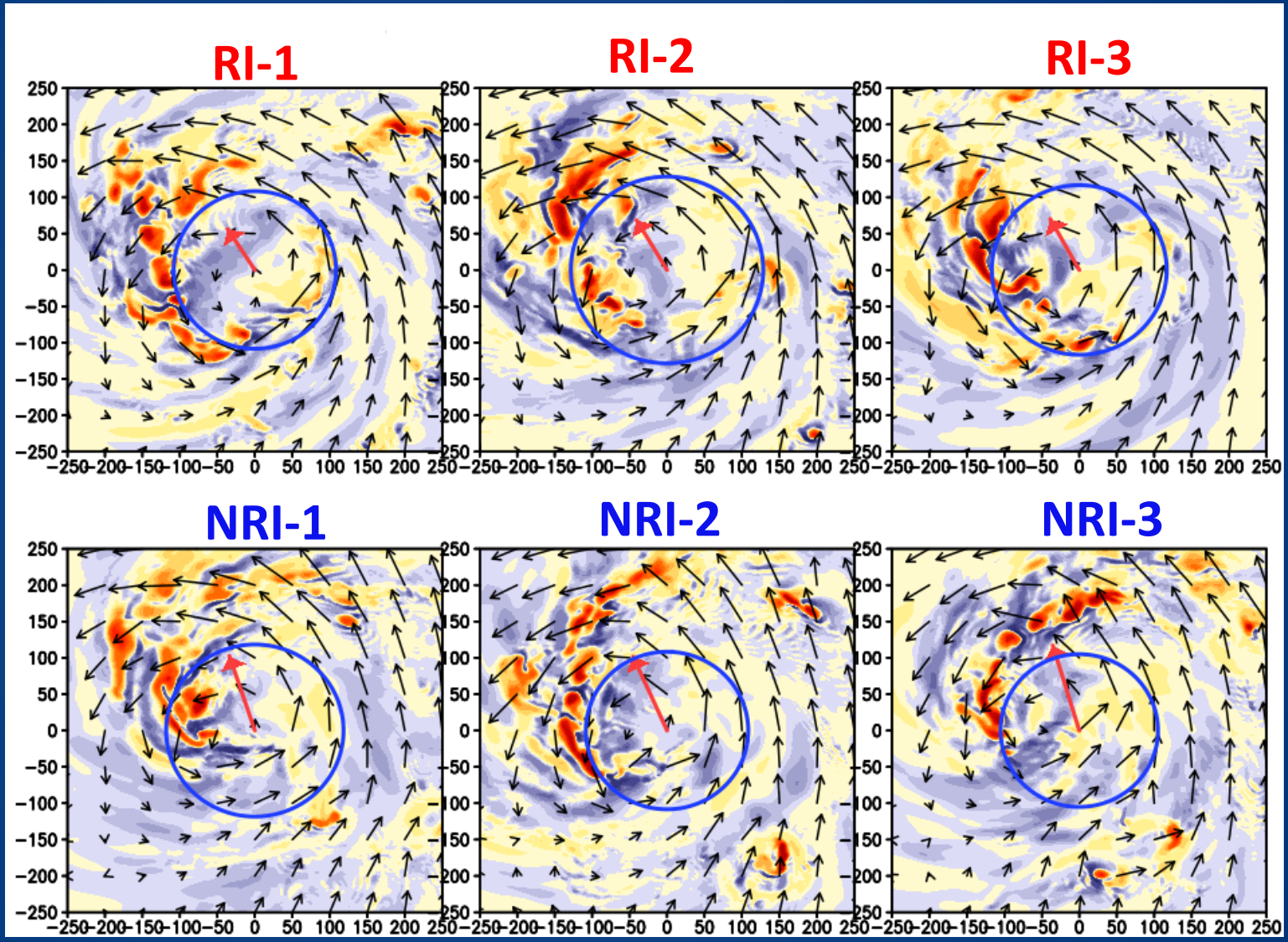
w(Shading) RMW at 2km (BLUE circle) shear vector (RED arrow)

DISTRIBUTION OF DEEP CONVECTION: RI MEMBERS AND NON-RI MEMBERS

27 AUG 18Z

RI

Non-RI



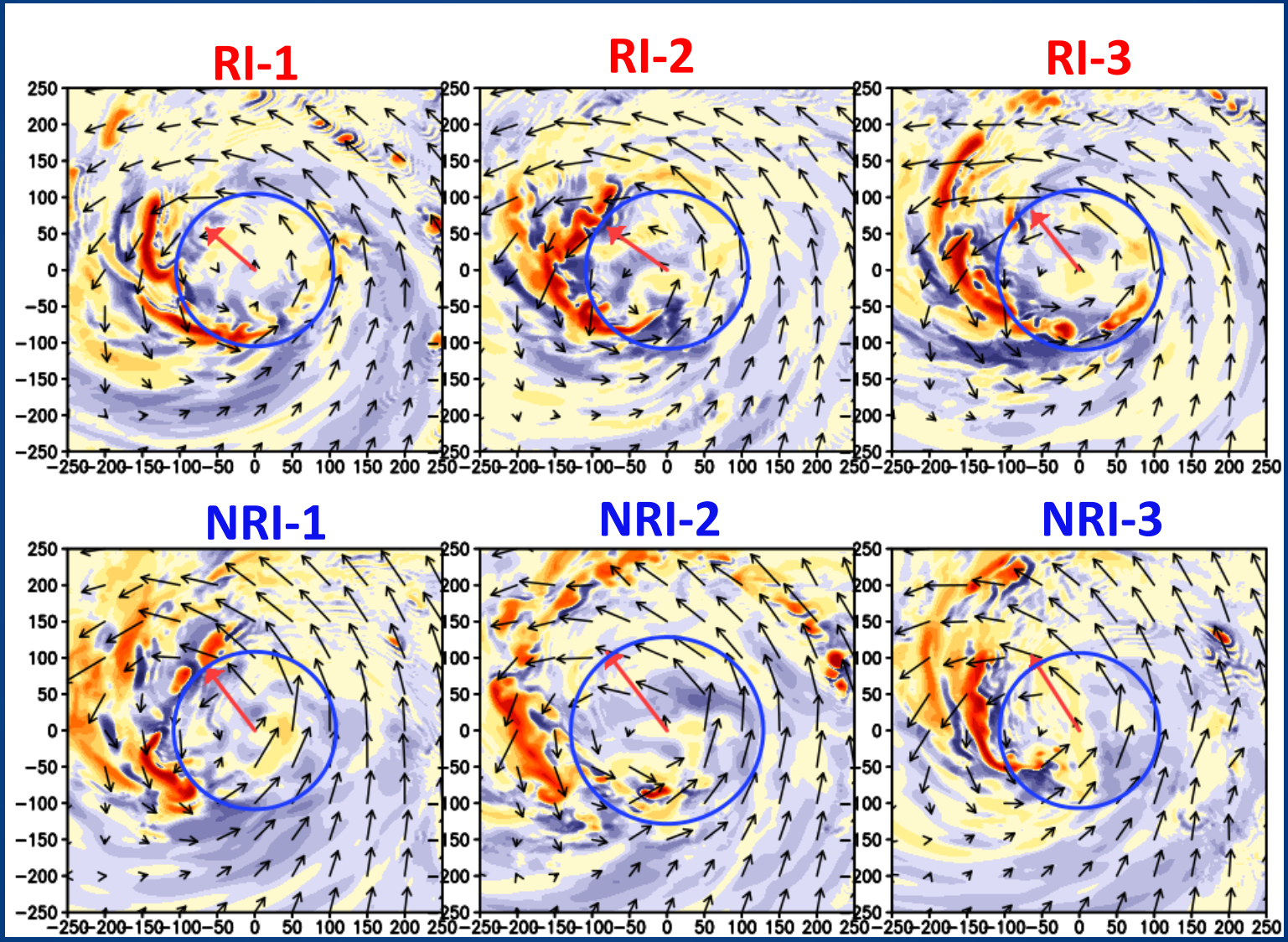
w(Shading) RMW at 2km (BLUE circle) shear vector (RED arrow)

DISTRIBUTION OF DEEP CONVECTION: RI MEMBERS AND NON-RI MEMBERS

27 AUG 21Z

RI

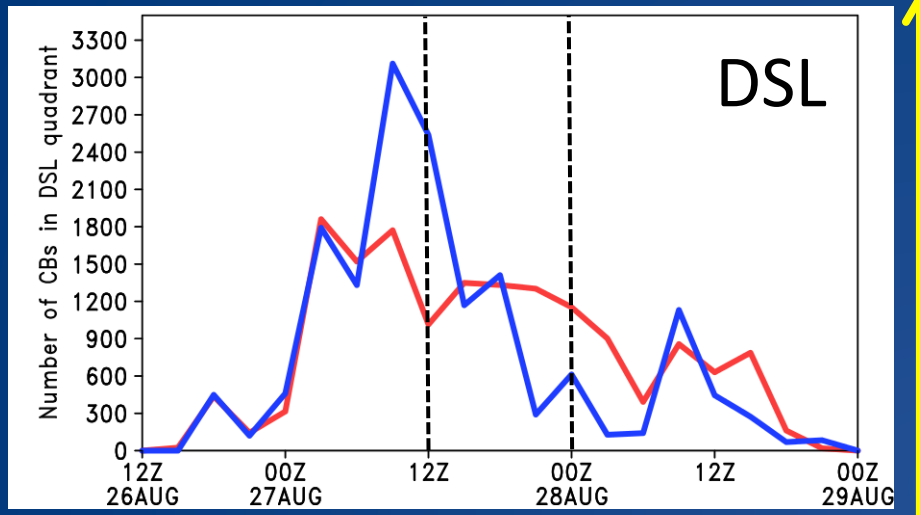
Non-RI

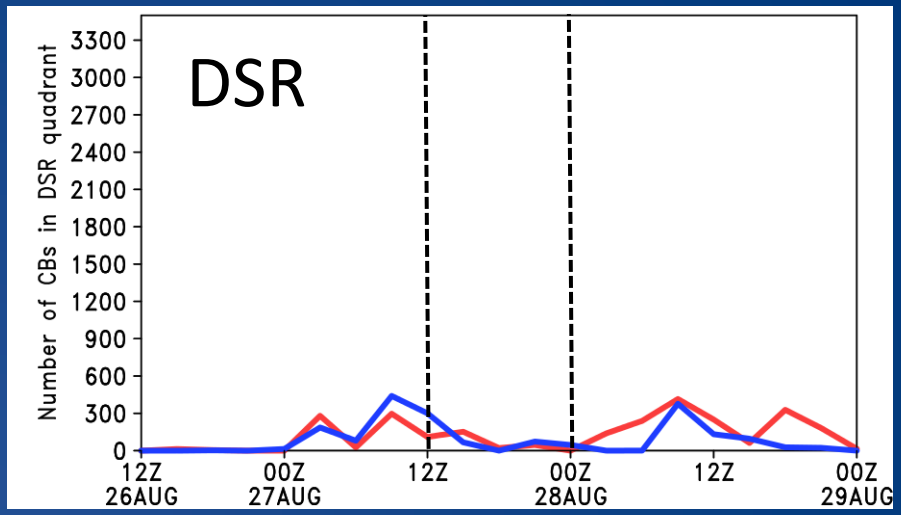


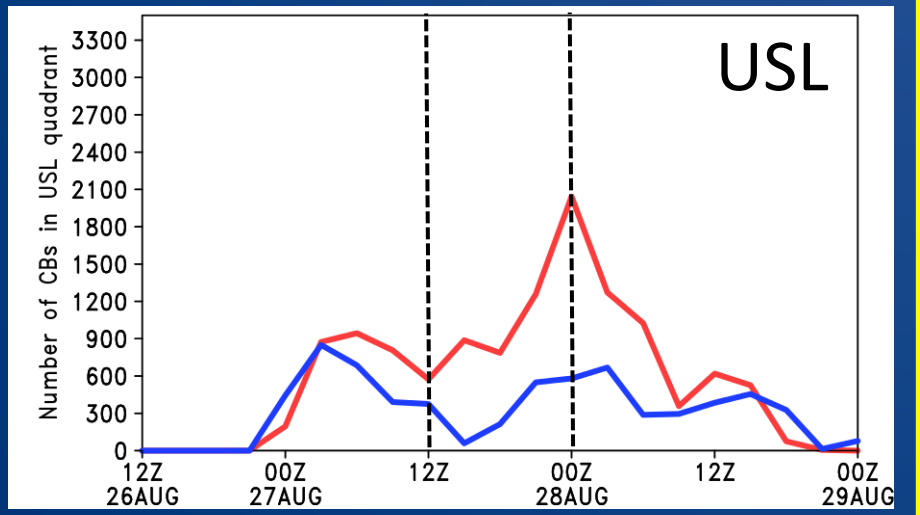
w(Shading) RMW at 2km (BLUE circle) shear vector (RED arrow)

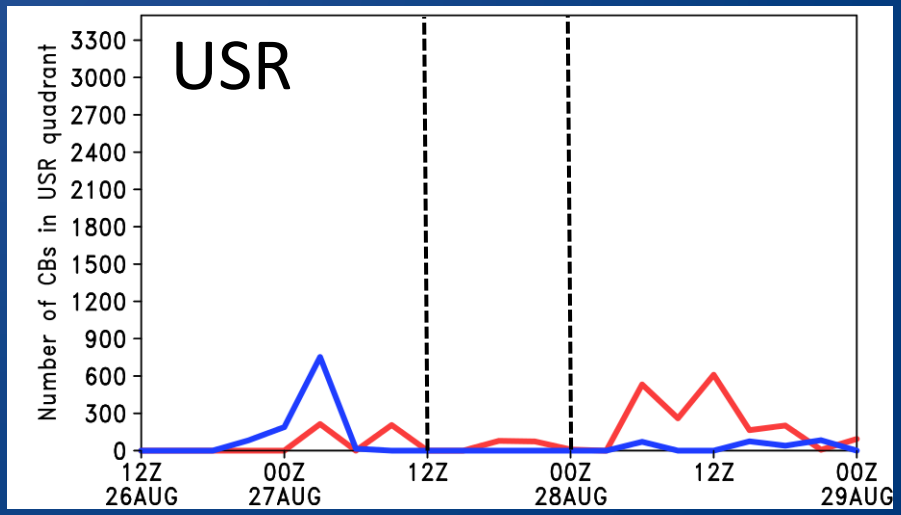
Shear-relative azimuthal distribution of convective bursts (CBs)

CBs count within 1.1(RMW_2km) in shear-oriented quadrants*







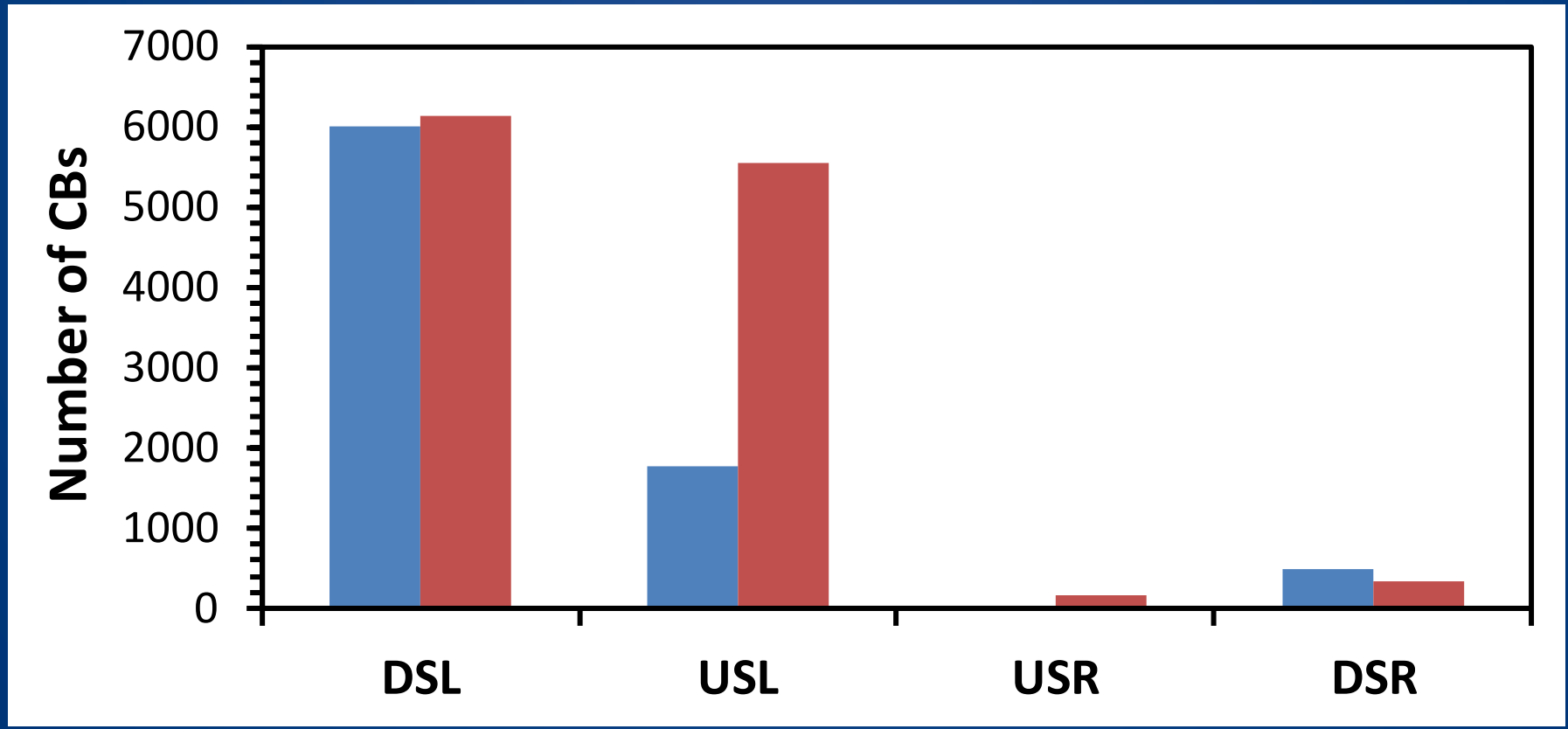


Shear vector

SHEAR-RELATIVE AZIMUTHAL DISTRIBUTION OF CONVECTIVE BURSTS (CBS)

Histogram of CBs

- within 1.1 x (RMW_2km)
- summed over 27 AUG 12Z -28 AUG 00Z (12h)



CONCLUSIONS

- Both radial location and azimuthal location of CBs are important
- RI members tend to have more CBs in the upshear-left (USL) quadrant within RMW then non-RI members
- For non-RI members CBs tend to propagate outward when they move downstream from downshear-left (DSL) to upshear-left (USL)

FUTURE WORK

- Look for missing link between convection distribution and environmental factors (e.g. upper level trough)
- Identify other storm structure differences between RI members and non-RI members
- Run HWRF ensemble for Edouard (2014) and Erika (2015) to evaluate our findings