The first HFIP–Biweekly teleconference in July 2017 was held 2:00 PM – 3:00 PM ET Wednesday July 12th *online* from the NWS Headquarters OSTI, Silver Spring, MD. Following roll call (see back for list of participants), Shane Forsythe-Newell (HFIP/PO) welcomed about 40 members onboard, and along with Gopalakrishnan Sundararaman (HRD/HWRF) shared opening remarks noting the purpose of the meeting.

Introduction and Announcements:
The first part of this meeting consisted of announcements from the HFIP Program Office related to letting all PI's and POCs for all RT DEMO Projects know that they need to report any update or issues to the HFIP Program Office by close of business (local) Monday July 17th (references an earlier e-mail Shane sent out to them this morning to that effect). Shane also shared a link via limited distribution only to all PI's and POC's supporting this year's RT DEMO projects, and this link allows them to view their project allocations (used and released). A question was raised to see if Forrest/Eric from RDHPC could be present at the next HFIP Meeting to which Shane replied yes and that would be an action item. Gopal added that GFDL had some previously requests discussed with Eric which could perhaps be addressed offline with the HFIP Program Office, and Shane took this as an *action item*. The second part of the meeting was the introduction of John Kaplan, the scheduled speaker.

Presentation by John Kaplan on:
Statistical rapid intensity prediction: Implications of recent model results[1] was shown via Go-To-Meeting, and also made available to all 40 participants via HFIP's anonymous FTP temporary link for those who might have a problem using Go-To-Meeting.

The speaker initially thanked his peers, contributors, supporters, and provided a brief history of his research that was followed by delivery of his presentation. The speaker outlined his presentation in six bullets: 1) RI problem background, 2) Analysis of RI prediction skill of recent deterministic model forecasts, 3) Statistical RI model descriptions, 4) Statistical RI model performance verification, 5) Overview of shear distributions of RI and non-RI cases, and 6) Summary. The speaker then detailed the background and difficulties associated with RI prediction. The speaker noted that nearly 80% of Atlantic of major hurricanes (MH) undergo RI, 30-kt/24-h, (Kaplan & DeMaria, 2003). TC intensity changes (Percentiles) over water from 1995 through 2016 were presented for both Atlantic (AL) and East Pacific (EPAC) basins. Probability of Detection (POD), False Alarm Rate (FAR), and frequency (55-kt/48-h, 30-kt/24-h, 25-kt/24-h) of operational model forecasts from 2014-2016 were presented for both of these basins. Specific focus involved Logistics Growth Equation Model (LGEM), Decay SHIPS (DSHIP), HWRF with 6-hour interpolation (HWFI), Hurricane Weather Research & Forecasting (HWRF), and Official National Hurricane Center Forecast (OFCL) forecasts.

Probability Of Detection (POD), False Alarm Rate (FAR), Frequency of RI (FoRI) were presented for operational forecasts supporting AL and EPAC basins operational performance over 3-years (2014-2016). These metrics included OFCL, LGEM, DSHIP, HWFI, HWRF

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[1] Kaplan, J., C. Rozoff, and M. DeMaria (2017). Statistical rapid intensity prediction: Implications of recent model results. Hurricane Forecast Improvement Project, 12 July 2017, National Weather Service HQ, Silver Spring, MD. [Available online at ftp://ftp.aoml.noaa.gov/pub/hrd/kaplan/newell/Kaplan_HFIP_2017_final_revised.pdf].

forecasts and for (FoRI) along with observed data for systems that were a Tropical Depression (TD) or greater. Some discussion ensued regarding POD and FoRI between AL and EPAC basins. FAR was saliently lower in the EPAC vs. AL basins for 30-kt/24-h and 25-kt/24-h categories. The 55-kt/24-h category was presented and models almost never forecasted in the AL basin, except for HWRF (<1%). In the EPAC basin, all models forecast some 55-kt/24-h RI but were consistently below the 2 percentile of what was actually observed. The 48-hr through 72-hr forecast time periods were emphasized by the speaker as being the most important to operational forecasters as this corresponds to watches and warnings disseminated to the public. Ryan Torn's brief was referred to in discussion from the last Annual HFIP Annual Conference, National Hurricane Center (NHC) related to RI events. The speaker described 7-threshholds at 4-lead times for both basins, i.e., 20-kt/12-h, 25-kt/24-h, 30-kt/24-h, 35-kt/24-h, 40-kt/24-h, 45-kt/36-h, and 55-kt/48-h. The more symmetric storms were briefly described as being the more RI producing storms. Generally, *front left quadrant deep convection was described as being most conducive for RI* as it appears easier to wrap around in the left rear quadrant. Statistically it was show that in the operational RI Model for the 2016 hurricane season that skill relative to climatology was better than in the EPAC basin than in the AL basin. The Caribbean was noted to be similar skill-wise to the
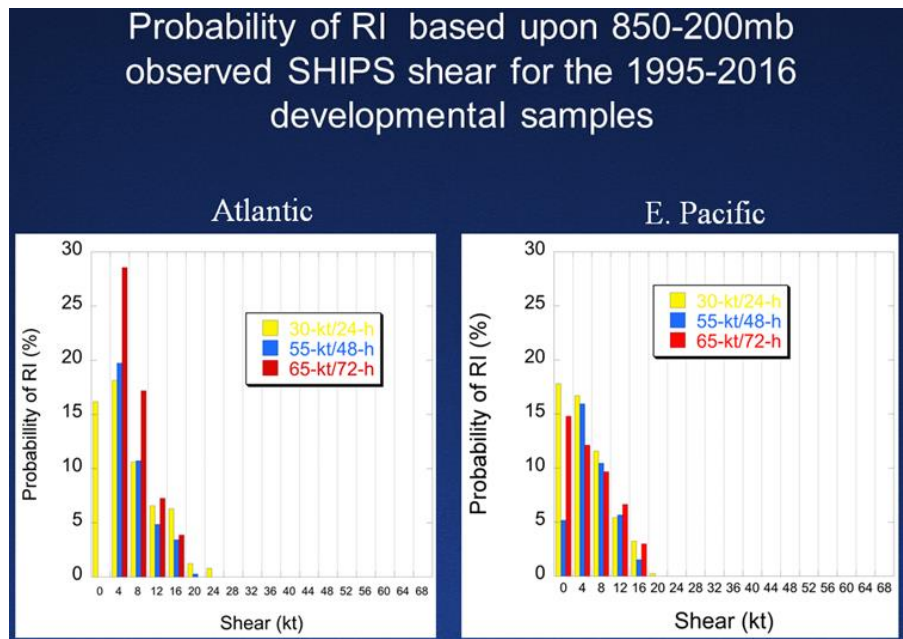

Figure 1: Probability of RI (%) vs. Shear (Kts.) 1995-2016 (AL & EPAC)

EPAC basin in terms of predictability of RI in many respects. The speaker noted last year that G.FS model derived Total Precipitable Water (TPW) was used in lieu of satellite based values (imagery had issues). The case of Matthew was brought up as a model that used a higher level of shear, i.e., using a broader shear averaged area and projection of a faster pace moving more west-northwest vs. moving slowly in a west-southwest trajectory. *RI events were described as being associated with low-shear regimes*. *Strong upper-level flow was also noted as being conducive to RI*. Fig. 1 illustrates how RI increases in environments of low shear and the speaker noted in particular that *when shear is greater than 12-kt there is a clear drop off in RI*.

Summary:

Deterministic model forecasts exhibited a low POD and moderate FAR for both AL and EPAC basins in 2014-2016. Statistical operational RI models showed a small (modest) degree of skill in both basins for the 2016 season. New 2017 RI models showed improvements over 2016 versions for 2014-2016 reruns. Also, Consensus of SHIPS, Logistic, and Bayesian RI models generally provided increased reliability and skill over SHIPS-RII for the 2014-2016 re-runs

forecasts (particularly in E. Pacific). Study results underscore the importance of accurately measuring and predicting the large-scale environment. Additional research was noted as being needed to better understand the processes that govern RI to ultimately improve RI prediction.

Questions:
1. John Knaff asked the speaker "In using the Climate Prediction Forecast Reanalysis for the earlier period, was it a lot better or marginally better?"
   Answer: The speaker replied that it was more stable.

2. John Knaff followed up with a statement and another question. "We always use these relatively large areas for the shear. Do you think for the RI application, it might be worth using a lot of circles and then finding the minimum?"
   Answer: The speaker affirmed "yes". However he suggested there still may be some associated problems in terms of knowing the storm's direction.

3. Frank Marks asked, "how does storm size or structure impact shear?"
   Answer: The speaker replied that this was looked at and a signal was seen indicating a preference for small radii of maximum winds being more likely to undergo RI so it is likely that the structure does matter.

4. Frank Marks asked, "Is there any value of doing the same exercise using GFS for the different ensemble members in getting some more information about the uncertainty into the shift's predictors?"
   Answer: Mark DeMaria quickly interjected asking if Kate Musgrave might respond and she responded noting that a few years back GFS did not improve the SHIPS ensembles forecasts … better results were not seen using GFS ensembles (probably before using the 25km resolution) … further adding that this was back in 2012. Frank Marks added that that this is something to consider with the uncertainty of intensity and track just mentioned by the speaker. John Knaff interjected that years ago the factor that helped out the most with intensity forecasts was whether the storm was over land so he suggested that if one were to use the ensembles, then one should remove land and landfall cases.

5. Is there any value in going to the SHIPS-RII predictors e.g., GFS analyses … can someone go back and track the evolution skill of the GFS in predicting those SHIPS predictors?
   Answer: Kate Musgrave afformed that there are some programs that will actually track how well the forecast times performed against the analyses. General discussion ensued regarding the accuracy of the shear analysis over the forecast period and flux.

Discussion:
Gopal Sundararaman noted it was observed from HWRF ensemble runs (recent work by Hua Chen presented just last week) that *impacts of both vertical and quadrant shear were very important [related to RI]*. It was further added that knowing what the environment is going to be in relation to the storm is very important.

Closing Remarks:

It was noted the presentation was a great one as well as the participation and interaction by Gopal Sundararaman. Shane Forsythe-Newell followed up by announcing the next meeting date time, thanked everyone, and adjourned the meeting.

Action Items (Open):

☐ Shane to try to get more details for the HFIP Program Manager regarding the *h217 code* for Basin-scale HWRF not being backwards compatible (involving the new GFS/NEMSIO) so that the rtbasin-hwrf can use h217 this year. Work with the HFIP PM, EMC and DTC, as needed. Pinged the PI, waiting for more information, and working with the PM and DTC.

Action Items (Closed):

■ Forrest Hobbs and/or Eric Schnepp have been scheduled to discuss RT details (Jet allocations, cores/nodes, etc.) at the next HFIP Teleconference.

Next Meeting time: 2-3 PM ET Wednesday, 26 July 2017

• Shane to send out a reminder. Following roll-call and any announcements from the HFIP Program Office, the next meeting will be a round table discussion including discussion with RDHPCS Jet representatives.

Participants (40):

Andrew Penny, Bin Liu, Bryce Tyner, Chanh Kieu, Chris Fairall, Christopher Rozoff, Daniel Melendez, David Ryglicki, Edward Mifflin, Frank Fendell, Frank Marks, Gopal Sundararaman, Gus Alaka, Hua Chen, John Kaplan, John Knaff, Jun Zhang, Jun Zhang, Kate Musgrave, Lin Zhu, Mark DeMaria, Michael Black, Mrinal Biswas, Morris Bender, Matt Morin, Nysheema Lett, Paul Leighton, Ping Zhu, Sergio Abarca, Shane Forsythe-Newell, Stan Benjamin, T. Gosh, Tim Marchok, Vijay Tallapragada, Yi Jin, Xinyan Lyu, Xu Lu, and Zhaoxia Pu.