VALUE OF EXTRA DROPSONDES DEPLOYED BY AFRES

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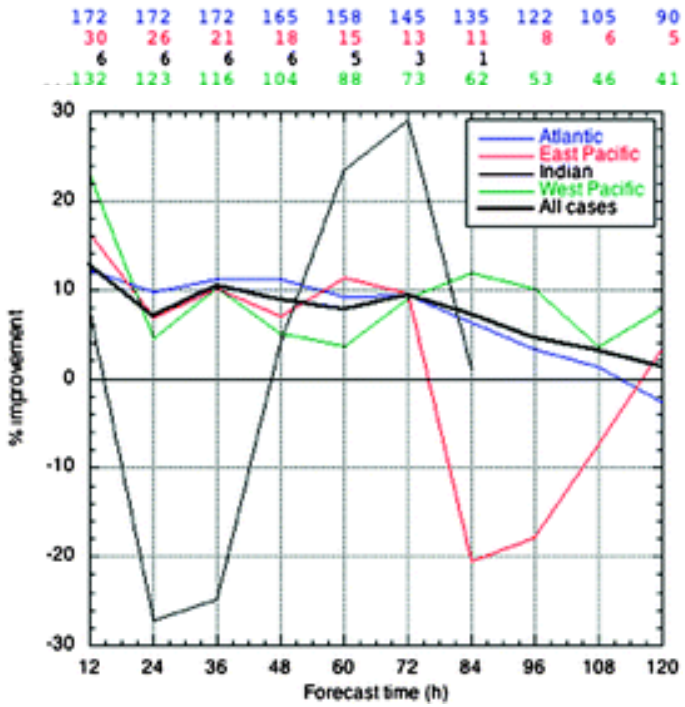
Outline

- Motivation (previous research)
- Impact of additional AFRES sondes
- Proposed future path

Previous research

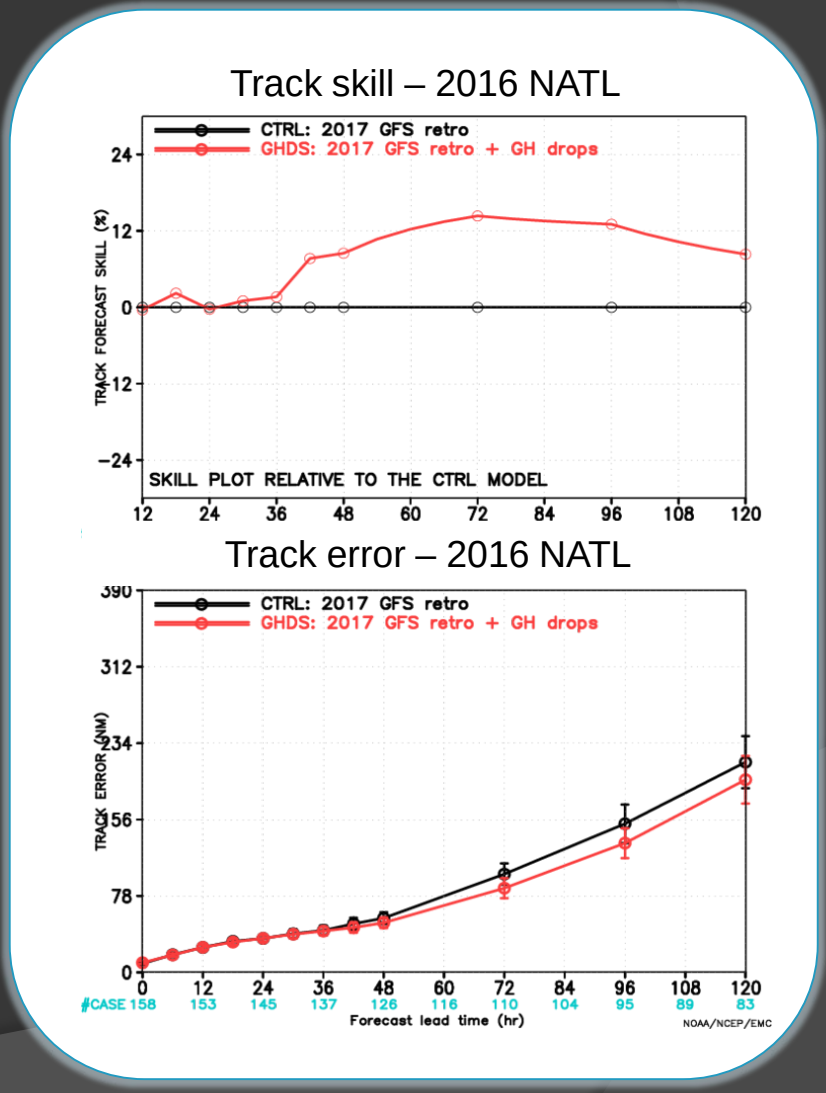
- Aberson (2010, 2011) examined impact of dropsondes in GFS
- Global verification
- Significant track improvement



Percent improvement as a result of assimilating NOAA, DOTSTAR, and THORPEX dropsondes in September 2008 (Aberson 2011)

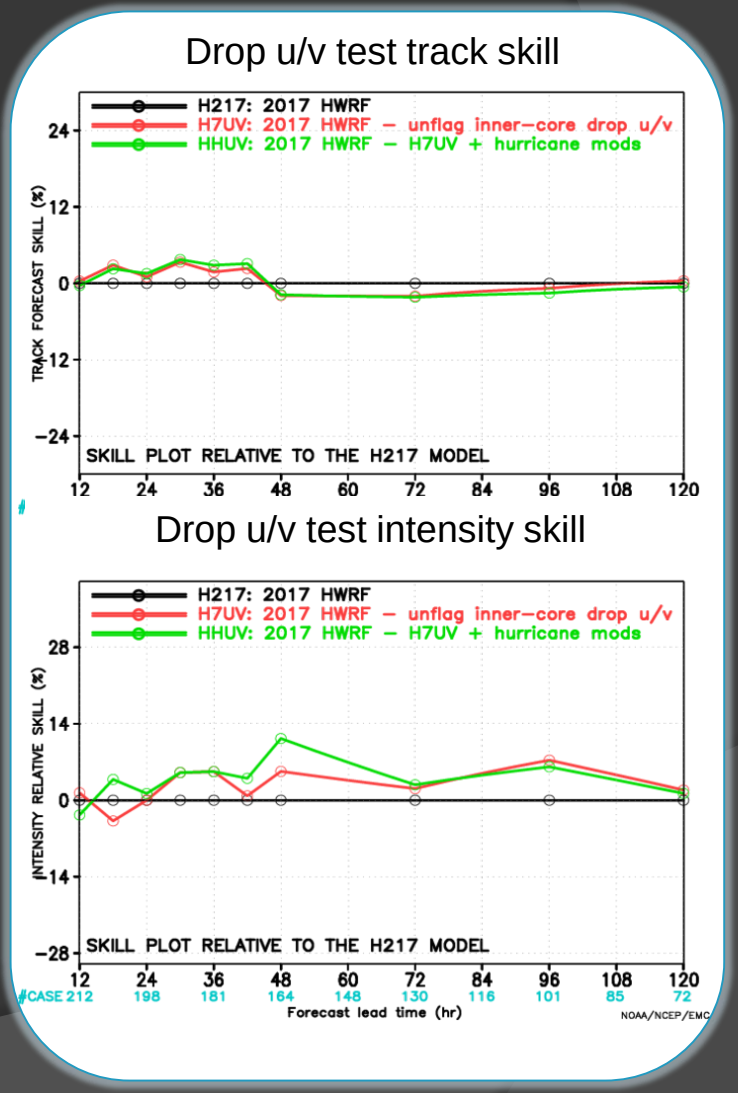
Previous research

- GFS retrospectives assimilating GH dropsondes with 2017 GFS
- Includes all concurrent TCs
- SUBSTANTIAL benefits for GFS track!!!



Previous research

- Recent test (green) unflagged u/v outside of R64
- Neutral impacts on track
- Improves intensity skill by 10-15% at 48 h
- Improvement diluted by many cycles w/o sondes



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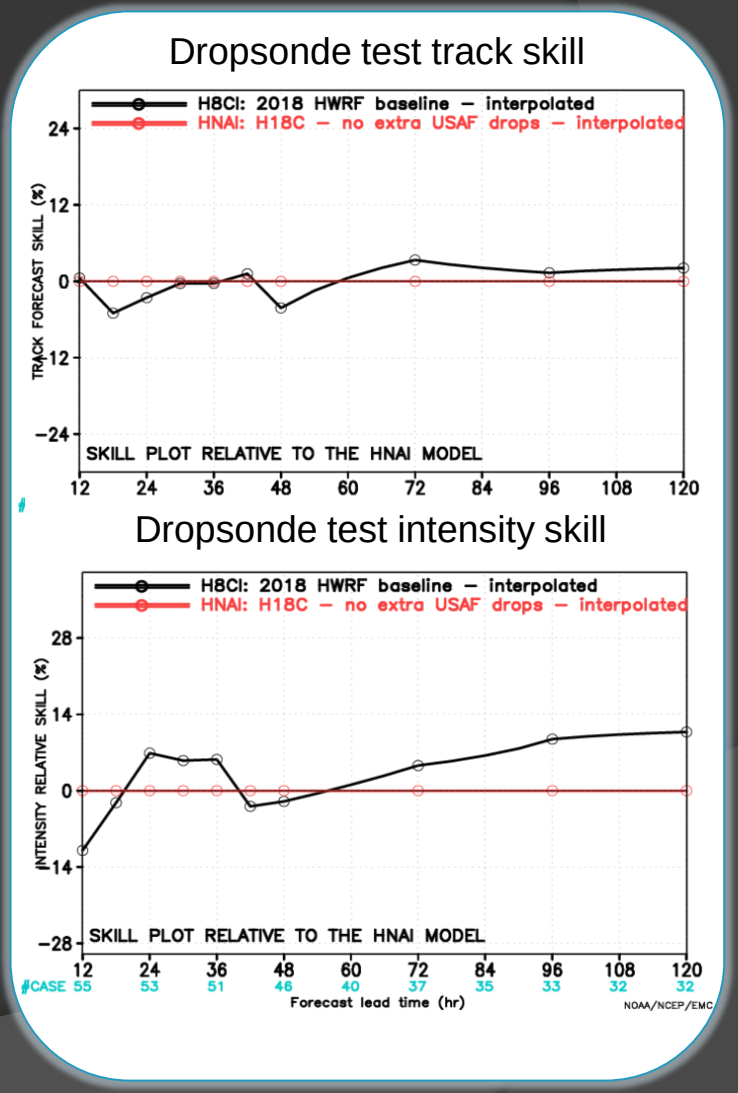
Impact of additional sondes

- End-point dropsondes were requested for Franklin, Harvey, Jose, Maria, and Nate
- Requests made for periods when P3 was absent/unavailable
- Data denial expts in HWRF reveal a +10% impact on intensity skill



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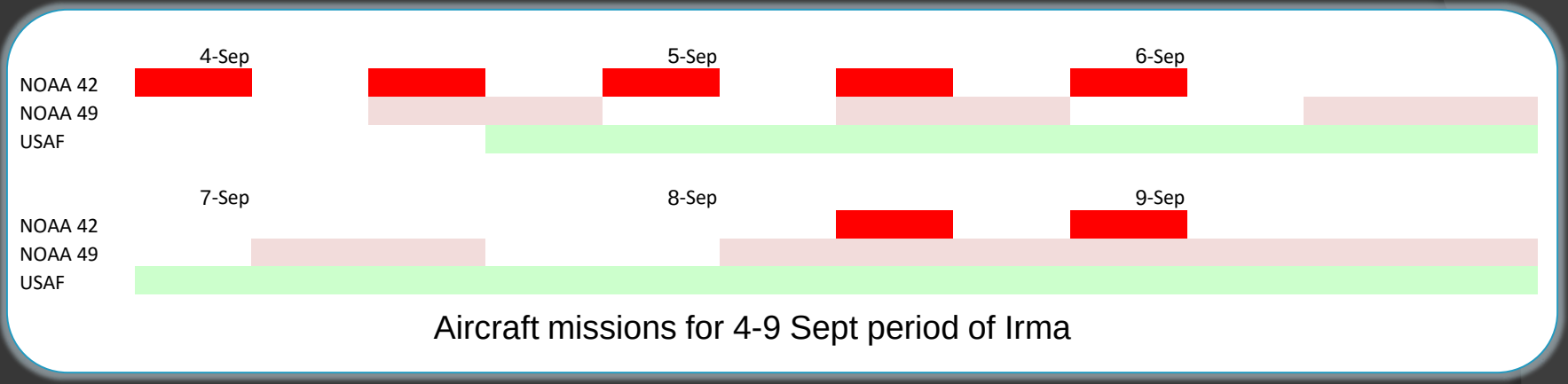
Proposal: Additional C-130 drops

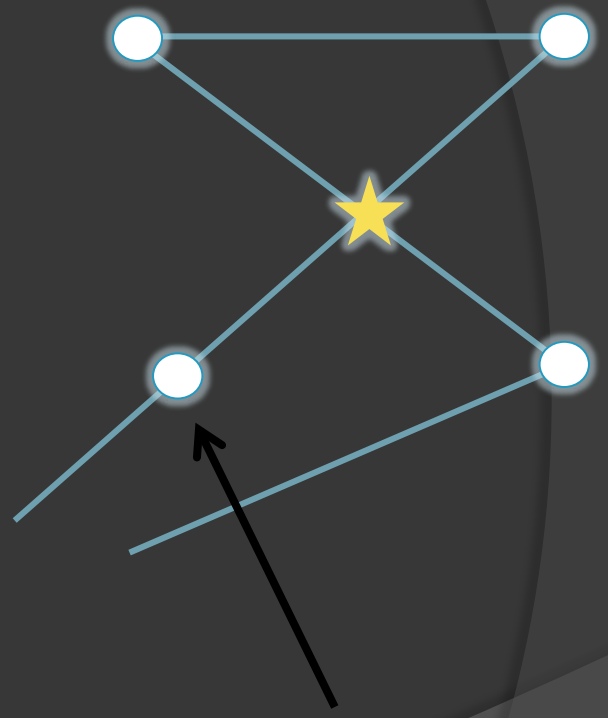


Aircraft missions for 4-9 Sept period of Irma

- Irma was heavily sampled but had large gaps in dropsonde sampling of vortex
  - G-IV did not sample immediate vortex
  - C-130 does mostly center/RMW drops
- Additional C-130 drops can significantly improve data continuity

Proposal: Additional C-130 drops

- Four end-point drops
  - Conditional upon P3 (and maybe GIV)
  - Only for first Fig-4 pattern
- Outbound ferry drops
  - Every 5 degrees
  - Conditional on G-IV on same calendar day
  - Could be limited to every 12 h



Symmetric distribution is important near vortex

Proposal: Additional C-130 drops

- The numbers (NATL only):
  - Roughly 50 missions in an average season would need 4 end-point drops (200 sondes) for vortex coverage
  - Additional sondes (50-60) needed for environmental coverage
  - For vortex coverage only, this is about $150k/yr, compared to $3M+/yr cost of flying (~5%)
  - For environmental coverage, roughly another $50k/yr