Understanding Hurricane Sandy's Track and Intensity Changes

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Track: GFS/EnKF & HWRF

GFS/EnKF T382 20 member ensemble
GFS/EnKF ensembles and ellipses, IC=201202300
for storm number 18 in the AL basin

HWRF
12Z 23 October – 00Z 29 October

http://www.esrl.noaa.gov/psd/forecasts/gfsenkf/ens/

http://www.emc.ncep.noaa.gov/gc_wmb/vxt/
HWRF Track
Start 00Z 25 October

00Z 24 October (blue)

00Z 25 October (red)

Tracks very similar to 36 h (12Z 26 October)
HWRF 500/200 hPa

500 hPa

200 hPa

Init: 00Z 24 October
Init: 00Z 24 October
Init: 00Z 25 October
Init: 00Z 25 October

24 h: 00Z 26 October
HWRF 500/200 hPa

500 hPa

200 hPa

24 h: 00Z 26 October
Track
Start 00Z 25 October
Vertical Wind Shear

- OCT102400
- OCT102500

- 36 h: 12Z 26 October
- 22 m s\(^{-1}\)
- 23 m s\(^{-1}\)
- 18 m s\(^{-1}\)

00Z 25OCT
Vortex Tilt
2-8 km Altitude

Distance (km)

00Z 26Oct  12Z 26Oct

00Z24OCT
00Z25OCT
Potential Vorticity
2-8 km Altitude

Init: 00Z 24 October

Init: 00Z 25 October
Potential Vorticity
2-8 km Altitude

Init: 00Z 24 October

Init: 00Z 25 October
R-Z Mean Tangential Wind

Init: 00Z 24 October

Init: 00Z 25 October
R-Z Mean Tangential Wind

Init: 00Z 24 October

Init: 00Z 25 October
TDR Analyses

00Z 26 October

12Z 26 October
TDR Analyses

12Z 26 October
Layer Means

Init: 00Z 24 OCT

Init: 00Z 25 OCT

15 h (15Z 25 October)

- 1000-500mb
- storm_movement
- 1000-200mb
- 850-200mb shear
Layer Means

Init: 00Z 24 OCT

Init: 00Z 25 OCT
Summary

• Two HWRF simulations initialized 24 h apart have similar tracks and intensity until 06Z 26 October
  • Large scale similar at 500 hPa, but 200 hPa trough over GOM further east and stronger in early run
  • Early run has stronger, slower storm, while later run storm further north
  • Shear over both storms identical from SW at ~20 m s\(^{-1}\)

• Track and intensity differences result of differences in vortex-shear interaction
  • Both storms interact with very strong shear from 18Z 25 to 12Z 26 Oct.
  • Storm with track closer to observed became shallower (as observed), altering steering flow from SSW to SSE
  • Change in steering led to track bifurcation
Questions?