NOAA HURRICANE FORECAST IMPROVEMENT PROJECT

Bi-Weekly Teleconference Summary

The second HFIP–Biweekly teleconference in October, 2017 was held 2:00 PM–3:00 PM ET Wednesday October 18th online from the NWS Headquarters OSTI, Silver Spring, MD. Following roll call (see back for list of participants) hosts, Dr. Gopalakrishnan aka "Gopal" Sundararaman (AOML/HRD) and Dr. Shane Forsythe-Newell (HFIP), welcomed about 30 members sharing opening remarks thanking everyone present for their participation and noting the purpose of the meeting is to deliver any HFIP Program Office/RDHPCS announcements and to receive updates/input from principal investigators/team leads regarding the status of their HFIP-funded projects and to address issues, if any. A HFIP GoToMeeting website link, https://global.gotomeeting.com/join/749042005, was provided to members along with an audio access line (877.985.3644, and pass code: 5846644#). A temporary anonymous ftp link was also provided, ftp://ftp.rap.ucar.edu/incoming/irap/hfip/hfip_telecon/ to participants for those unable to access *GoToMeeting*.

Introduction and Announcements:

The first part of this meeting consisted of announcements from the HFIP Program Office. Shane first announced that any users who wished to have their RT reservations extended past October 31st should send their requests to Dr. Vijay.Tallapragada@noaa.gov at their earliest convenience this week. The second announcement by Shane on behalf of the RDHPCS was that all /pan2 users need to transfer their data to /lfs3 before October 31st as /pan2 will be decommissioned 10/31/2017. Following /lfs1 being put into production, lfs2 will be decommissioned and that data will be relocated to /lfs3 or disposed. Sheema made the third announcement which was a reminder that participant registration for the HFIP Annual Conference November 7th-9th, 2017 opened up via www.hfip.org website last October 2nd. Sheema added that the draft agenda outlined a closed HFIP Strategic Plan Writing Team would meet *face-to-face* at NHC November 7th. Formal doors for the HFIP Annual Conference will open November 8th (Day-1) to report on 2017 activities, i.e., results, accomplishments, and lessons learned. November 9th (Day-2) consists of 2018 strategic plans and priorities in the morning. Day-2 afternoon activities would address storm surge including coordination of storm surge. Shane reminded users to open help tickets if they are having an issue they are unable to resolve by emailing "rdhpcs.jet.help@noaa.gov" and use the preface "HFIP RT -" plus title for issue, in the Subject line as this ensures the issue is tracked through the help system. Also, please release any unused reserved allocations back to the system on a daily basis.

Discussion with Team Leads:

Shane started out the discussion by asking if any Team Leaders had an issues with their projects that the HFIP Program Office might be able to help resolve and there were no replies. Dr. Gopalakrishnan (Gopal) Sundararaman added that in the future all project users when forwarding their project important results to the HFIP Program Office need to provide good key pictures, charts, features, etc. that bind to their project results, as this will be very useful in producing HFIP Annual Reports. Gopal added that 2017 HFIP Annual Conference presenters should state: 1) what their project is, and in 4-5 slides state the scope of their work i.e., 2) what is new they are doing, and 3) what is next to be done in the future. These three things would be the most appropriate thing to do in their time-limited 20-minute presentations.

EMC Update:

Dr. Avichal Mehra volunteered an update on what is happening at EMC with HFIP's two real-time (RT) experiments, i.e., *rthwrfv3 ensembles* and *rthwrf-awo (hwrfv3-w/POM)*… Dr. Zhan aka "Zack" Zhang provided an update with the EMC/NRL rthwrfv3 20-member ensembles. Preliminary results from about 400-cycles used the same 2016 configuration in 2017 year which is a lower resolution version than operational HWRF. The 2017 rthwrffv3 uses 3-km horizontal and 43 vertical level resolutions. Unlike this year, over past years, results reflected *ensemble-mean* forecasts for track and intensity outperformed the deterministic control-model. Preliminary analysis indicates that *sea surface temperature (SST) field data* in the GFS host-model may have caused 2017 ensemble-mean forecasts to underperform as compared to deterministic control model forecasts; however this is not a final conclusion and is still under investigation. Another cause might have been *low-resolution especially in the vertical levels*. Zack added

more results will be provided at the upcoming HFIP Annual Conference. Gopal suggested that these points be stated in the upcoming HFIP Annual Conference as recommendations to be implemented in 2018 [RT DEMO] research activities and how we may be able to get more computers for the upcoming [hurricane] season". Avichal then asked Dr. Bin Liu (EMC) to provide an update on the *rthwrf-awo (hwrfv3-with the Princeton Ocean Model)* 3-way coupled system. Bin Liu started out by stating that or 3-way (atmosphere-ocean-wave) coupled system wave coupling was restricted to one-way coupling during 2017 RT experiments. Numerical track and intensity prediction were described by Bin as being very close to operations and further details will be provided during the upcoming HFIP Annual Meeting. Gopal then asked Dr. Xuguang Wang to update the HFIP Program Office on *rthur-aoml-da* project.

EMC/AOML/HRD/OU Update:

Dr. Xuguang Wang (University of OK or OU) noted that the new Basin-scale HWRF with DA (rthur-aoml-da) project uses hybrid DA and in collaboration between OU, EMC and HRD are conducting more tests with this system. At OU we are continuing hybrid DA system using three-dimensional ensemble variational DA (3D-EnsVar) with a 6-hourly window with all the seasonal hurricanes and it has evolved quite a lot and the 3D alarm may not be working. So OU has also engaged in testing the four-dimensional (4D) ensemble-variational data assimilation (4DEnsVar) using grid-point statistical interpolation (GSI) based hybrid DA system and also the hourly window. Hourly and 6-hourly results are being compared associated with 4D-EnsVar and 3D-EnsVar systems. The method of the incremental analysis updates (IAU) is showing improvement and degradation especially for tracking and so we are proposing IAU with some modification for the global model. The reason for employing IAU is to see if it is possible to show improvement in predicting spin-down. Another research effort has begun in studying the impact(s) of using aircraft observations for improving intensity prediction in cases (e.g., Matthew), and a study regarding the evolution of physics in terms of physics forecast errors, especially in forecasting spin-down. Dr. Jason Sippel (EMC) added in details about the use of "full ensemble covariance for 3DEnsVar and covariance life-scales supporting intensity forecasts … and work on improving inner-core dropsonde usage by unflagging the Unmanned Maritime Vehicles (UMVs) to a degree and sometimes further out … Large improvements of intensity forecasts were observed as a result. These are the two big efforts that Jason noted. Xuguang and Jason affirmed they would be providing updates during Day-2 of the upcoming HFIP Annual Conference.

OMITT Update:

Dr. Hyun-Sook Kim introduced Dr. George Halliwell (AOML) and George noted a couple of slides that will be presented on the work of a visiting scientist at AOML did regarding idealized studies of the impact of different ocean additions representative of the Bay of Bengal on hurricane intensity. Dr. Kim added that assessment of sensitivity with hurricane *Edouard* resulted in some progress being made reviewing values between CAPE and sensible heat fluxes that coupling simulation is recommended. Resultant findings indicated that without persistent Sea Surface Temperature (SST) absolute |Cape| values were not as good as using a coupled system. Over the summer 188 Airborne EXpendable BathyThermographs (AXBTs) were collected in the AL-basin from a joint effort between the Air Force and HWRF which will be used for validation and to make progress for ocean HYCOM DA using the EnKF approach. It was noted that Air-Sea-Wave coupling will be examined in the next few months.

NHC Update:

Dr. Andrew Penny (NHC) added he would be providing HCCA input at the HFIP Annual Conference adding that for track HCCA has been performing fairly well and intensity is an issue than it was in 2016 and 2015. NHC is looking into this issue now.

AOML/HRD Update:

Dr. Gus Alaka noted preliminary EPAC-basin resultant findings researching multiple storm interaction showed that there is another impact of the early version coding and HRD will be focusing on some of the landmark/landfall high profile cases. The system is pretty much the same as the operational model

configuration except for multiple storms, ocean coupling, and the DA. HRD will be highlighting those differences and how it performed at the HFIP Annual Conference. It was also noted that all of the milestone capabilities are being merged into the HWRF trunk version so that in the next season we can test in the new setup.

DTC Update:

Kathryn Newman stated that HWRF 3.98 (Community model version) was released last Monday that is compatible with 2017 operational HWRF. The code, data sets, and associated documentation are on the webpage. Kathryn noted that open registration for the HWRF public tutorial will be held from the 23rd – 25th of January, 2018 at the NCWP building, College Park, MD. Kathryn added that anyone interested can now visit the website, www.dtcenter.org or they can contact her or e-mail the DTC helpdesk. User and developer meetings will also be highlighted at the HFIP Annual Conference. An *alternate physics option* will be committed to the trunk for testing post-HFIP Annual Conference but can be later presented during the year (e.g., HFIP-Biweekly Teleconference).

GFDL Update:

Matt Morin (GFDL) noted that Morris Bender will be showing verification statistics about 3-km AL-basin runs and resultant findings from a newer version of the dynamical core that is being run. Dr. Mark DeMaria stated that he would be showing Tiger Team results at the upcoming HFIP Annual Conference.

NRL Update:

Updates were provided Dr. Ryan Torn (Univ. of Albany, NY) and Dr, Jon Moskaitis (NRL). Dr. Torn stated that the Rapid Intensity (RI) product has been running very well and seas surface temperature (SST) was added. Dr. Moskaitis added that about 800 forecasts (WPAC and AL basins) are in the process of being analyzed that will be presented at the upcoming HFIP Annual Conference. 2017 deterministic model performance with ocean coupling will also be presented which different from the baseline ensembles (control). Analysis is being conducted currently so no preliminary result currently to present at this time.

Questions and Answers:

Question #1 (What is expected): Gopal asked "Are there any questions about *what is expected* from Team Leads or Principal Investigators (PI's) [regarding HFIP Annual Meeting Presentations]?" Dr. Hyun-Sook Kim responded with a request to have these guidelines e-mailed to her. Gopal replied that Shane will forward presentation *guidelines* via e-mail to all speakers well before the HFIP Annual Conference. Shane added these guidelines will also be scheduled to be provided at the next HFIP-Biweekly Teleconference.

Question #2 (Timelines): "What is your *timeline* for producing the [HFIP] Annual Report?" was addressed to Gopal from Dr. Vijay Tallapragada (EMC) and Gopal replied that the normal timeline for producing the annual report is by March or April. General discussion ensued about conducting the 2016 annual meeting in January of 2017 vs. November of 2016 which other high level meetings (e.g., AMS, AGU, etc.) and holidays. It was also added that since the season would not be over yet, 2017 resultant findings would likely also be modified if the annual meeting were held before January of 2018. More simply, preliminary resultant findings presented before January, 2018 would likely be different from finalized resultant findings presented in January, 2018 as it takes time complete everything. Gopal suggested that as long as key figures/charts were presented bound to important project results, the finalized values could be provided and figures/charts updated before the annual report is later published. Vijay replied that in the event figures/charts cannot be easily changed, then those persons who originally developed the figures/charts should be asked to reproduce them again with the updated finalized data. Gopal thanked Vijay for bringing up this point of concern.

Question #3 (Ensembles): Gopal asked Zack, "Given the future the way we are going with ensembles, in terms of writing reports and so on, and focusing on probabilistic land-falling cases, why do you set not having the deterministic version as the reference? More simply, do you think the deterministic

model should be used as a reference? Zack replied, "Exactly, we are trying to do that, the main block [or difficulty] is improving intensity forecasts using ensemble runs … we need higher vertical resolution that is at least the same resolution that is used in the deterministic-model [e.g., increase 43-level resolution to 61/75-level resolution]". Some discussion went back and forth regarding using almost the same model and model differences brought up were ocean coupling is used in the ensembles but not used in the deterministic model and vice versa with Inner-core Data Assimilation (DA). A brief discussion ensued about the need for more computers to support this effort.

Question #4: Gopal asked Avichal, "What are the plans we have for HWRF for the next season? … what is the impact for HWRF going into operations? Avichal replied, "We [EMC] will definitely include 3-way coupling as part of retrospective testing in both AL and EPAC basins … and it is planned to discuss configuration changes as well during the upcoming HFIP Annual Conference. Gopal suggested that the *rthwrfv3 ensembles* and *rthwrf-awo* HFIP projects be presented at the HFIP Annual Conference. Gopal added that data not presented at the annual meeting should be presented and discussed during post HFIP Annual Conference HFIP-Biweekly meetings. It was also suggested that during HFIP Annual Conference Day-2 discussions results could be presented and discussed.

Question #5: Dr. Frank Marks noted that there was a lot of glider data this year and he asked will this data be looked at? Kim replied, "Yes, that data is being looked at along with coupled simulation."

Question #6: The status of RSA/CAC requirements for RDHPCS access by November 30, 2017 was questioned by Evan Kalina (GSD) and Kathryn Newman (DTC). Evan focused on academic external collaborators. Nysheema Lett (HFIP) replied the DOD/CAC system is being used and verification is being done on AIM. If one is an external NOAA collaborator not specifically located at a NOAA facility and one does not have a CAC issue at this time then one can still use the RSA option. It is likely that an interim process will be put in place because everyone is supposed to have a CAC (HSPD-12 Rule). The NOAA ISSO stated that external collaborators at universities will not be impacted right now … they are working on it … I believe it is November 10th that it will be implemented for all users that do have CACs will no longer have RSA options. HFIP is trying to get formal documentation about this released. Another issue regarding working from home was brought up without the benefit of having a CAC reader using a MAC computer. Sheema replied that regarding the 30th November cut-off that MAC testing is still in progress on the NOAA system and she would bring this issue up and update everyone.

The second part of the meeting was the introduction of XXxx, NWS xxx (xxx), who was the scheduled speaker.

Closing Remarks:

It was noted the presentation and interaction by participants was good by Dr. Gopal Sundararaman. Dr. Shane Forsythe-Newell followed up by announcing the next meeting date time, thanked everyone, and adjourned the meeting.

Action Items:

- Tuesday, November 07, 2017 participants were reminded that there will be a *closed HFIP Strategic Plan Writing Team Meeting* supporting the new HFIP Strategic Plan that is due to Congress April 20, 2018.
- The AMS will hold their 97th Annual Meeting in Seattle January 22-26, 2018.

Discussion:

Jennifer noted to Shane

Next Scheduled Meeting: 2:00 PM – 3:00 PM Wednesday, 01 November 2017

- Shane will send out an invite and a reminder. Following roll-call and any announcements from the HFIP Program Office, a round table discussion with Team Leads and project updates. Dr. Andrew

Penny (NHC) plans to present updates on the *HFIP Corrected Consensus Approach (HCCA) Model* at the HFIP Annual Conference.

Participants (31):

Andrew Penny (NHC), Avichal Mehra (EMC), Bin Liu (EMC), Bryce Tyner (FIU), Chanh Kieu (Indiana Univ.), Chris Rozoff (UCAR), Daniel Melendez, Edward Mifflin (HFIP/PO), Evan Kalina (GSD), Francis E. Fendell (NGC), Frank Marks (AOML), George Halliwell (AOML), Gopal Sundararaman (AOML/HRD), Henry Winterbottom (EMC), Hyun-Sook Kim (EMC), James Franklin (NHC), Jason Sippel (EMC), Jun Zhang (AOML/HRD), Kate Musgrove (CO State Univ.), Kathryn Newman (DTC), Mark DeMaria (NHC), Matt Morin (GFDL), Nysheema Lett (HFIP/PO), Ryan Torn (SUNY), Shane Forsythe-Newell (HFIP/PO), Tim Marchok (GFDL), Vijay Tallapragada (EMC), Weiguo Wang (HMON-Ens.), Xuejin Zhang (Univ. of Miami), Yi Jin (NRLMRY), and Zhan Zhang (HWRF).