HFIP Annual Meeting Agenda
Day 2: Tuesday Nov 16, 2021
Meeting Notes

12:00 pm - 1:00 pm: Updates on Current Operational Model

12:00 pm Updates on Current Operational Regional Model Advances and plans (Avichal Mehra)

- Overview of HWRF - operational hurricane model - guidance on global TCs, GSI based DA
- Overview of HMON - another operational model, regional TCs only - no DA
- Configuration of HWRF and HMON - maintains diversity and some similarity between the two systems
- Downstream impacts on HWRF and HMON from the new version of global weather model - GFSv16 - mostly neutral and some aspects improved - see slide more details
- Future plans
  - FY22 WCOSS moratorium
  - FY23 - HAFS - more details in Thursday session
- Summary of HAFS experiments - collaborative project (AOML, GFDL, ESRL/NESII, ESRL/GSD, NCAR/DTC, AOC)
  - Realtime demo - 4 versions of HAFS model run, including NATL, EPAC, WPAC, Global-nest configurations
  - Track, intensity and bias errors examined for various basins
- Morris: Did you use scale aware SAS? Did you do any modification for high res?
  - Ans: Yes used scale aware SAS in all. No modifications for high res in the ones shown here, in other physics experiments, we did,
- John: - Any changes in HMON configurations?
  - Ans: HMON - no changes to configuration due to moratorium. bHAFS was run on WPAC basin, going forward will be to run all world basins - will be available operational

12:20 pm Updates on Global Model advances and plans (Vijay Tallapragada)

- Implementation updates on weather model - deterministic and ensemble systems
- Operational targets and timeline as per the 'rainbow chart' presented
- Coupled model prototype updates -
  - most recent is P7 - making progress toward P8, which will be the basis for next GFS and GEFS. Overview of prototypes' configurations presented (slide 14)

- TC forecast performance in the coupled system - some initial results shred - more work to do
- Ensemble prototypes
    - EP1 -EP4. EPI completed in May 2021, EP2 - EP4 - planned
    - Performance from EPI not great yet - under-dispersive
- UFS-R2O project update
    - Overview and structure and organization of the project presented - 3 Application teams and 7 cross-cutting teams
    - MRW/S2S Application under development through coupled prototypes - improvement in MJO is promising

12:40 pm RDHPCS and Operational Computing activities and plans (Vijay Tallapragada)

- Operational system
    - WCOSS moratorium upcoming - no more new implementations planned
    - New WCOSS-2 - names - Dogwood and Cactus - all operational systems are being transitioned to the new systems - final code deliveries planned through May 2022.
    - EMC modeling systems will be transitioned in FY 22
- RDHPCs in NOAA
    - Summary of current allocations in RDHPCs under NCEPDEV/HFIP portfolio - see slide 9
    - More than 100% utilization on Hera, Orion, Gaea
    - New UFS-R2O request - 89M core hours
- Cloud commuting
    - $740K per allocated in FY21
- Running HAFS in the cloud (AWS cloud is being used)
    - Make HAFS available on cloud for community collaboration
    - Built HAFS source code on the cloud
    - HAFS v2.0A - configuration that is being run on cloud
    - $1400 - cost of running one storm end to end
    - Comparison between results of runs conducted on Jet and cloud - limited samples now, but looks ok.
- Overall HPC resource challenges
    - 75% of total HPC for R&D and 25% for operations at ECMWF. We are exactly opposite at NOAA - which is concerning - need more allocation for R&D.

- Comments
  - Egress and ingress definitely cost in the cloud - some covered under BDP, for others there will be cost.
  - JET usage is lower than allocation, machines are idle many times - however JET can not run FV3 - Projects that do not require heavy resources can perhaps exchange resources and take advantage of JET, although people are reluctant to go to older machines

1:00 pm - 3:00 pm: Special session on 2021 Challenging Cases

1:00 pm   Overview of Modeling challenges

- Issues identified by the forecasters (NHC/JTWC - Mike Brennan/Levi Cowan) (10 mins)
  - Genesis: GFS/GEFS often too fast/aggressive, especially in EP
  - timing/detection in the Gulf of Mexico and off SE US coast
  - Timing onset of RI and East pacific basin RI false alarms
  - Track error negatively impacting intensity forecasts
  - Track: inconsistent track guidance
  - Leftward bias in ECMWF
  - Frequent track correction in the down-shear direction due to poor handling of tilted TC vortices - track shift can impact intensity
  - Bias is worse in pre-genesis in both Western pacific and NALT
  - The ensemble tends to cluster each other. Underdispersion is also an issue.
  - Will investigate if recon data positively impact tracks forecasts.
- Issues identified by Modelers (EMC/HRD - Zhan Zhang/Gus Alaka) (10 mins)
  - HWRF/HAFS over-intensification issue - e.g., Elsa, Fred, Grace. Also observed in HAFS-A.
  - Potential causes: GFSv16 initial condition & model physics
  - Sensitive to microphysics and turbulence. Entrainment rate adjustment (increase) improved the results.
  - Windshield wiper influenced both track and intensity
  - Vmax fluctuation issue in high frequency HWRF output
  - Cold bias increases with time
  - Higher cross-track errors for storms closer to the U.S. - related to western edge of the subtropical ridge
  - Unrealistic intensification in Henri - especially later in the period

- Difficulties with eyewall replacement cycles
- Edge of the static nest issue for Wanda: tracker move back on

1:20 pm   Difficult TC Cases Working Group Presentation (Panelists: Jim Doyle; Linus Magnusson; Julian Heming; Sharan Majumdar; Mike Brennan; Jon Moskaitis; Will Komaromi; Vijay Tallapragada)

- Tropical cyclone activities at ECMWF (Linus)
  - ECMWF tech memo: observations , DA, and modeling.
  - 47r3 pre-operational test - 10% reduction in track errors due to new physics
  - Ensemble - rightward track errors in Elsa and left hand track error in Sam
  - DA challenges: position of weak cyclones, intensity of strong cyclones
  - Modeling challenges
- Met Office Perspectives on 2021 Atlantic Hurricane Season (Julian)
  - 2021 error is lower than 2020's because of two longest lived storms
  - Deterministic model did not handle intensification well for Elsa but did well for Grace.
  - PS45: to be implemented in February 2022. Positive impact on overall model forecasts. Over-deepening in subtropics is reduced.
  - Loss of intensity spread in the ensemble is a concern.
  - Adjustments to mid-level and shallow convection schemes and turbulence have a bigger impact.
- Difficult Tack and Intensity Cases: Perspectives from COAMPS-TC (Jim)
  - 2021 forecasts have larger track error after 60 hours compared to NOAA models
  - Grace: Strong interactions with islands in the Caribbean. Right track errors, particularly at longer leads
  - Poor RI forecasts - L26, L18, L29. proplinged. Intensified very quickly.
  - 27L - RI all missed.
  - Ensemble: 11 operational members and 21 experimental members.
    - Grace, Sam - larger track bias, good intensity forecasts
    - Pamela - great track forecast, too strong intensity
  - Track errors more frequent when interacting with islands and terrain
- Difficult TC Cases Working Group (Vijay)
  - Low along track bias, slow & cross-track bias at longer lead times

- ○ Improved skills for strong storms but still have issues with longer lead times
  - ○ Elsa - Long range forecasts of GFS are encouraging. QPF footprints were not good compared to ECMWF.
  - ○ Ida - GFS produced a false loop over the Southeast for early forecasts.
  - ○ UFS - Coupled models produce higher error.

2:30 pm   Panel/Audience Q&A.

- Frank: Impact of IC/BC on some of those cases - why? What is causing that? Issues with size, moist processes, Issues with coupling.
- Genesis seems to be better predicted in the open ocean than it is closed to the land
- Linus: Satellite observations are not utilized enough.
- Jim: Interactions with land are a difficult issue. Highlight the importance of the IC for track error. Interactions of the flow and the ject in the North Pacific. Higher resolution helps. Improving physics helps but needs to improve understanding of the underlying process. Interactions with radiation, etc.
- Vijay: The 3-dimensional structure of the initial vortex is crucial in storm propagation and intensity. Need to look into more advanced methods, such as AI/ML. DA is critical. Optimization of coupling - how frequently you call physics, etc.
- Q: Track skill scores are flat in recent years. Did we reach the predictability limit? - A: more room for improvements at longer lead times.
- Q: Different models struggle with the same storms. Is there a deficiency in observations? - A: Maybe related to predictability. The resilience in DA for bad observations is important.
- Some storms are extremely sensitive to the underlying ocean and ocean eddies.
- Q: Impact of multi-storm interactions, impacts on the analysis or initialization? - A: Need a good coupled system and coupled DA.

3:30 pm - 4:30 pm: Social, Behavioral and Economic Science (SBES) Research

3:30 pm Status of Tropical Program (Jessica Schauer)

- Developed tropical roadmap starting 2019 with governance plan, internal assessment in 2020 and now looking at HSUP project from social science perspective for 2021-2022

- HSUP project 3A3 to improve storm surge modeling - extending to coupled hurricane model, extend to day 3 and OCONUS
- Consistency increased in level of service with MOMS and MEOWS
- Under HSUP 3A4, WTCM tool developed
- Working with NBM for feature matching
- Further wind hazard recommender developed to provide watch/warnings
- Social science projects will be integrated into product development. Current status is that they are wrapping up with PI's.
- Mark Demaria: WTCM is tied to the wind radii, and wind hazard recommender and to the watch/warnings, and not to forget about the structure, best track of RMW
- Andrea: Any roadmap for WTCM? Still talking about developing the plan, will be the focus during the Hurricane conference.

3:50 pm Early findings from the FY18 SBES Hurricane Supplemental Projects (Castle Williams)

- Highlight findings from four HSUP projects
- Numerical messaging actually helped the public understand
- Broadcast Meteorologists. struggled to transcribe the message to communicate on TC
- Public find it difficult to follow when there is a change in forecast
- Four design opportunities to modernize NHC websites, need to be location specific, integrate regional forecast offices sites
- Triangulation approach finding shows broadcast met. Emergency managers find the TC info useful
- Uncertainty information is very important to communicate, some what is done but there is room to improve, one way is to work with end users
- Uncertainty is currently misinterpreted creating confusion to public
- Frank Marks: how do you fund the future and get more people involved? A: Continue to bring it up at meetings and push the importance of social science.

4:10 pm Quantifying the economic benefits of the hurricane forecast program (Renato Molina)

- How to quantify the benefits of having a forecast program? Not an easy problem since there is no trading market and cannot put a price on the value of this products
- Methodology used to quantify: recreated and improved forecast for Florence and Michael, used dichotomous approach in survey

- What is the socio-economic value of the hurricane forecast? Looked into the forecast trigger behaviour, for eg. by looking into the overestimation or underestimation of wind speed, when underestimated the cost is high
- The change in forecast precision can show the economic value
- The behaviour pattern can give the indices to reduce the cost.

4:30 pm - 4:50 pm: Guest Talk: Storm Surge Modeling at NOS (Saeed Moghimi)

- NOS products: STOFS-G, STOFS-3D, NSEM, HSOFS, and in northern pacific ocean modeling
- NOS involvement: research to operations and dissemination
- Under NOAA UFS: goal is for total water (atm-wave-hydrology-coastal), with the NUOPC layer
- Coastal app available in github
- Hurricane surge on-demand development underway, cloud based post-processing and dissemination system included in cloud implementation
- On-demand unstructured mesh generation on cloud
- Frank: when is this system running? Is this for the coastal act? How does this work? It is not operational yet. It is R&D project.
- Jamie: NOS is trying to tackle the research problems in storm surge, but it is not operational yet.
- Frank: Storm surge is a key part of the HFIP weather act, glad to see programs supporting that.

Chat messages:

Youngsun Jung - NOAA Federal 12:05 PM

We are going to take a group photo at 3 pm, right before a break. Please stay for it.

Stanley Goldenberg - NOAA Federal 12:08 PM

Can I suggest showing skill

Plots for verification. A lot easier to understand the differences. The baseline can be HWRF

Stanley Goldenberg - NOAA Federal 12:11 PM

Also — have you done some stratifications to see which mode

Did better for various scenarios (maybe you will show on Thursday)

Daniel Melendez - NOAA Federal 12:20 PM

Is yesterday session slides available?

Frank Marks - NOAA Federal 12:21 PM

We have the notes and slides available. Ask Sikchya for the links.

Daniel Melendez - NOAA Federal 12:21 PM

thanks Frank

Avichal Mehra - NOAA Federal 12:22 PM

@Stan: HAFS talks on Thursday will show many more results for each configuration incl. for specific storms.

Stanley Goldenberg - NOAA Federal 12:25 PM

@Avichai— great! Thanks.

Lew Gramer - NOAA Affiliate 12:48 PM

@Vijay, did cost estimates include data ingress (BC/IC) and egress (model output) charges?

Zhan Zhang - NOAA Federal 12:49 PM

@Lew yes, including computer node usage and storage usage

Frank Marks - NOAA Federal 12:51 PM

@Zhan Gus has a cloud project to port the AOML model viewer to the cloud. It would be good to link that to any model data generated on the cloud from HAFS, GFS, and HWRF if available.

You 12:51 PM

@Zhan, I think egress and ingress were free for your project. Could you confirm?

Ghassan Alaka - NOAA Federal 12:52 PM

Thanks @Frank. Yes, @Zhan, I'm definitely interesting in using any model output that is already available on the Cloud. Not sure what costs, if any, are associated with copying the data.

interested*

Zhan Zhang - NOAA Federal 12:54 PM

@Youngsun OK, will check, the main costs are using AWS computer nodes

David McCarren - NOAA Affiliate 12:55 PM

Sorry - can't stay on for more - will be back on tomorrow -

Zhan Zhang - NOAA Federal 12:57 PM

@Frank and Gus Yes, Gus is under the same cloud project, he should be able to access the HAFS output as well 2021 operational GFS

Curtis Alexander - NOAA Federal 12:57 PM

Sorry, my bad...ignore.

chunxi zhang - NOAA Affiliate 12:59 PM

Usually data transfer into AWS are free; data transfer out of AWS are NOT free.

Zhan Zhang - NOAA Federal 1:03 PM

@Chunxi Thanks for the clarification

chunxi zhang - NOAA Affiliate 1:04 PM

@Zhan, you are welcome

Frank Marks - NOAA Federal 1:08 PM

@Mike and @Levi is the HWRF intensity over-prediction usually in pre-formation disturbances, or does it carry over into full storms.

Daniel Melendez - NOAA Federal 1:09 PM

What about precip? Is that off the agenda?

Frank Marks - NOAA Federal 1:09 PM

I am concerned that there is large uncertainty in early storm re location.

Frank Marks - NOAA Federal 1:10 PM

@Levi I could see the presence of dry air intrusions in the ATL, but I don't think that is the case in the WPAC cases. Or am I wrong?

Frank Marks - NOAA Federal 1:12 PM

Is the HWRF over-prediction contributing to our increased RI performance James talked about?

James Nelson - NOAA Federal 1:12 PM

Hi Daniel - I can send you some QPF verification we have for TCs if you like.

Daniel Melendez - NOAA Federal 1:12 PM

Thanks James, yes, interested....

morris bender 1:15 PM

Any experiemnt as to why HMON has such a negative bias compared to the positive bias in HWRF ?

Andy Hazelton 1:16 PM

If you increase the entrainment, how does that impact the RI skill in a marginal case like Dorian?

Daniel Melendez - NOAA Federal 1:16 PM

Is there physical justification for the increased entrainment rate?

Robert Rogers - NOAA Federal 1:16 PM

How can you test these modifications?

Andy Hazelton 1:17 PM

Seems like these moderate shear and/or marginal RH cases are still a big challenge

Robert Rogers - NOAA Federal 1:17 PM

Can we use observations to ground these modifications (e.g., statistics of reflectivity and vertical velocity) for given thermodynamic environments (from deep-layer sondes, possibly)

Andy Hazelton 1:17 PM

There are several knobs you can play with in SA-SAS. Morris knows these well

JungHoon Shin - NOAA Affiliate 1:17 PM

@Daniel: for Elsa case the HWRF/HAFS storms overcome the moderate level of VWS (7.5 m/s~10 m/s) was over-intensified between 3~5 July. Because larger d1 (in the entrainment rate of sa-SAS scheme) suppresses the convection in a drier environment and strong (or moderate) VWS is related to the dry air intrusion, perhaps increasing d1 could mitigate the over-intensification of Elsa.

morris bender 1:18 PM

Andy please clarify HWRF cals their MP every 60 seconds in operations ???

Robert Rogers - NOAA Federal 1:18 PM

thinking of trying to do some model evaluation work similar to what's been done with eddy diffusivity (structure-based diagnostics using observations as a guide)

Daniel Melendez - NOAA Federal 1:19 PM

Thanks JungHoon, I wonder if there is more foundational basis for it...

David Ryglicki - NOAA Federal 1:19 PM

@Andy: Dorian was an Atypical RI case, with the full outflow-blocking/tilt-wobbling machine. Not a great example to use for thermodynamic constraints.

George Alvey - NOAA Affiliate 1:19 PM

Could these weaker/moderate shear cases benefit from ensembles that perturb model physics instead of just initial conditions?

Andy Hazelton 1:20 PM

@Dave I was thinking the early intensification in the Caribbean

That RI north of the Antilles was definitely more that shear/tilt process you described

Robert Rogers - NOAA Federal 1:20 PM

I would think so, Trey (physics-based ensembles). I think that's been done?

David Ryglicki - NOAA Federal 1:20 PM

@Andy -- true. Was like two different storms.

Andy Hazelton 1:21 PM

@Trey that's an interesting idea. I'll chat with you offline

Jason Sippel - NOAA Federal 1:22 PM

CTCX was even worse for Henri

David Ryglicki - NOAA Federal 1:23 PM

Re: Henri. It was trying to pull the outflow blocking move, but the upper level winds were 35-50 kt. Way too high for outflow to stop that. Gravity wave arcs are there in WV.

Andy Hazelton 1:23 PM

Yeah the question in my mind is why the models didn't pick that up in Henri

Xuguang Wang - NOAA Affiliate 1:24 PM

@Zhan, can you entail why you think GFS initial condition caused the problem?

Levi Cowan 1:24 PM

@Frank sorry just saw your earlier question about dry air intrusions. They definitely happen in WPAC more often than you would think, especially once TCs move away from the monsoonal moisture belt.

Remember that at higher theta-e values, a given dewpoint depression will actually yield stronger downdrafts (more DCAPE), so it takes a lot of work to properly warm/moisten the tropospheric column, even in WPAC

Frank Marks - NOAA Federal 1:25 PM

@Levi Thanks. That makes sense.

JungHoon Shin - NOAA Affiliate1:26 PM

@Dave: If the convection associated with Elsa is more suppressed by dry air associated with VWS that may mitigate the over-intensification.

JungHoon Shin - NOAA Affiliate1:27 PM

My response is for Daniel.

Frank Marks - NOAA Federal1:27 PM

Given that is the over-prediction issue latitudinally related - i.e., storms closer to the subtropics?

morris bender1:28 PM

Zac I asked this question earlier in the chat but have you looked why the intensity bias is so different in HWRF and HMON ? That may be useful please to look. Also, very interested in the impact of the calling of the MP in the intensity bias in HWRF which I am not surprised about. What about HMON ??? We know that can have large impact in intensity in how often you call the moist physics.

Xingchao Chen1:29 PM

ls

Zhan Zhang - NOAA Federal1:30 PM

@Xuguang this is just speculation, based GFSv16 evaluation, "Too many false alarms from 50°-70°W", mid level moisture bias?

Jason Sippel - NOAA Federal1:37 PM

@Morris - I've long suspected that the HWRF MP is a big player here. HWRF forms these insane "VHTs" quite frequently, and my subjective assessment is that they're often associated with the false alarms

Jason Sippel - NOAA Federal1:39 PM

it feels like the convective structures are insufficiently sensitive to environmental humidity / shear

Levi Cowan1:39 PM

@Jason Agree - formative circulations are often anchored to one of those early VHTs in pregenesis simulations

Jason Sippel - NOAA Federal1:40 PM

which has always lead me to believe that it's something akin to lack of entrainment, or mixing between the cloud and environment

Andy Hazelton1:40 PM

It seems like a real process that happens too often in HWRF

It occasionally happens in the real world (Dorian early, Sally, Michael)

Frank Marks - NOAA Federal1:41 PM

@Levi and @Jason it appears to be a humidity profile bias potentially related to lack of vertical resolution in the satellite humidity retrieval's.

Jason Sippel - NOAA Federal1:41 PM

yeah it happens but those features are fagile unless they're embedded in a larger vortex

Zhan Zhang - NOAA Federal1:42 PM

@morris Current operational HWRF calls MP every 20 sec. for d03, and 60sec for d01 and d02. Just checked HMON has the same calling frequency. Will do more investigations

Jason Sippel - NOAA Federal1:42 PM

we see really intense vortices, but they're often short lived

Levi Cowan1:42 PM

@Linus very interested in whether you go forward with assimilating best track synthetic pressure estimates. It has long been suspected that it would help ECMWF initialize vortices at proper intensity

Michael Brennan - NOAA Federal1:42 PM

@Jason - that discussion reminds me a bit of Delta from last year - very intensity but fragile.

(east of the Yucatan)

Andy Hazelton1:43 PM

Or on a smaller scale Elsa and Sally

Jason Sippel - NOAA Federal1:43 PM

Delta, Eta, first Sally, Isaias

Beta even had one

Andy Hazelton1:44 PM

We see these in HAFS-B too but they're generally more transient

Jason Sippel - NOAA Federal1:44 PM

right, which is really more realistic

Linus Magnusson1:44 PM

@Levi It was in the slide I had to skip.. We did not see any significant benefit from assimilating BestTrack. But we need to look a bit more into it. We also plan to test HDOBS (flight level data)

Jason Sippel - NOAA Federal1:44 PM

@Linus - HDOB had up to almost 15% impact on GFS cycles that used them

currently writing up those results

Linus Magnusson1:45 PM

@Jason Very interesting, interesting to hear more!

Ghassan Alaka - NOAA Federal1:45 PM

Nice discussion. In addition to potential physics issues, tracker data can be misleading for how intense disorganized storms are. It's really important to look at the 3D fields.

Jason Sippel - NOAA Federal1:46 PM

big reason why the smoothed HF output helps so much I think

the tracker just picks up on one of these things and comes up with something completely unrepresentative

morris bender1:46 PM

Jason calling the Moist physics too infrequently can cause unrealistic over intensification. Bob Tuleya and I made this case to the HWRF group for years. . SJ Lin and I discussed this frequently. THat is why I am very curious about HMON frequency of calling the MP. This impact is not too surprising if you think about it from a physics perspective..

Ghassan Alaka - NOAA Federal1:47 PM

Absolutely @Jason. It makes the model output more like the Best Track

Jason Sippel - NOAA Federal1:47 PM

yeah HMON typically has a negative bais

likely why it did so well this year

in NATL

Frank Marks - NOAA Federal1:47 PM

@Linus I am also concerned about whether NHC is using the coarse ECMWF or the native resolution output for the tracker.n That could account for differences in the biases between your results and Mike's.

Linus Magnusson1:49 PM

@Frank It concerns me as well. But I showed the pressure bias. As it lack a bit the wind-pressure relation the wind is going to be weaker.

Michael Brennan - NOAA Federal1:49 PM

@Frank - we have access to both can compare results between the NCEP tracker (EMX) and the raw tracker we get from the native ECMWF fields

Frank Marks - NOAA Federal1:50 PM

Great! Thanks @Mike. That would be very useful for comparison purposes.

morris bender1:50 PM

Frank NHC primarily uses Tim's tracker which is 25km (called EMX). ECMWF does provide them the higher resolution track resolution using their tracker (ECMO). But it is not as realiable to get there on time. Correct me on that Linus

George Alvey - NOAA Affiliate1:50 PM

Ida was another good example of that shear direction related track bias during early stages

Xiaomin Chen - NOAA Affiliate1:50 PM

@Morris Did this mean the heat release in the MP may be too quick than the reality? Wondering if different particle growth behave in a specific cycle

James Franklin - NOAA Affiliate1:50 PM

Frank, you were asking earlier about whether HWRF overforecasts were influencing the results I showed for RI. For 2021, at least, that did not seem to be the case:

https://www.dropbox.com/s/2gkb97ixlgsfqso/aesy2021_hwfi_dist024.png?dl=0

James Franklin - NOAA Affiliate1:50 PM
Frank, you were asking earlier about whether HWRF overforecasts were influencing the results I showed

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https://www.dropbox.com/s/2gkb97ixlgsfqso/aesy2021_hwfi_dist024.png?dl=0

Frank Marks - NOAA Federal1:51 PM
Thanks @James. That is a relief.

Thanks @Morris. I think Kike's suggestion to compare the two would be informative.

Mike's

Linus Magnusson1:53 PM
@Morris I am not sure about the dissemination times for the tracks. But Tim's tracker could be run on ~10

km resolution I believe?

Frank Marks - NOAA Federal1:53 PM
@Julian Larry had problematic intensity forecasts from HWRF and HAFS as well.

Zhan Zhang - NOAA Federal1:55 PM
@Youngsun will the messages in chat be saved somewhere?

morris bender1:55 PM
Frank, Tim and I have done it many times. The track is hardly impacted, Intensity can have a huge impact.

FYI the GFS also uses a degraded 25 km resolution to determine the intensity. People do not realize that.

I made this point before FV3 was made operational.   Our version uses the native grid and so our intensity

skill is much larger. But EMC could not use the higher resolution grid because of disk limitations.

Youngsun Jung - NOAA Federal1:55 PM
@Zhan, yes, we are capturing them in notes.

Zhan Zhang - NOAA Federal1:56 PM
@Youngsun Thanks!

Frank Marks - NOAA Federal1:57 PM
@Morris Thanks. That is an issue I was not aware of for GFS.

morris bender1:59 PM
Yea, Tim and I have made that point in past IHC meetings. Perhaps that is something you could push for

EMC to reconsider.

Michael Brennan - NOAA Federal1:59 PM
I ran a quick comparison of intensity error for EMX vs. ECMO for the Atlantic for 2021. Very little

difference: https://drive.google.com/file/d/1qlnMpuP2-Us1IlLXY2cr-Xfs9VohUuRM/view?usp=sharing

Jason Sippel - NOAA Federal2:00 PM
@morris - do you have a comparison of op GFS tracker vs verification at the full resolution?

as in, you got a link?

morris bender2:01 PM
Mike that is interesting. That was not the case previously but there were a lot of weak storms in 2021.

Please replot the bias and I am sure ECMO will have much less of a negative bias.

morris bender2:02 PM

Jason there is no way to get the GFS tracker at full verification. I can do for you plots of our FV3 version (which uses native grid) and the GFS. Again people not aware of this point.

Xuguang Wang - NOAA Affiliate2:03 PM
@Julian, You mentioned increasing ensemble IC spread? Can you provide more details how you plan to do this? inflation?

Michael Brennan - NOAA Federal2:04 PM
@Morris - here a comparison for 2020 and 2021 combined in the Atlantic. Not much difference there either: https://drive.google.com/file/d/1C1Xru3iaXy2Q1A04r_Gc35CgUhQctlkS/view?usp=sharing

Michael Brennan - NOAA Federal2:05 PM
The bias is about 1 kt less for ECMO compared to EMX

Julian Heming2:05 PM
@Xuguang This is a very new idea and no details have been discussed yet. It will probably involve perturbations of the central pressure data (from TCvitals) which is already assimilated.

Linus Magnusson2:05 PM
@Michael Thanks for checking!

Jason Sippel - NOAA Federal2:06 PM
@Jim - wonder if the track degradation was a result of intensity errors

did CTCX have a significantly different intensity bias this year from last?

asking because HWRF did

morris bender2:07 PM
Mike mind redoing the same for bias of EMX vs. ECMO ?

James Doyle2:10 PM
@Jason - Good question regarding the role of intensity errors. I'm not really sure how the intensity and track errors in CTCX correlated in the past year. The intensity bias was overall pretty similar in 2021 to 2020. Intensity bias was near zero beyond 48h. There was a little weak bias in CTCX intensity in the 6-48h time.

morris bender2:11 PM
Mike, I am going to look at some of my past plots of EMX vs . EMCO. I should have some examples from the past as I recall differences quite a bit larger then 1 knot. (on the order of 3 knots or so). But the bias will be quite larger

Michael Brennan - NOAA Federal2:15 PM
Morris - here you go:

https://docs.google.com/spreadsheets/d/13Ybv8ufZgi3h3haftWajXdgWldLmLli7fdYJRc6fF_Y/edit?usp=sharing

Zhan Zhang - NOAA Federal2:19 PM
@Micheal we noticed that ECMO constantly has missing cycles in a-deck, while EMX normally includes all cycles

Linus Magnusson2:19 PM
@Morris Have Tim's tracker any wind scaling applied? We used to have one but took it out in 2020.

Frank Marks - NOAA Federal2:20 PM
@Jon James' RI presentation showed CTCX did really well.

Timothy Marchok - NOAA Federal2:21 PM
@Linus... No, for the EMX produced from the tracker in NCEP operations, the winds are taken directly from the fields and reported with no additional scaling applied.

Linus Magnusson2:22 PM
@Tim thanks for the info!

Jon Moskaitis2:26 PM
@Frank Since the 2020 model upgrade, CTCX has much improved performance for RI. There are still tricky storms like i showed, but usually it has the right idea even if not quite matching the observed intensification rate

Frank Marks - NOAA Federal2:27 PM
Thanks @Jon. I think that this is a major success with caveats we need to address.

Will Komaromi2:27 PM
@Frank As is the case every season, CTCX had some hits and some misses. We highlighted a bit of both for the purposes of this discussion, but certainly the ratio of hits to misses was about as good as we've ever seen.

Frank Marks - NOAA Federal2:28 PM
Speakers I would like to see if we can discuss how much of the issues you raised are related to IC/BC issues, storm size, sand physics.

morris bender2:28 PM
Zhan my experience is that is often the case. By the way Mike the ECMO decks i still have are from a number of years ago. I just did a quick verifications from a few years about and the bias difference was huge and the intensity error improved about 4 knots. So, maybe your analysis is right, the impact is much less in the newer version of the model or just the differences of the seasons over the past couple of years ???? ...Interesting

morris bender2:31 PM
Tim in regards to Mike's plots do yo happen to have some of our plots of EMX vs. EMCO from the past ??? I cannot seem to find

Levi Cowan2:35 PM
@Morris regarding GFS-derived intensity, I believe some fields on the native grid (including 10m wind) are provided publicly via NOMADS through the "sflux" files, so it is possible to use those in a vortex tracker, even if it's not done operationally

Dave Jones2:42 PM
@Linus Do you mean there is a lack of polar orbiting or geo satellite observations in model initialization/assimilation? Perhaps both?

Levi Cowan2:43 PM

@Linux an anecdote regarding EC assimilation of TC pressure data: it seems to be most impactful early in the TC lifecycle, and especially when the vortex is small. If you test it on mature TCs, I imagine the benefit will be much lessened

Linus* sorry

Linus Magnusson2:44 PM
@Dave We still assimilate the IR data in clear-sky mode, so missing a lot of data close to TC. But the all-sky data we thin to 100 km resolution so we miss some details.

@Levi Thanks!

Xuguang Wang - NOAA Affiliate2:44 PM
@Levi, even they use them, there are quite a bit of thinning so not all data are used for data assimilation.

Correct me if incorrect, Linus.

Linus Magnusson2:45 PM
@Xuguang We will start to reduce the thinning of ASCAT from 100 km to 50 km.

Xuguang Wang - NOAA Affiliate2:47 PM
@Linus, any plan to reduce the thinning of the all sky radiance for assimilation?

Linus Magnusson2:47 PM
@Xuguang Not at the moment. The correlation of observation error is a concern.

Xuguang Wang - NOAA Affiliate2:48 PM
@Linus, sure.

Youngsun Jung - NOAA Federal2:50 PM
We are going to take a group photo at 3 pm after this session. Please stay for it.

Timothy Marchok - NOAA Federal2:53 PM
@Morris @Linus Here is a table of stats for EMX compared to ECMO for the Atlantic, 2015-2017 seasons, for track, intensity errors, intensity bias. Definitely a wider difference between the two for the intensity stats. For track, the differences are confined the first 24h:

https://docs.google.com/spreadsheets/d/16pG0PO6bibAHBNJW3akjd88hOMa5Ue0WuVkS8sEGvP4/edit?usp=sharing

Jason Sippel - NOAA Federal2:54 PM
But as James pointed out yesterday, there was a levelling off back around 2005 for several years... then improvements resumed.   i suspect the jury is still out

Christopher Landsea - NOAA Federal2:54 PM
Thanks, Linus, Julian, and Vijay!

Dave Jones2:57 PM
Maybe we are not using all of the existing observation systems adequately yet..?

Linus Magnusson2:59 PM
@Christopher I checked my plot. For Day 5, ERA5 was better than HRES for all years before 2016, and since 2018 HRES has been better for all years. So I believe a reanalysis with a fixed model is a good benchmark.

Xuguang Wang - NOAA Affiliate3:00 PM

@Xuejin and @All: In terms of Obs., one aspect is to best utilize the existing obs. through e.g. DA. I think we still have big room to improve on the use of existing obs. The other is the gap of the observation system.

Jason Sippel - NOAA Federal 3:00 PM
most certainly we're not. there have been some really exceptional results coming from use of all-sky radiances in research systems over the past few years

Lew Gramer - NOAA Affiliate 3:00 PM
+1 to Jim Doyle's comment re ocean DA. Eddies, and coastal regions, too.

Jason Sippel - NOAA Federal 3:00 PM
we have a ton of room to improve data use in the operational stream and also to expand what's in the operational stream

Jonathan Poterjoy 3:02 PM
From the perspective of a DA developer, I think we still have a lot to improve upon; multivariate obs uncertainty, non-Gaussianity, sampling error, ...

Daniel Melendez - NOAA Federal 3:35 PM
Did I hear that OCONUS funding got nixed because it is off-Atlantic?

Frank Marks - NOAA Federal 3:36 PM
Yes. However I think that fortunately PR was included

Daniel Melendez - NOAA Federal 3:37 PM
Still not enough....

Frank Marks - NOAA Federal 3:46 PM
We need to make the best use of JHT and JTTI to close the "2" gaps!

morris bender 3:46 PM
Tim just saw your emx vs. ecmo difference for 2015-2017 which is more in line with what I saw in the past so I am confused by Mike's plots... But maybe something peculiar about the past 2 seasons or due to the ECMWF recent upgrades. I believe the last time I did this was 2018 when this issue came up with Jan-Huey in her paper. No big deal to persue this any more. But it is interesting that most do not realize that both the GFS and EMX atcf standard decks are using 25km resolution

Dave Jones 3:49 PM
Are all of the supplemental projects going to be placed into the JHT and JTTI? Also have you looked at collaborative technologies to deliver these products to potential users for feedback? Thanks.

Michael Brennan - NOAA Federal 3:49 PM
This year

Christopher Landsea - NOAA Federal 3:49 PM
Yes, Mark is correct: 2021 best tracks will have RMW.

Andrea Schumacher - NOAA Affiliate 3:51 PM
Well said, Frank.

Frank Marks - NOAA Federal 3:52 PM
Hello @Jen Sprague

Excellent @Chris and @Mike.

Daniel Melendez - NOAA Federal 3:56 PM
@Castle, what were the sample sizes roughly?

Frank Marks - NOAA Federal 3:57 PM
@Daniel each project had a different sample, but they were fairly large.

Daniel Melendez - NOAA Federal 3:57 PM
ok

Frank Marks - NOAA Federal 3:57 PM
100s

Robbie Berg - NOAA Federal 3:57 PM
WFO Forecasters (n=297), EMs (n=293), Public 1 (n=1000), Public 2 (n=1550)

Frank Marks - NOAA Federal 3:58 PM
Thanks @Robbie

Daniel Melendez - NOAA Federal 3:58 PM
Thanks Robbie

Daniel Melendez - NOAA Federal 4:02 PM
Is understanding and response in the scope of the project wrt TC messages?

And if so what have we learned?

Frank Marks - NOAA Federal 4:03 PM
Yes

Dave Jones 4:04 PM
We are finding that decision makers and users who want to use more NOAA data in their decision making processes want products in geospatial formats so they can also overlay critical infrastructure and other key data (some proprietary to their org). Are you considering providing data that is F.A.I.R. - Findable, Accessible, Interoperable and Reusable? Thanks.

Daniel Melendez - NOAA Federal 4:05 PM
What does it take to "communicate well" the information of uncertainty?

Daniel Melendez - NOAA Federal 4:08 PM
(My question can be for Castle)

Castle Williams - NOAA Affiliate 4:12 PM
@Daniel: There are some ongoing social science efforts within NWS to better understand some of the practical recommendations and best practices for communicating uncertainty. You can see them on this interactive dashboard: https://crcm.shinyapps.io/probcom/#section-bibliographic-archive

Daniel Melendez - NOAA Federal 4:13 PM
@Castle - thanks

Jennifer Sprague - NOAA Federal 4:16 PM
Good work Renato! Heading back to Fall Strategy...

Frank Marks - NOAA Federal 4:16 PM
Thanks @Jennifer

Frank Marks - NOAA Federal 4:25 PM

@Renato it also seems to indicate the actionable time frame for a lot of these actions.

Daniel Melendez - NOAA Federal 4:26 PM
Does this tell us anything about the kind of response induced by the forecast?

Dave Jones 4:29 PM
This seems to support a slight overestimation of the wind speed forecast. Perhaps support for 'Forecast of least regret'? Where this gets real impactful is with protecting critical infrastructure where the cost of protecting can get REAL high real fast depending on forecast parameter (i.e. wind, storm surge, rainfall total).

Frank Marks - NOAA Federal 4:29 PM
@Daniel I don't think so. Triangulating these results with the other projects could definitley do that.

Daniel Melendez - NOAA Federal 4:29 PM
Fascinating!

Castle Williams - NOAA Affiliate 4:30 PM
Thanks for the info Renato!

Dave Jones 4:32 PM
@Renato Does your research consider corporate or state responses that may cost a lot of money to prepare? Or is your research focused on public response? Sorry if I missed your focus area. Great talk!

Frank Marks - NOAA Federal 4:35 PM
@Dave I think the results highlight the dramatic increase in costs for intensity forecast error of >18 kts. But I think that can also be looked at for other forecast guidance products as well.

Dave Jones 4:39 PM
@Frank Great thanks! Agreed. For example the utility industry will spend millions with a storm surge forecast that slightly exceeds their thresholds for coastal sub-station protection.

Frank Marks - NOAA Federal 4:42 PM
@Dave Agreed. Same with the oil inductry.

Dave Jones 4:43 PM
@Ed Does the on-demand cloud implementation and operational coupled ADCIRC-based HSOFS-Wavewatch III provide output in geospatial data formats for ingestion by GIS systems to accelerate decision making?

Jamie Rhome - NOAA Federal 4:45 PM
Dave, no. This is research grade modeling supporting Coastal Act
Decision makers rely on official products and warnings issued by NWS

Dave Jones 4:47 PM
@Jamie thnx agreed. We are being asked if any research on future anticipated SLR scenarios plus storm surge may impact critical infrastructure. This is where the research effort may contribute...is that a fair assumption?

Frank Marks - NOAA Federal 4:48 PM
@Ed and @Soroosh what is the hurricane data that the system requires? Is uncertainty in that hurricane data used in the output products?

Saeed Moghimi - NOAA Affiliate4:50 PM
@Mark, At the moment we pull historical best track or forecasts to establish impacted reion for

on-demand mesh generation.

Jamie Rhome - NOAA Federal4:50 PM
Dave, give me a ring sometime as there are multiple sources of SLR plus surge risk data

Dave Jones4:52 PM
@jamie great will do, thnx. This will be very helpful.

Saeed Moghimi - NOAA Affiliate4:54 PM
@Frank, One of the reasons for developing on-demand mesh is to reduce amount of HPC needed in order

to run more ensemble members with the same amount of HPC resources.

Dave Jones4:58 PM
@Jamie Excellent thanks for clarifying. It is an exciting effort that shows great cross-NOAA collaboration.

Saeed Moghimi - NOAA Affiliate4:59 PM
Thanks HFIP team for the opportunity and Jamie for clarification.