

2017 Ensemble Tiger Team Highlights

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Purpose & Objectives

- **Charge:** Develop new ensemble-based products beyond the typical mean/standard deviation that could be used by NHC forecasters to improve forecasts
- First product was ensemble-based RI probabilities, which are compare to current statistical methods (SHIPS, DTOPS)

Configuration

Model	Type	Real-Time Offset
HWRF (HWMN)	Dynamical (IC + Physics)	12 h
HMON (HMMN)	Dynamical (IC + Physics)	12 h
COAMPS (COMN)	Dynamical (IC)	6 or 12 h
HWRF Analog (ANEN)	Statistical model applied to retrospective HWRF	6 h
DTOP (DTOP)	Statistical combination of dynamical forecasts	0 h
SHIPS (RIOD)	Statistical	0 h

- Probabilities derived for first four models via counting number of members where intensity change criteria is satisfied

Major Milestones

- Increased participation in the real-time intensity change probability product
- Additional models (DTOP, HMON)
- Integration of products into HFIP site
- Additional analysis of intensity change probabilities between models
- Moskaitis-style intensity change probability added to HWRF & HMON ensembles
- Use of ECMWF ensemble guidance for aircraft flight plans and extra sondes

HWAN:	175	57	31	12	2
COM2:	270	26	11	3	1
HMM2:	100	32	8	4	1
HWM2:	92	22	8	4	2
DTOP:	219	219	43	13	11
RIOD:	132	254	80	18	5

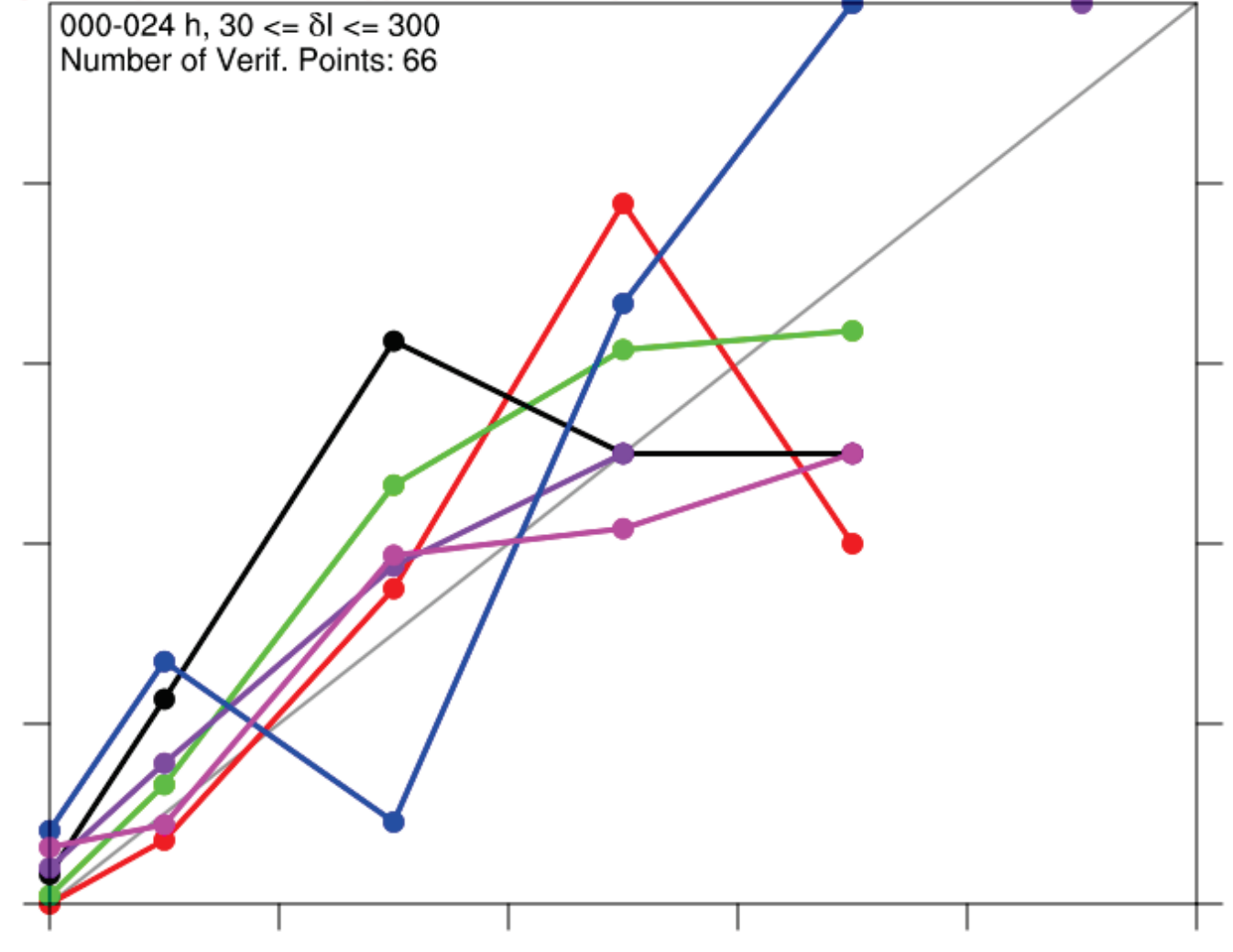
000-024 h, 30 <= δt <= 300
 Number of Verif. Points: 66

Observed Probability

0.80
0.60
0.40
0.20
0.00

0.0 0.2 0.4 0.6 0.8 1.0

Forecast Probability



2

2

5

11

1

1

4

3

12

8

8

32

26

57

175

2

1

1

4

3

12

8

8

32

26

57

175

2

1

1

4

3

12

8

8

32

26

57

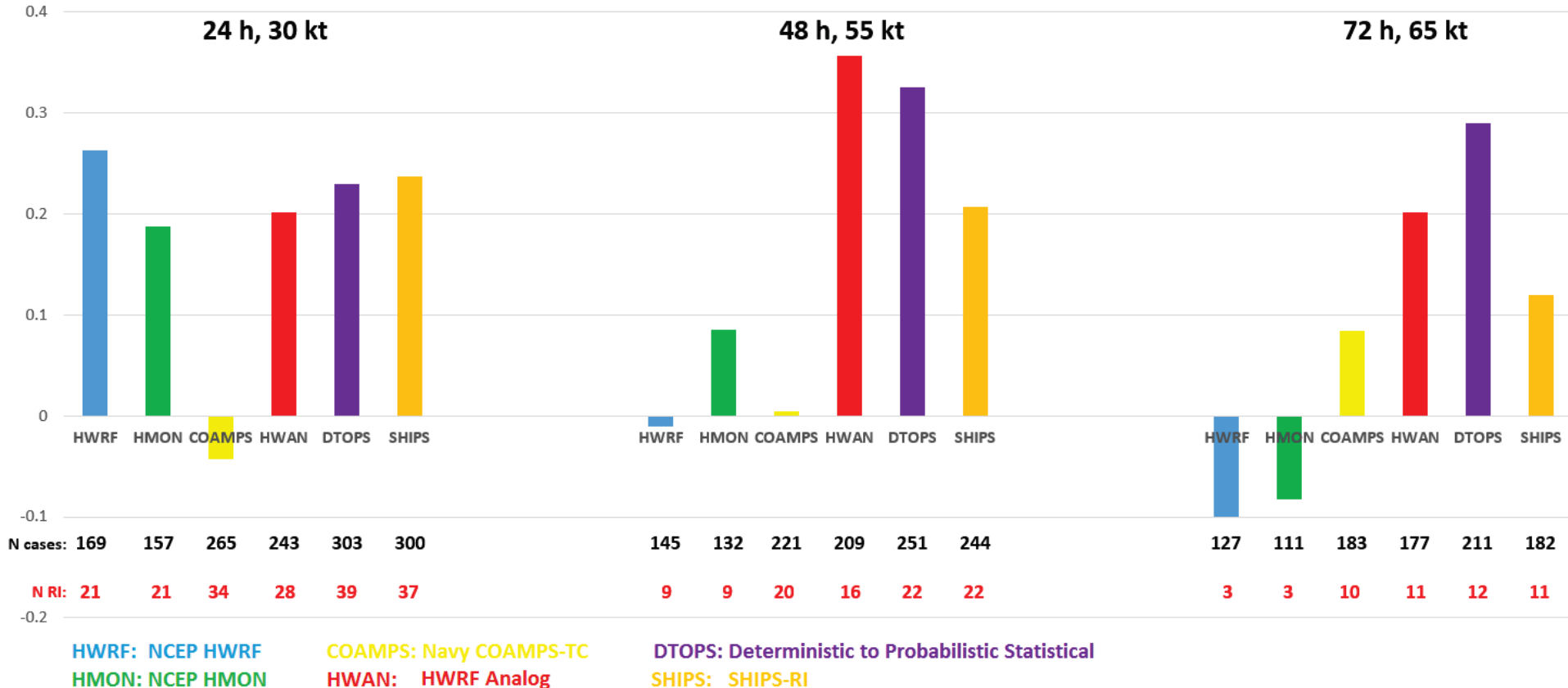
175

Brier Skill Scores

- 2017 demonstration forecasts
 - Atlantic and east Pacific verified separately
 - Heterogeneous verifications with all available cases
 - Homogeneous verifications for Atlantic statistical models
- Skill baseline uses 1987-2016 climatological probability as the forecast
 - $\Delta V \geq 30$ kt in 24 hr climo = 5.9%
 - $\Delta V \geq 55$ kt in 48 hr climo = 3.9%
 - $\Delta V \geq 65$ kt in 72 hr climo = 6.8%

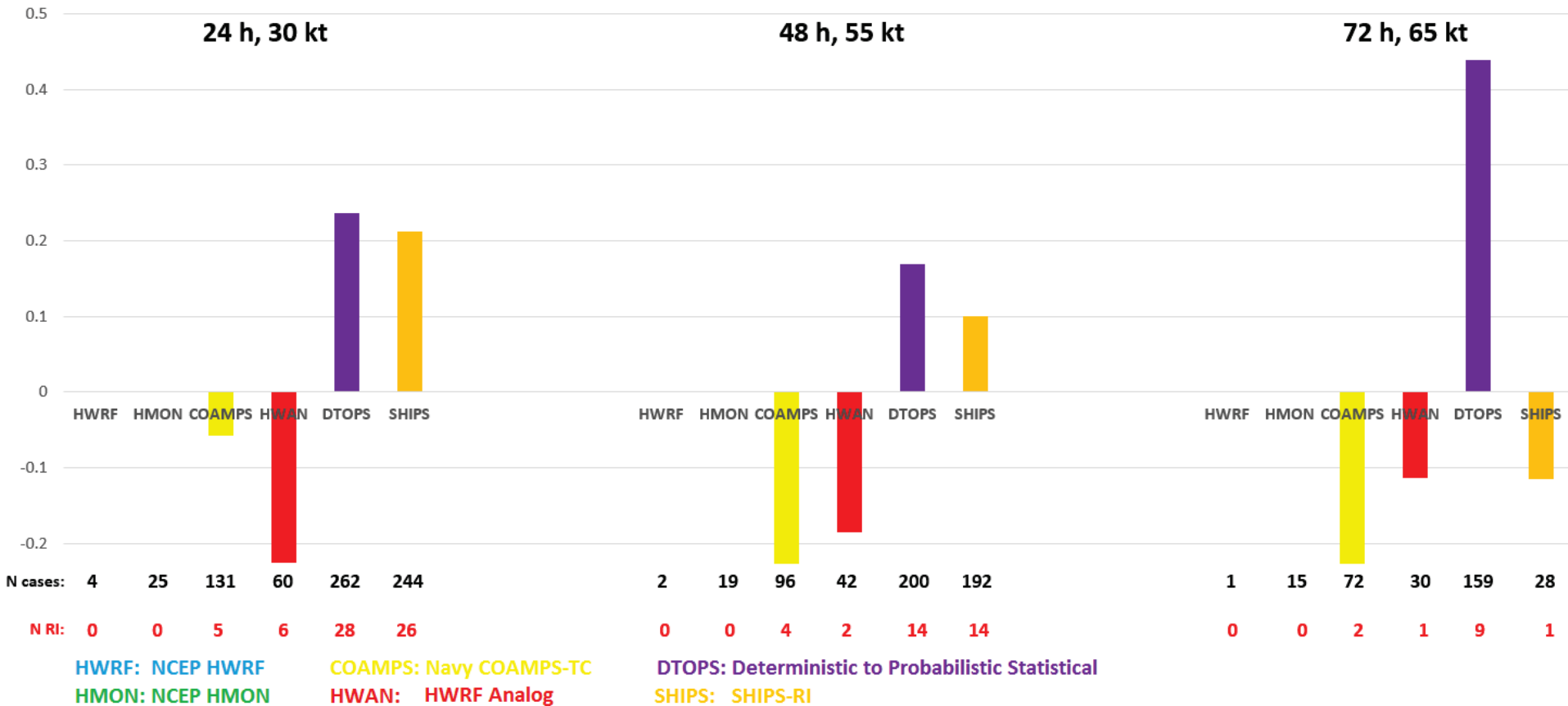
Brier Skill Scores

Brier Skill Scores: Atlantic Basin

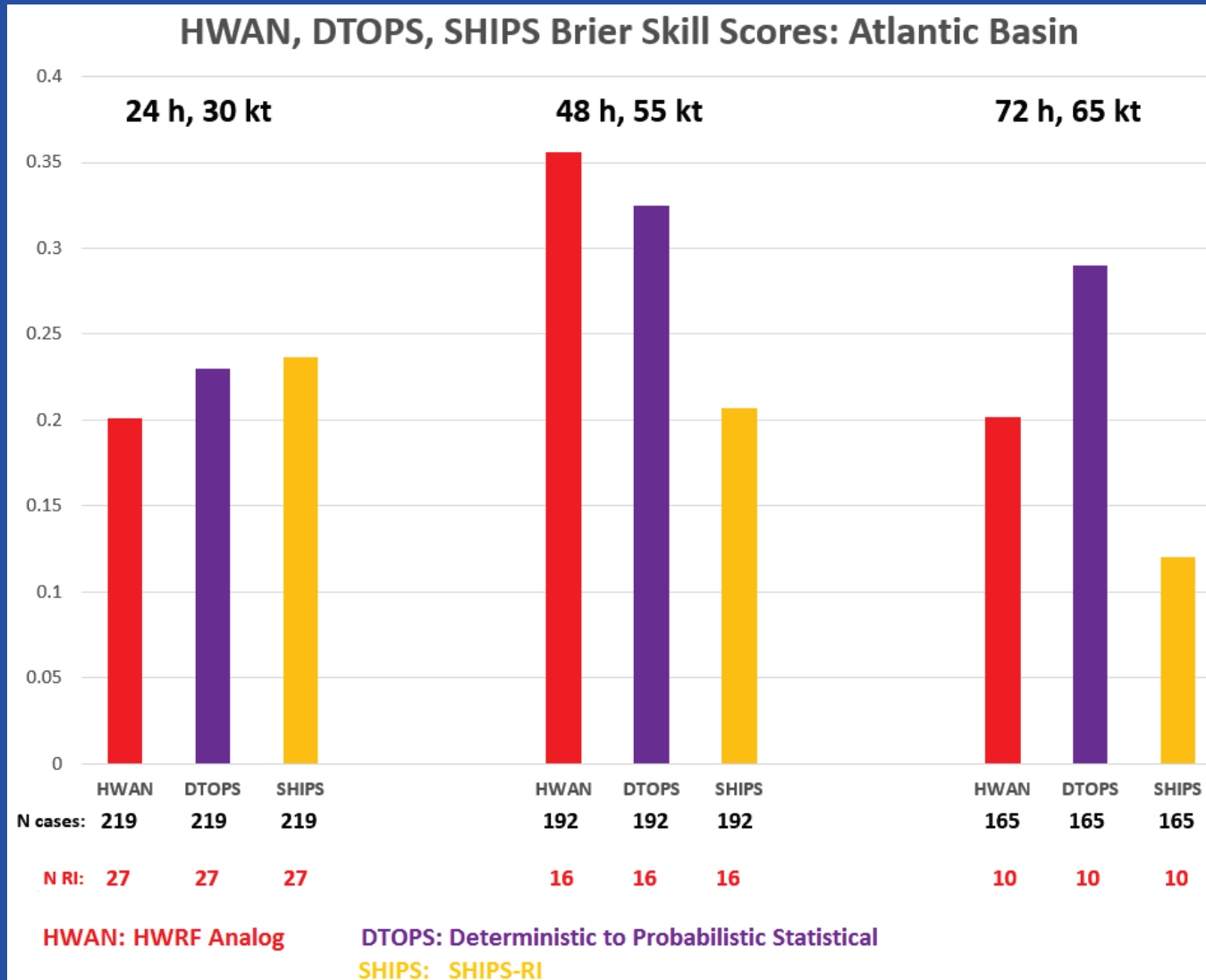


Brier Skill Scores

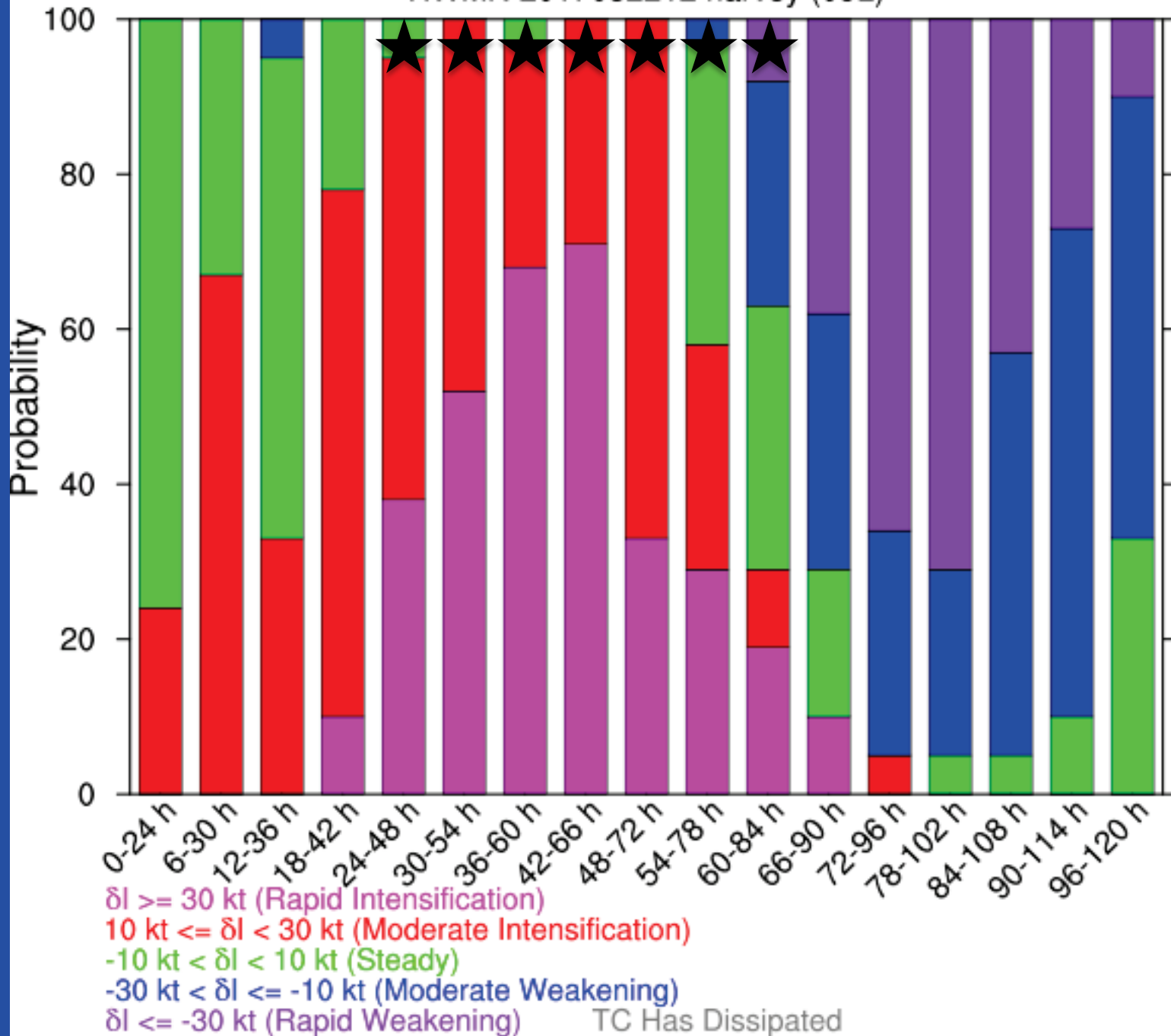
Brier Skill Scores: East-Pacific Basin



Brier Skill Scores

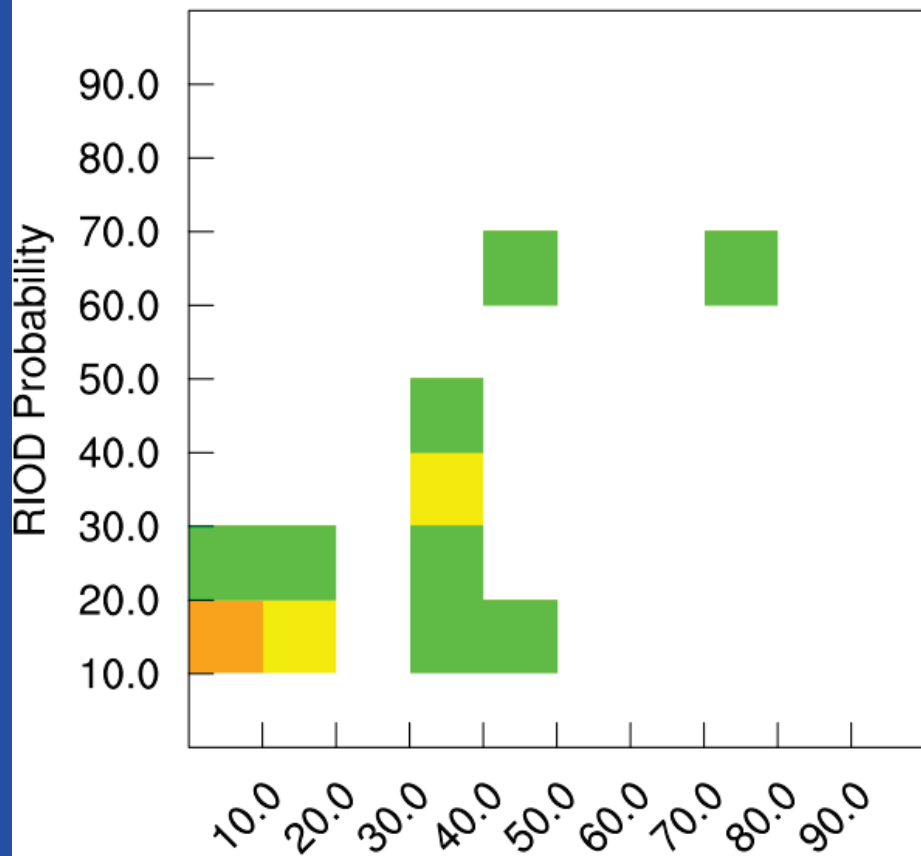


HWMN 2017082212 harvey (09L)

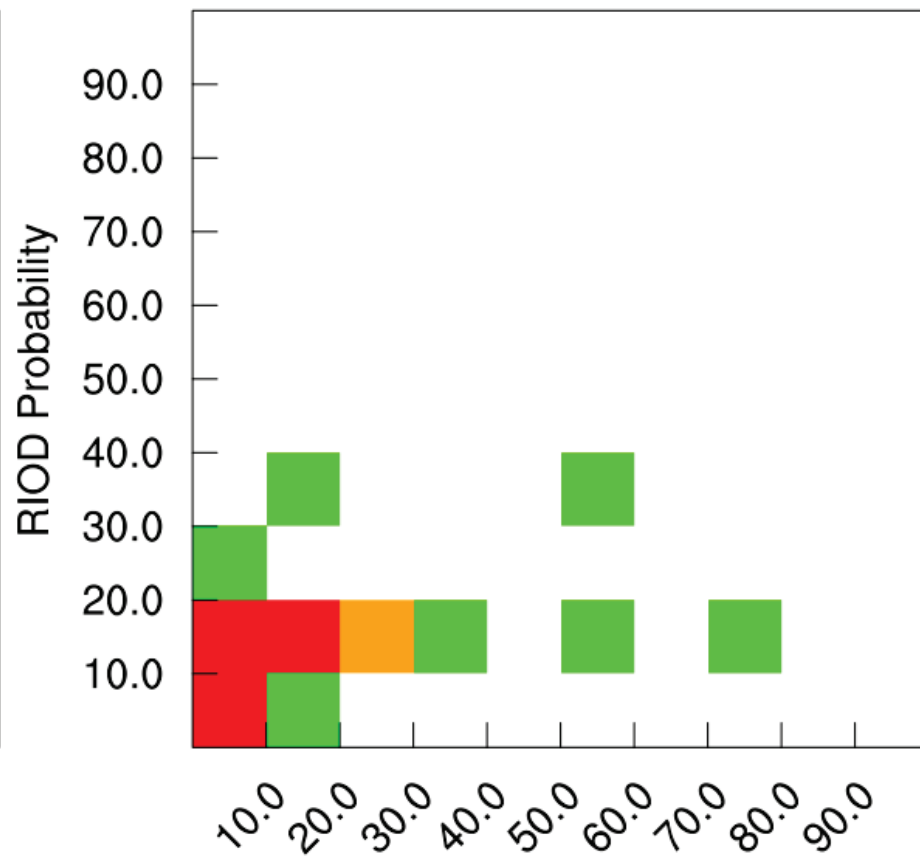


000-024 h, 30 kts $\leq \delta I \leq$ 300 kts

Best Track Meets Condition



Best Track Fails Condition



HWM2 Probability

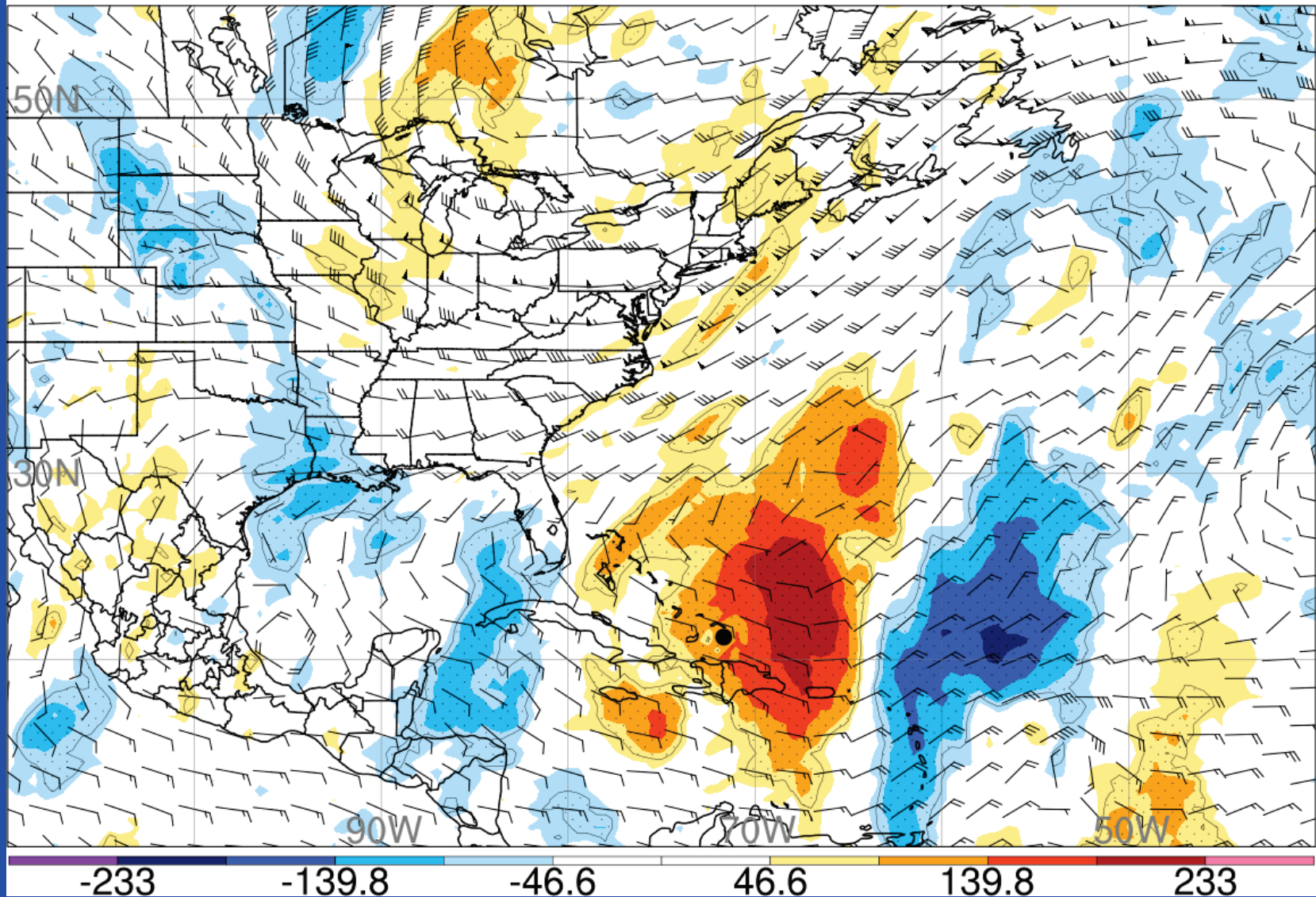


HWM2 Probability

0.0025 0.005 0.01 0.015 0.025 0.05

00 UTC 7 Sept. Irma Sensitivity

F024 Layer-Average Meridional Wind



Future Plans/Priorities

- Combinations of individual probabilities (i.e., multi-model probabilities)
- Generate and validate ensemble-based hazard probabilities (wind, rain)
- Expanded use of ensemble-based methods for observation targeting information
- Further use of ensembles for model diagnostics in individual cases

Summary

- Dynamical ensemble systems have shown more skill at predicting RI in 2017
- Statistical methods better for 48 and 72 hr lead times
- Models have even greater skill for non-RI intensity change categories
- Not uniform agreement between dynamical and statistical models in case-by-case basis
- Ensemble systems offer opportunities to extract other information, including forecast sensitivity and model dynamics