

Hi all,

Friday map discussion for 6 Sep 2019 focused on TC Dorian. Minghao Zhou led a detailed overview of TC Dorian. Tyler Leicht assisted with the discussion. Links used during the discussion can be found here:

<http://www.atmos.albany.edu/mapdisco/20190906/>

## **1. Forecasts:**

The forecasts for TC Dorian can be summed up run one word: Outstanding. See Brian Tang's verification statistics for statistical evidence of my assessment (<http://www.atmos.albany.edu/facstaff/tang/tcguidance/al052019/>). Click on bias and mean absolute error under verification on the lower left part of the aforementioned web page. For those of you like me who are model name-challenged, here is an acronym guide to the various hurricane model forecast output used by NHC from the University of Wisconsin-Milwaukee (<https://web.uwm.edu/hurricane-models/models/models.html>) and from NHC (<https://www.nhc.noaa.gov/modelsummary.shtml>) as used in Brian Tang's statistical verification summaries.

I find it remarkable that the official NHC forecast mean absolute errors for TC Dorian were near 200 km, 130 km, 90 km, 50 km, and 25 km at 96 h, 72, 48, 24h, and 12h, respectively. Among the various hurricane models, the UKMO model (UKX) and the Navy's COAMPS-TC model (CTCX) performed especially well. This is a noteworthy forecast accomplishment and is a tribute to the steady and continuing advances in numerical weather prediction.

Kudos also to the various NWS forecast offices in the Southeast for a uniformly excellent job of keeping citizens informed of what would happen (and equally important what would not happen) in their areas of forecast responsibility through coordination with local and regional elected officials, the news media, the social media, and FEMA.

Given that the level of "hurricane hysteria" in Florida knows no bounds, the performance of the NHC was extraordinary. The hurricane forecasters had sufficient confidence in the hurricane models and their own forecasts to state clearly, concisely, and confidently that TC Dorian would slow down and make a turn to the north before reaching the east coast of Florida despite Dorian's nerve-jangling steady and relentless westward movement toward and through the northern Bahamas. Talk about forecasters being on the hot seat....

## 2. Science:

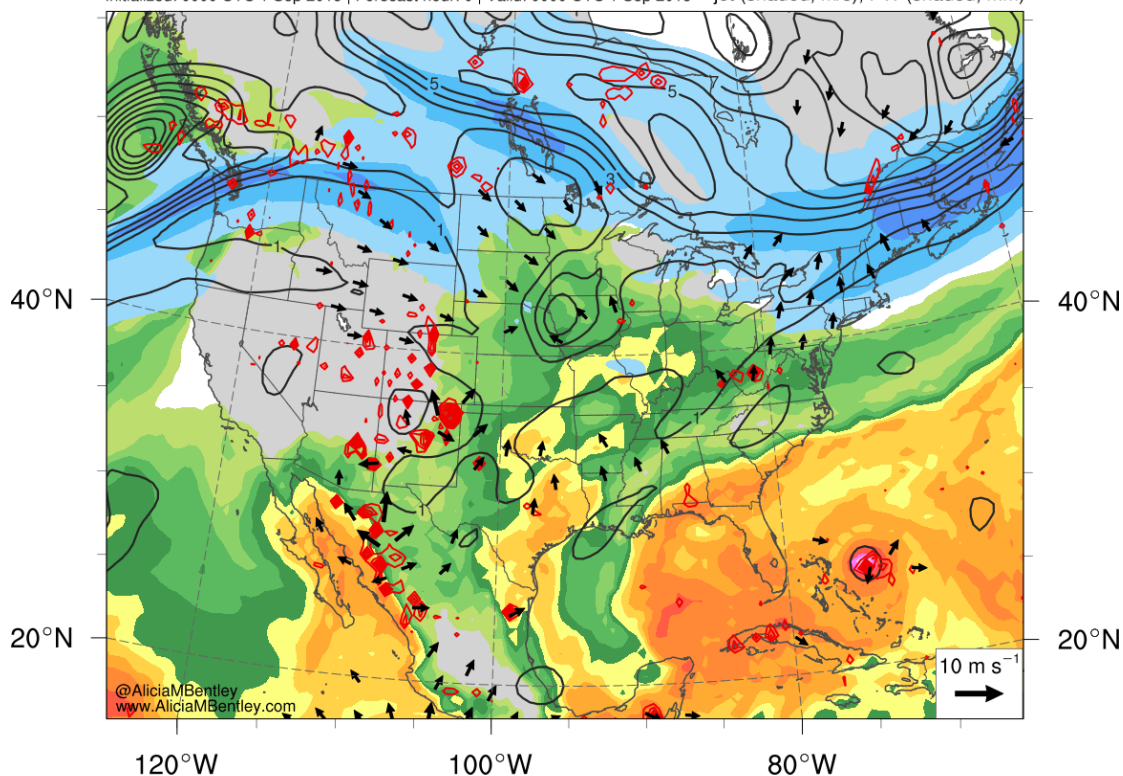
The science opportunity from TC Dorian is to quantify the dynamical processes that contributed to the slowing of TC Dorian's westward track and its subsequent turn to the north. I will hypothesize that uncertainty on the forecast northward turn of TC Dorian could be related to forecast uncertainty associated with: (1) the southern extension of a trough across the MidAtlantic region, (2) the structure and evolution of a western CONUS ridge, and (3) the timing and intensity of upper-level disturbances cresting the western CONUS ridge and dropping southeastward across the Plains. I will hypothesize further that upstream organized convection over the Plains and Midwest that culminated in the formation of a NNE-SSW oriented "PV tail" that moved southeastward, elongated eastward toward the Gulf coast, and subsequently stretched southward across the extreme northeastern Gulf of Mexico and central Florida was critical to TC Dorian's subsequent turn to the north and then to the north-northeast before the storm could make landfall in Florida. I have attached Alicia Bentley's maps of 300–200-hPa PV and layer-mean irrotational wind vectors, 600–400-hPa ascent, PW, and the 250-hPa jet winds at 0000 UTC 1–4 Sep 2019 in support of the above inferences. Alicia's complete 4\*daily loop of the attached imagery can be found here

([http://www.atmos.albany.edu/student/abentley/realtime/subtrop.php?domain=conus&variable=irro\\_wind](http://www.atmos.albany.edu/student/abentley/realtime/subtrop.php?domain=conus&variable=irro_wind)). Caveat: the imagery on Alicia's loop will soon age-off our computers.

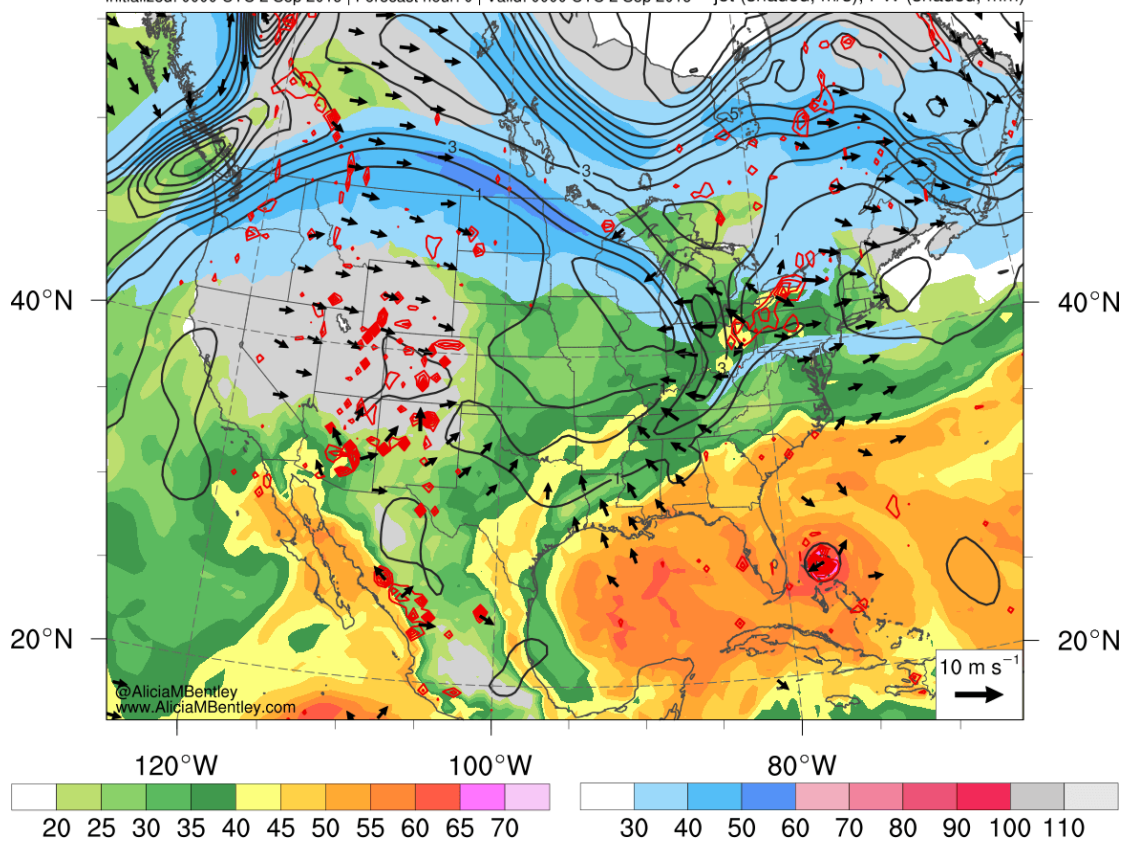
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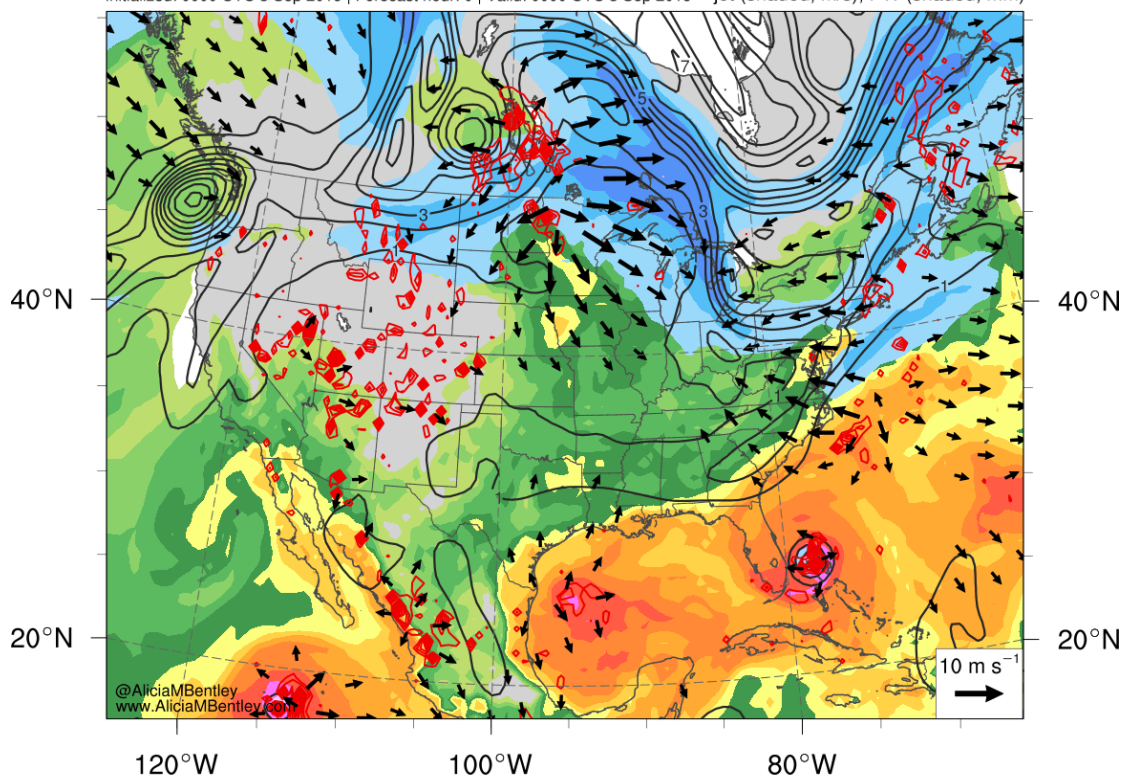
300-200-hPa PV (gray, PVU) & irro. wind (vectors, m/s), 600-400-hPa ascent (red,  $5 \times 10^{-3}$  hPa/s), 250-hPa  
 Initialized: 0000 UTC 1 Sep 2019 | Forecast hour: 0 | Valid: 0000 UTC 1 Sep 2019 jet (shaded, m/s), PW (shaded, mm)



300-200-hPa PV (gray, PVU) & irro. wind (vectors, m/s), 600-400-hPa ascent (red,  $5 \times 10^{-3}$  hPa/s), 250-hPa  
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