


Global Models during the HFIP 2011 Summer Demo and the Track-Intensity Error Relationship

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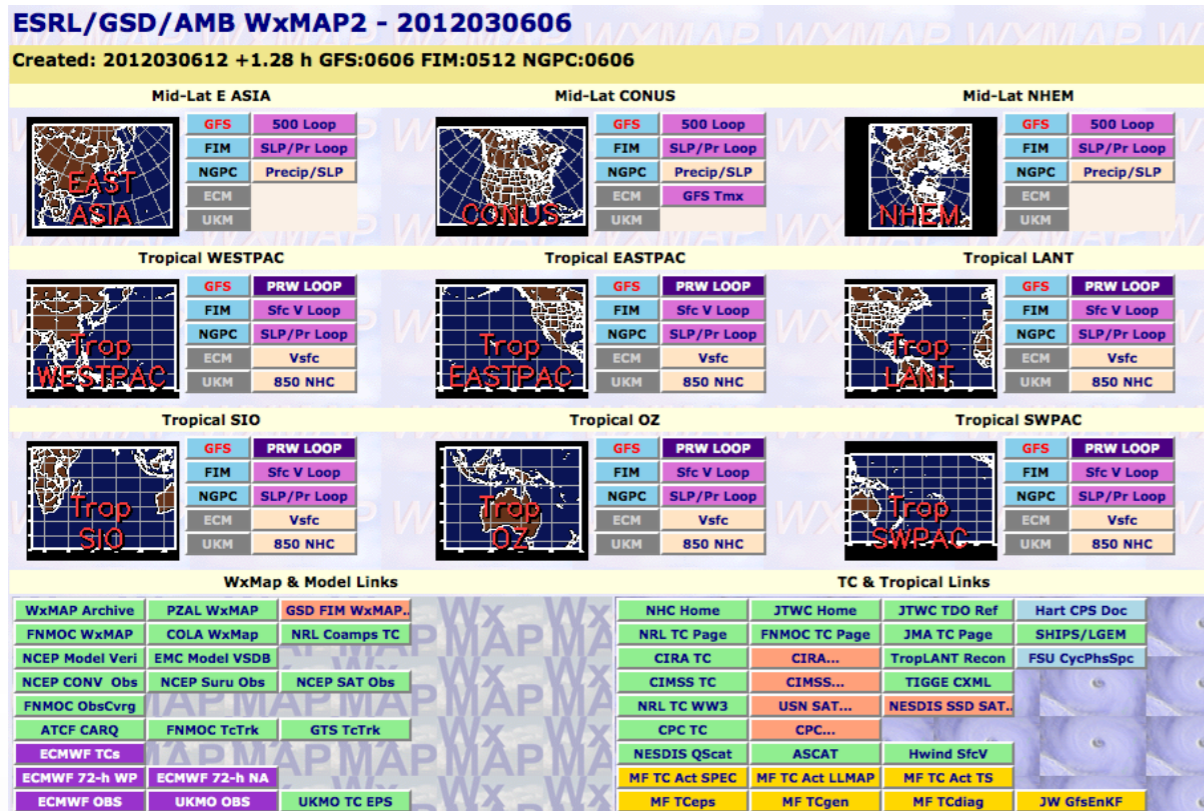
National Hurricane Center, Miami FL
Joint Typhoon Warning Center, Pearl Harbor HI
Lawrence Livermore National Laboratory, Livermore CA
European Centre for Medium-Range Weather Forecasts, Shinfield Park, Berkshire, UK
Japan Meteorological Agency, Tsukuba JAPAN
Space and Naval Warfare Systems Command, Arlington VA
Goddard Space Flight Center, Greenbelt MD
National Centers for Environmental Prediction, Camp Springs MD
Naval Postgraduate School, Monterey CA
Fleet Numerical Meteorology and Oceanography Center, Monterey CA
Naval Research Laboratory, Monterey CA
Atlantic Oceanographic and Meteorological Laboratory, Miami FL
Pennsylvania State University, University Park PA



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pre-outtakes – wxmap(2)



- 17 y old
- 1996 LLNL #1 web hits
- 1997 R2O FNMOC/NLMOC
- 1999 .gov innovation award with AWIPS
- 2001 R2O JTWC/WxMAP2

meteorologist (still) do it by the #s – squiggly lines & endless digits

s/w repo:

<http://wxmap2.sf.net/>

public:

<http://ruc.noaa.gov/hfip/wxmap2>

noaa.gov, navy.mil, af.mil: <http://ruc.noaa.gov/wxmap2>



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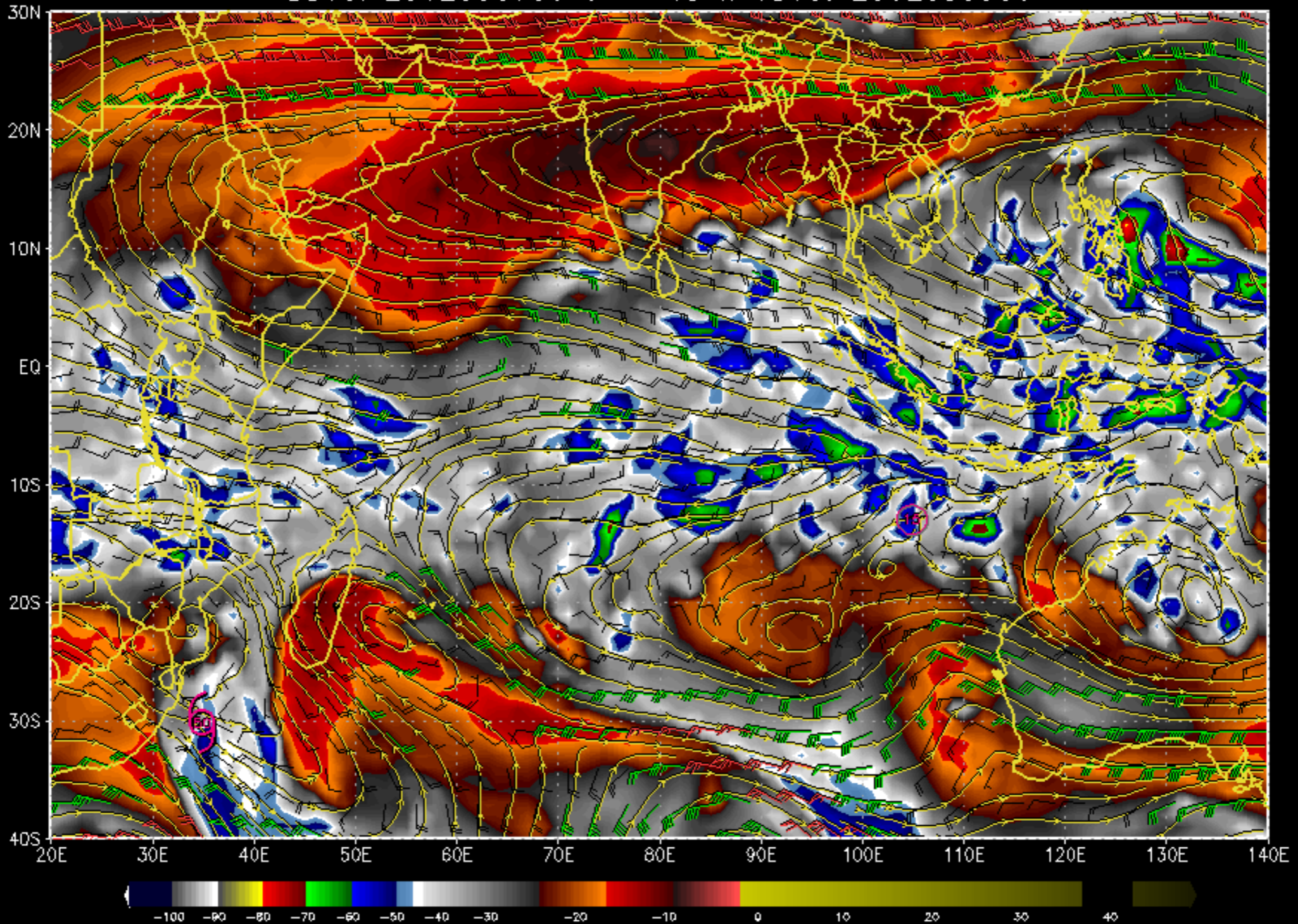


Tropical SA – 2012030706

TCs: 14S 16S pTCs: 94P

GFS 1.0° GOES12 Chnl 3 (W/V) + GFS 0.5° 200 mb Winds

BDTG: 2012030706 $\tau = -48$ h VDTG: 2012030506

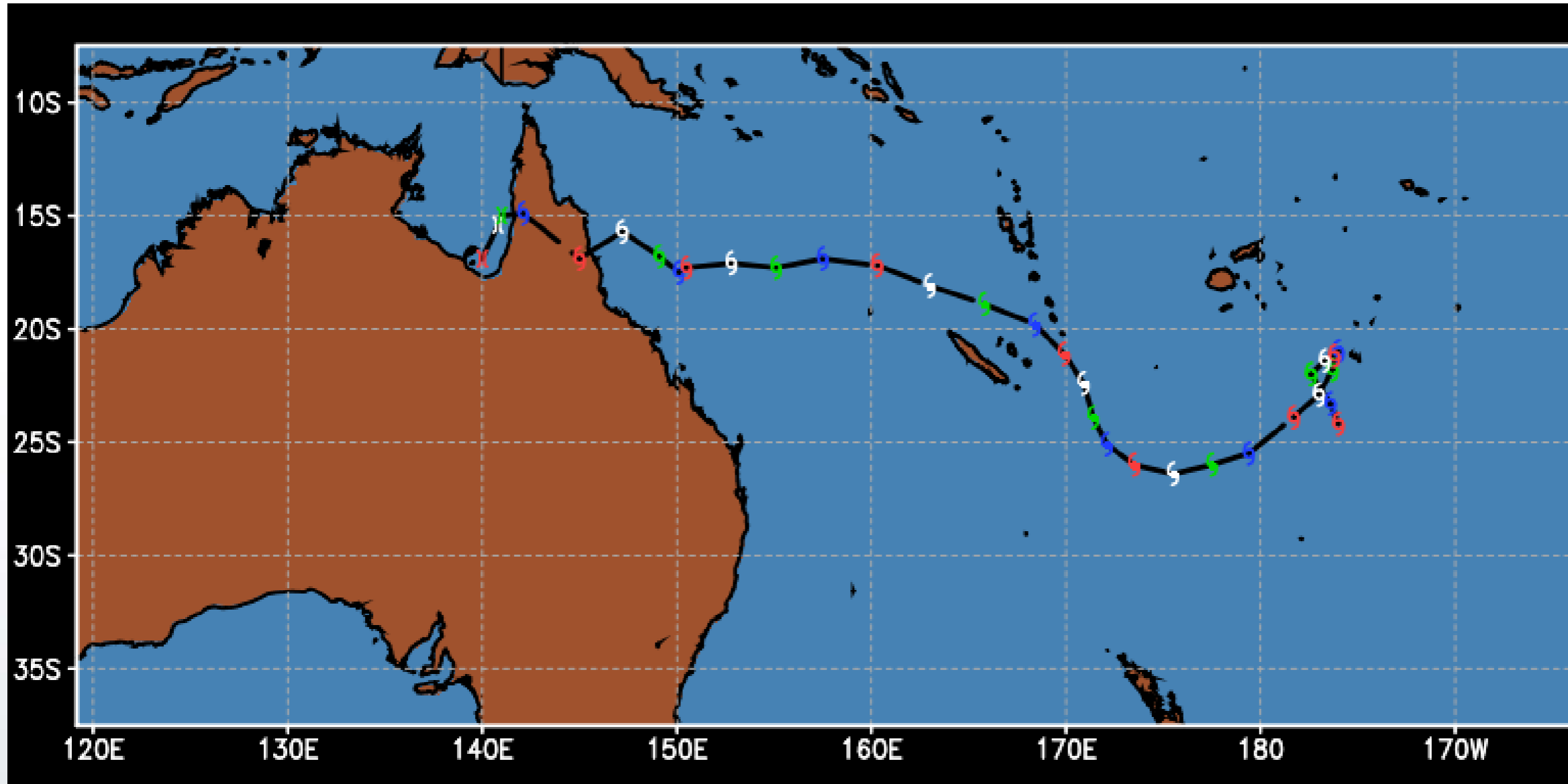


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Whiskey Tango Foxtrot, over...

TC: 10P.2012 [JASMINE] V_{max} : 115kt
mdeck2 best track



013112	15
020100	15
020112	15
020200	25
020212	25
020300	25
020312	30
020400	30
020412	40
020500	45
020512	50
020600	50
020612	60
020700	75
020712	105
020800	110
020812	115
020900	110
020912	95
021000	80
021012	75
021100	75
021112	65
021200	45
021212	35
021300	35
021312	35
021400	35
021412	35
021500	35
021512	35
021600	35
021612	30



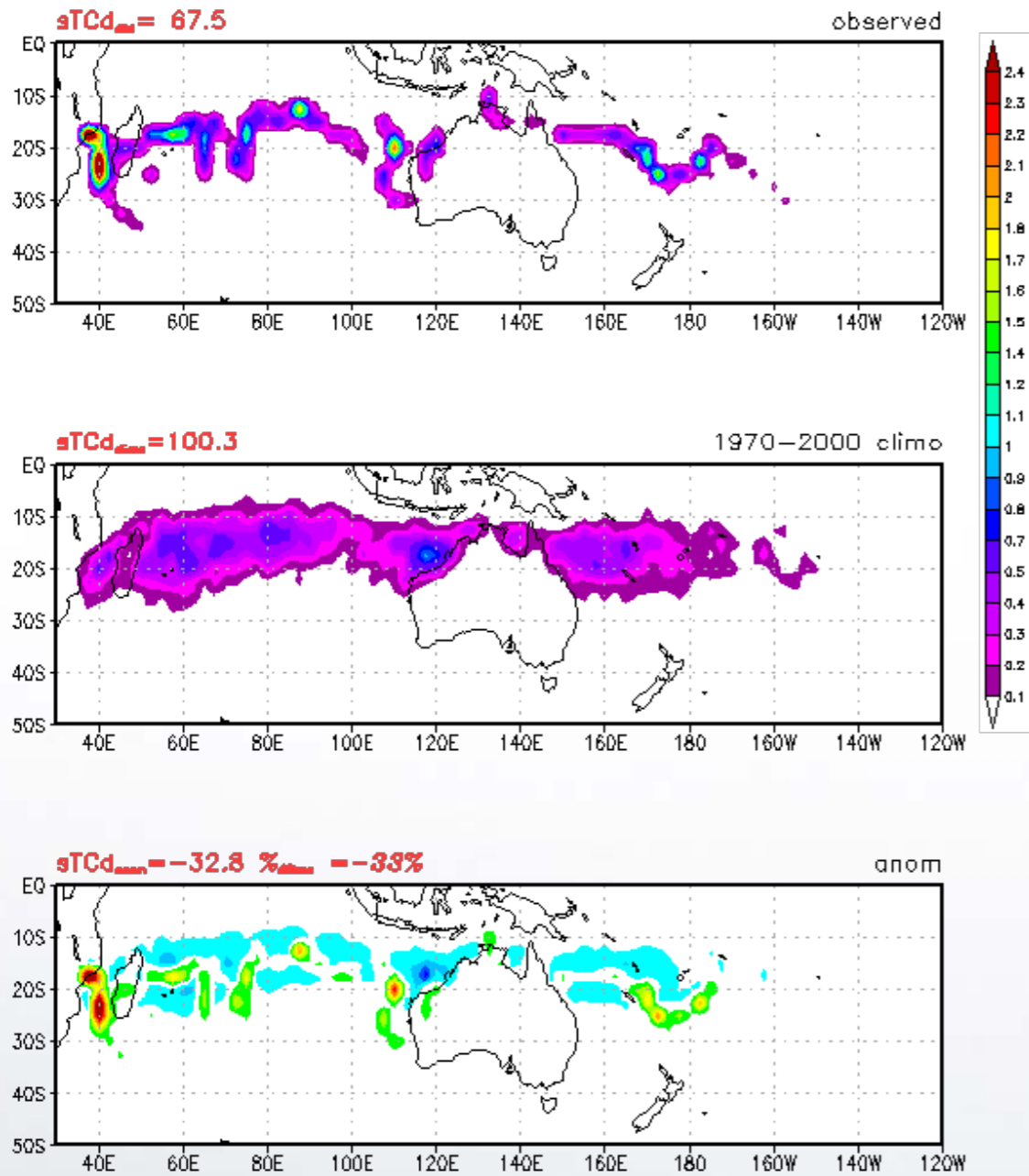
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SHEM 2012 TC activity

SHEM TC Activity sTCd (scaled TC days) for: 20110701-20120307

sTCd = sum of TC(scaled Vmax) every 6h * 1[d]/4[6h]
 TC=0.25(TD), 0.50(TS), 1.0(TY), 2.0(STY)

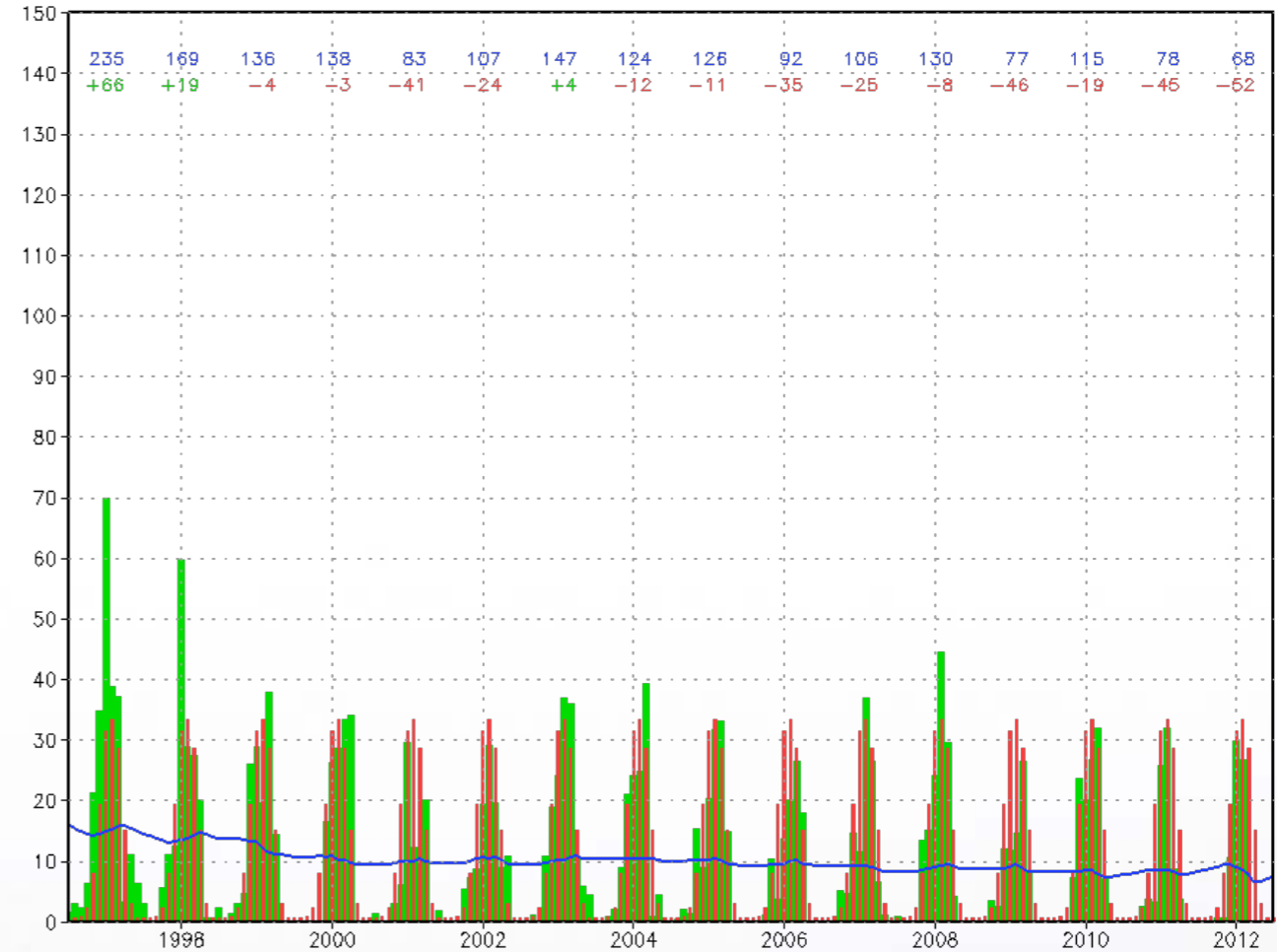


Dr. M. Fiorino, NOAA ESRL/GSD/AMB, Boulder, CO
 ~/tc.act.llmap.shem.20110701.20120307.tcstr.eps

2012-03-07-09:46

SHEM TC Activity sTCd (scaled TC days) for: 19960701-20120701

sTCd = mo sum of TC(scaled Vmax) every 6h * 1[d]/4[6h] ; TC=0.50(TS); 1.0(TY) ; 2.0 (STY) Climo: 1970 - 2000
 (B)#: yearly sTCd ; # below: % of yearly climo, (G)>0, (R)<0 (B)line: 48-mo run mean; (R) trend



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 ~/tc.act.mots.shem.199607.201207.tcstr.eps

2012-03-07-09:46

year-to-date 33% below normal..



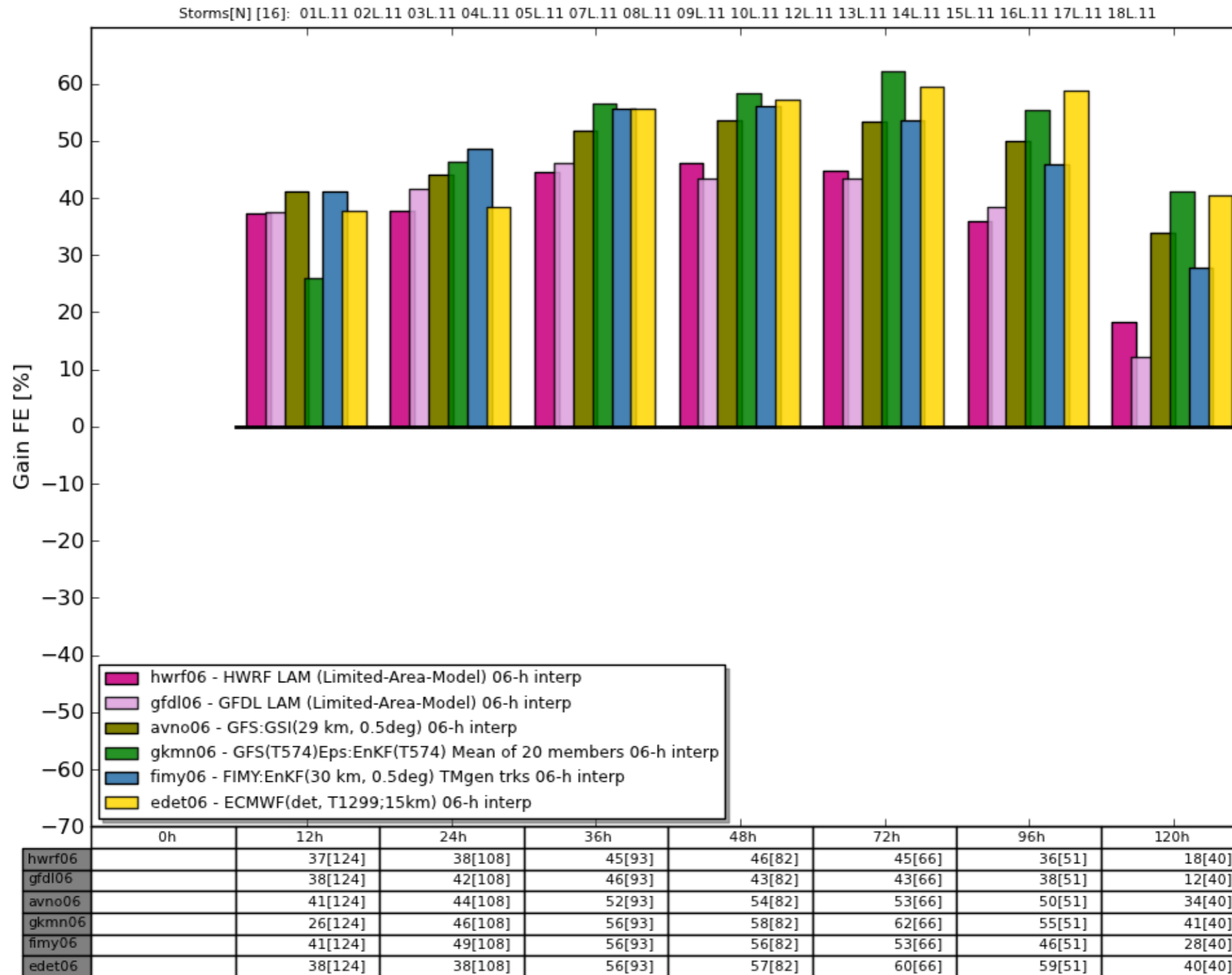
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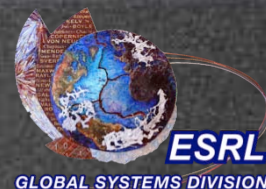
HFIP 2011 Demo Track Forecast Error

% improvement over HFIP baseline & CLIPER (skill)

LANT 2011 Track Skill HWRF/GFDL v HFIP Global Models % improve rel to CLIPER
bias corr tau=06

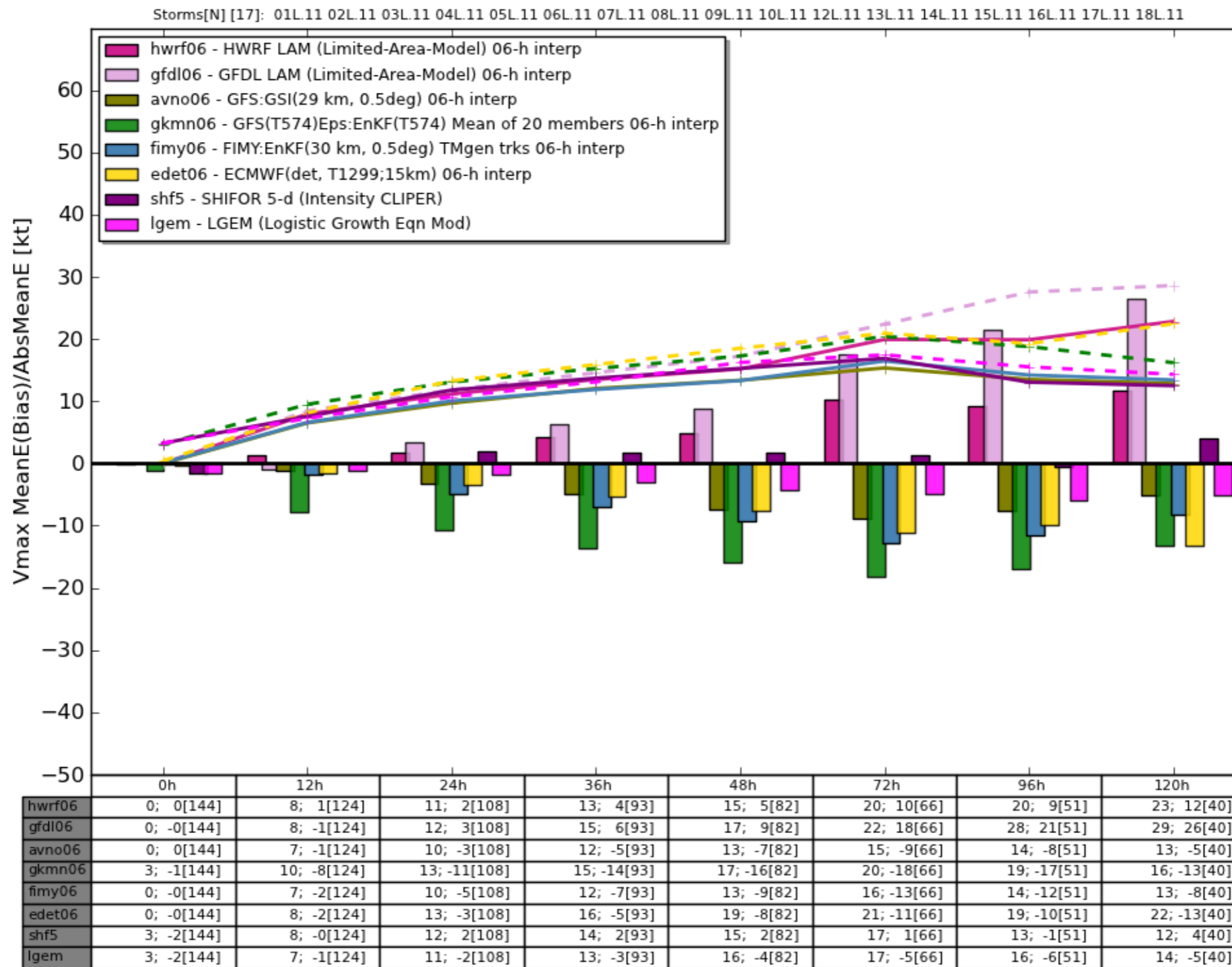


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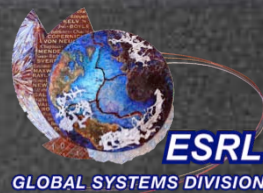


HFIP 2011 Demo Intensity Error

LANT 2011 Intensity Error HWRF/GFDL v HFIP Global Models
 Bias = mean(diff) -- bars ; Error = mean(abs(diff)) -- lines



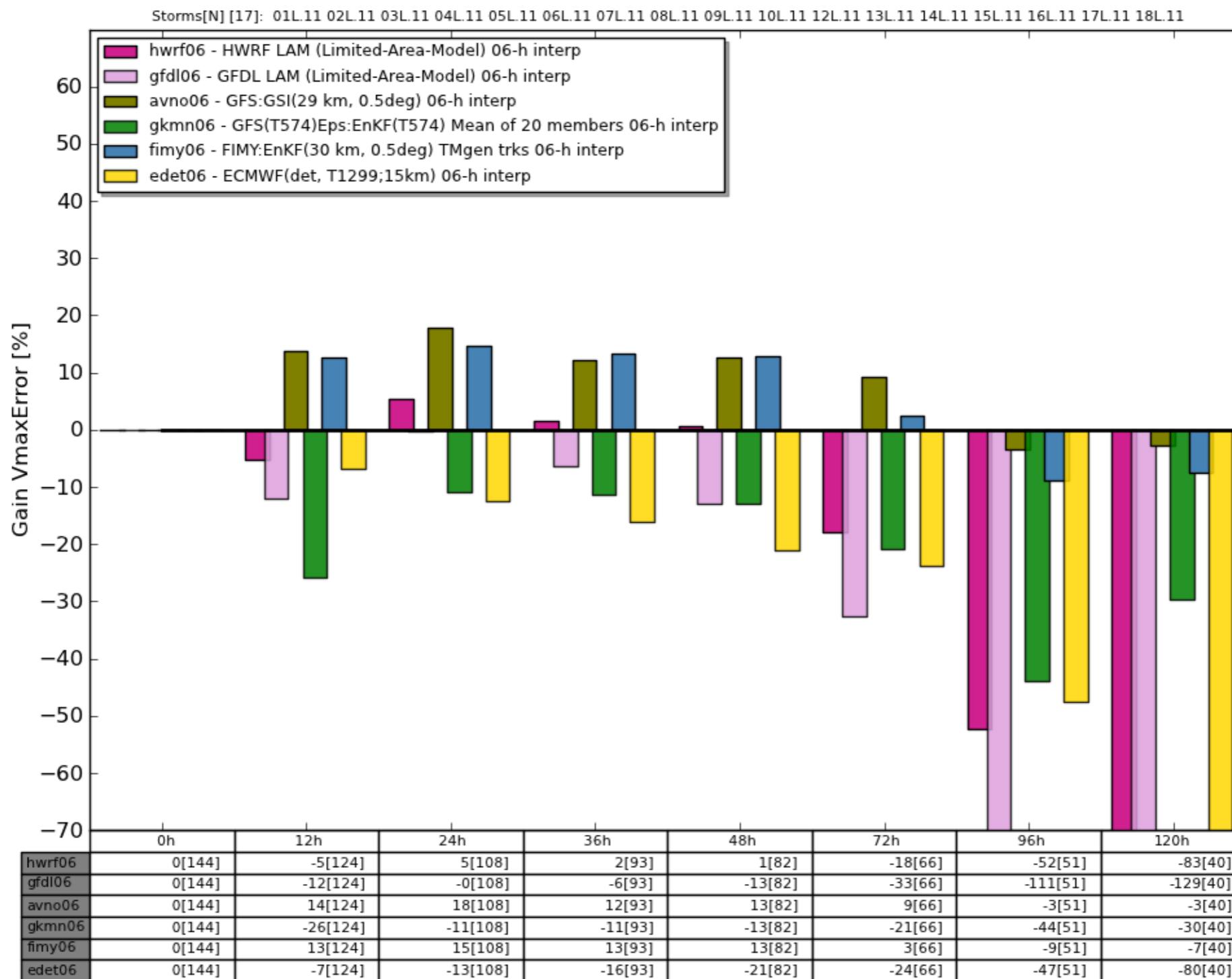
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HFIP 2011 Demo Intensity Error

% improvement over HFIP baseline & SHIFOR (skill)

LANT 2011 Intensity Error HWRF/GFDL v HFIP Global Models % improve rel to SHF5
bias corr tau=06



Summary of HFIP 2011 Demo

- Track
 - low-res GFS with hi-res GFS(EnKF) ensemble best skill of US global models
 - hi-res ECMWF deterministic closest to HFIP 20% improvement goal at tau=72-120 h
- Intensity
 - low errors for all the models, especially the 'no-skill' aid SHIFOR at tau=72-120 h
 - SHIFOR had the smallest bias → intensification rate slower the normal
 - FIMY had the lowest error tau=12-72 h
 - bias ~ mean for the models, but in different directions
- *Track error not correlated with intensity error?*

the “good” forecast?

“you’re only as good as what you measure”

CAPT Vic Addison USN(ret) CO FNMOC

“I verify, therefore I forecast”



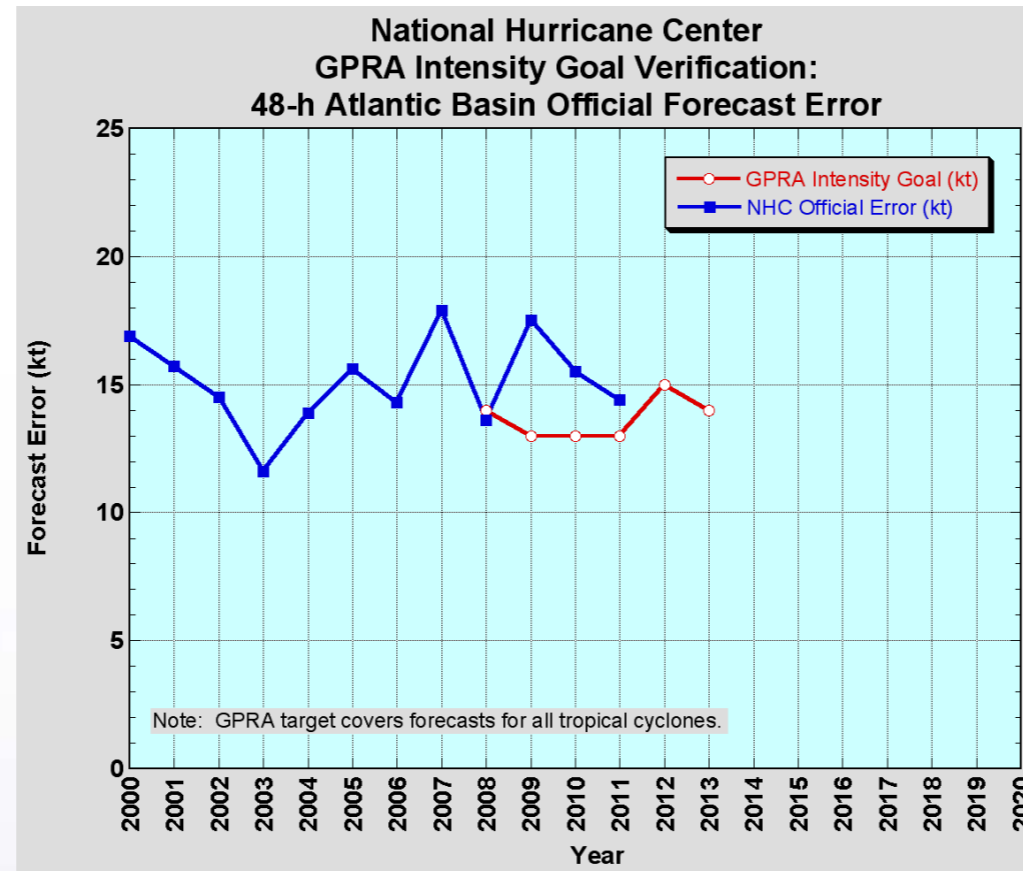
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the “good” forecast?

Goodness of Forecast (GoF)





GPRA for NHC Intensity



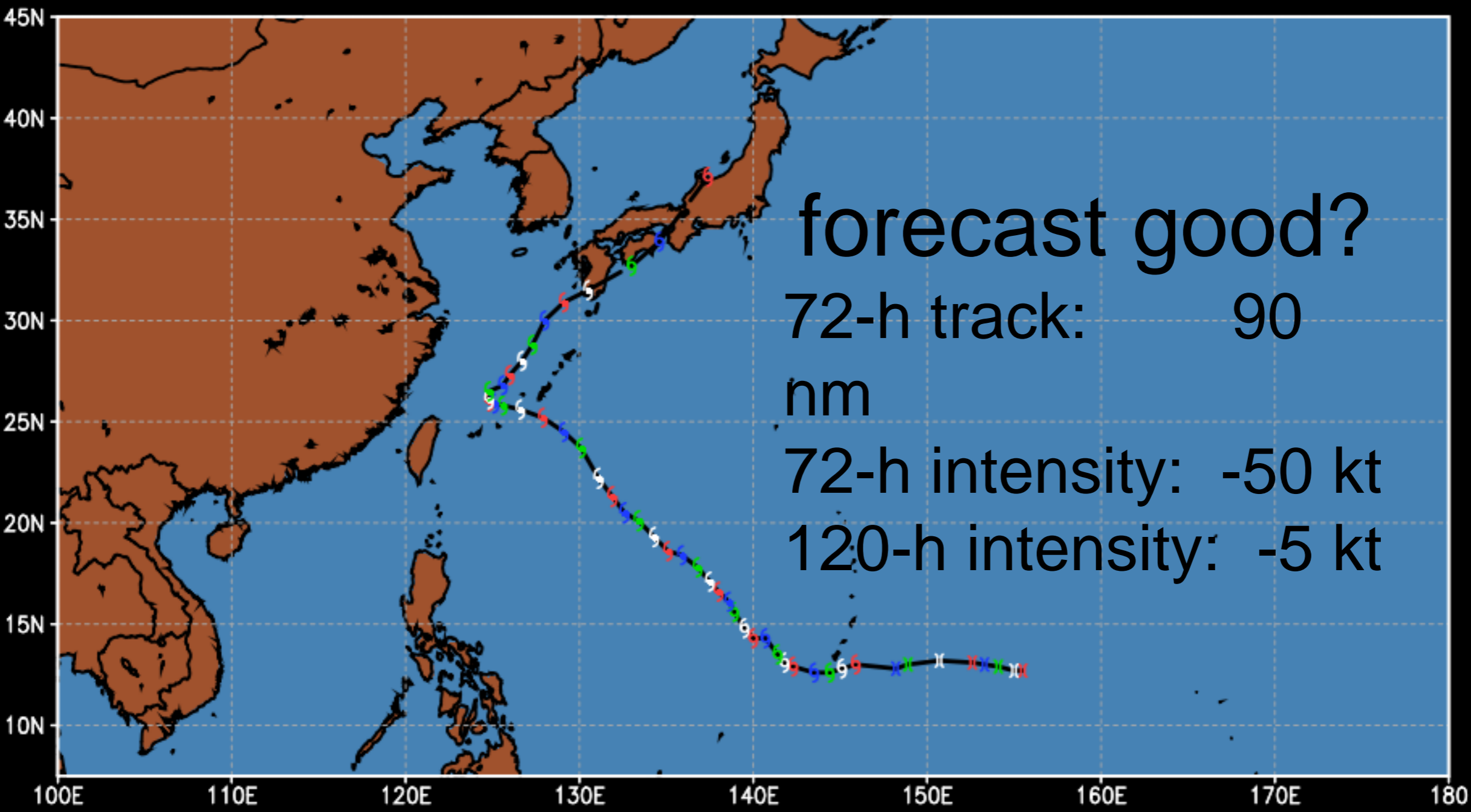
$$\text{GoF} = f(\text{track err}, \text{intensity err})$$

the no-win life of a forecaster...

$$\text{GoF} = f(\text{CINCHOME})$$

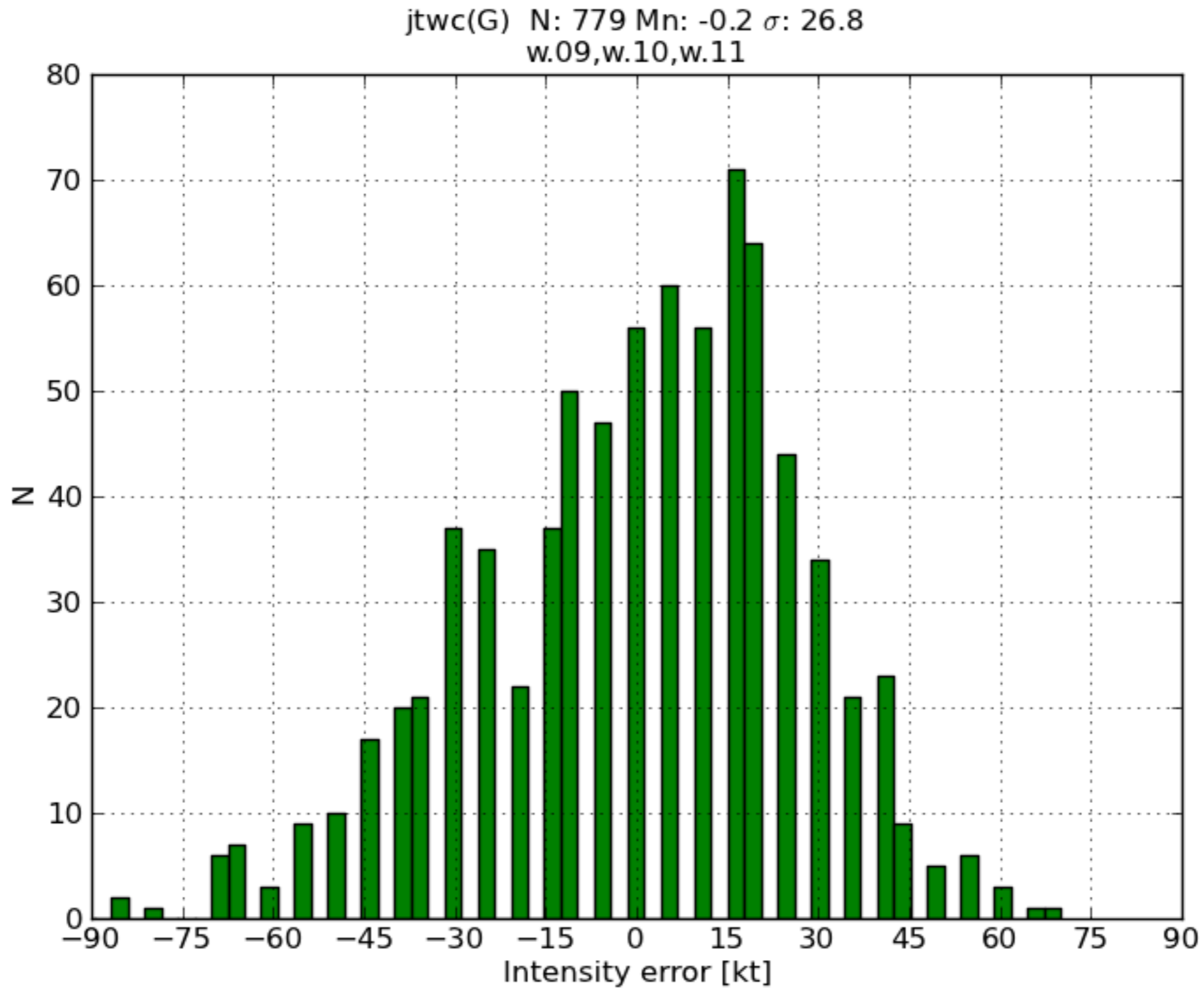
	snowy	sunny
snowy		
sunny		

TC: 25W.2004 [MEARI] V_{max}: 120kt
mdeck2 best track



091718	15
091800	15
091806	15
091812	15
091818	15
091900	15
091906	15
091912	15
091918	25
092000	25
092006	30
092012	30
092018	30
092100	35
092106	45
092112	50
092118	55
092200	60
092206	60
092212	65
092218	65
092300	75
092306	90
092312	100
092318	105
092400	115
092406	120
092412	120
092418	120
092500	120
092506	115
092512	110
092518	105
092600	90
092606	90
092612	100
092618	105
092700	105
092706	105
092712	90
092718	85
092800	75
092806	75
092812	75
092818	70
092900	70
092906	60
092912	55
092918	35

2009-2011 OFCL/JTWC 72-h intensity errors

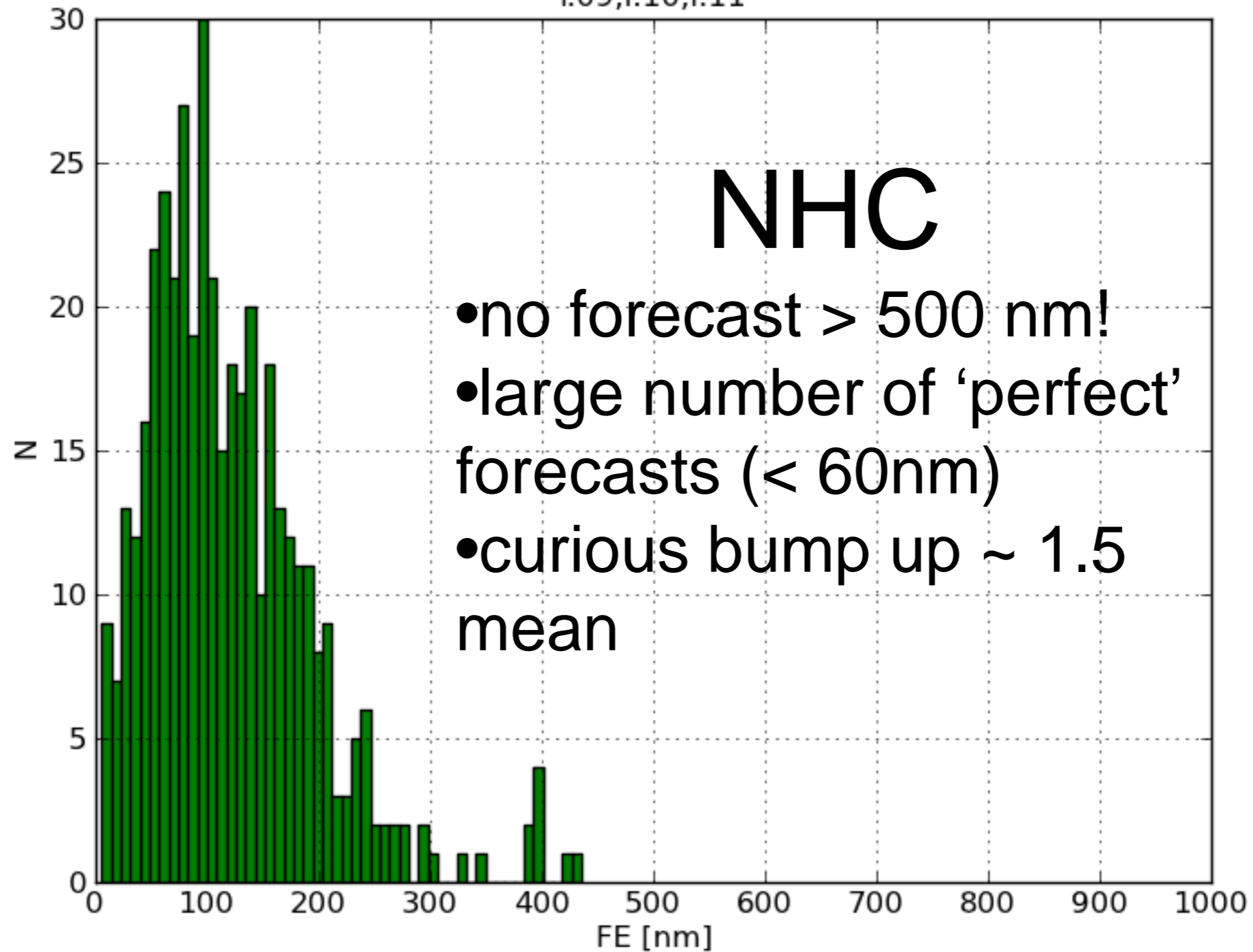


TC Intensity Error

- my 25W120-h error was “good” but 72 h “bad”
- “good” forecasts can have high magnitude
- “bad” forecasts can have low magnitude
- the mean does not well represent the general quality of the intensity forecasts...and thus we have a metrics problem...

2009-2011 OFCL/JTWC 72-h track FE

ofcl(G) N: 421 Mn: 119.4 σ : 74.4
l.09,l.10,l.11

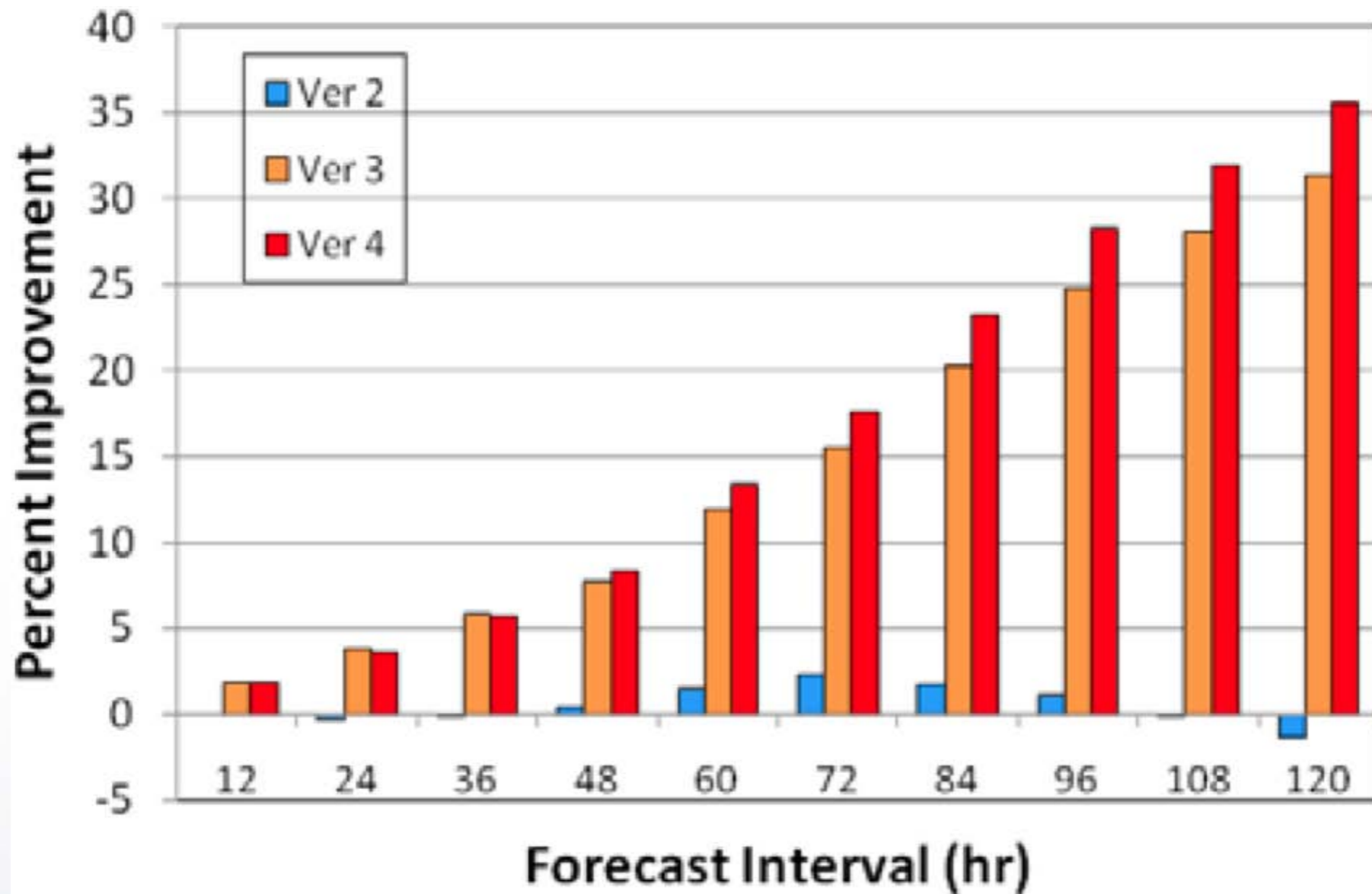


TC Track Error

- there may be cases of large FE that are “good” but they are few...
- the mean is reasonable measure of general quality of the forecasts, my CINCHOME notwithstanding...

DeMaria 2010 - 29th AMS Hurricane Conf

LGEM 2010 predictability study...

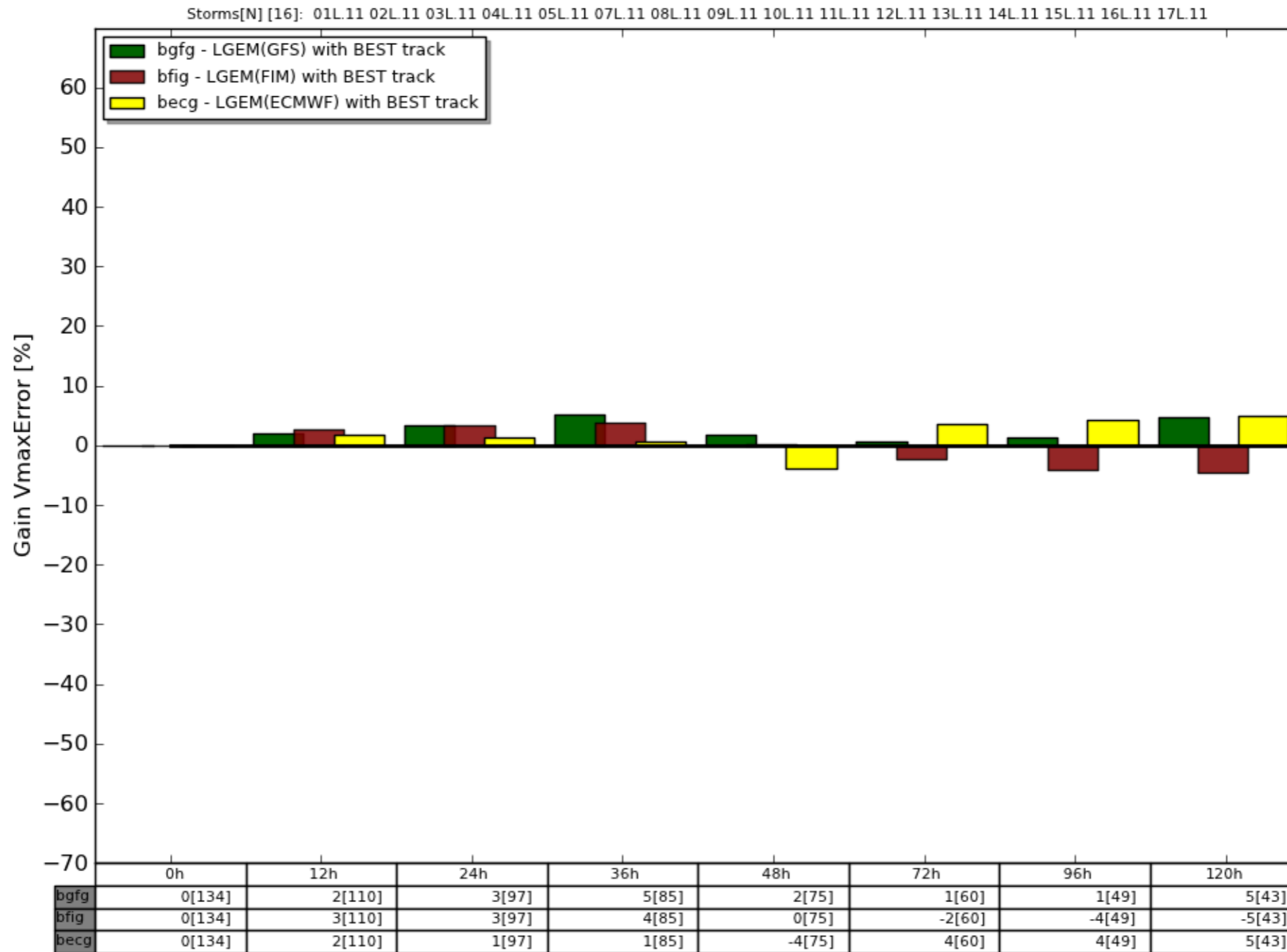


Ver 2: OFCI + perfect prog (env = analyses v forecast)

Ver 3: BEST + model forecast

% improvement over standard LGEM using BEST in GFS/FIM/ECMWF

2011 LANT LGEM % Improvement over LGEM(OFCI,GFS) with BEST in GFS/FIM/ECMWF



Summary

- 2011 HFIP demo: global models not only made good track forecasts but “good” intensity forecasts as well...
- HFIP milestone: calculate the diagnostic file (input to SHIPS/LGEM) for any model and run SHIPS/LGEM
- Histograms of track and intensity errors indicate the problem of measuring the goodness of forecast for intensity.
- Alternate intensity metrics? net intensity change