

WPO-Obs Project Meeting #2

1:00 - 3:00 PM Wednesday, 04 January 2023

Invited participants: Entire

Planned meeting duration: 2.0 h

Actual meeting duration:

Document color conventions:

- Discussion/information added post-meeting (blue)
 - Action items still to be addressed (red)
 - Action items which have been addressed (green)
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Attendees

Alex DesRosiers (AD)

Chris Rozoff (CR)

Eric Hendricks (EH)

Michael Bell (MB)

Jen DeHart (JD)

Jonathan Vigh (JV)

Jun Zhang (JZ)

Wallace Hogsett (WH)

Absent

John Cangialosi (JC)

Agenda

New Business

1. Introductions to Wallace Hogsett (5 min)
 2. Overview presentations of capabilities (times listed below include 5 min for questions/discussion)
 - a. Alex DesRosiers: Flight Level Wind Reduction Parameterization Progress (25 min)
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- b. Christopher Rozoff: Center-finding (20 min)
 - c. Jonathan Vigh: TC-OBS (30 min)
- 3. Travel Plans for IHC/TCORF and NHC visit (5 min)
- 4. Implementation plan (10 min)
- 5. Additional updates from other team members and open discussion (10 min)
- 6. Data preparation and issues arising (5 min)

Meeting Notes

New Business

1. Introductions to Wallace Hogsett (5 min)
 - a. NHC is highly interested in the products of this project because it's bound to improve efficiency on operations.
2. Overview presentations of capabilities (times listed below include 5 min for questions/discussion)
 - a. Alex DesRosiers: Flight Level Wind Reduction Parameterization Progress (25 min) ~1:20 PM
 - i. Alex presented first: Takeaways –

Matching SFMR with predicted SFMR from flight-level - doing wind reductions.

Everything is done a leg-by-leg basis (using leg maximum RMW for the normalization).

Uses “mined variables”: $v_{\text{flightlevel}}$, $\max v_{\text{flightlevel}}$, SFMR, r normalized, θ parameterized, time/year. Uses r^* , θ^* , v_{max} for 3 predictor MLR [2012 - 2019], θ^* and r^* model good at asymmetry in reduction factor but not a good model; adding v_{max} and v profile has better performance, though under predicts at higher wind speeds

Neural network works better at higher windspeeds but still a tad problem at higher wind speeds

Designs a new loss function to work better for higher wind speeds when there's much less data. This one does better at higher v_{max} but the overall metrics aren't much better.

Q: Why aren't the NOAA SFMR data included from prior to 2007 (or maybe after too?).

Q: Would quantile-quantile mapping be useful for solving the tail issue? Jonathan Vigh : I think this could be a good approach, actually.

It's somewhat similar to the analog ensemble, another method that may be auspicious for the high-end winds.

Q: Can new model results be phrased in same way as Franklin et al. method? Not checked into yet. In particular, how do the uncertainties from the MLR or NN models compare to Franklin et al.'s.

Q: Problems with SFMR? Stability of estimates over time in large dataset?

Could feed the reprocessed/recalibrated SFMR data to make a new version of FLIGHT+.

Michael: Next steps is to predict 2-d wind field at the surface. Will use output of products from NCAR as input to SAMURAI. Thinks 4 m/s uncertainty is pretty good as a first cut. They'll do the dropsondes independently, assuming enough data to do a separate model.

Q: Could SST (or boundary layer instability) and some measure of the convective instability be included in the model? These are oft-discussed in NHC forecast discussions when there are discrepancies between flight level and surface winds.

MB: Challenge is availability of data.

They already have the TCDROPS dataset and ? from JZ.

b. Christopher Rozoff: Center-finding (20 min)

Noted blocky data on L1 FLIGHT+ Data. Jun thinks it can be AF data and/or turbulence data.

MB: From his 2008 JHT project, they had a check about if the center is too far from the operational centers (used TCVITALS).

@Michael -- per your earlier question about interpreting drops operationally, this likely isn't any groundbreaking new info for you, but it's a good reference (slides 14-16):

https://severeweather.wmo.int/TCFW/RAIV_Workshop2022/12_RAIV-HurricaneWorkshop2022_UseAircraftData_JamesFranklin.pdf

JZ: Be careful about using the BT centers.

EH: What temporal frequency are the centers. ~1.5 h per pass, 3-4 centers per flight

c. Jonathan Vigh: TC-OBS (30 min)

"Objective state estimation"

Interests in time-dependent uncertainty bounds

TC-OBS tries to provide key "state estimation": track, intensity, RMW, size (wind radii), time-dependent observations-based uncertainty bounds, azimuthal wind speed, spatial/temporal "coherence" of location of VMAX

VDM+: best track, extended best track, ships developmental dataset, VDMs raw

soon to be extended 2021

VDM+ essential for TCOBS

Chris recommended Katia (2017) for studying blocky data.

Nice demonstration of TCOBS given showing the characteristics of uncertainty bounds for various parameters (e.g., VMAX, RMW, wind structure)

JD: What radar data will be coming off the plane?

JZ: It's called super-obs. MB has some example data from Michael. Paul Reasor's was very organized. Used to be open, but may not be any more. John Gamache also has superobs.

MB: It comes off after each leg.

JZ: It gets sent directly to EMC on a private line. It gets archived somewhere.

3. Travel Plans for IHC/TCORF and NHC visit (5 min)

Jonathan will present on the project.

4. Implementation plan (10 min)

- a. Timing: Draft by end of January? Final version by end of February?

Very important to get this established early.

Intention of the implementation plan is to get the plan put on paper and then modify as needed.

MB out the week of the 23rd.

Start a Google Doc.

Historically they have been lax.

They are moving toward a standard stack: bash, Fortran, Python

They are trying not to use Matlab.

NCL? They use in some of the graphics.

Jen had an informal discussion with Alan Brammer about the code stack, crontab, etc.

WH: We can treat Alan as an expert in how we want to transition things.

5. Additional updates from other team members and open discussion (10 min)

Discussed the possibility of the team members flying with the Hurricane Hunters. Possibly also getting involved with the field campaign. Valuable to see how the data are collected and what the uncertainties look like during that process.



Jun will put in our names as interested in potential flights.

6. Data preparation and issues arising (5 min)

Action Items

- 1.

Next Meeting

Proposed date for next our next project meeting:

- Location: Virtual
- Date / Times: 25 January 2023 (??)
 - 2:00 PM MST / 4:00 PM EST

Agenda Items for the Next Meeting

[Please add any items here that you would like to discuss at our next meeting.]

High priority items:

1. Discussion of progress on Activity #1
2. Discussion of progress on Activity #2
3. Discussion of progress on Activity #3
4. Discussion of progress on Activity #4
5. ...

Low priority items (if there is time):

1. Briefing on recent relevant observational studies
2. Discussion of recent observational issues in storms
3. Discuss any potential funding opportunities [standing agenda item]