

Application of Global Ensemble Prediction Systems to Deterministic TC forecasting

***Some Perspectives from a (part-time)
JTWC Typhoon Duty Officer***

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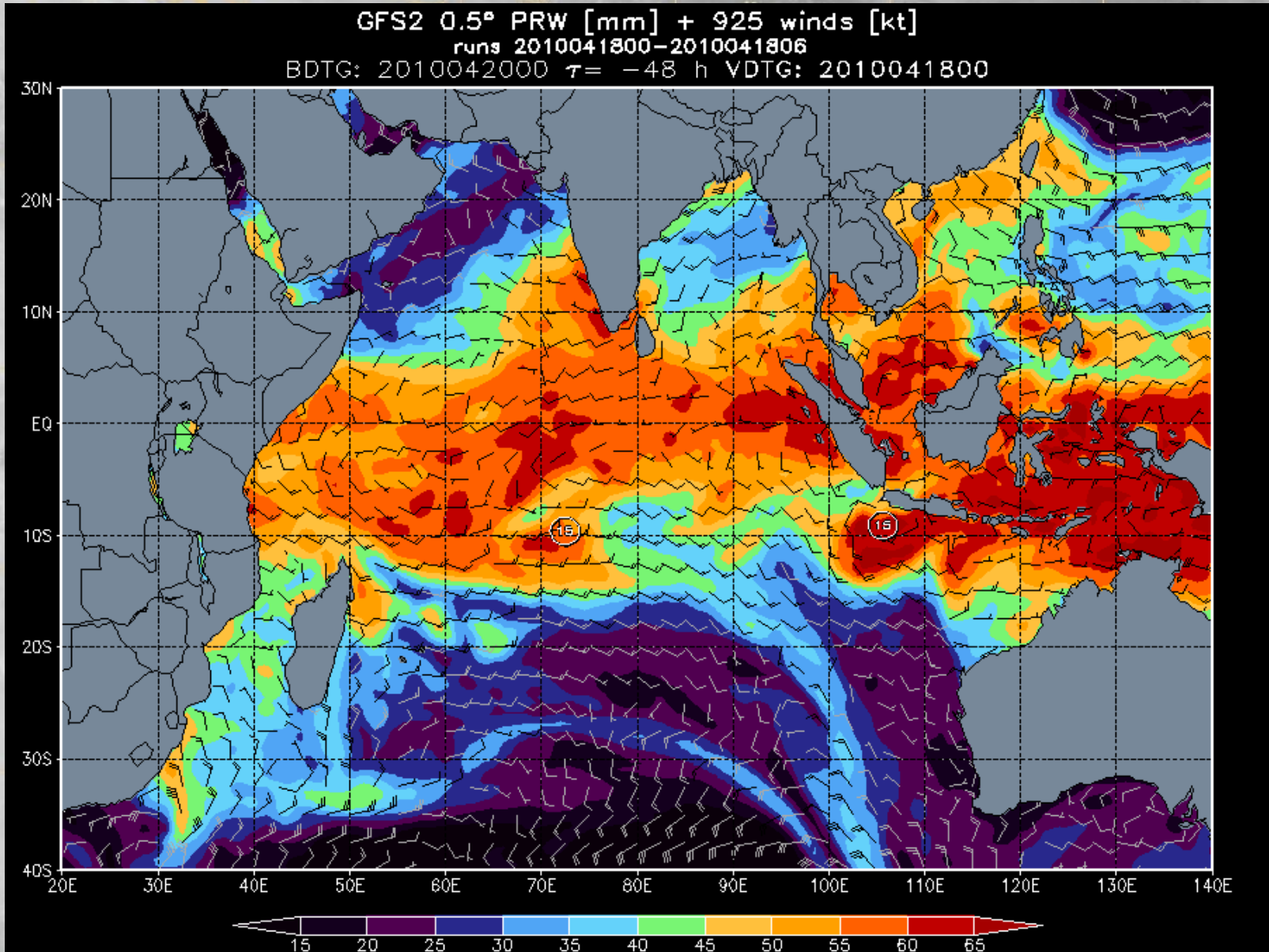
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TC SA 2010042000 – 91S, 99S



Deterministic TC track prediction

$$JTWC = (1 - \alpha - \beta) \cdot JTWI + \alpha \cdot CONW + \beta \cdot (ECM | CYA | \dots)$$

JTWC - official forecast ('analysis')

JTWI - official forecast ('analysis')

CONW

ECM |

α - weighting for consensus

β - weighting for non-consensus aid

$$OFCL = (1 - \alpha - \beta) \cdot OFCI + \alpha \cdot TVCN + \beta \cdot (EMX | \dots)$$

it's not just a job.
it's an **ADVENTURE**

TC track forecast problem...

- α & $\beta = f(\text{tau}, \text{storm}, \text{TDO}, \text{proximity to Okinawa (the Miami of WESTPAC)})$
- how much weight (α) to give CON v JTWI?
- is $\beta \neq 0$? i.e., is there a model beating CON? – model of the day/season?

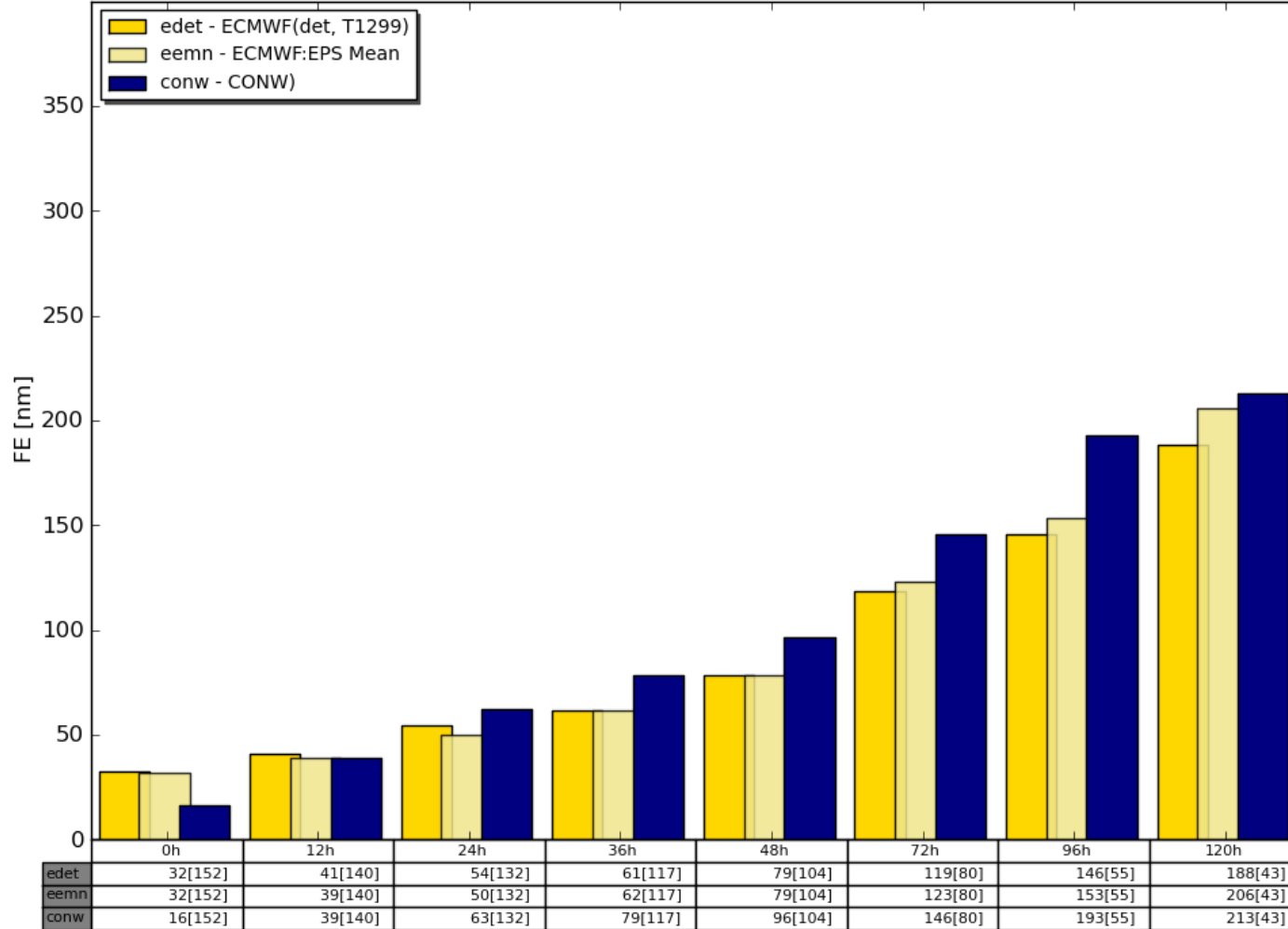
Application of global EPS ...

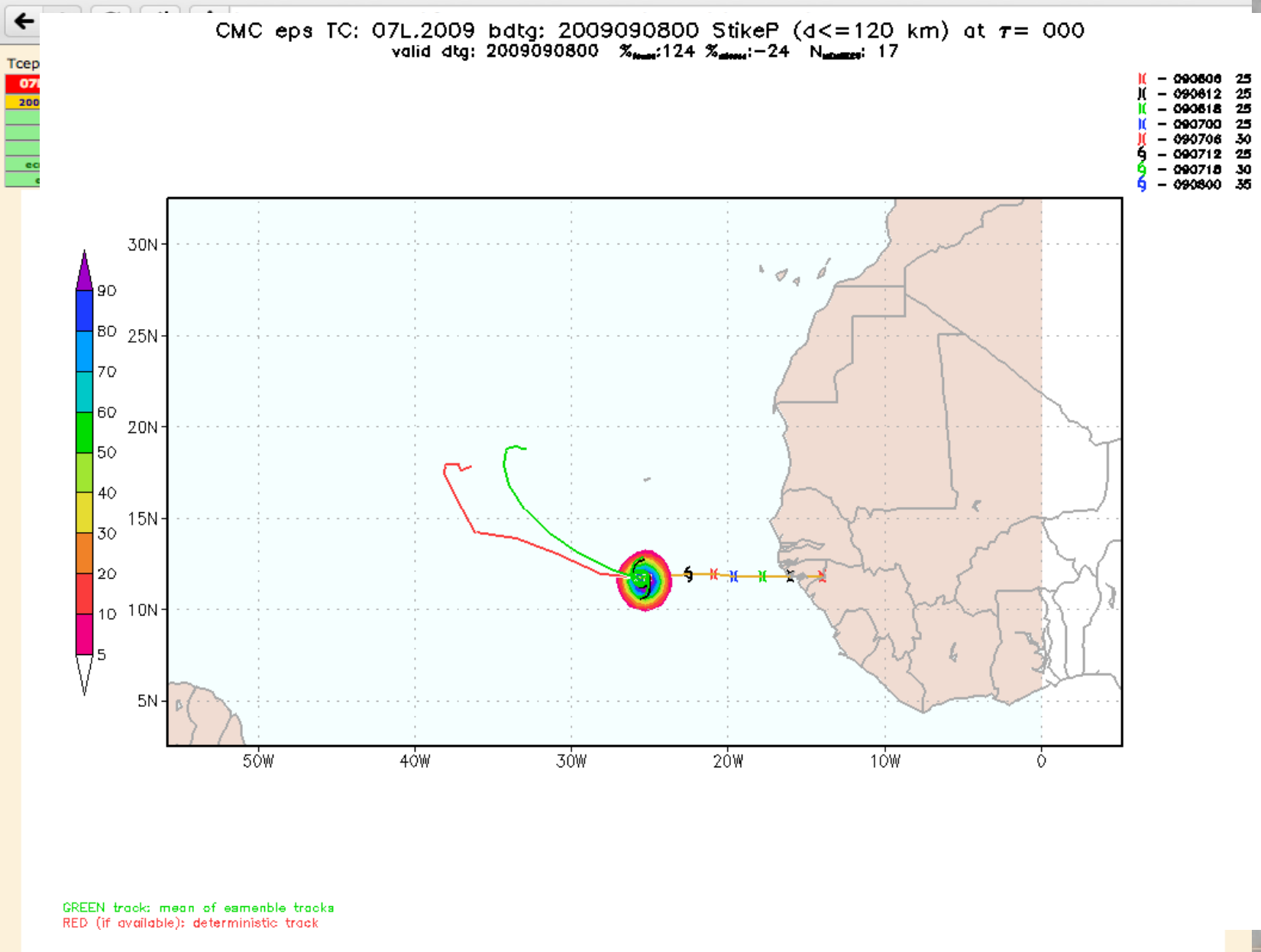
- *forecast skill of EPS mean track; comparable to CON?*
- *assessment of α for track (and intensity)*
 - is spread related to uncertainty in CON?
 - diagnosis of the synoptics affected the track/intensity, i.e., the meteorology of the spread – bi-tri-furcations – breaks in subtropical ridge, TUTT cells, monsoon troughs...

deterministic v EPS v CONW

SHEM 2010 ECMWF(DET) v ECMWF(EPS) v CONW

Storms[N] [16]: 07S.2010 08S.2010 09P.2010 11S.2010 12P.2010 13S.2010 14P.2010 15P.2010 16S.2010 17P.2010 18S.2010 19P.2010 20P.2010 21S.2010 22P.2010 23S.2010

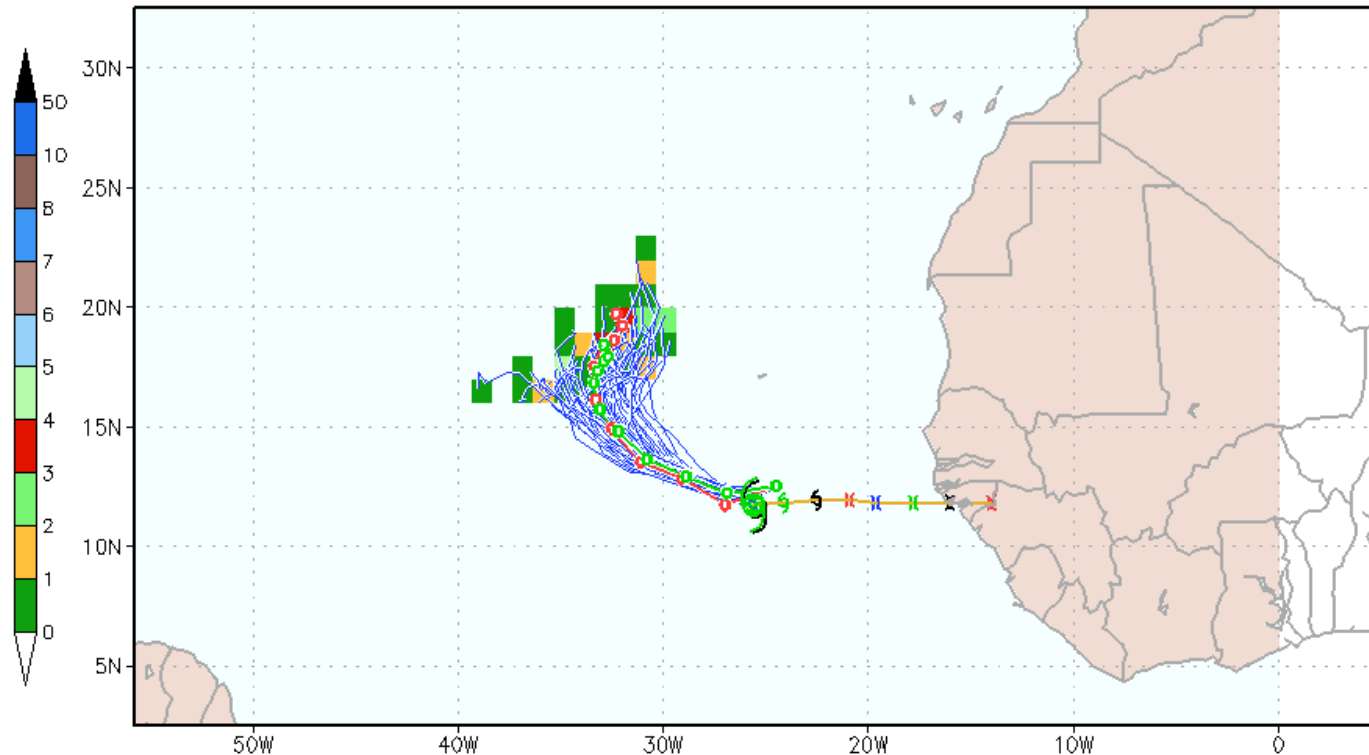




TCEPS V1.0 – 'Hit' analysis grid

ECMWF EPS TC: 07L.2009 bdtg: 2009090800 Hit Count at $\tau = 120$
 valid dtg: 2009091300 %_{max}:100 %_{min}: 0 N_{members}: 51

- K - 090606 25
- K - 090612 25
- K - 090618 25
- K - 090700 25
- K - 090706 30
- G - 090712 25
- G - 090718 30
- G - 090800 35



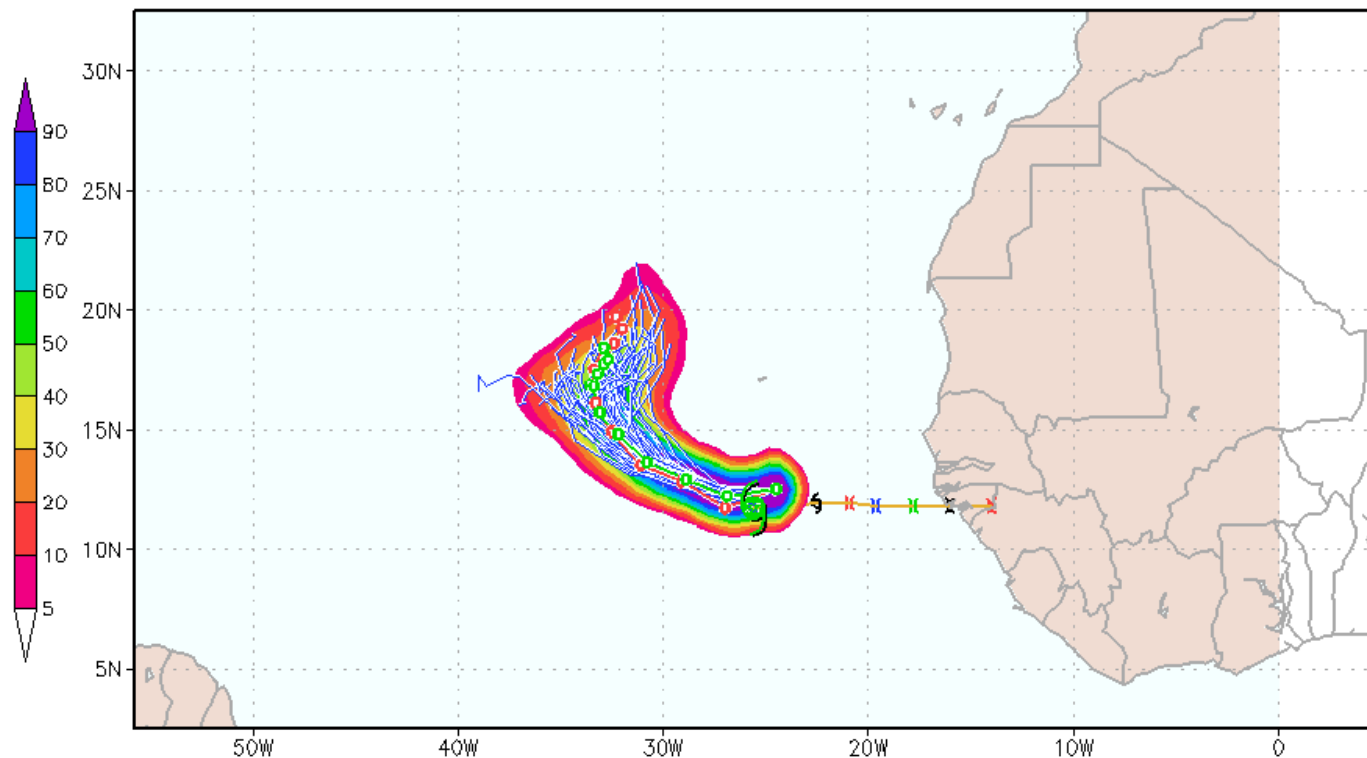
GREEN track: mean of ensemble tracks
 RED (if available): deterministic track



TCEPS V1.0 – STRIKEP

ECMWF EPS TC: 07L.2009 bdtg: 2009090800 StikeP (d<=120 km) at $\tau = 120$
valid dtg: 2009091300 %_{track}:100 %_{radius}: 0 N_{ensemble}: 51

K	-	090606	25
K	-	090612	25
K	-	090618	25
K	-	090700	25
K	-	090706	30
G	-	090712	25
G	-	090718	30
G	-	090800	35



GREEN track: mean of ensemble tracks
RED (if available): deterministic track

Deterministic TC intensity prediction

$$JTWC = (1 - \alpha - \beta) \cdot JTWI + \alpha \cdot (1T\# / \text{day}) + \beta \cdot (...)$$

α
 β

weighting for consensus

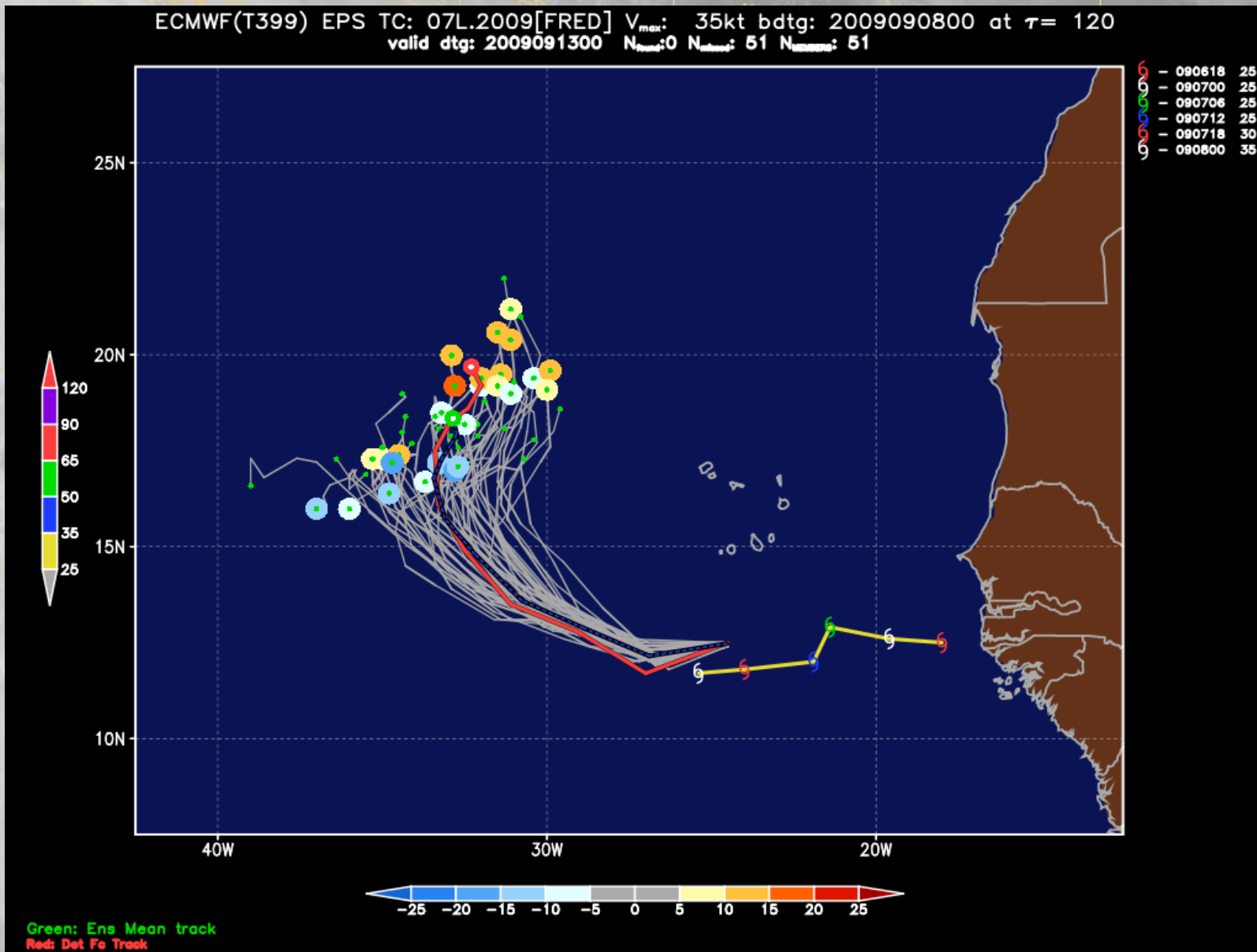
'aim-high' USAF TDOs to this USN TDO:
come on Navy, 'accelerate your life (V_{max})'

$$OFCL = (1 - \alpha - \beta) \cdot OFCI +$$

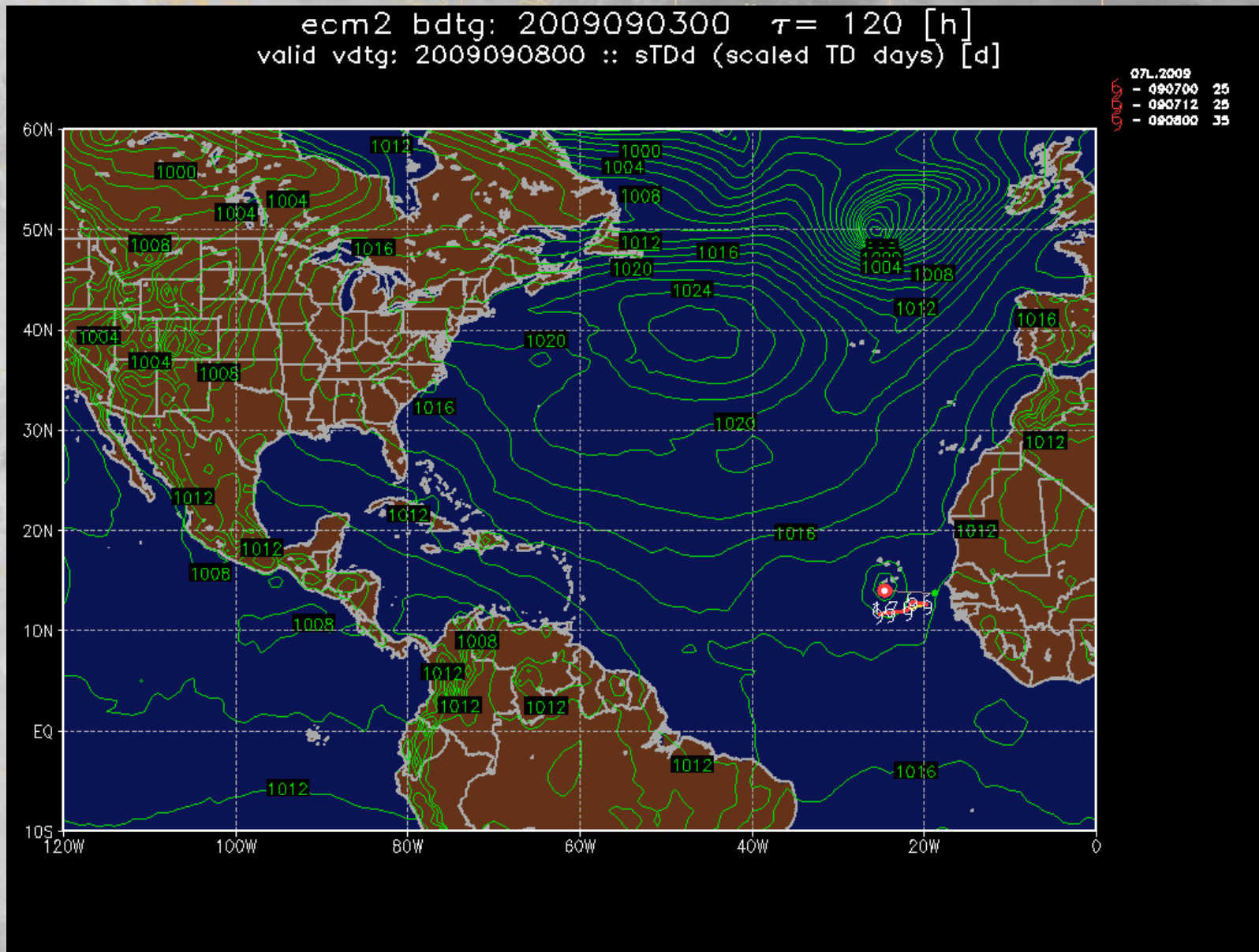
$\alpha \cdot SHIPS +$

$\beta \cdot (HWRF | GFDL...)$

TCEPS V2.0 for 2010 NHEM season



TCGEN 1.0 for 2010 – TM genesis tracker

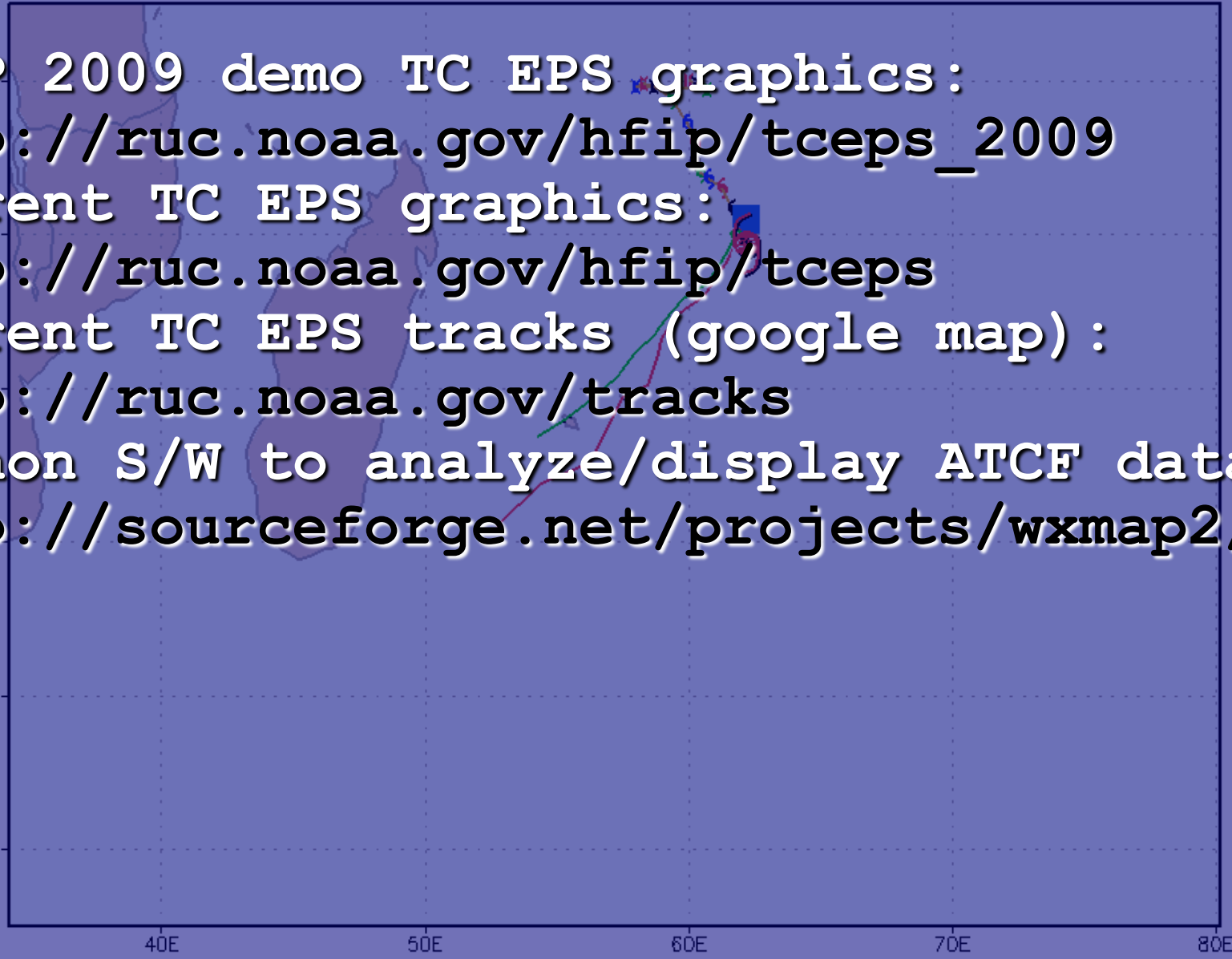


Some concluding comments...

- ***deterministic v probabilistic?***
 - using EPS for current and future probabilistic products depends on value to deterministic forecasting – TDO/HS confidence that EPS gives a physically plausible assessment of uncertainty – spread is not just engineered using modeling magic
- ***potential applications to deterministic forecasting***
 - α , β – weighting of CON v OFCI v ???
 - track scenario diagnosis (vortex – synoptic interaction)
 - intensity change as a function of track
- ***genesis/formation***
 - multi-model, multi-EPS consensus

resources:

HFIP 2009 demo TC EPS graphics:
http://ruc.noaa.gov/hfip/tceps_2009
Current TC EPS graphics:
<http://ruc.noaa.gov/hfip/tceps>
Current TC EPS tracks (google map):
<http://ruc.noaa.gov/tracks>
Python S/W to analyze/display ATCF data:
<http://sourceforge.net/projects/wxmap2/>



II	- 021408	15
II	- 021412	15
II	- 021418	15
II	- 021500	25
II	- 021506	25
II	- 021512	25
6	- 021518	30
6	- 021600	35
6	- 021606	45
6	- 021612	45
6	- 021618	55
6	- 021700	65
6	- 021706	80
6	- 021712	80
6	- 021718	75
6	- 021800	75
6	- 021806	90
6	- 021812	95

GREEN track: mean of ensemble tracks
RED (if available): deterministic track