

Ensemble-based genesis guidance

Tim Marchok

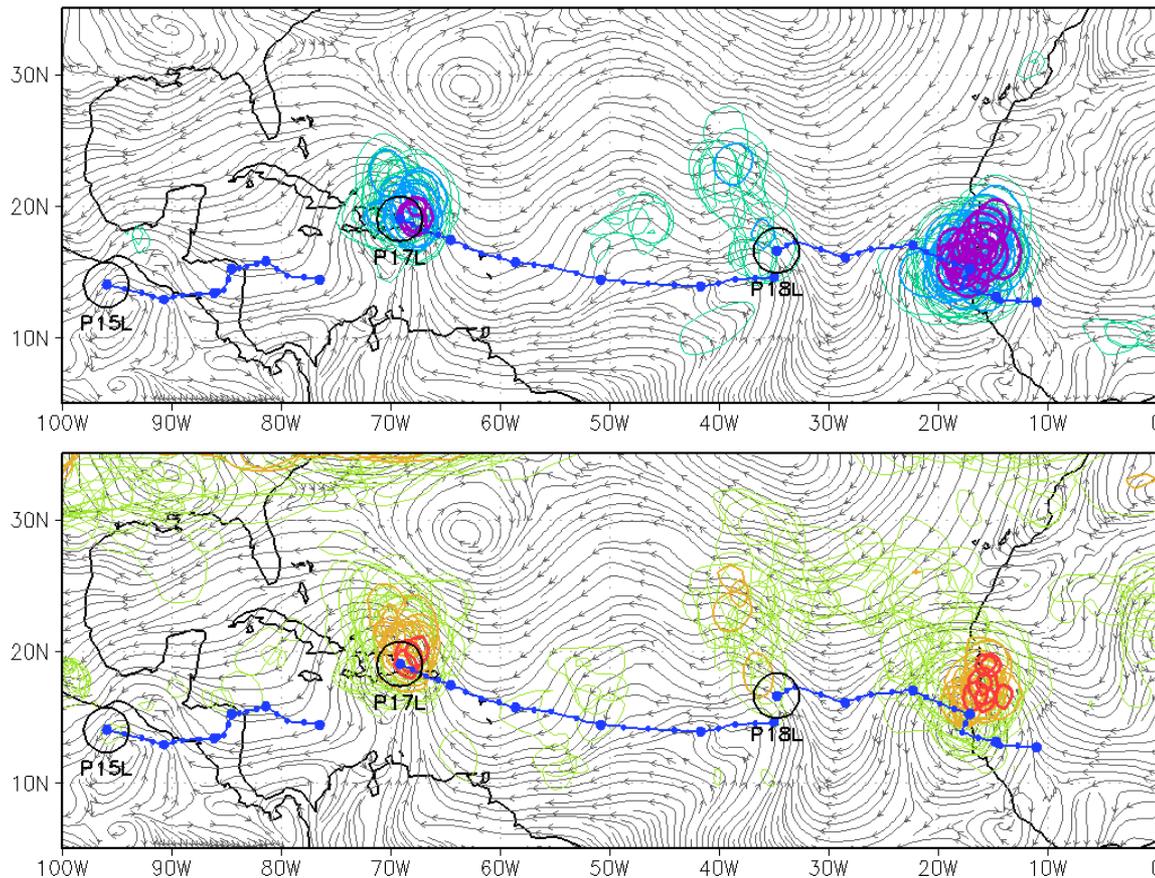
HFIP Ensemble Subgroup

10/31/11 Telecon

Two related pathways....

1. Ensemble-based diagnostics (e.g., Majumdar)

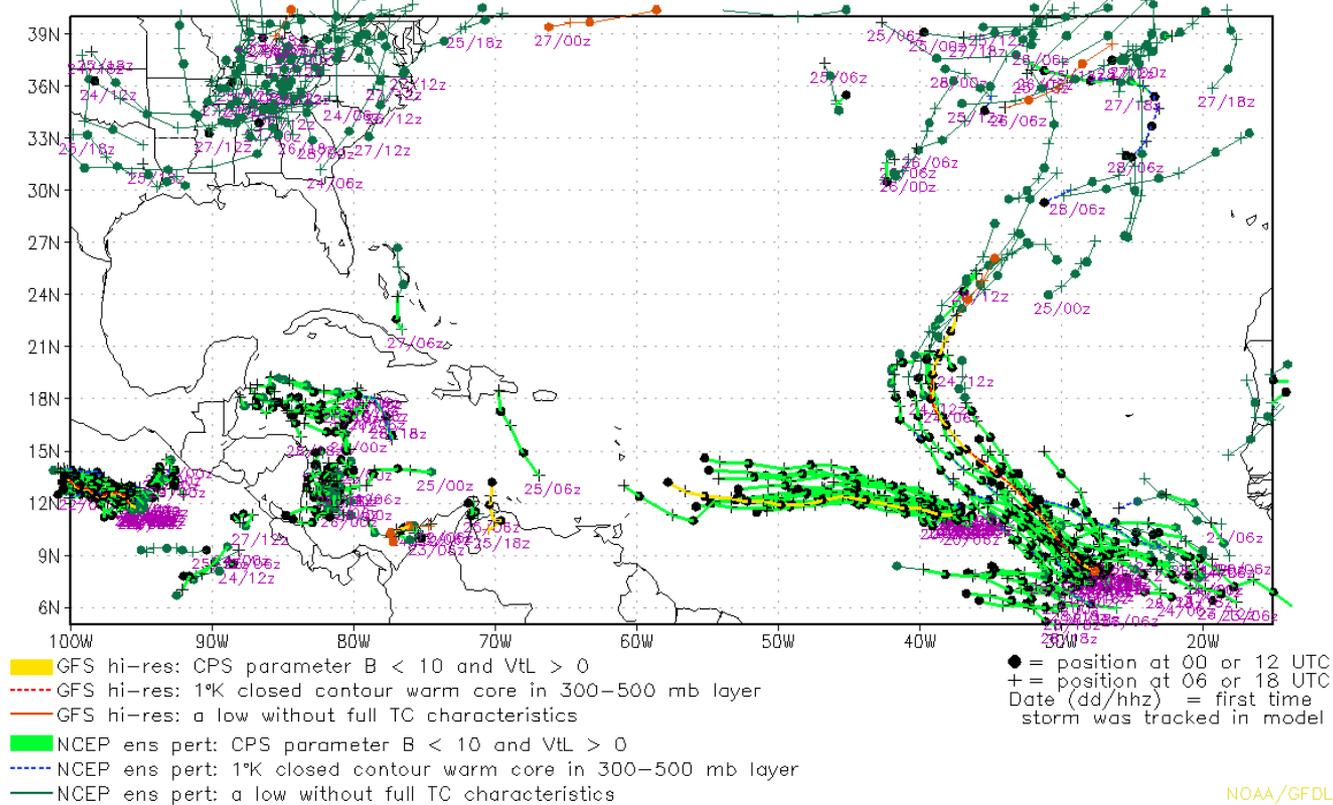
Gray: NCEP 120-hour CTRL streamlines of 700–850 hPa ave wind. Init. 2011081800, Valid 2011082300.
Color: 700–850 hPa AREA-AVG REL. VORT. $\times 2.5e-5 \text{ s}^{-1}$ and 200–850 hPa THICK ANOM $\times 20 \text{ m}$. 20 members.



Synoptic & statistical analysis of various diagnostics (e.g., relative vorticity, convergence & divergence, thickness anomalies, RH, etc)

2. Track-based guidance

NCEP Ensemble Perturbation Forecast Storm Tracks
For forecast with initial time = 2011092000

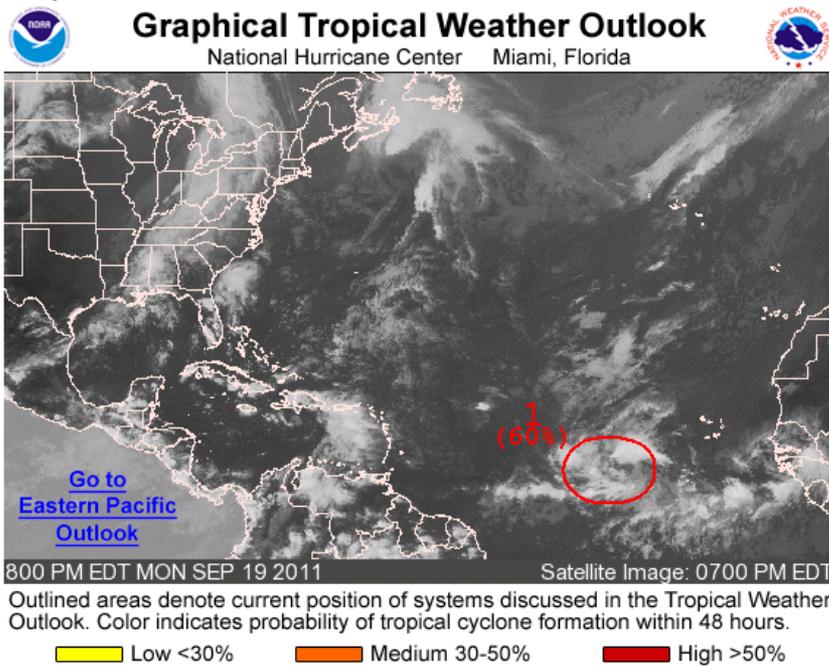


<http://www.emc.ncep.noaa.gov/gmb/tpm/emchurr/tcgen>

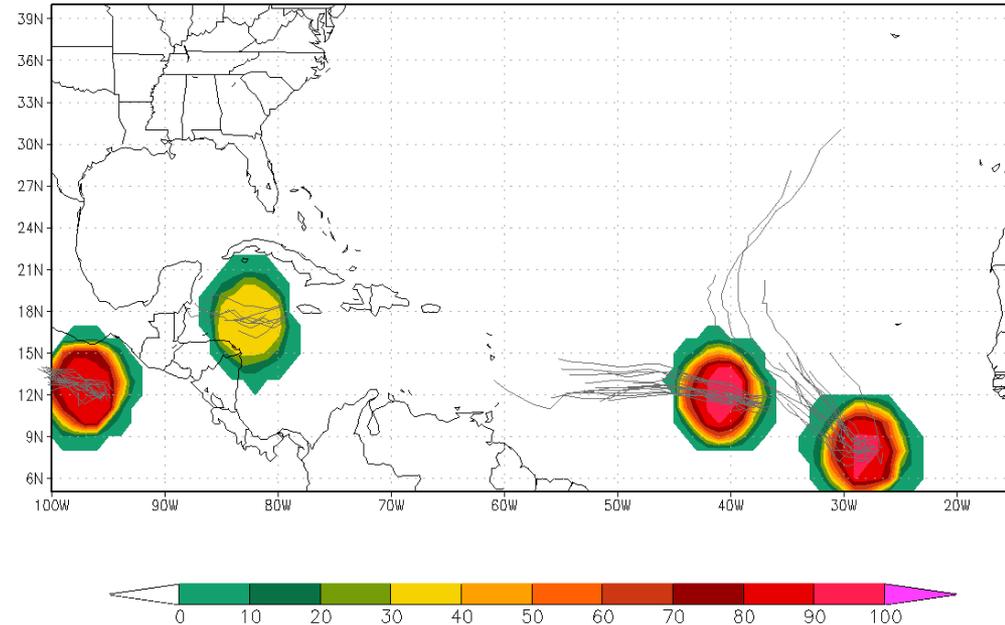
A few critical criteria for tracking and TC / non-TC determination

- At least one closed mslp contour
- Azimuthally averaged 850 mb V_T must exceed threshold
- Cyclone phase space & simple warm core checks used for TC / non-TC determination
- Forecast storm must last at least 24h

Ensemble track-based probabilistic genesis guidance



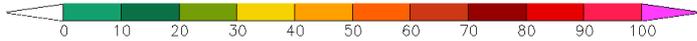
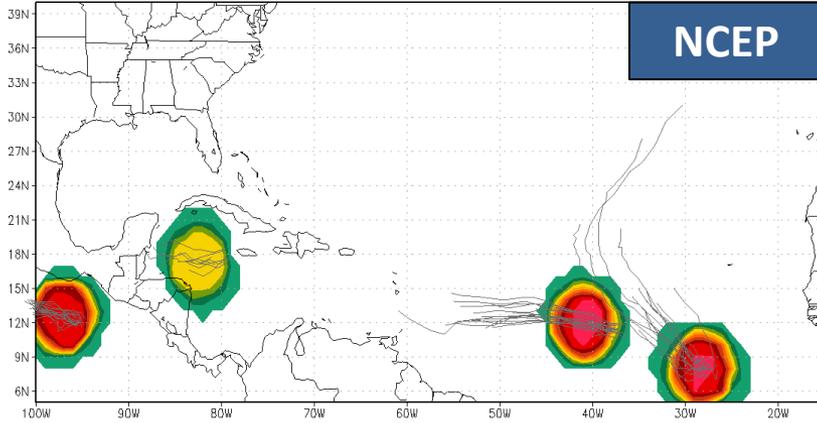
NCEP Ensemble: 2011092000 Member Forecast Storm Tracks and Genesis Probabilities (shaded,%) during the 0-24h period



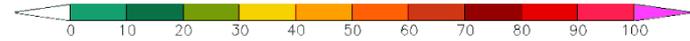
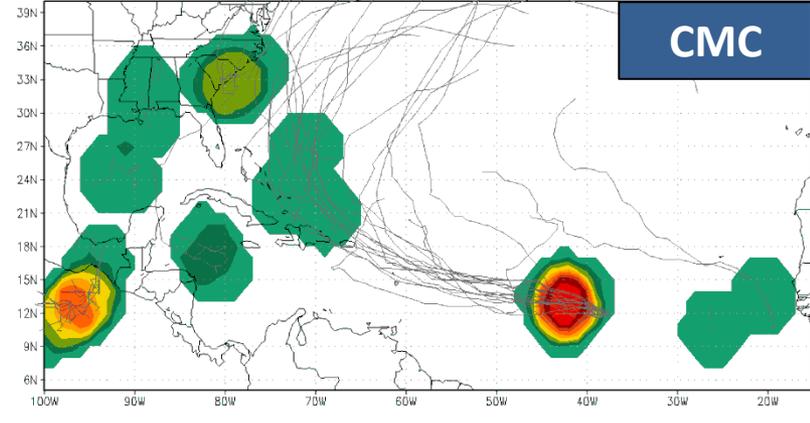
Probability is simply the percentage of members indicating genesis in a given lead time window (here, 0-24h).

4 global ensembles for 2011092000: Pre-Ophelia (0-24h)

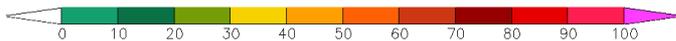
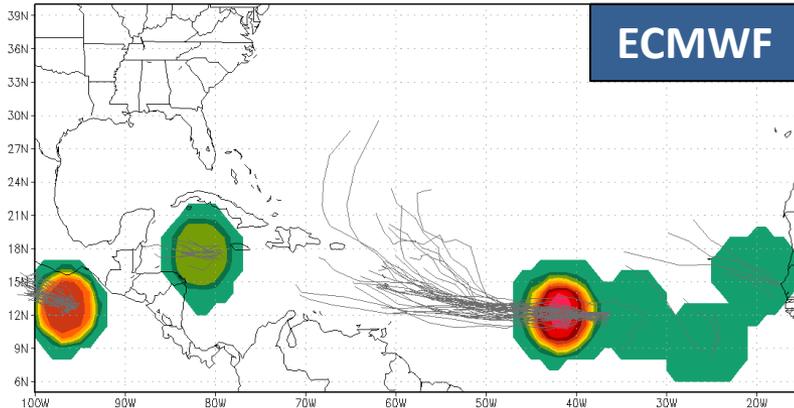
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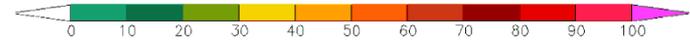
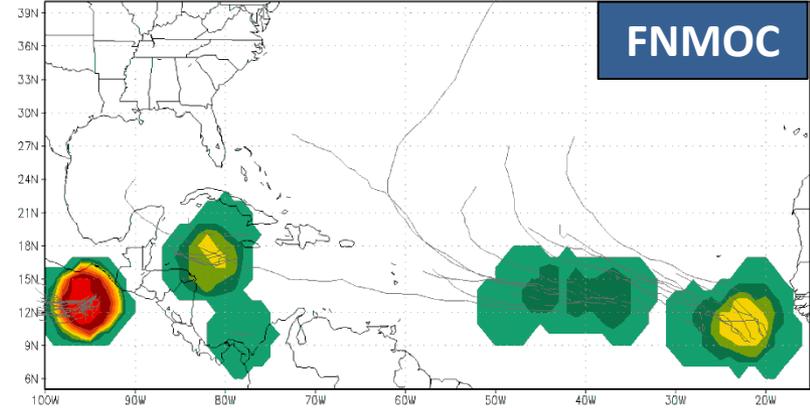
CMC Ensemble: 2011092000 Member Forecast Storm Tracks and Genesis Probabilities (shaded,%) during the 0-24h period



ECMWF Ensemble: 2011092000 Member Forecast Storm Tracks and Genesis Probabilities (shaded,%) during the 0-24h period

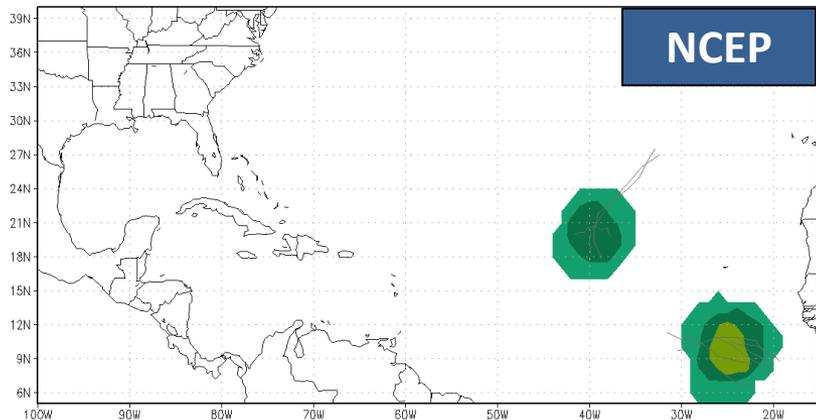


FNMOC Ensemble: 2011092000 Member Forecast Storm Tracks and Genesis Probabilities (shaded,%) during the 0-24h period

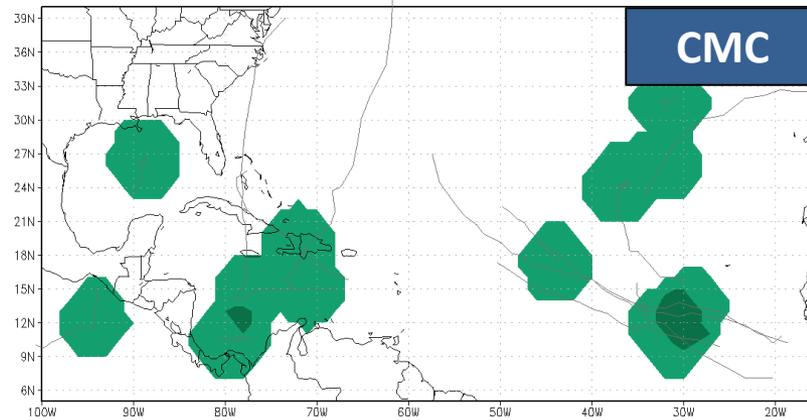


4 global ensembles for 2011092000: Pre-Philippe (96-120h)

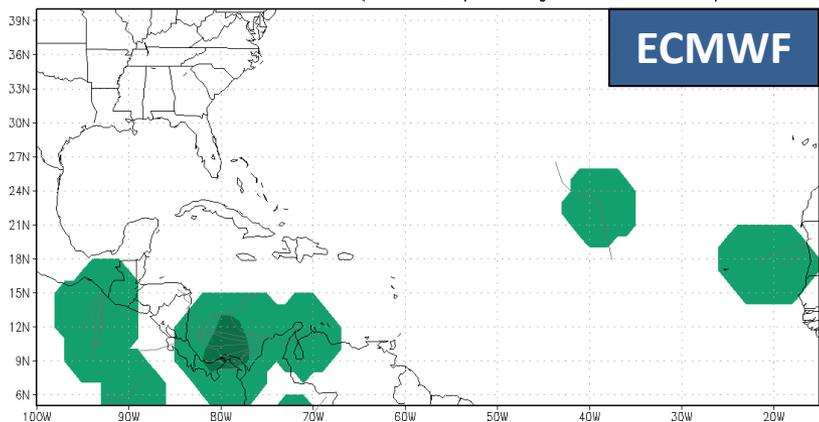
NCEP Ensemble: 2011092000 Member Forecast Storm Tracks and Genesis Probabilities (shaded,%) during the 96-120h period



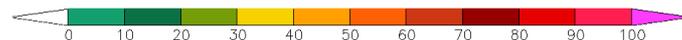
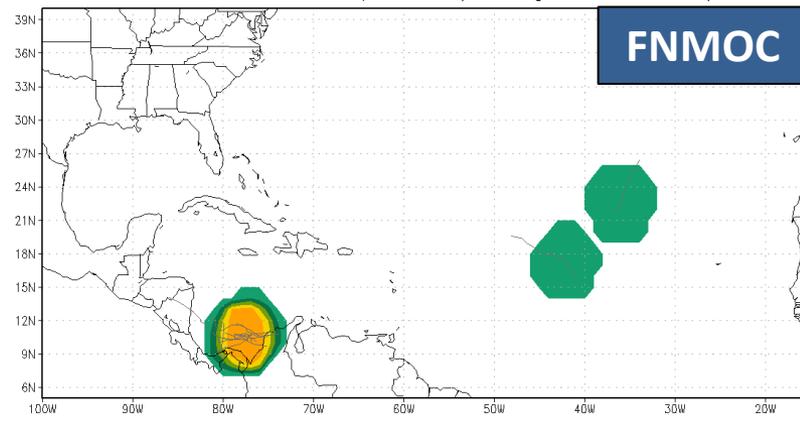
CMC Ensemble: 2011092000 Member Forecast Storm Tracks and Genesis Probabilities (shaded,%) during the 96-120h period



ECMWF Ensemble: 2011092000 Member Forecast Storm Tracks and Genesis Probabilities (shaded,%) during the 96-120h period



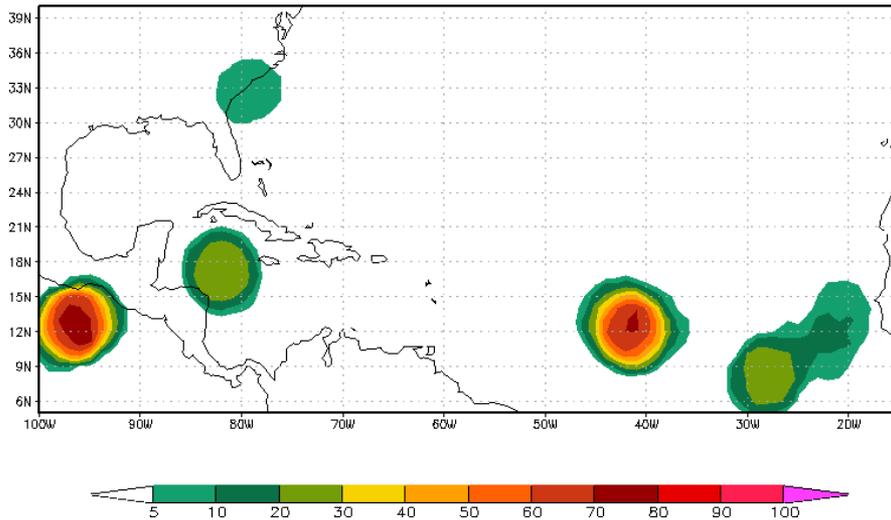
FNMOC Ensemble: 2011092000 Member Forecast Storm Tracks and Genesis Probabilities (shaded,%) during the 96-120h period



Multi-model consensus probabilities

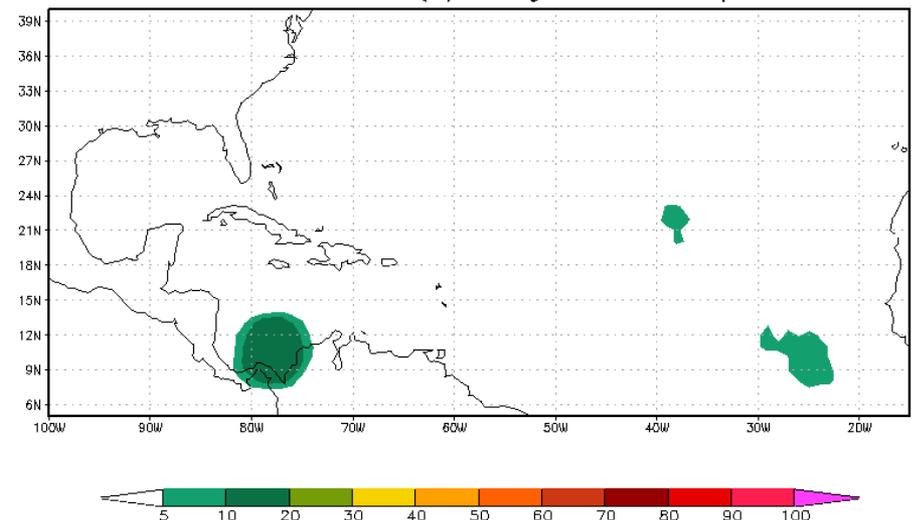
0-24h

Global Ensemble Consensus: 2011092000 (NCEP, CMC, FNMOC, ECMWF)
Genesis Probabilities (%) during the 0-24h period



96-120h

Global Ensemble Consensus: 2011092000 (NCEP, CMC, FNMOC, ECMWF)
Genesis Probabilities (%) during the 96-120h period



Probabilities could also be computed from a consensus of the deterministic counterparts of the above ensembles.

Discussion

- Develop in conjunction with Majumdar ensemble-based diagnostics methods
- What other models should be included, including HFIP deterministic models and the FIM ensemble.
- What can be changed / added to improve this method?
- Verification: Similar to NHC genesis verification, using reliability diagrams, brier skill score. Also, Probability of Detection, False Alarm Rate. Collaboration with TCMT on this would be beneficial.