

HFIP Annual Meeting Agenda

Day 1: Monday Nov 15, 2021

Meeting Notes

12:10 pm - 1:40 pm: Programmatic updates and Plans

12:10 pm HFIP Status and Plans (Frank Marks)

- 2017 HFIP asked to continue by weather innovation act
- Strategic plan on June 2019
- High level plan approved by congress May 2019
- Some of the goals are: Reduce numerical forecast guidance, produce 7 day forecast guidance
- 6 key strategies outlined
 - Advance HAFS
 - Use FV3 for all development
 - Running 4 versions
 - Improve probabilistic
 - Incorporate uncertainty into hazard models
 - Enhance communication of risk
 - Evaluate TC products using FACETS
 - Paper on BAMS
 - Support high performance computing
 - Using HERA, orion and JET
 - R20 enhancement
 - Broaden expertise
 - Been able to maintain outreach with outsiders
 - NOFO out
- Increase investment on social and behavioral sciences
- How much is related to supplemental activities? Vijay, A: we been able to leverage the HSUP, but we emphasize that is short term

12:30 pm HFIP Programmatic Updates (Youngsun Jung)

- Budget and highlights will be discussed
- 4.6M in FY21
- \$700K to support 3 projects FY22 grants
- 6 projects run in real time
- 2021 accomplishments
 - DA capability to HAFS included
 - Moving nest
- No cost extension to several FY2018 NOFO projects
- Priorities:

- Continue to support operational capabilities
- Transition to WCOSS 2
- Future directions
 - HAFS V1 on Q3 FY23

12:50 pm Hurricane Supplemental Updates (James Sims)

- Two HSUP projects, FY18 (\$16M) and FY19
- including wildfires in FY19
- Projects starting to conclude
- Story maps published, good overview
- Executives summaries of the projects being prepared
- 6 projects had been completed from the FY2018 projects
- Two Gliders deployed during 7 missions during 2021
- FY22 disaster supplemental in preparation
- Evan, How can potential PIs engage in the proposals for FY22? A: further engagement will occur when we have more information, James

1:20 pm RDHPCS/Cloud Computing updates from OCIO (Frank Indiviglio)

- Increasing interest and use of GPUs
- Also on ARM based system
- Cloud platforms continue to improve
- There should be seamless transition between platforms
- Cloud task order issued in FY20 and 21, with microsoft, amazon and google
- Use parallelworks for uniform access
- Networking upgrades performed on all supercomputer systems
- Upcoming training? Bootcamp on 12/10/21, deadline to apply on November 24, link on presentation
- Xuejin: Are the training sessions for developers or IT support? A: open to everyone, different events for different levels
- Need the right balance between R&D and operations

- **Frank Marks: Real time experiment in Jet every summer needs to be mirrored in other computational systems. Frank Indiviglio: It can be done technically if we can place the requirements for that.**
- Xuguang: what would be the best way to outline what's needed for R&D and operations? A: need to maintain 2 to 1 ratio but more discussion needed, Frank
- Ghassan: Are reservations possible somewhere else? Need to tackle experiments now to be ready
- Sundararaman: How much will be linked to the supplemental?

1:40 pm - 5:00 pm: Forecaster needs and Activities Supporting Operations

1:40 pm Current forecast capabilities - NHC verification (John Cangialosi)

- Atlantic basin verification:
 - Track and intensity records broken for 2021
 - 399 forecast issued in 2021, above average
 - 2021 errors were below the 5 year average
 - Track errors pointing downward
 - Track skill is plateauing
 - Hurricane center forecast very skilful
 - GFS was the most skilful
 - Intensity error is improving, slow uptake in skill
 - **Best individual model for intensity forecast was the HMON**
 - Regional models have overtaken the statistical models
 - Low bias for genesis forecast
 - Quiet year in average
- EPAC basin verification
 - Intensity Less skilful this year
 - HMON best performer again
 - Genesis predictions are well calibrated

2:00 pm NHC's analysis and forecasting challenges (Mike Brennan)

- Season summary Atlantic
 - 21 named storms

- 7 hurricanes (4 major)
- 8 US landfalls
- 10 systems with watches or warnings on the first advisory
- Season summary EP
 - 19 named storms
 - 8 hurricanes (2 major)
- Challenges
 - Several microwave imagers offline
 - Metop-A (ASCAT-A) will be deorbited, reduced ocean winds coverage
 - Danny genesis was a challenge, close to land, no model support
 - Henri was a challenge on genesis and track forecast
 - Rapid intensification of several systems
 - Elsa and fred have high biases on HWRF intensity forecast
 - Henri intensity forecast
 - Pamela rapid intensification, false alarm
 - Rick rapid intensification timing off
 - Track and intensity issues for Elsa, Fred and grace
 - Pre-genesis track guidance for IDA
 - Henri track guidance was significantly bias, complex interaction with mid-latitude shortwave
 - Nora track guidance on the east pacific
 - Olaf, double the forecast track error
 - we don't take reformation into account, need to look into it

2:20 pm WPC rainfall forecast (Jim Nelson)

- Collaborative track forecast, rainfall by WPC
- Service desk rearranged
- Public advisories for downgraded storms
- Training for international forecasters (south/central america, caribbean)
- HAFS verification project using rain gauges in the caribbean
- Mark: Is your impression that the HAFS system can be useful for your QPF forecasters? In the future yes

2:40 pm JTWC TC activity, forecast challenges, and priorities (Levi Cowan)

- Very few tracks on the 2020 near Guam, activity higher in 2021, la nina year
- Quiet after July 24 to September 6, no typhoons
- Records for high accuracy in 2021 on forecast track
- Uptick forecast intensity skill
- List of priorities on presentation
- Robert to reach out to Levi on eP-3 in Japan
- JungHoon: Is SAR wind data used for TC intensity estimation in JTWC? A: SAR availability is helpful

3:30 pm Verification of Rapid Intensification Metrics (James Franklin)

- Reduce intensity and forecast errors by 50% - HFIP RI goal, baseline and targets set.
- 2021 performance - overall good - forecasters were outdoing the guidance in 24 hours
- HMON - perhaps not doing great
- Distribution of errors for the baseline vs 2020-21 period - shift in distribution is very evident - very large negative errors disappeared
- Probabilistic RI models verification - SHIPS-RII, DTOPS, RIPA
 - DTOPS is inconsistent
 - E. pacific rough for probabilistic models , 2 year sample looks more promising.
 - Good reliability, especially for SHIPS RII
- Overall excellent progress, metrics errors decreasing on the way to achieving target, probabilistic guidance not as skillful as in 2020, but good reliability.
- Q: Gopal: HWRF - did you look at dynamical models, suggest looking at dynamical models too.
 - Ans: Focus was HFIP metrics, not yet, can do.
- James F: Distribution slide 13 - still a negative bias - looks like bimodal distr.
- James F: HFIP metric combined E.Pcf. and Atlantic to get a good sample size
- Q: Robert Rogers: Did you stratify the storms based on wind speed?
 - Ans: Can do that, sample size may reduce though.

3:50 pm Operational applications including ensemble products (Brian Zachry)

- Proj 1: Statistical post-processing forecast improvements -
 - neural net intensity forecast
- Proj 2: AWIPS/ATCF product improvements

- HWT-TC wind hazard experiment, AWIPS-2 migration, WTCM use experimental
- Proj 3: Graphical product improvement for external users
 - TC intensity forecast uncertainty - Connected to social science testing
- Proj 4: Storm surge forecast improvements
 - JTTI project on hazard services
- Proj 5: JHT and R2O activities
 - Improved R2O transitions, tracking of real time demonstrations, maintenance of NHC's public JHT communication
- FY22 HFIP supported projects
 - Milestones on track
- Dave Jones: NHC library renovation - any new products?
 - Ans: Funding from OAR received, completed renovation, working on transition. Premature to talk more about it now.

4:10 pm Post Processing and Verification (PPAV) Team update (David Zelinsky)

- Conducted evaluation of PBL schemes in HWRF - vertical eddy diffusivity in boundary layer
- Conducted LES experiments - recommend the max mixing length
- Case study on importance of PBL physics - HAFS-B with modified TKE method provided better forecast for Ida
- Model Radar comparisons are promising overall
- Impact of obs (from Coyote) in model - conducted with and without Coyote data experiments
- Developed AOML hurricane model viewer - allows researchers to compare various models
- New HFIP.org - better look and feel of the website
- NHC display and diagnostic page
- New TC ensemble diagnostic products
- Guidance suite updates
 - Migration to WCOSS-2 is a major activity
- ML for track and intensity forecasting - one of the ideas is to be able to use ML to provide "guidance on guidance"
- WCTM - idea is to provide products and convert NHC data forecast to gridded products and graphics

- Model evaluation included
 - SHIPS-RII
 - COMPAS-TC
 - Interactive display of intensity change - Visualization of ensemble forecasts
- 3D visualization of obs and model data
- Effort underway to develop landfall intensity product
- Future directions
 - NHC guidance to continue, ML implementation, bias correction, guidance on guidance efforts
 - Continue model display
 - continue interaction with EMC

4:30 pm Infrastructure: ATCF and AWIPS plans (David Zelinsky)

- NHC technical infrastructure
 - NHS forecast desk - Mix of various systems in use - AWIPS system, windows, ATCF, laptop, AWIPS2
 - Trying to make it more standardized
 - Input data sources are - NCO, SBN, NESDIS Product distribution access, local satellite dishes, data of opportunity
 - Forecast data have various output destinations
- Technical operations in 2021
 - Remote operations continue due to Covid
 - Quite a number of implementations, migrations to deal with - including WCOSS-2
- Migration to AWIPS2
- Future
 - NAWIPS to AWIPS2 transitions - timeline slipped (N-AWIPS is a mature stable system for model display and products)
 - Not clear of AWIPS performance is suitable for operations
 - Challenges
 - Covid19 remote work - not having proximity and interaction with forecasters
 - Moving goalposts

- Lack of centralized support
 - Number of upcoming OS and software migrations - upcoming infrastructure projects - less exciting, but needed.
- Looking ahead
 - Model improvement → - better forecast → better guidance → better service for society
 - Opportunities for research and operation interactions - AWIPS is becoming more accessible to community including AWIPS ‘in the cloud”, expanded testbed
 - Further ahead - Developing TC forecast capabilities in AWIPS2.
 - Also Wanting to Update coding standards and standardize languages, platforms, input data formats
- Mark DeMaria: question about Python library - how to take advantage of its full resources
 - Ans: working with NCO to have a standardized Conda 3 framework - to expand the potential of Python.
- Christopher Slocum: David, once you have the enterprise environment, can that be shared so that developers are using the same versions of the packages?
 - Ans: will get back on that

4:50 pm Operational storm surge modeling (Andrew Penny/Laura Alaka)

- Probabilistic storm surge
- RMW error and bias improved in P-surge v2.9
- Low bias at all lead times- reduced bias in new version of the model
- Landfall adjustments for intensity - interpolation issues causing oscillating forecast - new method implemented keeping the intensity constant seems to work.
- Future work include - Evaluating the implementation of constant intensity up to landfall , Couple wave model SLOSH among others
- Mark DeMaria: Any update on on free range points - this is a problem for downstream applications
 - Ans: We have out that in the list of things to look at

- Hendrik Tolman: there are other ways of sampling - a work to be published soon with University of Notre Dame - suggest to take a look at it when published
- Dave Jones: Laura How does local WFO handle P-surge model output? Do they tweak or use as is? Have you looked at local WFO surge forecasts vs NHC or is NHC used without question?

Thanks.

- Ans: Close collaboration with WFOs, do ingest the p-surge values directly

Chat messages:

James Franklin - NOAA Affiliate 12:04 PM

Anyone else's audio not working?

Andrew Hazelton - NOAA Affiliate 12:04 PM

Hmmm it's OK for me

Lew Gramer - NOAA Affiliate 12:04 PM

My audio is working ok also

Zhan Zhang - NOAA Federal 12:04 PM

It's OK to for me

James Franklin - NOAA Affiliate 12:05 PM

Sigh. Okay, thanks.

Timothy Marchok - NOAA Federal 12:05 PM

James, very recently (last week), I hit the same problem with no audio from Google Meets while on Chrome. When I switched to Firefox, the audio was fine.

Maria Aristizabal - NOAA Affiliate 12:06 PM

you call the meeting +1 415-763-1682

PIN: 689 509 889#

James Franklin - NOAA Affiliate 12:07 PM

Quitting the browser and rejoining the meeting worked on the second try. Odd.

Youngsun Jung - NOAA Federal 12:08 PM

Yes, closing the browser and reopening a window could help.

Lew Gramer - NOAA Affiliate 12:28 PM

HAFS-B nested domain was also coupled with HYCOM for our 2021 RT experiment

Sundararaman Gopalakrishnan - NOAA Federal 12:35 PM

@Lew Noted

David McCarren - NOAA Affiliate 12:57 PM

I need to drop - will be back after this meeting - sorry to miss Frank I's talk -

Zhan Zhang - NOAA Federal 1:10 PM

The HAFS-A configuration can be now compiled and run end-to-end on AWS cloud

Frank Marks - NOAA Federal 1:15 PM

@Zhan That is great news!

Ghassan Alaka - NOAA Federal 1:16 PM

@Frank @All, Are there plans to modernize Jet so more of the machine is useful for HAFS experiments and other HFIP priorities? What can be done to support reservations for HFIP real-time experiments, which can currently only be done on Jet?

Youngsun Jung - NOAA 1:17 PM

@Zhan, does this include DA?

Frank Marks - NOAA Federal 1:18 PM

@Gus my understanding is that plans are to increase capacity on Hera and Gaea, not the Jets

Zhan Zhang - NOAA Federal 1:19 PM

@Youngsun No, we have not tested GSI or HAFS-D configuration on cloud yet

Youngsun Jung - NOAA 1:19 PM

@Zhang, thanks!

Frank Marks - NOAA Federal 1:19 PM

@Gus we need to start thinking about moving the HREx effort to Hera if possible. This is something we need to work toward as part of the 2021 HSUP HPC support.

Xuguang Wang - NOAA Affiliate 1:21 PM

@ Frank Indiviglio, Would the use of Cloud allow an easier access by international students?

Ghassan Alaka - NOAA Federal 1:21 PM

@Frank, the problem (at least for our team) is not limited to resources, it's also the need for reservations. To the best of my understanding, reservations won't be configured on Hera

Dave Jones 1:21 PM

@FrankIndiviglio Are you planning to make model output available from the cloud as geospatial data services that can be quickly accessed and shared across platforms or is that not in HPCC's area of responsibility? Thanks.

Andy Hazelton 1:21 PM

Is there a reason why reservations can't be made on Hera?

Frank Marks - NOAA Federal 1:22 PM

@Gus that is the issue we need to address moving forward to continue our HREx effort to test & evaluate HAFS moving forward.

Wei Yu1:22 PM

@Zhan, Hera and Jet installed Singularity. if you use the singularity on Cloud., you can run on Hera/Jet also.

Ghassan Alaka - NOAA Federal1:23 PM

I know this is a complex problem. Without near real-time forecasts for HREx, we lose a critical capacity to interact with NHC forecasters and other stakeholders.

Frank Marks - NOAA Federal1:23 PM

I agree. This has to be addressed by the program management group as a high priority.

Zhan Zhang - NOAA Federal1:24 PM

@Wei Thanks for the info.

Frank Marks - NOAA Federal1:30 PM

We can't get to RL-8 without the real-time effort in an operational cadence.

Frank Marks - NOAA Federal1:31 PM

We need access to the operational data flow no matter what HPC system we expand the HREx effort to.

Frank Indiviglio - NOAA Federal1:36 PM

@Xuguang Wang. We have that ability on Orion, right now we have similar rules on cloud that we do on internal systems

@dave jones - There are some options to do this, we can follow up to discuss

Frank Marks - NOAA Federal1:38 PM

@John It would be great if you could plot the standard deviation of the forecast errors (provided they are normally distributed) on the summary plots of the errors to give an idea of the spread in the errors.

Jason Sippel - NOAA Federal1:38 PM

yeah we really need to start looking at median errors more as well

Andy Hazelton1:39 PM

There were some big outlier cases this year for sure. Wanda for GFS I think

Michael Brennan - NOAA Federal1:39 PM

Larry for the GFS too

Frank Marks - NOAA Federal1:39 PM

I think DTC developed a box and whisker version of those plots that provided the spread.

James Franklin - NOAA Affiliate1:41 PM

There was also a plateau around 2003-6.

Jason Sippel - NOAA Federal1:41 PM

@james - yeah i was thinking that as well

Xuguang Wang - NOAA Affiliate1:42 PM

@Frank Indiviglio, I thought one of the reasons going to Cloud is easier for the external community to access. Do you envision some of the clouds will be having similar rules as Orion in terms of access so that a much broader community can access and work together more easily?

Evan Kalina - NOAA Affiliate 1:43 PM

@Frank Yes, METplus (specifically MET-TC) has that capability.

James Franklin - NOAA Affiliate 1:44 PM

I wonder if the GFS performance relative to the ECMWF had anything to do with the year not being particularly challenging (at least as measured by CLIPER).

Frank Marks - NOAA Federal 1:46 PM

@Evan I think we need to utilize that going forward so we can identify the outliers for both track and intensity. I would want to see HFIP also reduce the impact of outliers, not just improve the mean error.

Dave Jones 1:46 PM

I have a meeting at 2pm but will return at 3pm. Thank you for this great meeting.

Linus Magnusson 1:47 PM

For intensity, is EMXI based on native resolution tracks or "low-resolution" tracks?

Jason Sippel - NOAA Federal 1:47 PM

@James - GFS adding a bunch more recon data this year had a lot to do with its performance it gave a bump in track skill of about 15%

Michael Brennan - NOAA Federal 1:47 PM

Linus, EMXI is run off the grids that come to NCEP, so I think it's lower than the native resolution.

James Franklin - NOAA Affiliate 1:48 PM

Thanks, Jason. Nice to see.

Andy Hazelton 1:48 PM

Any ideas why HMON did so well this year?

Evan Kalina - NOAA Affiliate 1:49 PM

@Frank Agreed. There is documentation available, and I know Tara Jensen and her team would be happy to answer any questions about using MET-TC for this purpose.

https://met.readthedocs.io/en/main_v10.0/Users_Guide/met-tc_overview.html

Xuguang Wang - NOAA Affiliate 1:49 PM

Did EMXI behave similarly on intensity forecast in the past or it is something unique this year?

John Cangialosi - NOAA Federal 1:57 PM

@FrankMarks, I'll do that for the final verification stats. Thanks for the suggestion!

James Franklin - NOAA Affiliate 2:01 PM

Interesting that the storms that accounted for 60% of the seasonal ACE (Larry and Sam), barely affected land at all. As Professor Snape might sneer, "Clearly, ACE...isn't...everything."

Frank Marks - NOAA Federal 2:03 PM

@John Great! Still a great summary, but I think we need to look more at the outliers, potentially relevant to James' RI summary coming up.

John Cangialosi - NOAA Federal2:08 PM

@Frank, I agree, we can do that. I've looked at Elsa so far and the EMXI performed very poorly. The TCRs should give us a good clue where to look for problems.

Levi Cowan2:10 PM

ECMWF poor representation of initial vortex intensity (especially in cases without recon data) still seems like a large contributor to its short (and perhaps even long) lead time intensity struggles

John Cangialosi - NOAA Federal2:10 PM

@Xuguang, usually EMXI is not skillful or competitive for intensity in the bulk sense.

@Andy Hazelton, not sure why HMNI was more successful this year. Worth looking into this for sure.

Jason Sippel - NOAA Federal2:11 PM

probably had something to do with HMON liking weaker storms

not as much RI this year as last year

HMON has always been negative biased compared to HWRF, for example

Frank Marks - NOAA Federal2:13 PM

@Mike how much of the track errors are due to uncertainty in the initial position or potential reformation?

Robert Rogers - NOAA Federal2:14 PM

@Mike, came in a couple minutes late -- but wondering if reformation is something on your radar screen in terms of a challenge?

Jonathan Poterjoy - NOAA Affiliate2:15 PM

@Frank: I think your comments are a good motivation for testing high-res 'small' (~5-10 member) ensemble capabilities within our HAFS DA framework.

Frank Marks - NOAA Federal2:16 PM

@Jon I agree 100%.

Frank Marks - NOAA Federal2:17 PM

I am really leery of the whole vortex relocation process, so any approach that would help account for initial storm location is essential moving forward

Jason Sippel - NOAA Federal2:21 PM

@Frank - we probably can't completely get away from it, but we should do it as little as possible

Frank Marks - NOAA Federal2:22 PM

@Jason We still need to figure out how to represent initial storm location uncertainty

Jason Sippel - NOAA Federal2:23 PM

I think the only time when relo can be useful is if we have recon data and if it's a hurricane in that context, we know the location fairly well

in the long term, as we move to more frequent cycling, we can get away from it. but that wont' be in the ioc

Ghassan Alaka - NOAA Federal2:24 PM

@Jason, still potential issues with "cutting and pasting" relocation methods (as you know)

Jason Sippel - NOAA Federal2:25 PM

sure. i completely agree. i hate it. we're just not going to be quite there in the ioc in terms of having the framework in place not to need it at all

but, for instance, gfs doesnt' do relo, and the recon still has a tremendous positive impact there

Jonathan Poterjoy - NOAA Affiliate2:26 PM

@Gus, There are ways to do 'relocation' without the cut-and-paste approach—but their really is no elegant solution to the problem posed by position uncertainty.

there*

Xuguang Wang - NOAA Affiliate2:27 PM

@Frank, Jason, Gus, frequent cloudy radiance DA would reduce the need for relocation.

Jason Sippel - NOAA Federal2:28 PM

yes

Frank Marks - NOAA Federal2:28 PM

@Jim Have any of the WPC products been evaluated in a FACETs way to assess their ability to communicate risk effectively? Seems like low hanging fruit.

Jason Sippel - NOAA Federal2:29 PM

i'm confident by 2030 we won't be using it at all but beyond that i don't want to speculate

Andrew Hazelton - NOAA Affiliate2:43 PM

Seems like the prevalence of mid-latitude/subtropical activity east of the TUTT was something favored in both the WPAC and NATL this year

Frank Marks - NOAA Federal2:54 PM

@Levi Great summary! I really appreciate the top 5 list of JTWC priorities. We can map that onto the HFIP Goals.

Robert Rogers - NOAA Federal2:56 PM

@Levi we are planning to have a P-3 in Japan next summer, from late June to late-ish July. Could help provide some in situ measurements (thinking about your data exploitation priority)

JungHoon Shin - NOAA Affiliate2:57 PM

Is SAR wind data used for TC intensity estimation in JTWC?

Avichal Mehra - NOAA Federal2:59 PM

@Brian: Thanks.

Andy Hazelton3:35 PM

Very interesting that HMON's comparatively poor RI skill was opposite to its overall skill
Maybe indicates the good performance coming from the weaker cases as Jason mentioned

Jason Sippel - NOAA Federal 3:36 PM

was just thinking that

Robert Rogers - NOAA Federal 3:36 PM

I'd be curious if these stats have been/can be stratified by initial intensity

Jason Sippel - NOAA Federal 3:36 PM

bad 2019 probably is dorian

Frank Marks - NOAA Federal 3:37 PM

@James it would be good to plot the standard deviation for the errors to identify the uncertainty in the improvements. It would help with identifying outliers. Was EPAC or ATL storms dominating the improvements?

Slide 13 is perfect. Thanks.

Evan Kalina - NOAA Affiliate 3:40 PM

Do we know if the typical 2015-2017 RI forecast was harder than the typical 2020-2021 RI forecast?

Michael Brennan - NOAA Federal 3:43 PM

Forecaster situational awareness from going through numerous RI events recently also plays a role.

Increased human forecaster confidence probably comes from recent success as well.

Jason Sippel - NOAA Federal 3:44 PM

might have something to do with a lot of the RI events being in the western part of the basin, where there is high situational awareness

Michael Brennan - NOAA Federal 3:45 PM

@Jason although you probably observe more of the variability in the actual intensity in recon cases compared to those with just satellite.

John Knaff - NOAA Federal 3:46 PM

James, how were the biases?

Ryan Torn 3:46 PM

It would be interesting to look at the RI probabilities from the HAFS ensemble that was run this season and compare to the statistical models.

John Knaff - NOAA Federal 3:48 PM

Halving the bias is a big deal. Thanks!

James Franklin - NOAA Affiliate 3:50 PM

Evan, I'm not sure offhand if the more recent forecasts were "easier" than the 2015-17 cases, but I could look at SHIFOR errors to test that.

Evan Kalina - NOAA Affiliate 3:52 PM

@James – thanks, could be interesting to see how the skill for the 2015-2017 and 2020-2021 RI samples compares

James Franklin - NOAA Affiliate 4:03 PM

Evan, the composite intensity skill (all time periods combined) for IVCN in 2015-17 was 14.5%. For 2020-21, the skill was 29.1%. So the more recent forecasts were not only more accurate, they were also more skillful.

Frank Marks - NOAA Federal 4:04 PM

@Brian Great summary! It provides a great reason for why TMT is needed. We need to figure out how to get HFIP supporting TMT type activities to smooth out the NHC R20 effort within AWIPS II.

Kate Musgrave - NOAA Affiliate 4:04 PM

<https://www.nhc.noaa.gov/jht/>

Evan Kalina - NOAA Affiliate 4:05 PM

@James - a doubling in skill is fantastic. We really are making a lot of progress. Thanks for the rapid analysis!

Robert Rogers - NOAA Federal 4:05 PM

Good point @Frank re: TMT

Frank Marks - NOAA Federal 4:06 PM

@James we need to make sure that is captured in the workshop summary.

James Franklin - NOAA Affiliate 4:08 PM

Frank, before the meeting ends Thursday I'll work up a slide showing skill.

Frank Marks - NOAA Federal 4:09 PM

Thanks. That would be great!

Jason Sippel - NOAA Federal 4:10 PM

it'd be interesting to compare the skill evolution of the RI forecasts over the past decade to that of the rest of the sample

e.g., we see a doubling of the RI skill, but what does the evolution of the median forecast error look like?

Frank Marks - NOAA Federal 4:15 PM

@Jason That begs the question of which is more important to the HSU forecasters. James has argued in the past that the forecasters were more interested in getting rid of the outliers (>15 kt error/24 h) than reducing the averages error. He hypothesized that if we could eliminate the outliers in would also improve the mean error. I think we need to look at both of those ideas as we move forward.

Frank Marks - NOAA Federal 4:17 PM

I think the results each season suggest that James was correct, e.g. the impact of Larry intensity errors on the 2021 season stats.

Jason Sippel - NOAA Federal 4:18 PM

I agree in principle - I think it's more important to cut a 50-kt error in half than a 15-kt error, I'm just curious how both pieces are evolving and contributing to the entire picture

James Franklin - NOAA Affiliate 4:19 PM

Jason, Mark and I published time series of errors (not skill) for the entire sample vs RI sample.

Michael Brennan - NOAA Federal 4:21 PM

We have probabilistic hazard products that can capture the uncertainty associated "typical" intensity forecast errors a lot better than they can handle 50 kt errors at 72 h

Frank Marks - NOAA Federal 4:21 PM

Great question. I think the distribution James showed for the ICON and official errors is a great start to that issue, for storms that increase >30 kt / 24 h. We need to look at that for different threshold intensity change values (e.g., >15 kt / 24h) to evaluate that.

Jason Sippel - NOAA Federal 4:21 PM

can you share that link James?

James Franklin - NOAA Affiliate 4:21 PM

Jason, RI errors over 2000-2020 were improving at a slightly slower rate than for the overall sample.

Mark DeMaria - NOAA Affiliate 4:22 PM

@Dave: Your description of NNIC and the related ANN was good.

James Franklin - NOAA Affiliate 4:22 PM

Jason: <https://www.mdpi.com/2073-4433/12/6/683>

James Franklin - NOAA Affiliate 4:24 PM

But clearly, over the past several years, there has been more improvement in the RI sample than with the entire sample.

Jason Sippel - NOAA Federal 4:25 PM

right, a very stark development

Sundararaman Gopalakrishnan - NOAA Federal 4:28 PM

@Frank et al. All our recent publications on understanding RI, including the one starting with Earl (Hua..) all the way to, Irma (Al Green..) .. Dorian (Andy..) show that with resolution (1-2km), better physics and better initialization of the environment HWRF/HAFS is getting the RIs for the right reasons as well.

Frank Marks - NOAA Federal 4:30 PM

@Gopal Agreed, but not all the time!

@Dave Great Summary of a lot of activities going on.

James Franklin - NOAA Affiliate 4:39 PM

I may retire a second time before NAWIPS is retired.

Frank Marks - NOAA Federal 4:39 PM

;-)

me too!

Christopher Slocum - NOAA Federal 4:50 PM

David, once you have the enterprise environment, can that be shared so that developers are using the same versions of the packages?

Levi Cowan 4:51 PM

You will enjoy Anaconda -- it allows external library dependencies to be handled properly in addition to plain Python packages, and it can be used on a user level

Lew Gramer - NOAA Affiliate 4:51 PM

+1 Christopher Slocum!

Frank Marks - NOAA Federal 4:51 PM

@Dave maybe that could be an activity for TMT to support.

Dave Jones 5:12 PM

@Laura How does local WFO handle P-surge model output? Do they tweak or use as is? Have you looked at local WFO surge forecasts vs NHC or is NHC used without question? Thanks.

Frank Marks - NOAA Federal 5:13 PM

Great Day 1