THE ‘UNUSUAL’ EVOLUTION OF HURRICANE ARTHUR 2014:
GOES-R AND JPSS
SATELLITE PROVING GROUND PERSPECTIVE

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NWS Watches and Warnings as Arthur Moved up the East Coast

HURRICANE ARTHUR

NOTE ALL OPC ATLANTIC OFFSHORE ZONES CURRENTLY UNDER TROPICAL STORM OR HURRICANE WARNINGS

FOR THE LATEST OPC ATLANTIC OCEAN ANALYSIS AND FORECASTS:
http://www.opc.ncep.noaa.gov/Ati_tab.shtml
A cluster of thunderstorm in northeast NM moves southeast into the TX panhandle and forms an MCV.

The MCV gradually moves east towards the SC coastline between 06/25/14 – 06/30/14.

The MCV develops thunderstorms that remain sheared for ~48 hours while drifting south towards the northern Bahamas.

Tropical Storm: 1500 UTC on 07/01/14

Hurricane: 0900 UTC on 07/03/14
  - Landfall in NC at 0315 UTC on 07/04/14

Transitions to an extratropical storm on 07/05/14, producing damage in Nova Scotia.
GOES-Sounder RGB Air Mass
Hurricane Arthur’s Lifecycle
GOES-R Convective Initiation
Arthur – Tropical Cyclone Stage
Arthur merged with a stationary (coastal) front early on July 5
On July 5, MSLP rose from 976 mb at 00Z to 983 mb at 15 Z
MSLP then decreased to 980 mb as post-tropical Arthur rejuvenated over Nova Scotia, through 00 Z July 6
Widespread damaging wind event ensued across Atlantic Canada during the rejuvenation phase of ET
Gusts over land were 65-80 mph with a peak official gust of 86 mph
300,000+ lost power, power grid demolished, took 10+ days to fully restore
Jet Stream Interaction During ET

- Arthur’s vortex interacted with an approaching high-amplitude, negative tilt trough in the westerlies.
- The northwestern quadrant of the Arthur’s circulation came under influence of the right entrance region of the trough’s jet streak.
- Favorable mesoscale ascent in this diffluent region may have led to rejuvenation of post-tropical Arthur.
- Arthur’s upper-level vortex phased with the westerly trough.
Both the CMC and CIMSS stated that the region of damaging gradient wind over Atlantic Canada, left-of-track, was likely associated with a sting jet – which developed during rejuvenation phase of ET.

6.5 μm water vapor image courtesy of CIMMS Blog
July 5, 2330 Z
RGB Air Mass: Hurricane Phase on 07/05/14
Shown: The 00Z OPC Atlantic Surface Analysis with the 00Z position for Hurricane Arthur & the 0035 UTC altimeter pass from 07/05/14. Maximum wave height retrieval from the altimeter pass was 42.57 ft.
RGB Air Mass: Hurricane Phase on 07/05/14
RGB Air Mass: Hurricane Phase on 07/05/14
AIRS Ozone:
ET at 1700 UTC on 07/05/14

TOTAL COLUMN

ANOMALY
Multiple satellite PG products were available to forecasters during Arthur’s lifecycle and were occasionally used.

- GOES-R Convective Initiation – MCV stage
- Overshooting Top Detection/Magnitude – MCV/TC genesis stages
- RGB Air Mass – Extratropical Transition stage
- Ozone Product – Available, but unsure of use (more training needed)

Arthur’s extratropical transition was well-forecast and there were interesting features noted in the RGB Air Mass imagery that forecasters are learning to use during these transitions.

More research needs to be done to quantify these PG products for extratropical transitions, including showcasing the usage with NWP and other observations to emphasize features of interest.