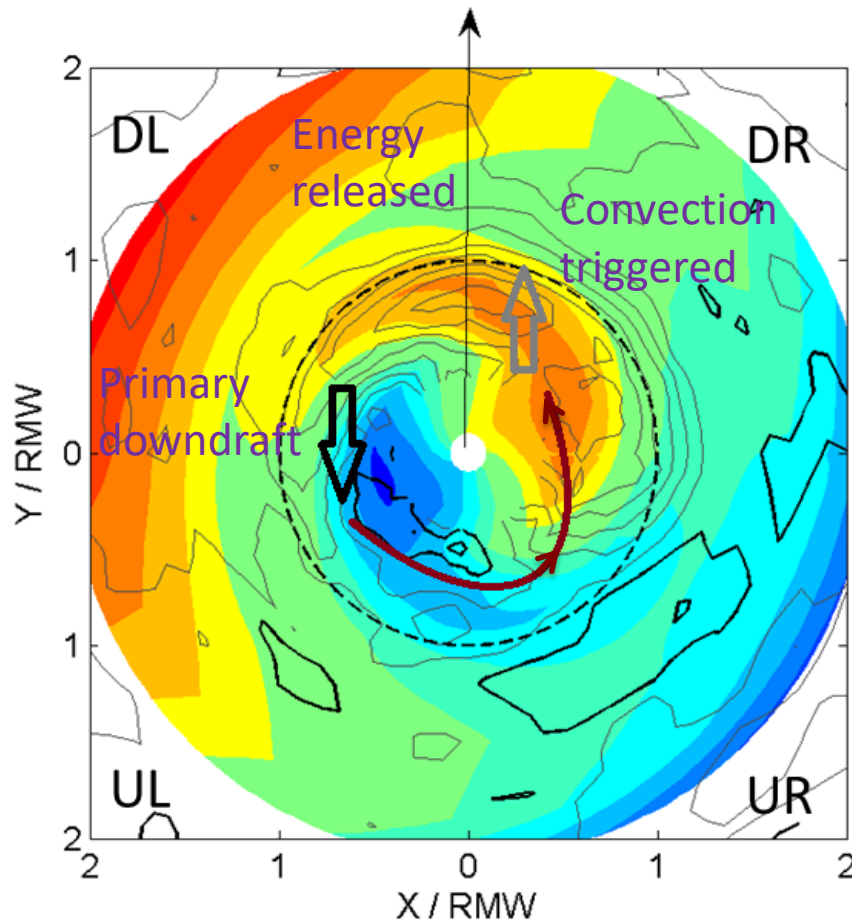


The role of surface fluxes in hurricane intensification through boundary layer recovery

Jun Zhang, NOAA/HRD & U. Miami/CIMAS

A paradigm of energy cycling process tied to shear-induced asymmetry of convection



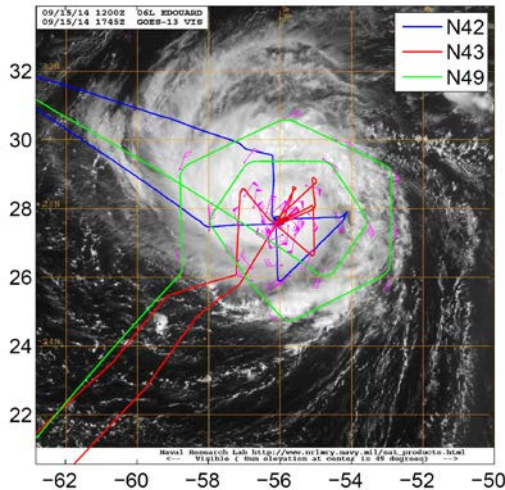
- As air parcels rotate from the upshear left (UL) quadrant to the downshear right (DR) quadrant, they acquire equivalent potential temperature (θ_e) from surface fluxes ;
- Convection is triggered in the DR quadrant in the presence of asymmetric mesoscale lifting coincident with the θ_e maximum.;
- Energy is then released by latent heating in the downshear left (DL) quadrant;
- Convective downdrafts bring down cool and dry air to the surface and lower θ_e again in the DL and UL quadrants.

(Jun Zhang et al. 2013 MWR)

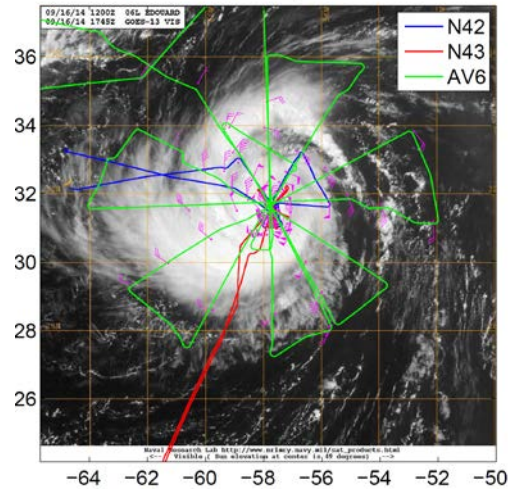
SST observations using GPS dropsonde in Hurricane Edouard (2014)

(Jun Zhang et al. 2017 JTECH)

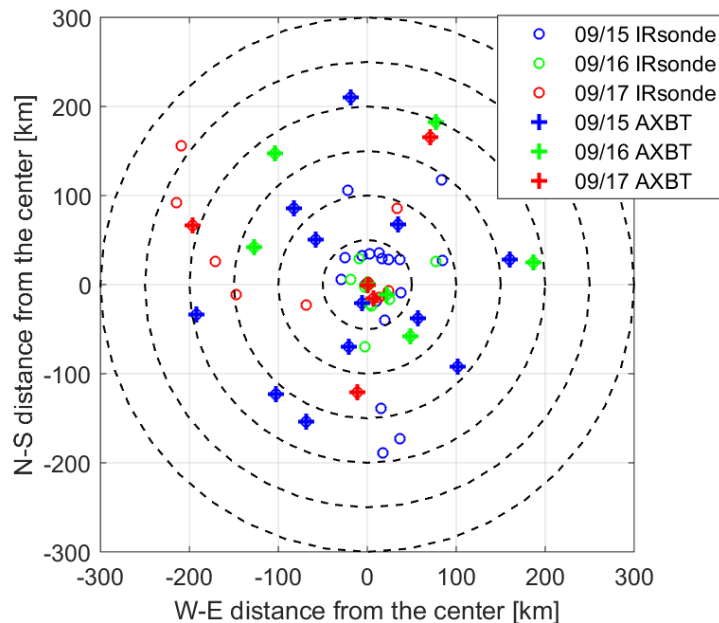
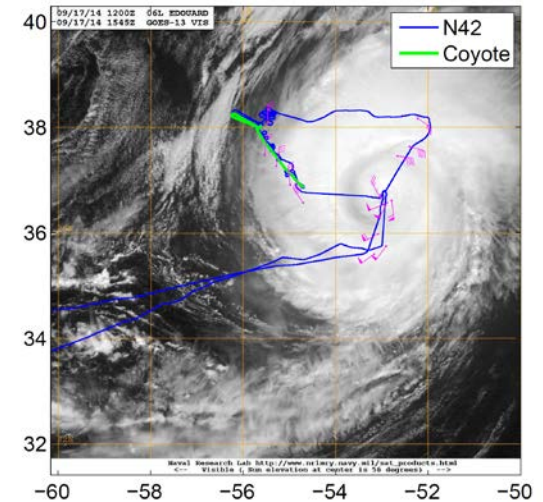
H. Edouard 15 Sept. Missions



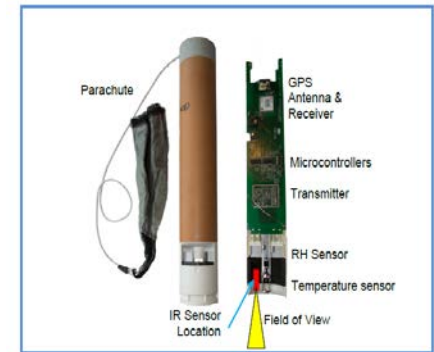
H. Edouard 16 Sept. Missions



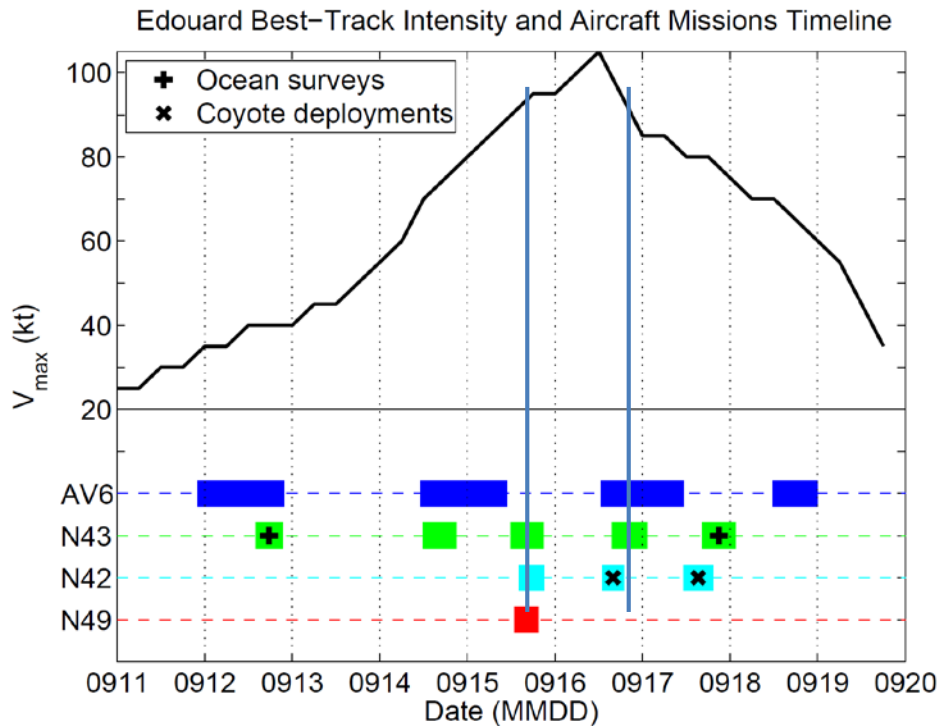
H. Edouard 17 Sept. Missions



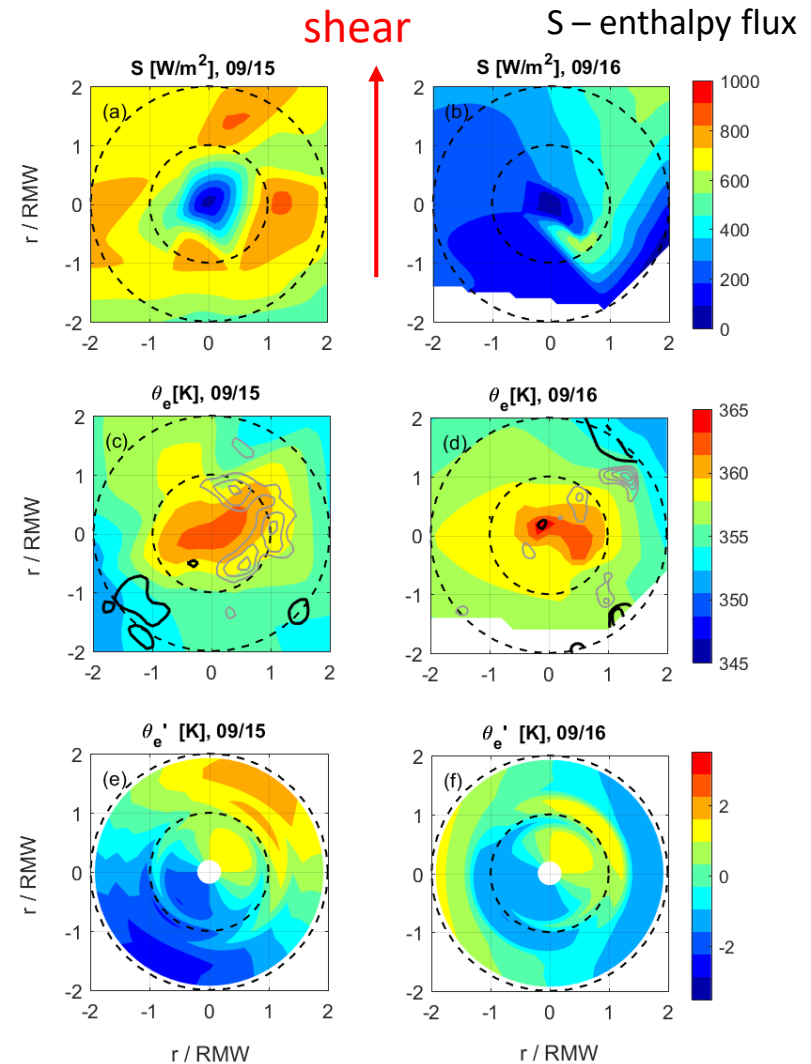
20140915	N42	16(15)
20140915	N43	19(12)
20140915	N49	16(0)
20140916	AV6	87(0)
20140916	N42	24(18)
20140916	N43	13(0)
20140917	N42	17(15)



A total of 60 IR sondes were dropped in Hurricane Edouard (2014) with 25 of them paired with AXBTs.



- The boundary layer recovery of low-entropy air through surface fluxes may be a key mechanism for TC intensity change, while the hurricane intensity is correlated to the entropy of the inflow more than the surface fluxes.
- Ocean structure and SST are crucial for determining enthalpy fluxes.



- Can operational hurricane models capture this multi-scale interaction process?