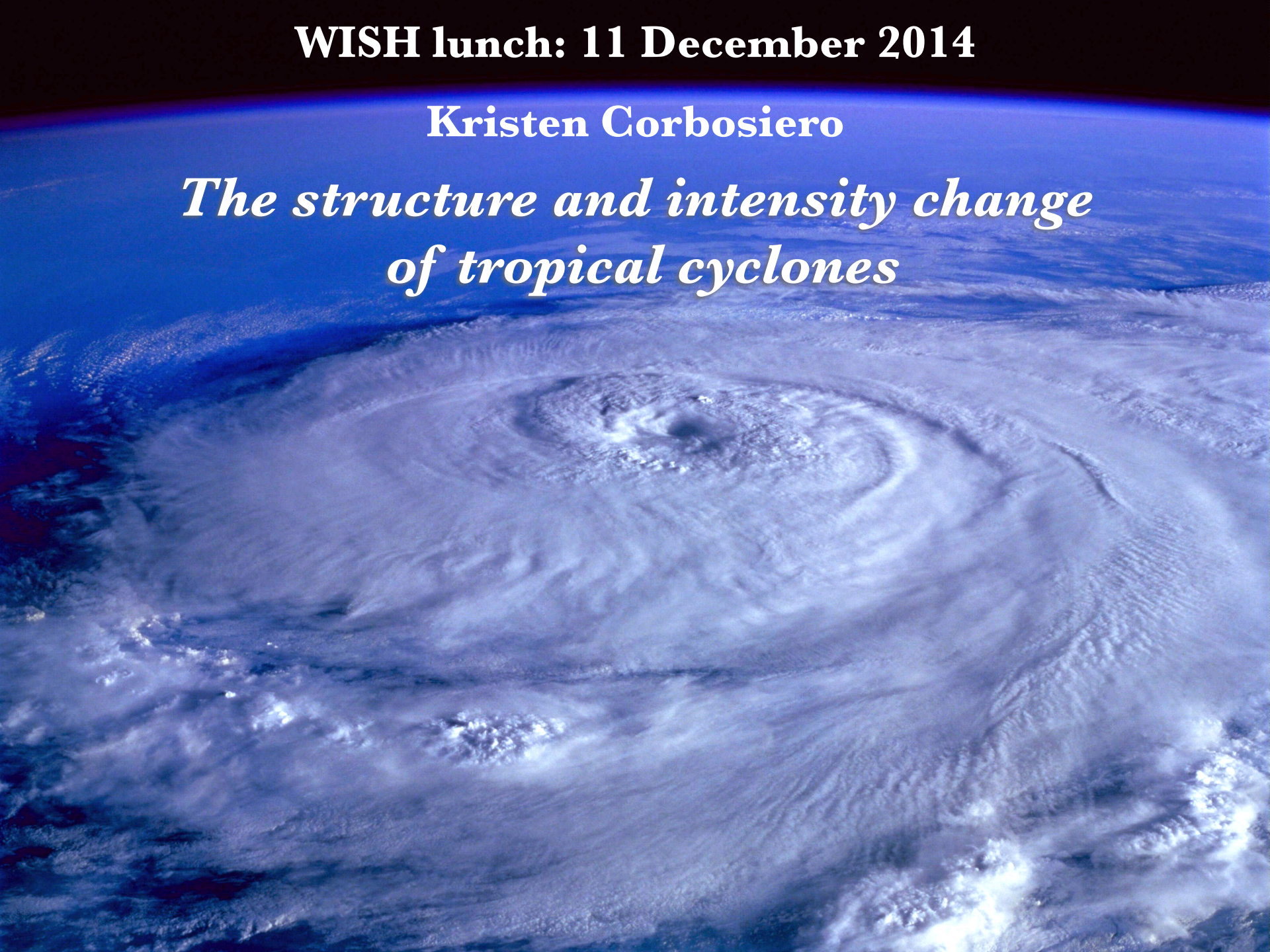
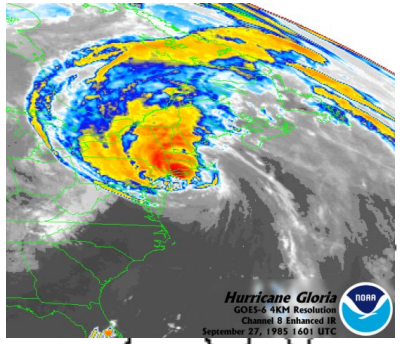


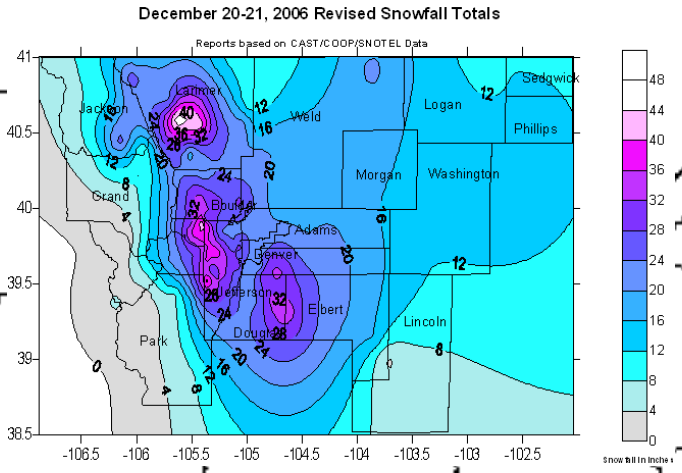
WISH lunch: 11 December 2014

Kristen Corbosiero

The structure and intensity change of tropical cyclones


Hurricane Gloria
GOES-6 4KM Resolution
Channel 8 Enhanced IR
September 27, 1985 1601 UTC
NOAA


BOSTON
RED SOX


December 20-21, 2006 Revised Snowfall Totals
Reports based on CAST/COOP/SNOTEL Data
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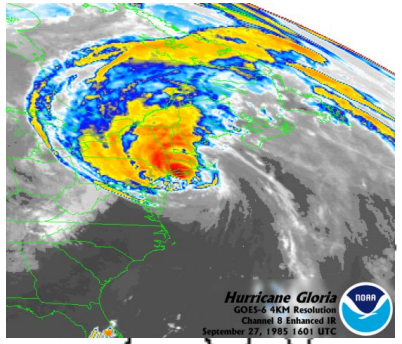
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RED SOX

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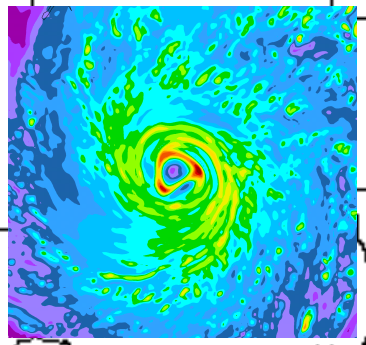

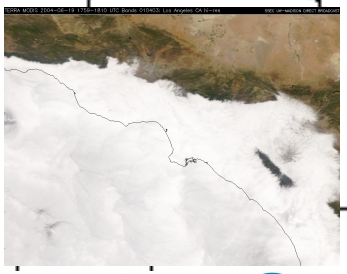

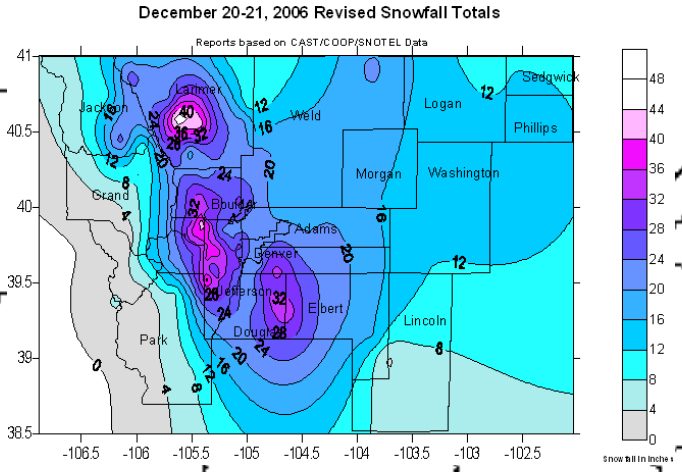
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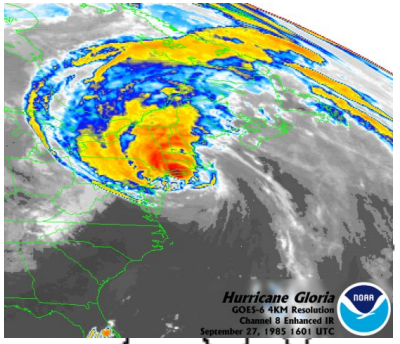
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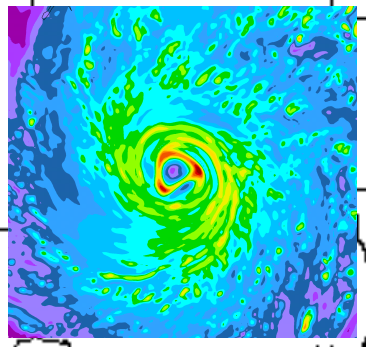
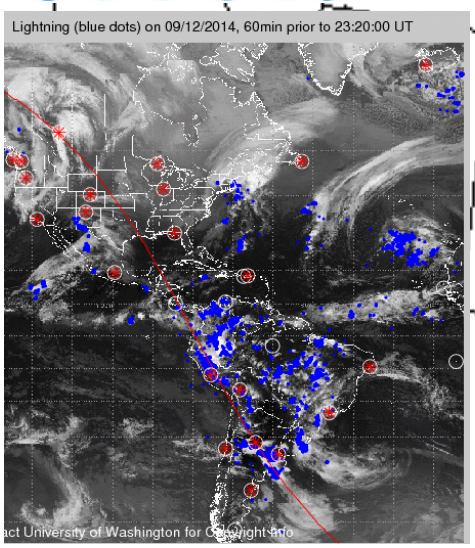
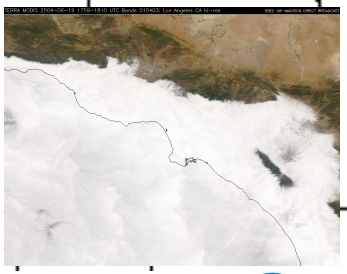
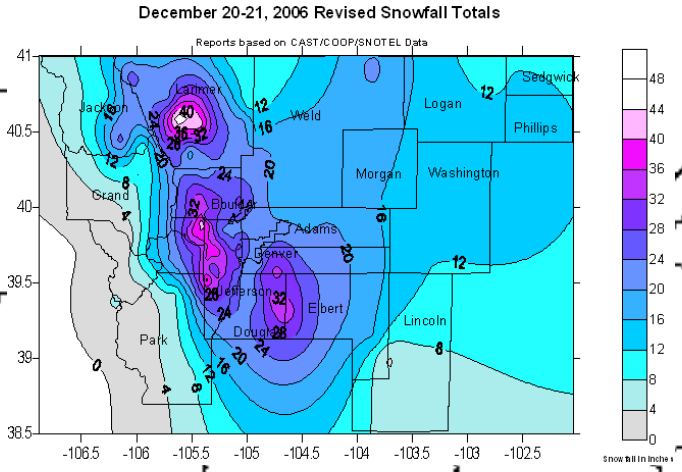
RED SOX




Lightning (blue dots) on 09/12/2014, 60min prior to 23:20:00 UT
act University of Washington for Copyright info

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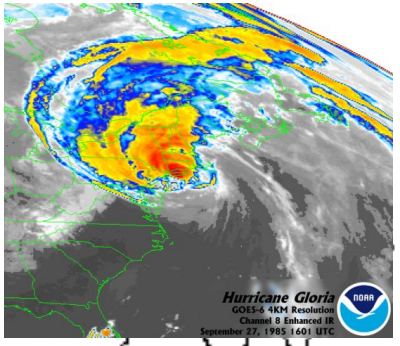
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BOSTON
RED SOX


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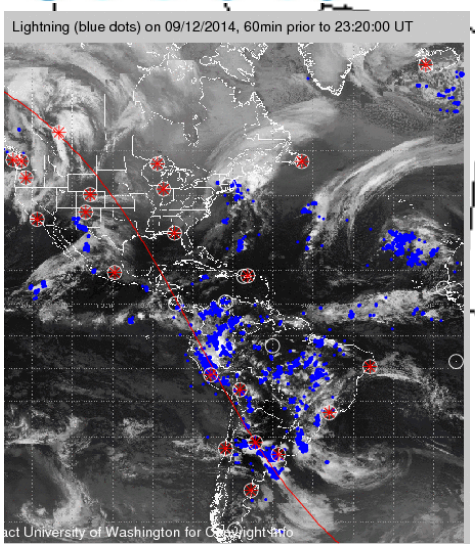
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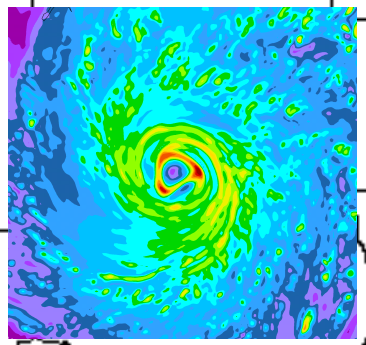
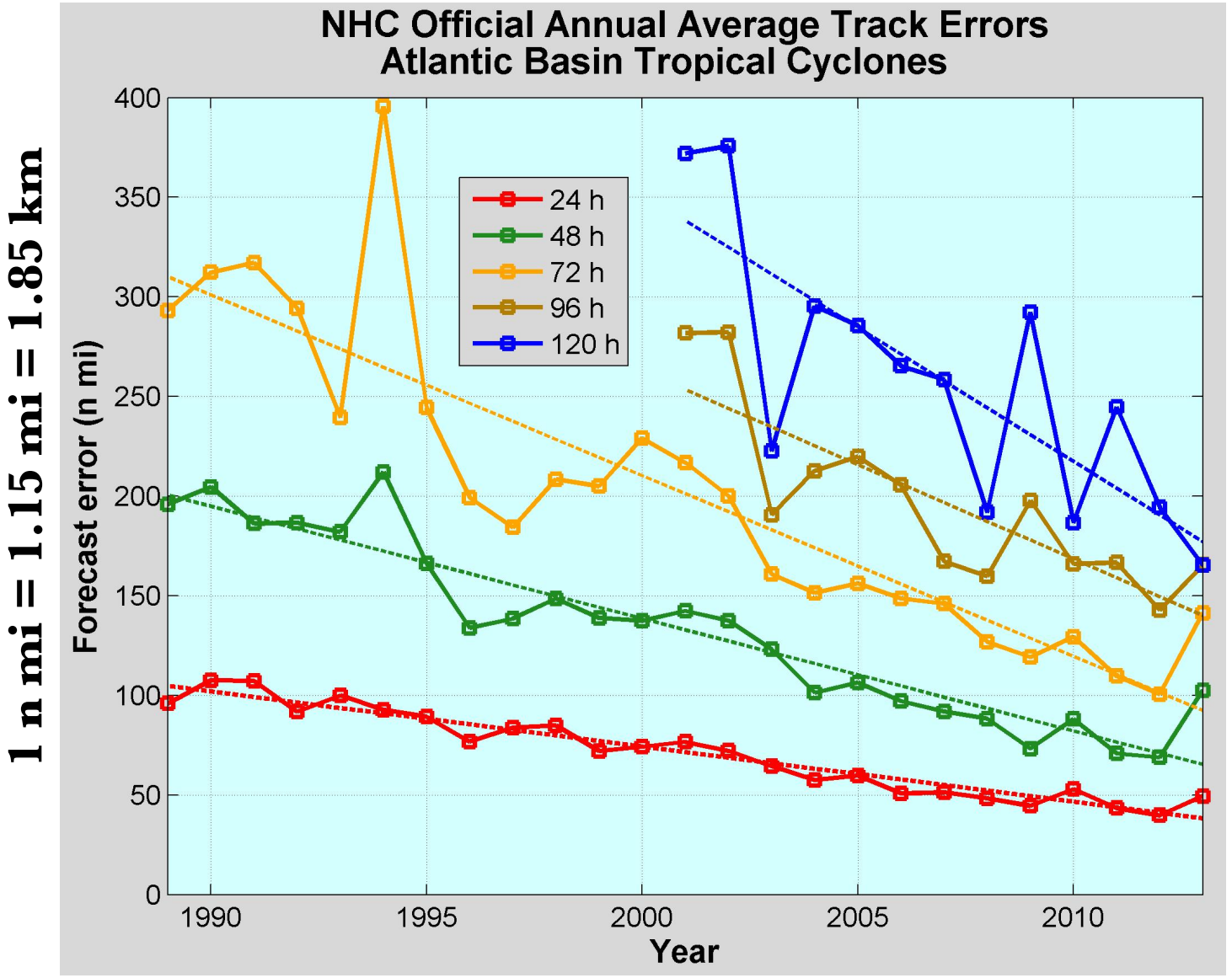
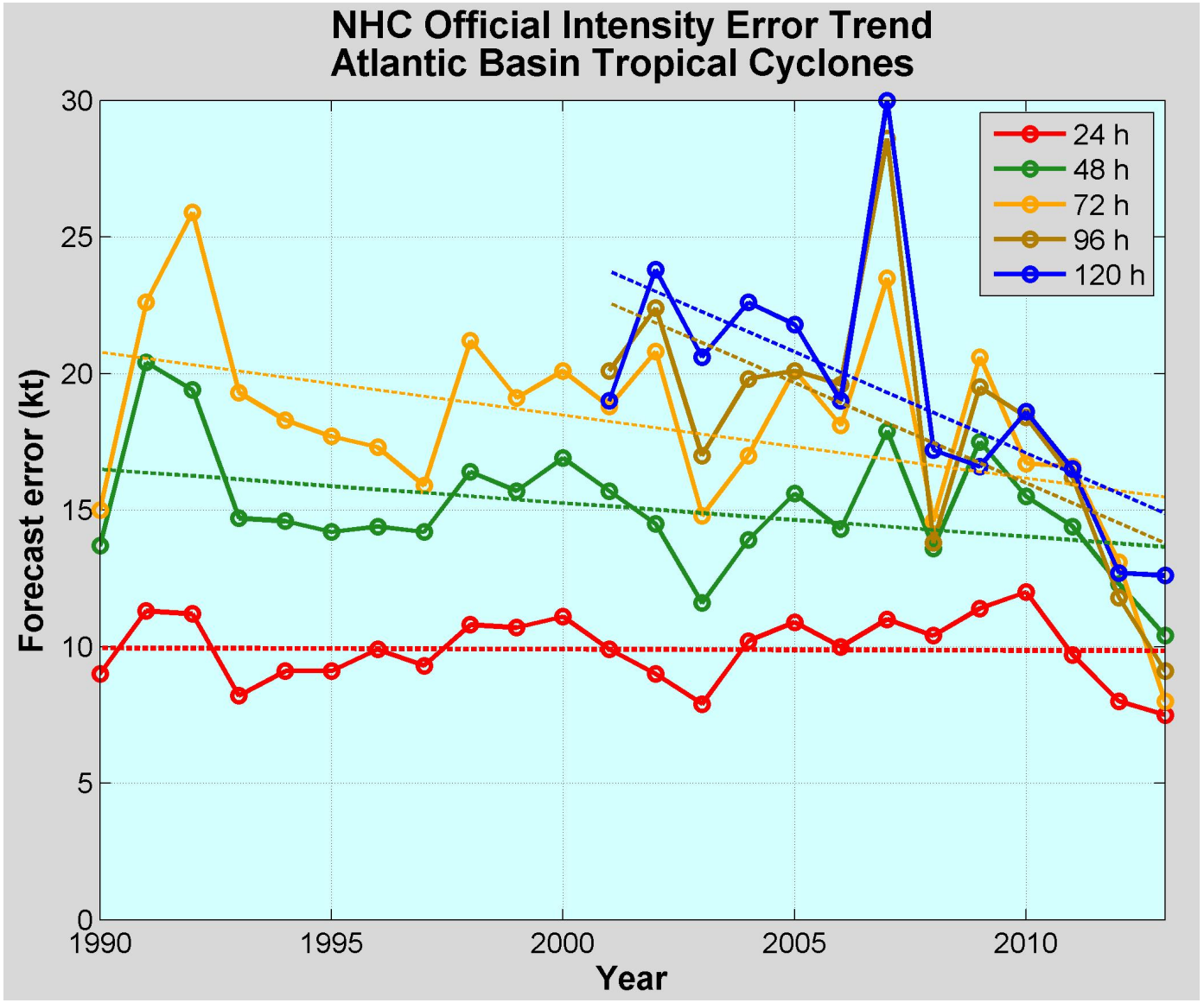




Forecast track errors have been cut in HALF

http://www.nhc.noaa.gov/verification/

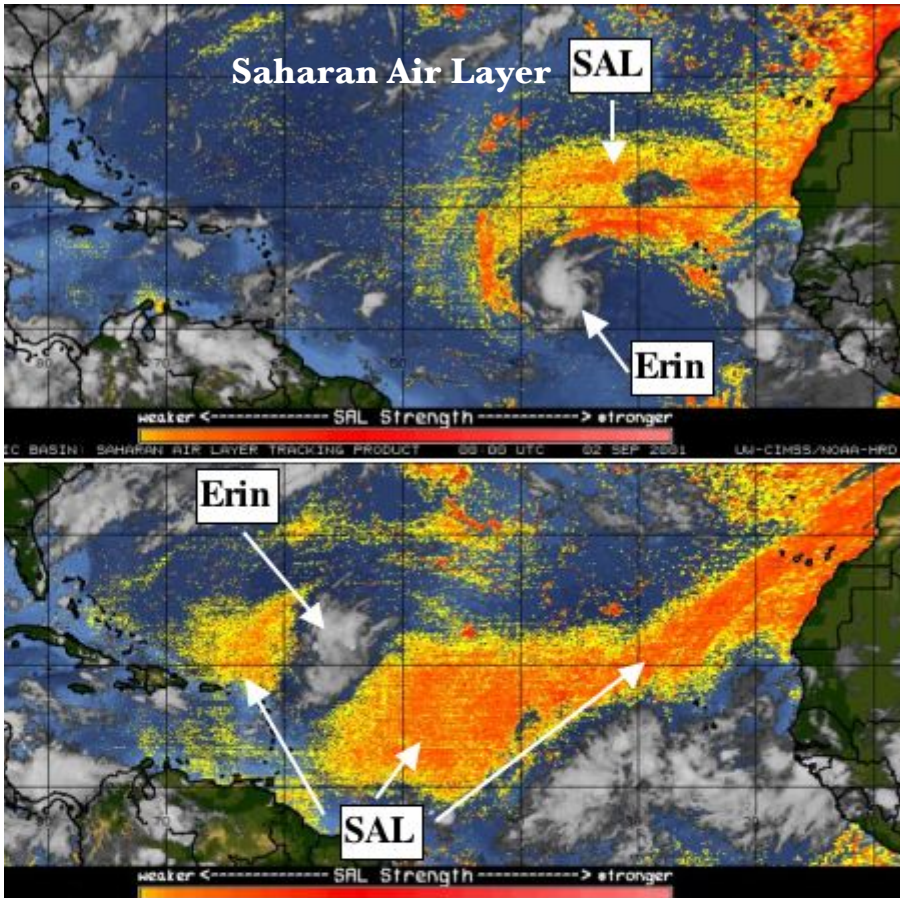


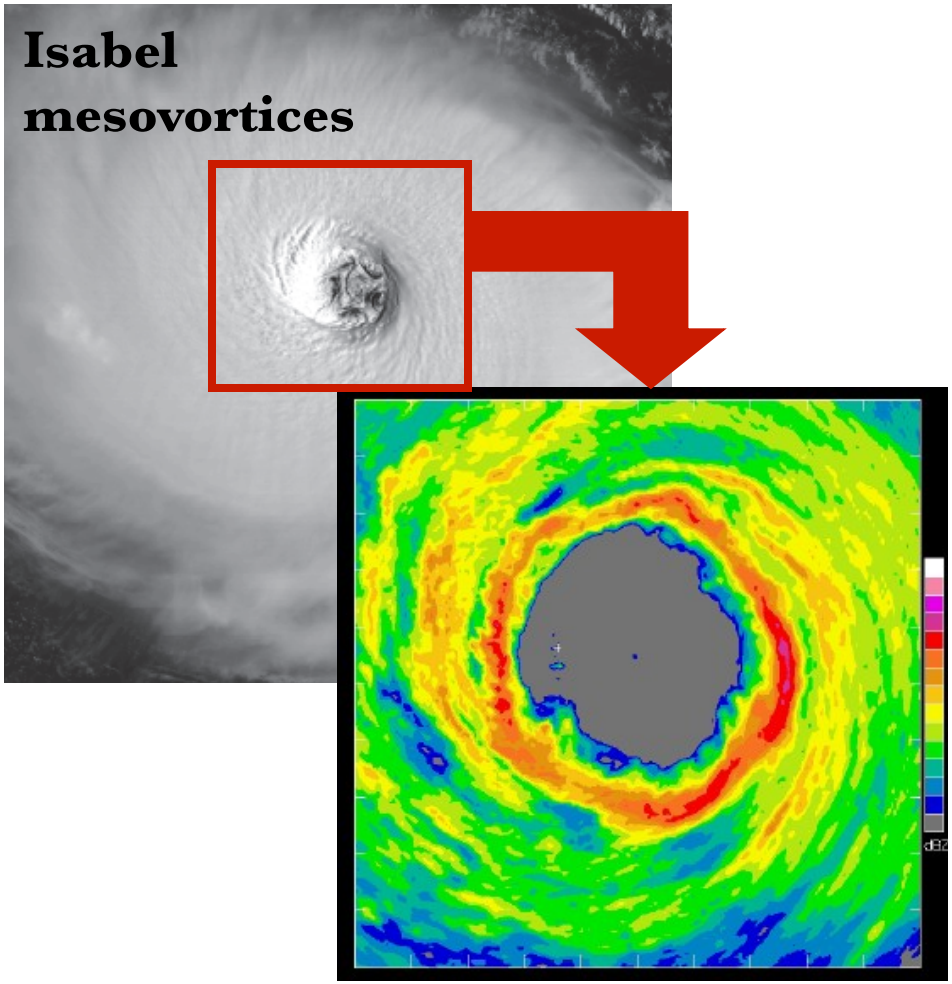
Forecast intensity errors have NOT improved

http://www.nhc.noaa.gov/verification/

Why does this discrepancy exist between tropical cyclone track and intensity forecasting?

~ The intensity of a tropical cyclone is controlled by both the large scale environment (the intrusion of dry air, vertical wind shear) and internal storm dynamics

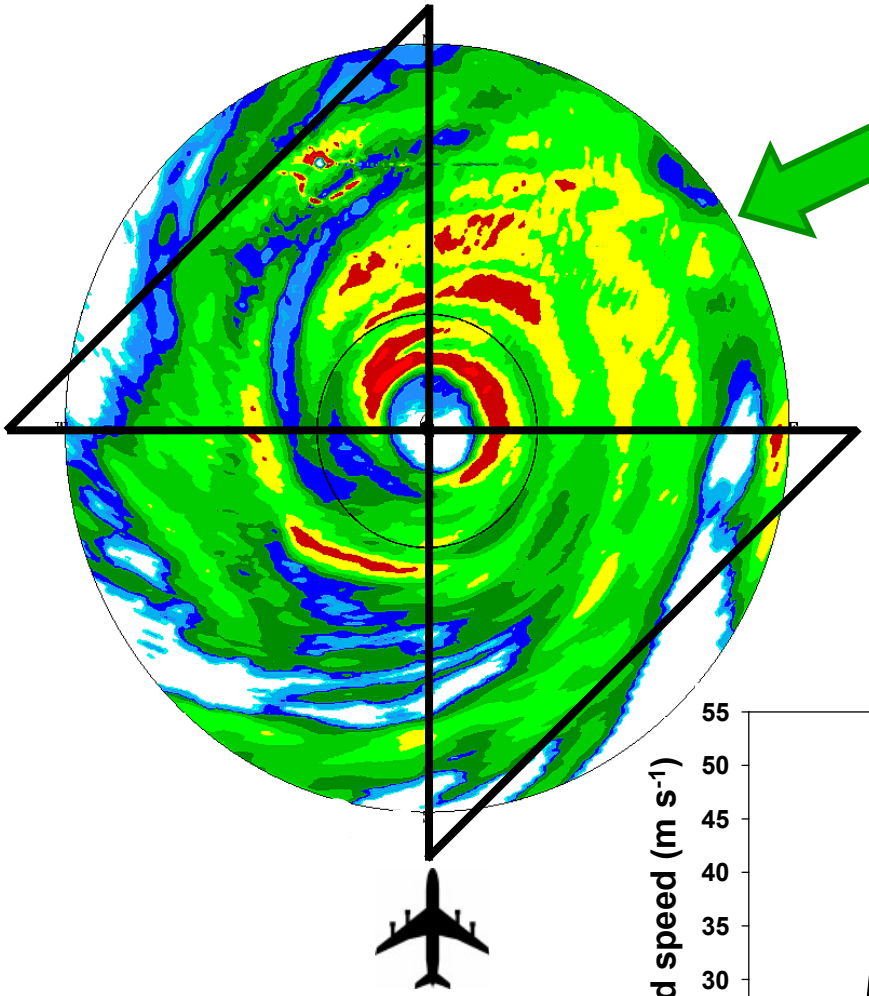




Images courtesy NOAA HRD and UWisc-Madison

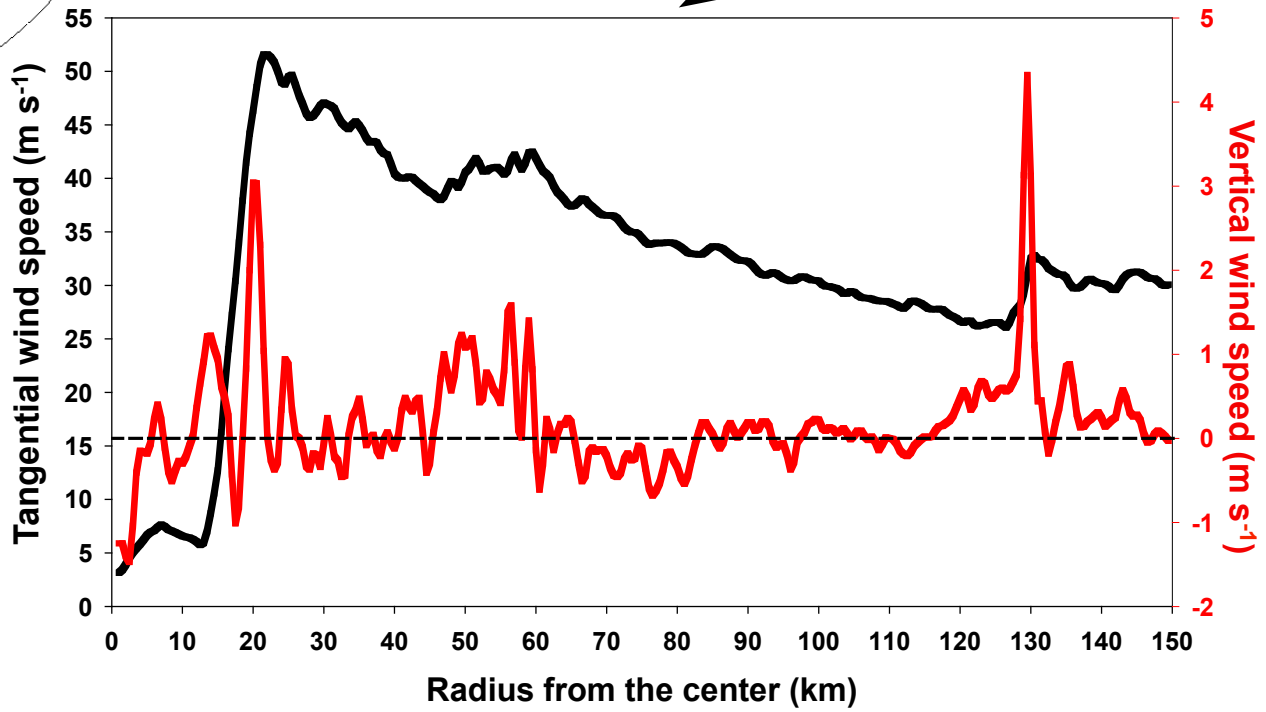
Air Force Reserve
C-130

NOAA P-3s

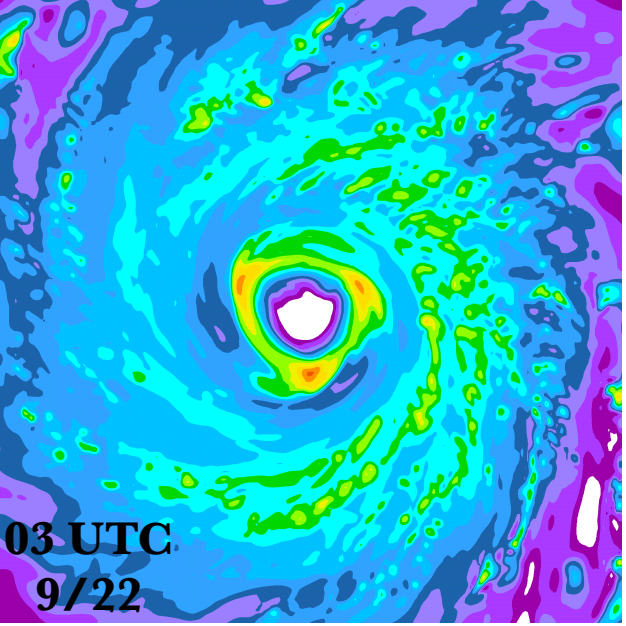


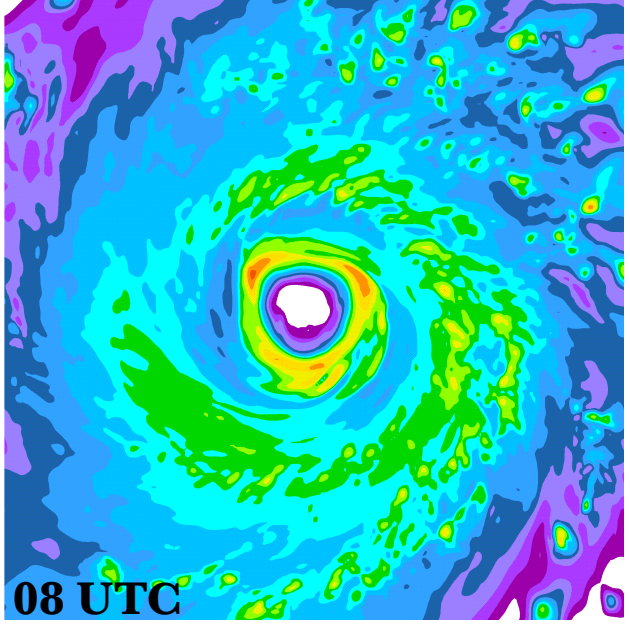
"Figure 4" flight path and precipitation structure in Hurricane Elena (1985)

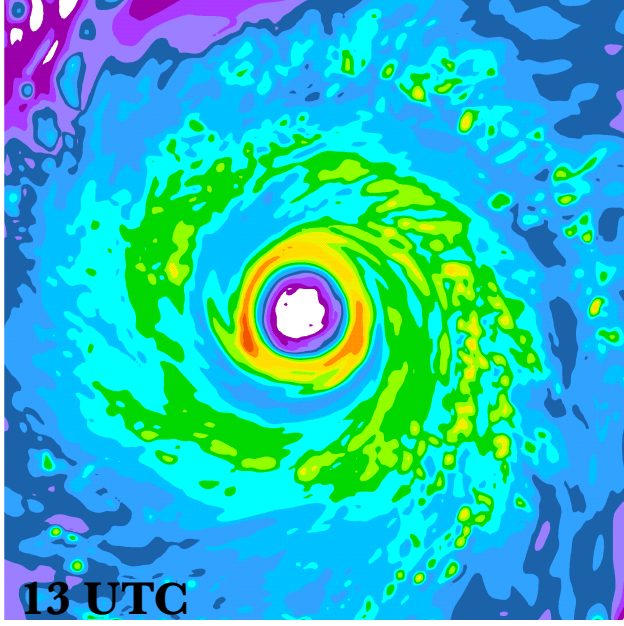
Wind speed and vertical air motion at 1 mile above the ground along the southern flight path



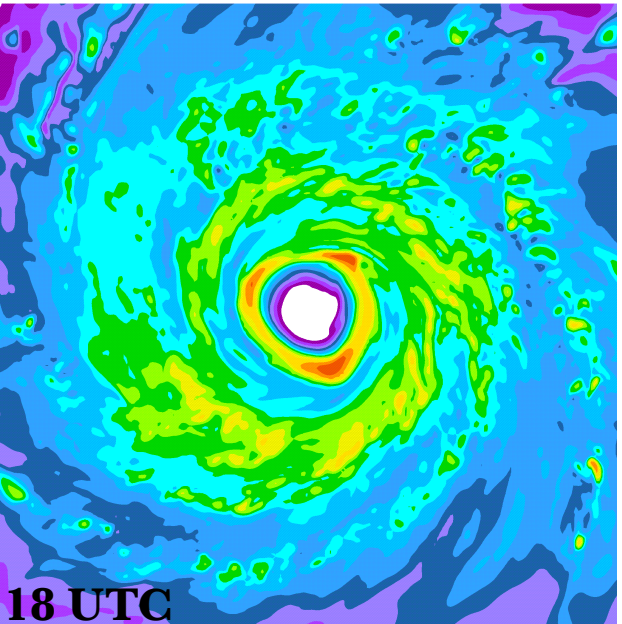
Corbosiero et al. (2005, 2006)

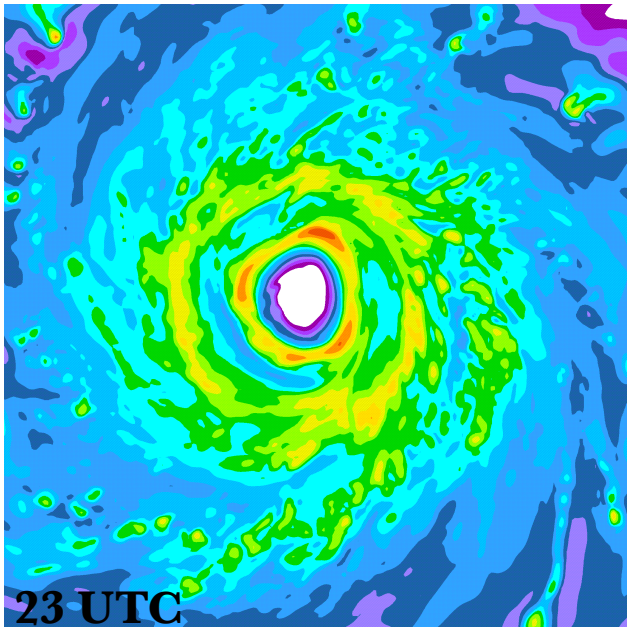


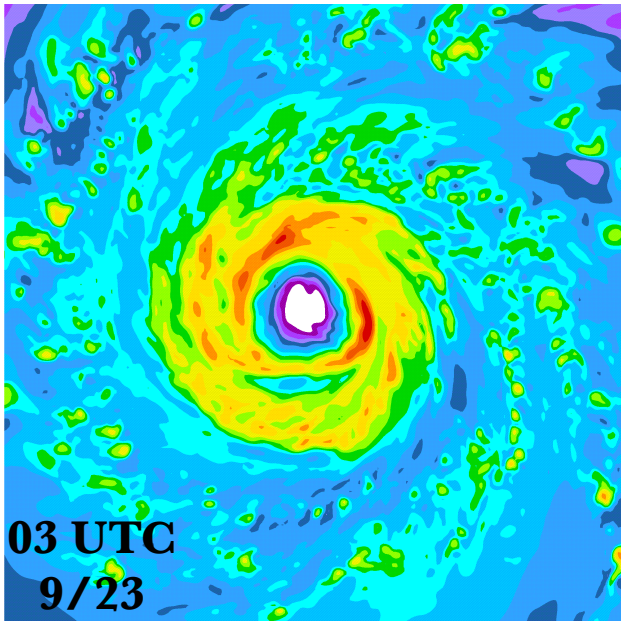




Secondary eyewall formation & contraction
Hurricane Rita (2005)

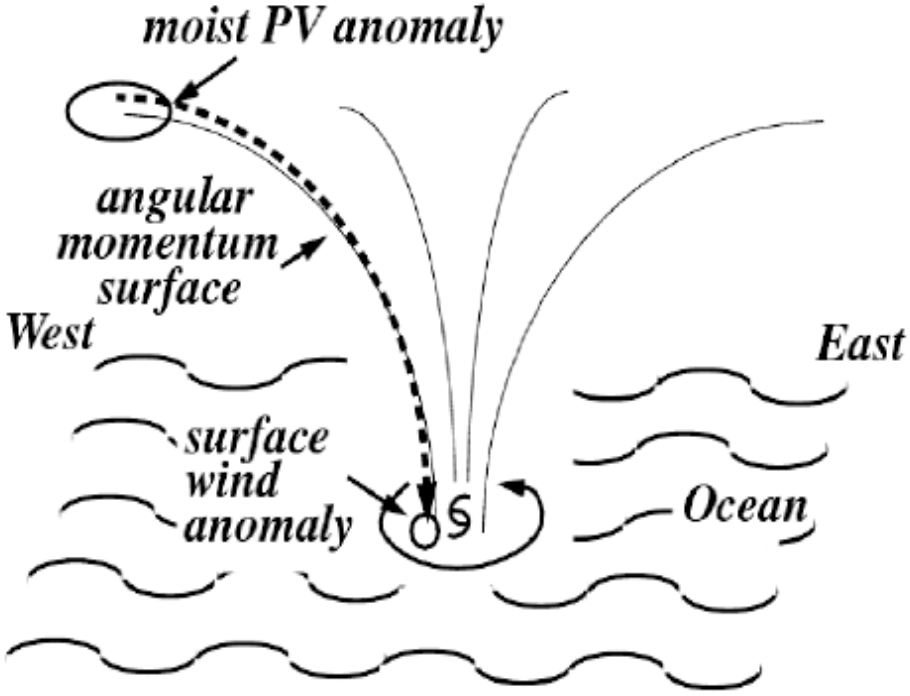






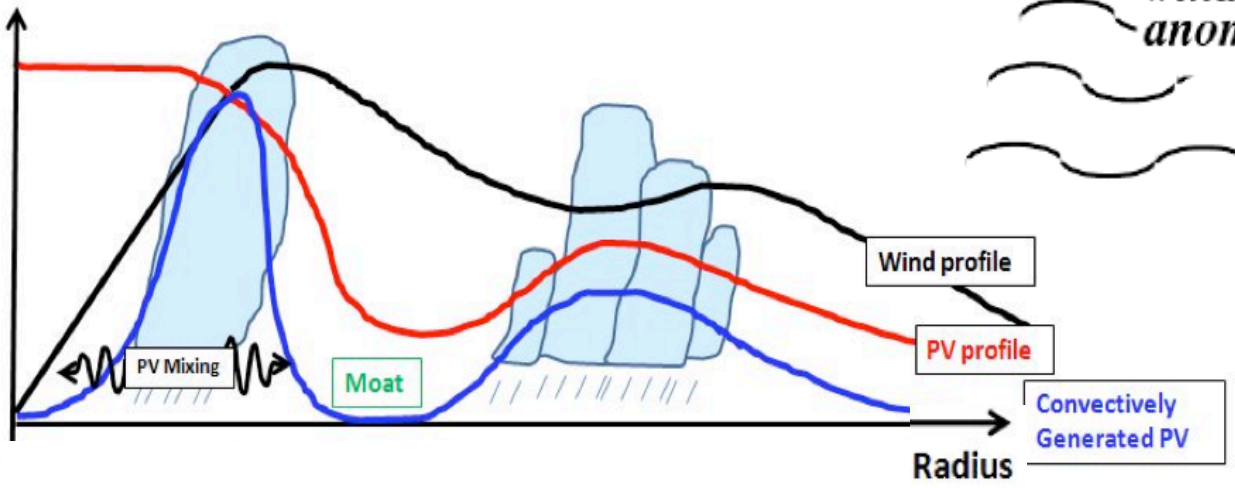
Secondary eyewall formation hypotheses: Environmental factors

Finite amplitude WISHE instability



Nong and Emanuel (2003)

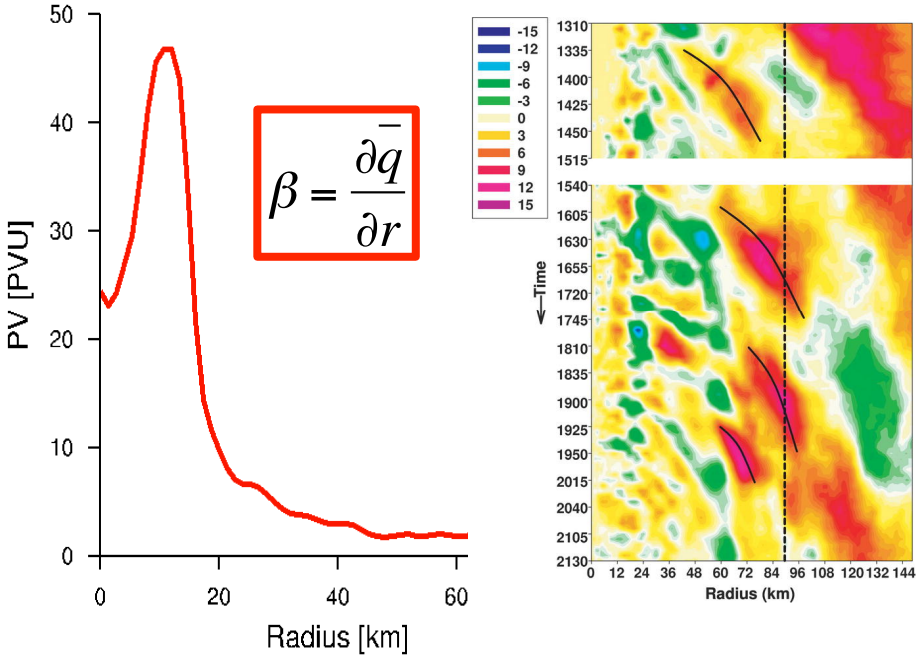
Rainband pattern and water vapor distribution



Judt and Chen (2010)

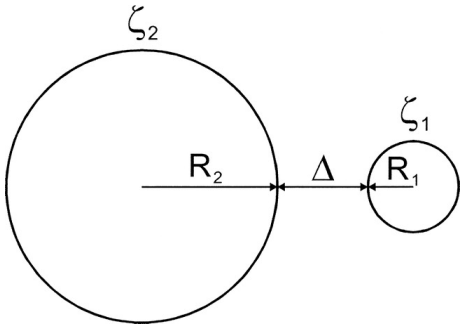
Secondary eyewall formation hypotheses: Internal dynamics

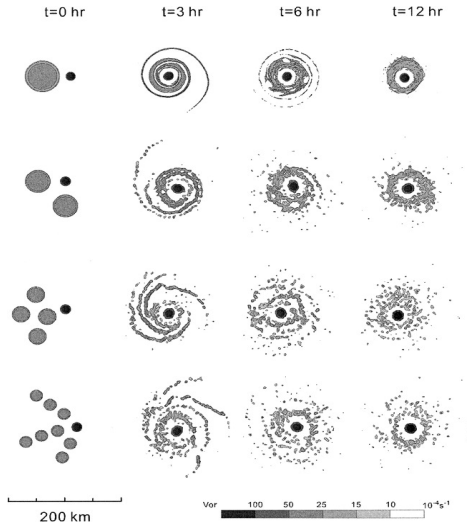
Vortex Rossby waves (VRWs)



Montgomery and Kallenbach (1997)
Abarca and Corbosiero (2011,2014)

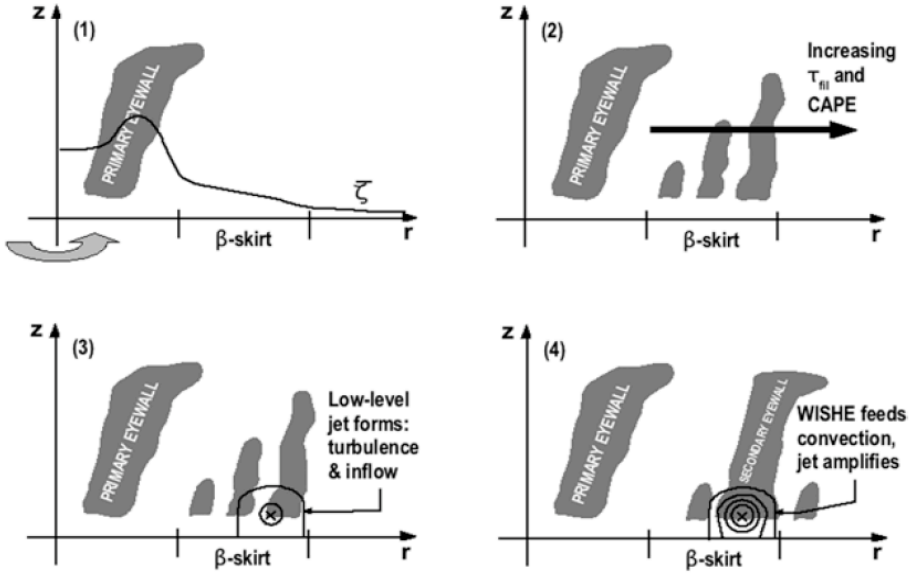
Barotropic vortex interactions





Kuo et al. (2004, 2008)

β-Skirt axisymmetrization



Terwey and Montgomery (2008)