A Comparison of Model Precipitation Forecasts for Hurricane Ida (2009)

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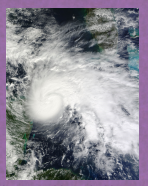
Introduction

- Hurricane Ida was a long-lived late season (04 November – 10 November) hurricane which caused large amounts of rainfall on the East coast
- At its peak, Ida was a Category 2 hurricane with maximum recorded wind speeds of 90 knots (~46 m/s)
- Made landfall on 10 November as tropical storm, quickly became extratropical and merged with an occluded front to form a new cyclone
- Record storm surges recorded along the cost in Virginia, North Carolina, Maryland and Delaware, significant flooding and winds, with overall damage of over $300 million
- This study will compare the NAM, GFS & HWRF models and their accuracy on 09 November 12z (pre landfall) and 11 November 12z (post landfall) going out 72 forecast hours

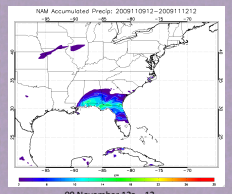
Methods

- Pulled archived NAM and GFS grib2 files from the NOAA site and HWRF files from a local archive
- Created four programs in IDL to easily interpret the data: NAM, GFS, HWRF and comparison
- Compared data to the actual 3755 reported rainfall sites
- Compared totals and locations from 09 November – 12 November and 11 November – 14 November to other models and actual totals

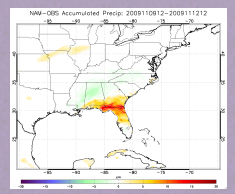


Hurricane Ida in the Yucatan Channel on 08 November

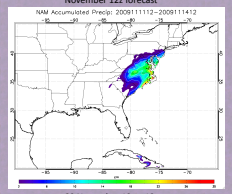
NAM



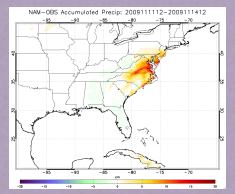
09 November 12z – 12 November 12z forecast



NAM - observed



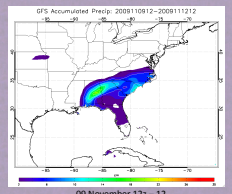
09 November 12z – 12 November 12z forecast



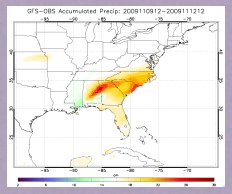
NAM - observed

- 09 Nov forecast had precipitation locations Southeast of actual and greater than observed totals
- 11 Nov 7 hour forecast had very accurate precipitation locations but more than observed totals
- Overall, NAM forecasted more rain than observed with location of the precipitation becoming more accurate after Ida made landfall

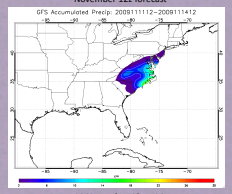
GFS



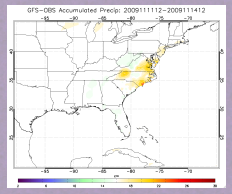
09 November 12z – 12 November 12z forecast



GFS - observed



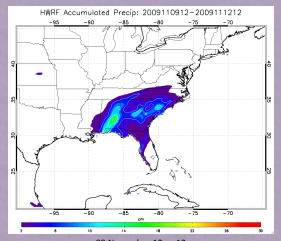
11 November 12z – 14 November 12z forecast



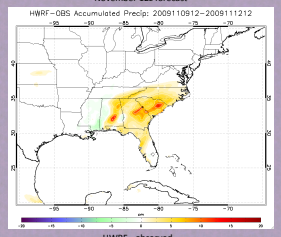
GFS - observed

- 09 Nov forecast had accurate landfall location with more than observed precipitation totals and locations too far Northeast for the 72 hour time period
- 11 Nov 72 hour forecast had accurate precipitation locations and relatively accurate totals
- Overall, GFS had accurate locations and forecasted greater amounts of rainfall than observed

HWRF



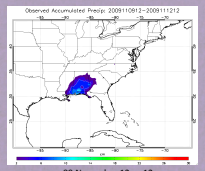
09 November 12z – 12 November 12z forecast



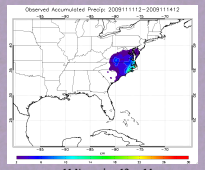
HWRF - observed

- Overall, forecasted higher precipitation amounts than actual
- Accurate location of landfall with above actual precipitation
- Forecasted correct rain location for upcoming days, but past the 72 hour forecast period

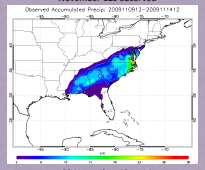
Observed



09 November 12z – 12 November 12z observed



11 November 12z – 14 November 12z observed



09 November 12z – 14 November 12z observed

- Maximum: 18.00" (46 cm) in Hampton, VA

Conclusions

- Ida's remnants stalled along the mid-Atlantic due to a lower level high pressure system in the Northeast, causing the large amounts of rain
- Overall, all models forecasted greater than observed rainfall amounts and reasonably accurate locations
- All models did better with totals and locations after landfall occurred
- For 09 November 12z – 11 November 12z, HWRF did best for rainfall amounts as well as locations
- For 11 November 12z – 14 November 12z, GFS did best with rainfall amounts and locations
- Different models performed better at different times, an average of all models should be used to best forecast hurricane rainfall amounts and locations

References

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- ida image: *http://quibb.blogspot.com/2009_11_01_archive.html*

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