HFIP Topics
NOAA FAB

Paula McCaslin
Zoltan Toth

Nov 8-9, 2011

GIFS TIGGE

- 9th International THORPEX Meeting of the GIFS-TIGGE Working Group
  - (THORPEX Interactive Grand Global Ensemble–Global Interactive Forecast System)
  - August 31 to September 2, 2011 – Geneva
- 50% of Presentations were on topics of TC
  - JMA, ECMWF, WMO, South Pacific, Others
  - Quick tour….

GIFS TIGGE – JMA

GIFS TIGGE – JMA

- Monitoring and verification website
  - http://tparc.mri-jma.go.jp/TIGGE
  - Or, search web for “mjo tigge”

TIGGE monitoring and verification website

Automatically updated everyday!

TIGGE Medium-Range Ensemble

- Spaghetti (5550m)
- Spaghetti (5600m)
- Spaghetti (5650m)
- Spaghetti (5700m)
- Spaghetti stamp (NH)
- Spaghetti stamp (SH)
- Ensemble Mean (NH)
- Ensemble Mean (SH)
- Ensemble Spread (NH)
- Ensemble Spread (SH)

Initisted time :
Year Month 201007
Day 25

-1 Day | +1 Day | latest

FT:
000 003 024
036 048 060
072 084 096
108 120 132
144 156 168
180 192 204
216 aCline

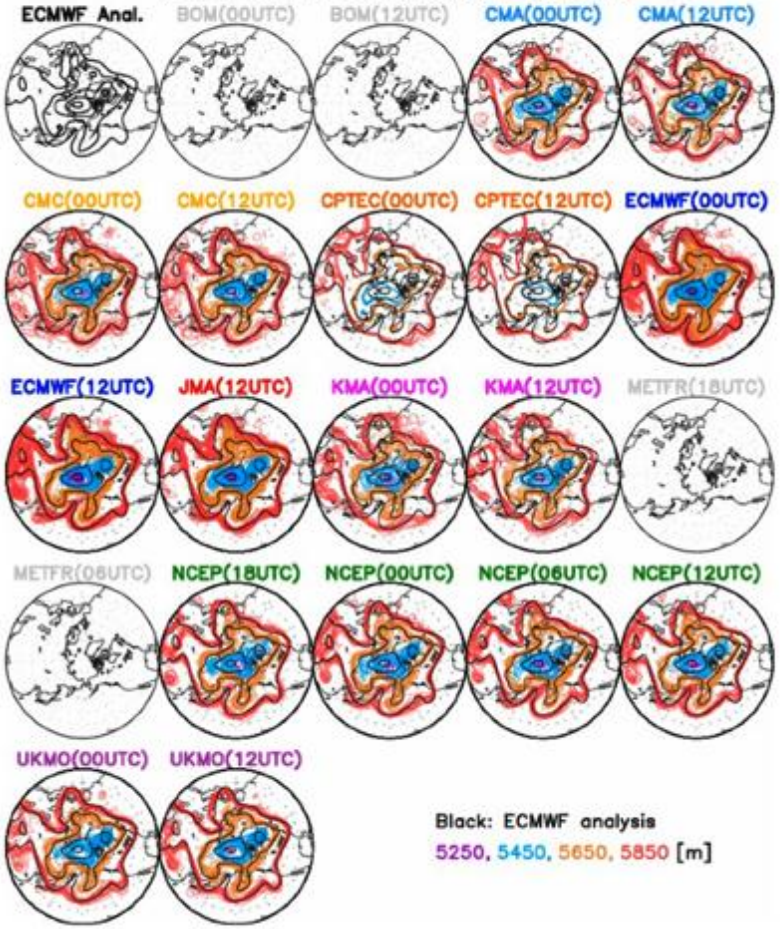
Go to main page

TIGGE Global Ensemble Forecasts

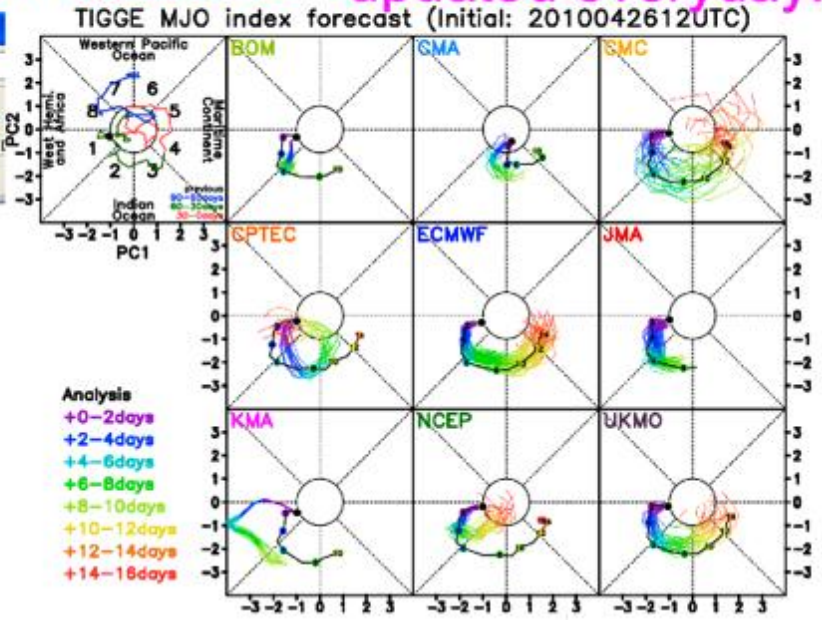
Z500 spaghetti diagram

Initial time: 20100725

Valid time: 20100730 12UTC

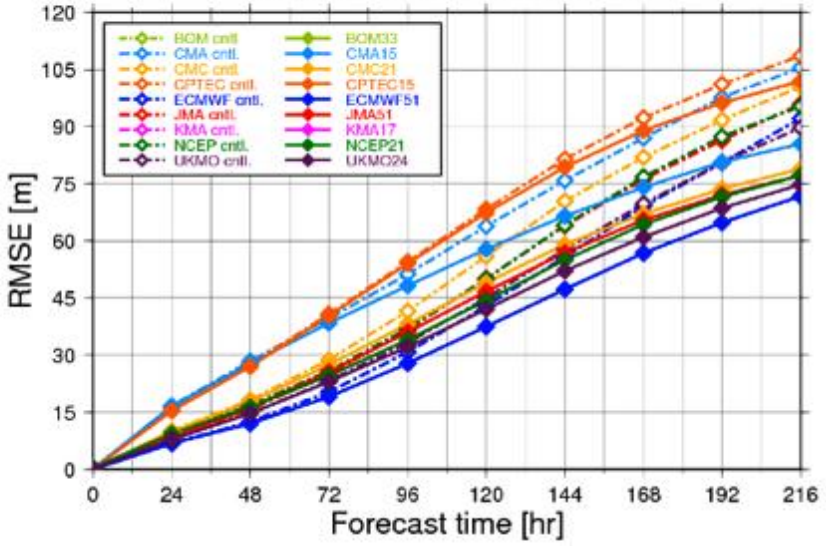


TIGGE MJO index forecast (Initial: 2010042612UTC)



TIGGE medium-range ensemble forecasts

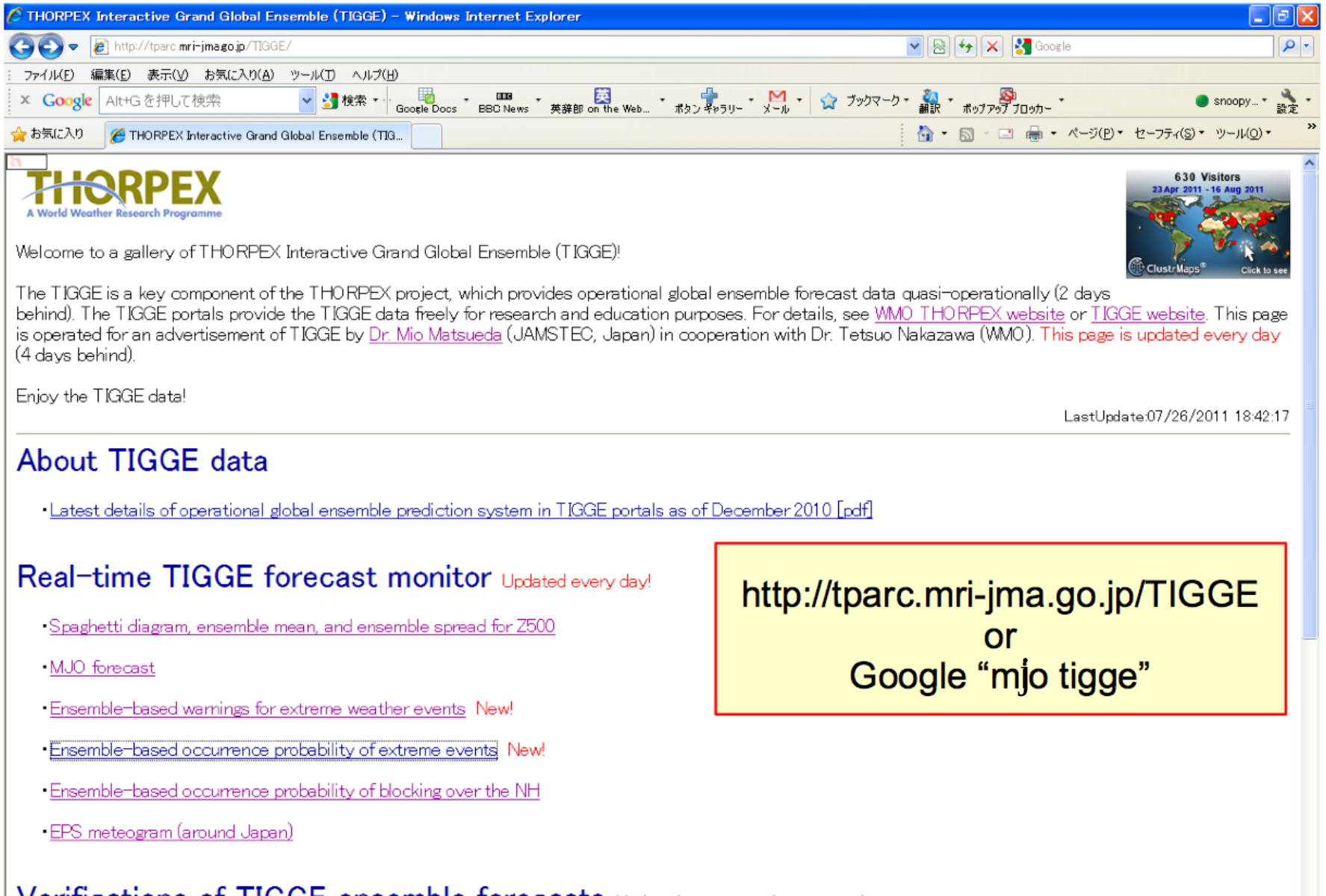
Z500 RMSE (2011MAM: NH)



Automatically

TIGGE monitoring and verification website

Automatically updated everyday!



http://tparc.mri-jma.go.jp/TIGGE
or
Google “mjo tigge”

GIFS TIGGE – ECMWF

GIFS TIGGE – ECMWF

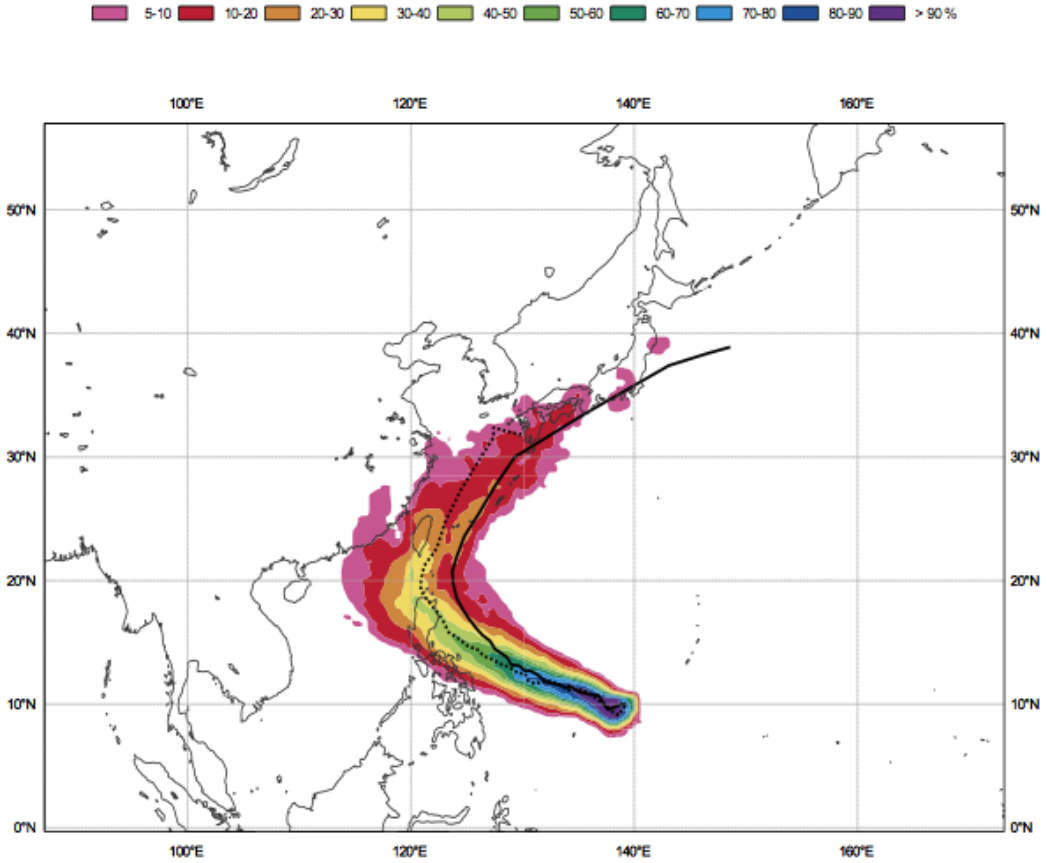
- Tropical cyclones
  - Tracking of tropical cyclones developing during forecast
  - Operational tracks – deterministic up to 1 hour early
  - Under testing: replacement of operational tracker (beyond 5 days)

Tropical cyclones

Date 20110520 12 UTC @ **ECMWF**

Probability that **04W** will pass within 120 km radius during the next **240** hours

tracks: **solid**=OPER; **dot**=CTRL



List of ensemble members numbers forecast Tropical Cyclone

Intensity category in colours: TD[up to 16] TS[17-32] HR1[33-42] HR2[43-48] **HR3**[>48 m/s]

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+024 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31   33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
+048 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
+072 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
+096 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
+120 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
+144 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
+168 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
+192 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
+216 h: hr ct 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25    27 28 29 30 31 32 33 34 35 36 37 38    40 41 42 43 44 45 46 47 48 49 50
+240 h: hr    01    03 04 05 06 07 08    10 11    13 14 15 16 17 18 19 20 21 22 23       27 28 29       32 33 34 35 36 37       40       43 44       47 48 49 50
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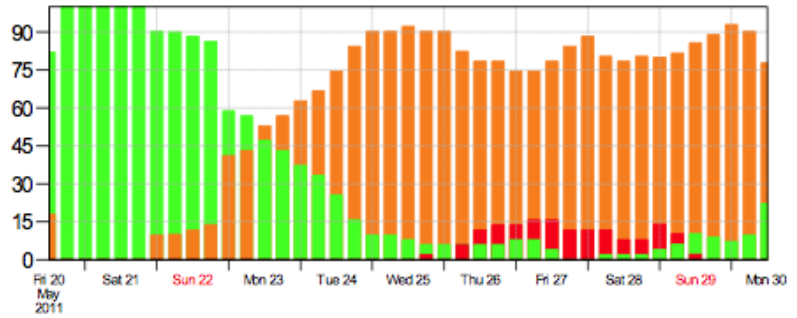
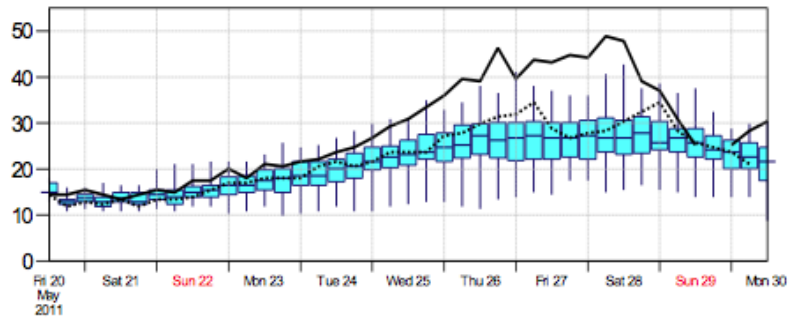
Probability (%) of Tropical Cyclone Intensity falling in each category

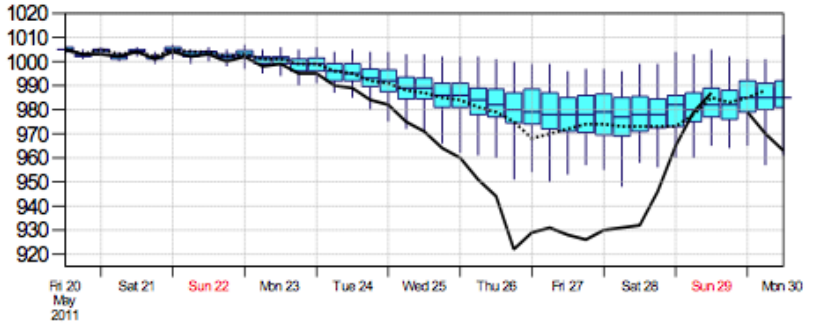
TD[up to 16] TS [17-32] HR1[33-42] HR2 [43-48] **HR3** [> 48 m/s]



10m Wind Speed (m/s)



Mean Sea Level Pressure in Tropical Cyclone Centre (hPa)



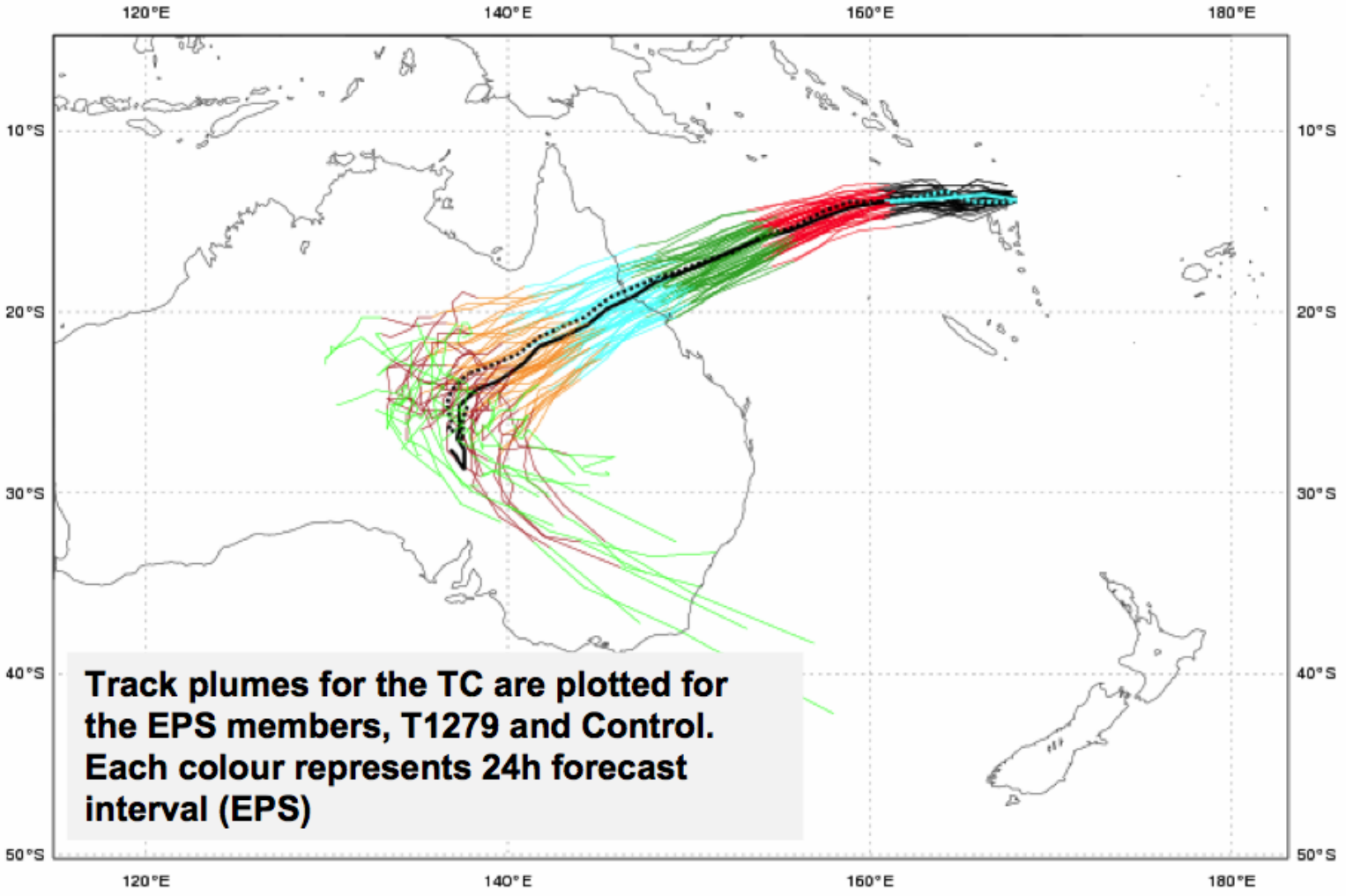
ECMWF

Date 20110130 12 UTC @ECMWF

Probability that **YASI** will pass within 120 km radius during the next **168** hours

tracks: **thick solid**=OPER; **thick dot**=CTRL; **thin solid**=EPS members

0-24h **24-48h** **48-72h** **72-96h** **96-120h** **120-144h** **144-168h**

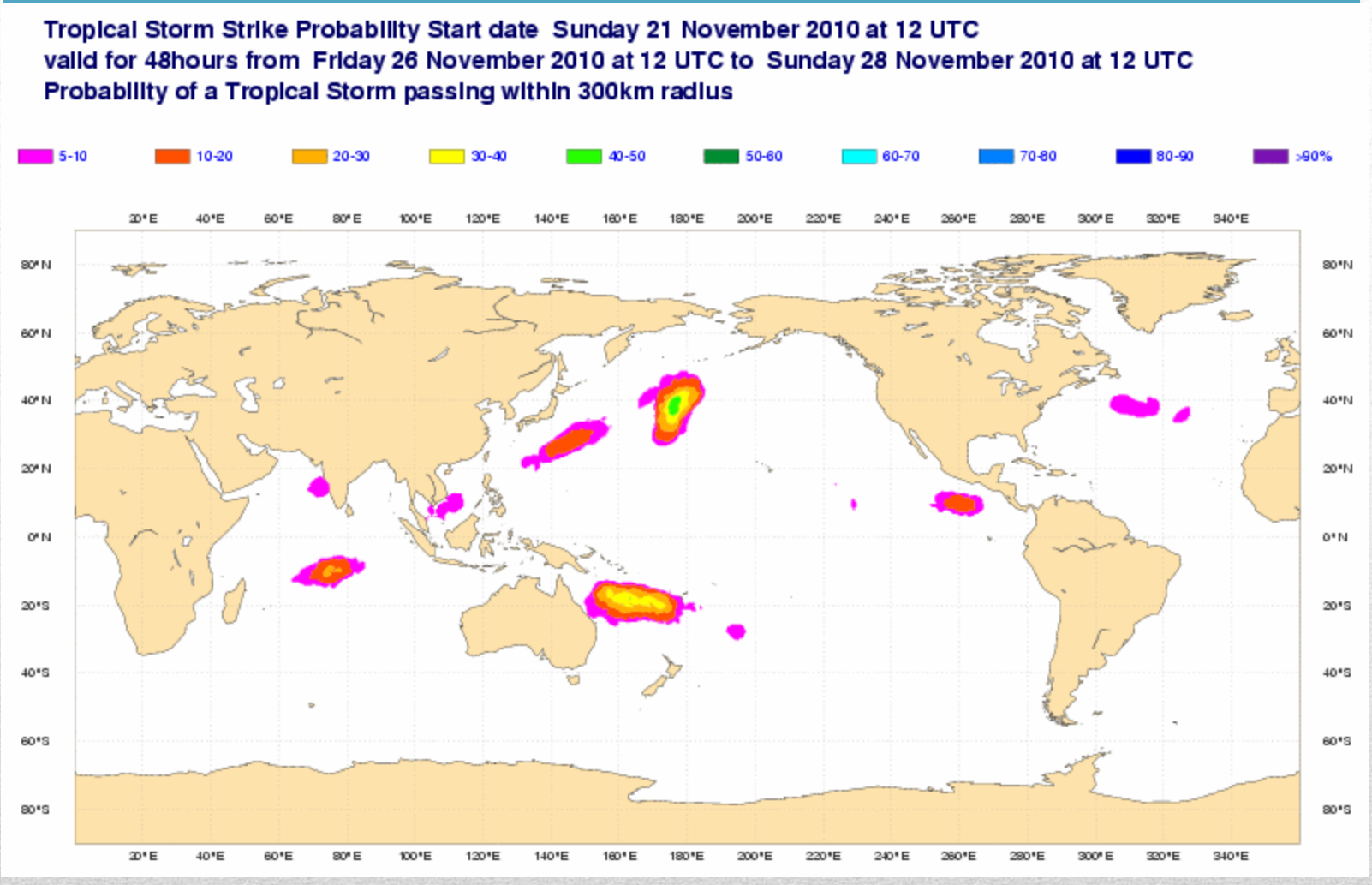


ECMWF

GIFS TIGGE – THORPEX

GIFS TIGGE – THORPEX

- Tropical cyclones
  - TC Genesis
  - Analysis of weak and strong storms differ
  - Global view
  - Contradictions
- The archive is a tremendous resource for the research community



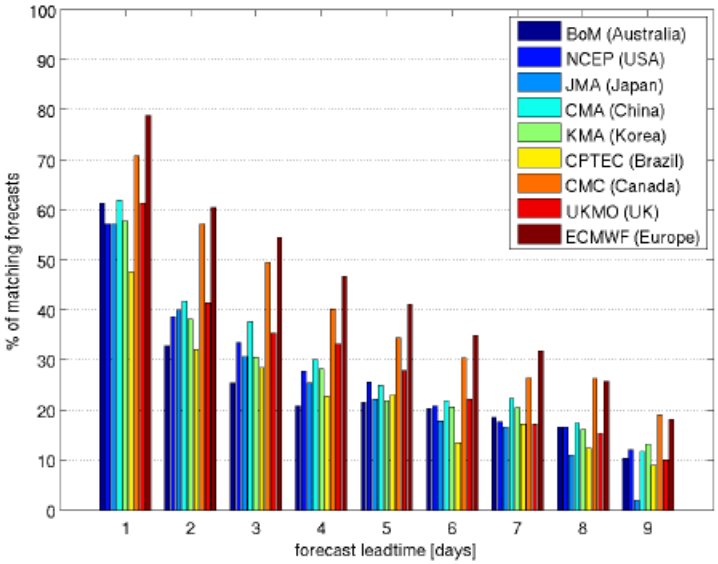
Forecasting TC genesis strike probability 5-7 days ahead

David Richardson / ECMWF

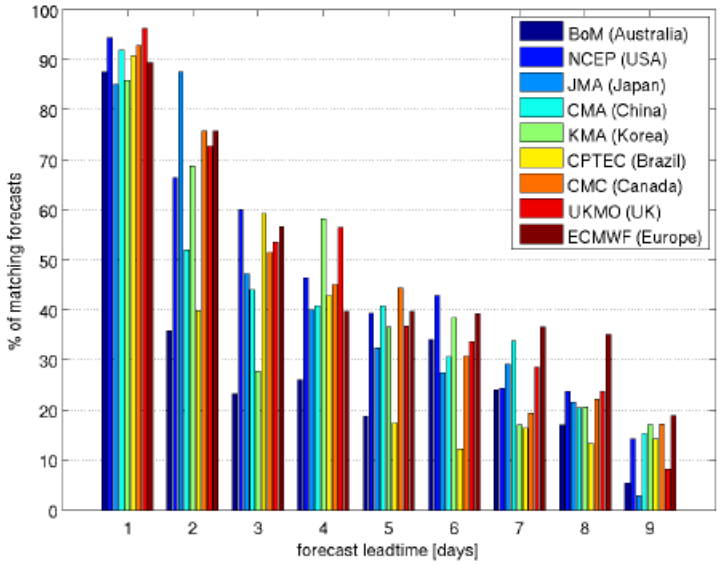
Results

Number of tracks

990 hPa < min SLP < 1000 hPa



930 hPa < min SLP < 950 hPa



Importance of analysis – especially for weak cyclones

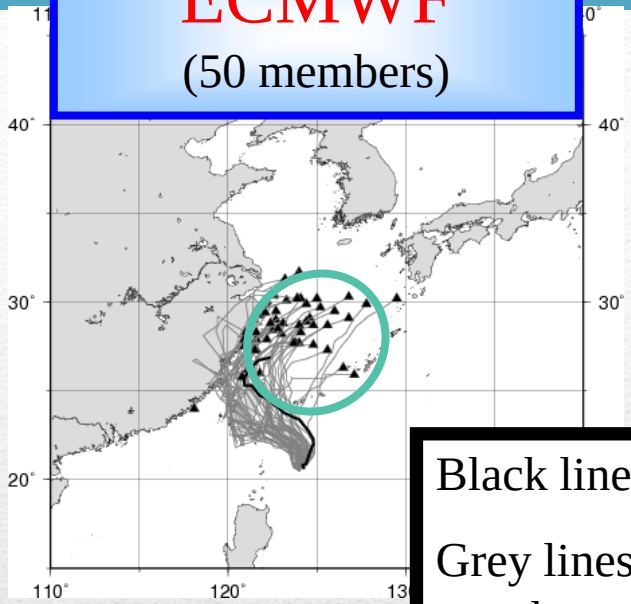
Forecasts of cyclone tracks

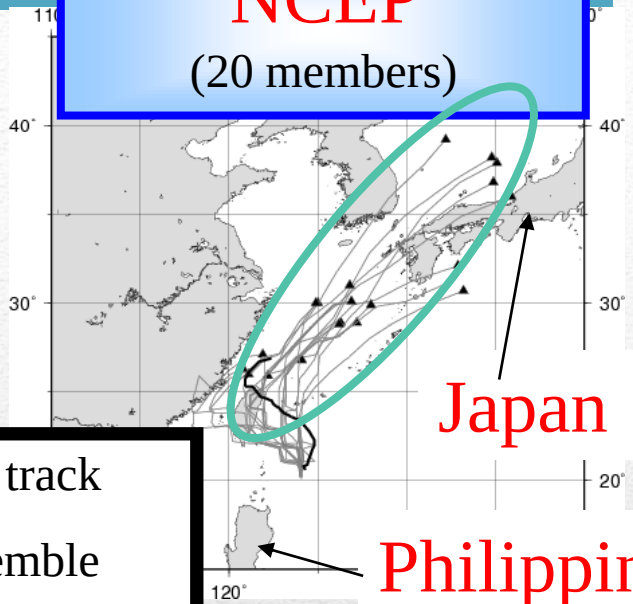
Jana Čampa, Heini Wernli

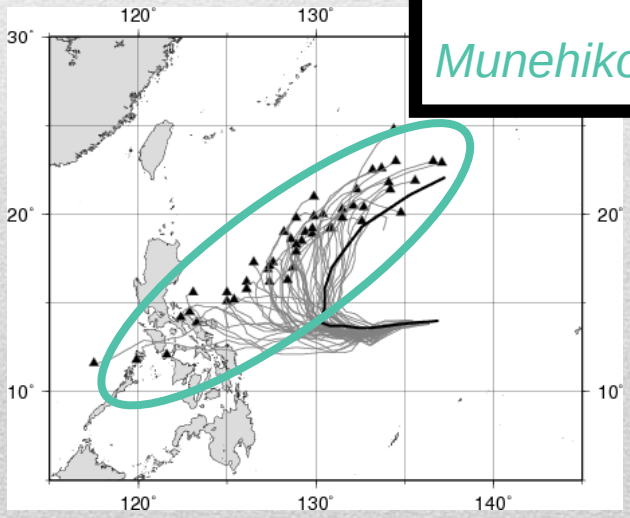
TC forecasts – ensemble spread contradictions

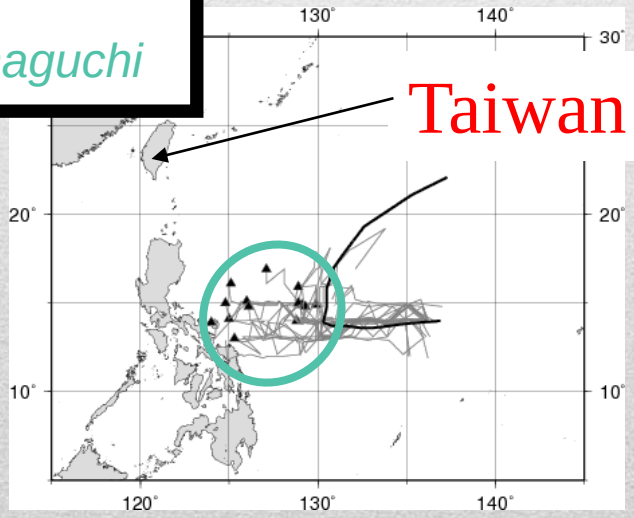
Sinlaku initiated at 12UTC 10 Sep. 2008

Dolphin initiated at 00UTC 13 Dec. 2008









Black line: Best track

Grey lines: Ensemble member

Munehiko Yamaguchi

Publicising TIGGE

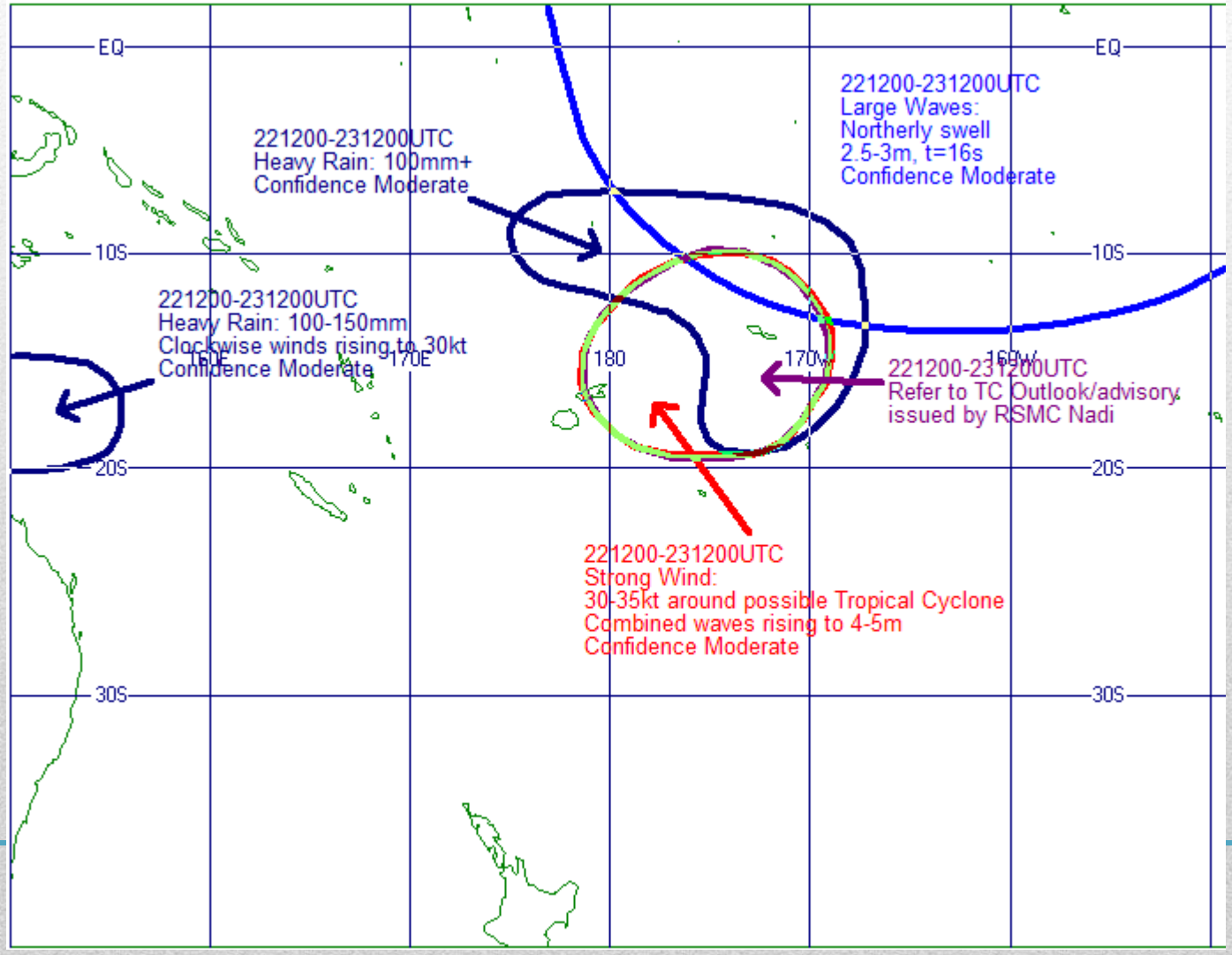
- Major Article in BAMS
- New leaflet to publicise TIGGE to researchers
- Contribution to GEO book "Crafting Geoinformation"
- Tropical cyclone case study in WMO Bulletin
- Update of TIGGE website

GIFS TIGGE – South Pacific

- Severe Weather Forecasting and Disaster risk reduction Demonstration Project (SWFDDP)
- Informing small island communities

GIFS TIGGE – South Pacific

South Pacific Guidance chart during TC Wilma Jan 2011

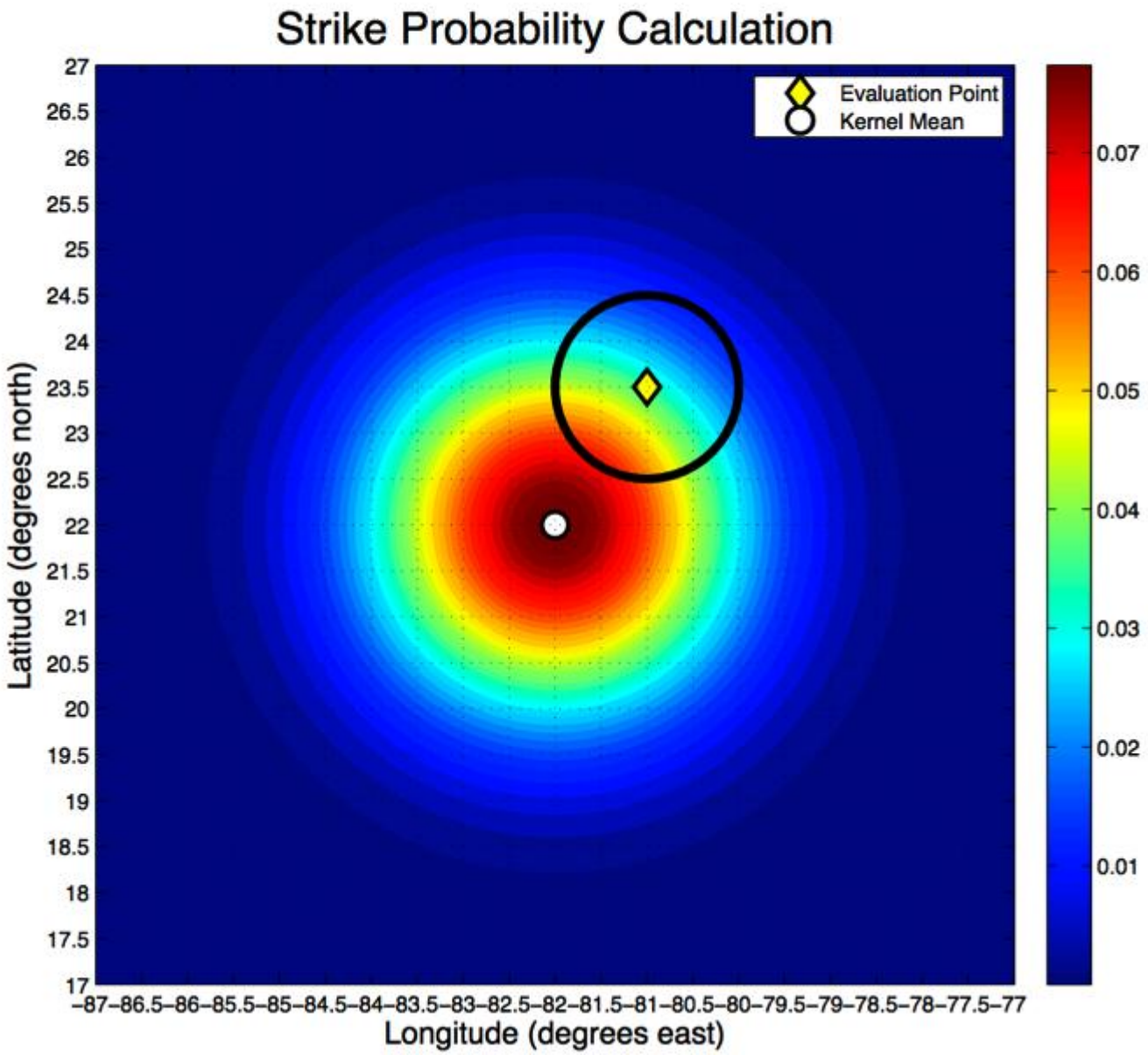


HFIP – FAB Statistical Post-Processing

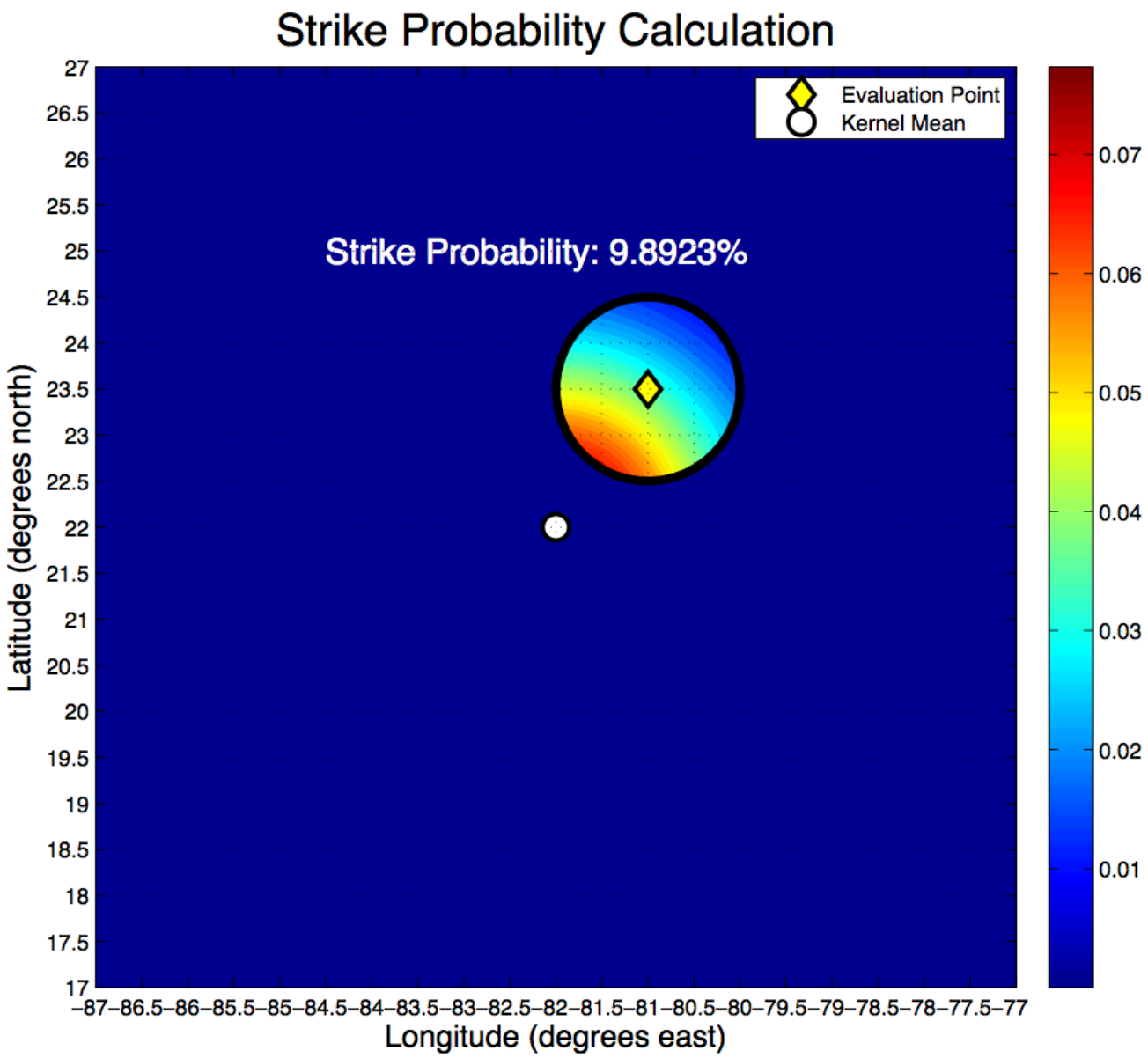
- Strike probability and track forecast cones each describe the probability of a single event (storm will be located within a 60 n mi radius)
- A storm position pdf (SPPDF) forecast is a more general approach describing the probability of all events related to storm position.
- Users may be interested in the probability of storm passing within their state or county. They can obtain this information if they have access to a storm position pdf.

HFIP – FAB Statistical Post-Processing

Example: 2D PDF

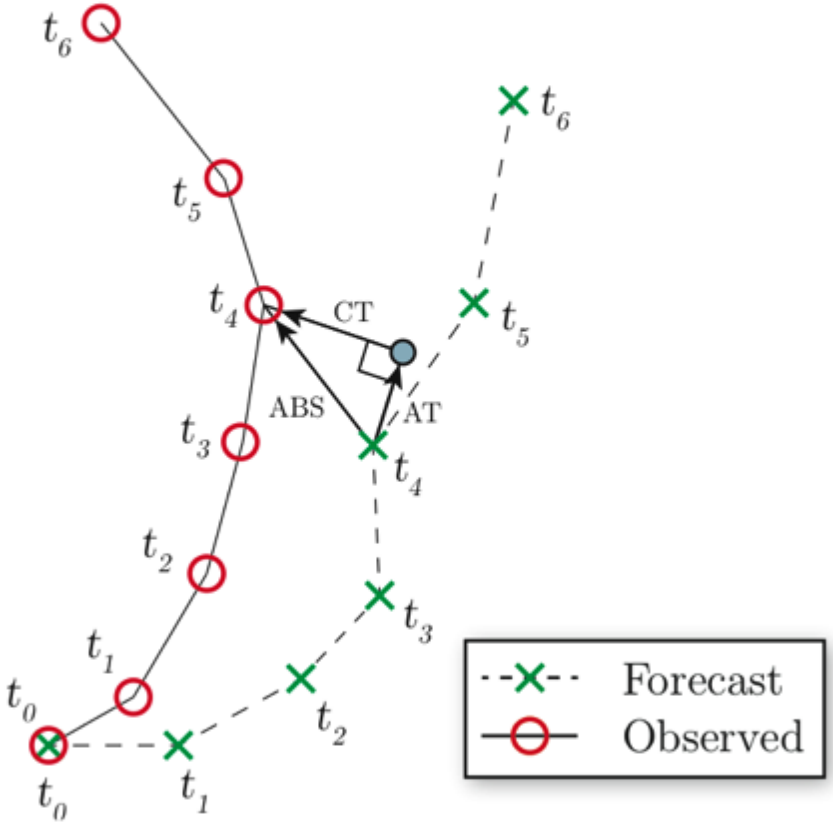


Example: 2D PDF



Proposed Method: Track Errors

- An SPPDF is constructed from an ensemble forecast and is based on historical error statistics.
- These historical errors are seperated into **along-track** (timing) and **cross-track** (position) components.
- All errors are great circle distances, accounting for the curvature of the Earth's surface.



Proposed Method: Best Members

- For a given forecast case, we can determine a **best member**, which is closest to the observed track *in that case*.

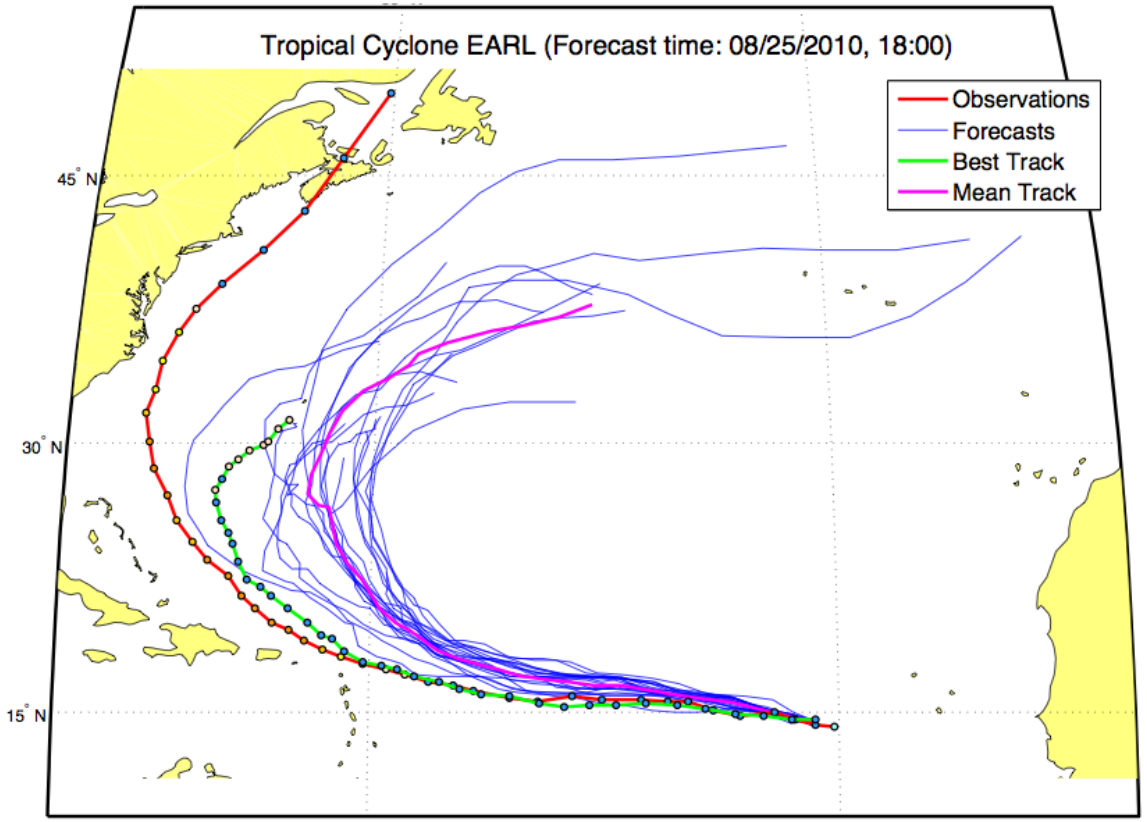
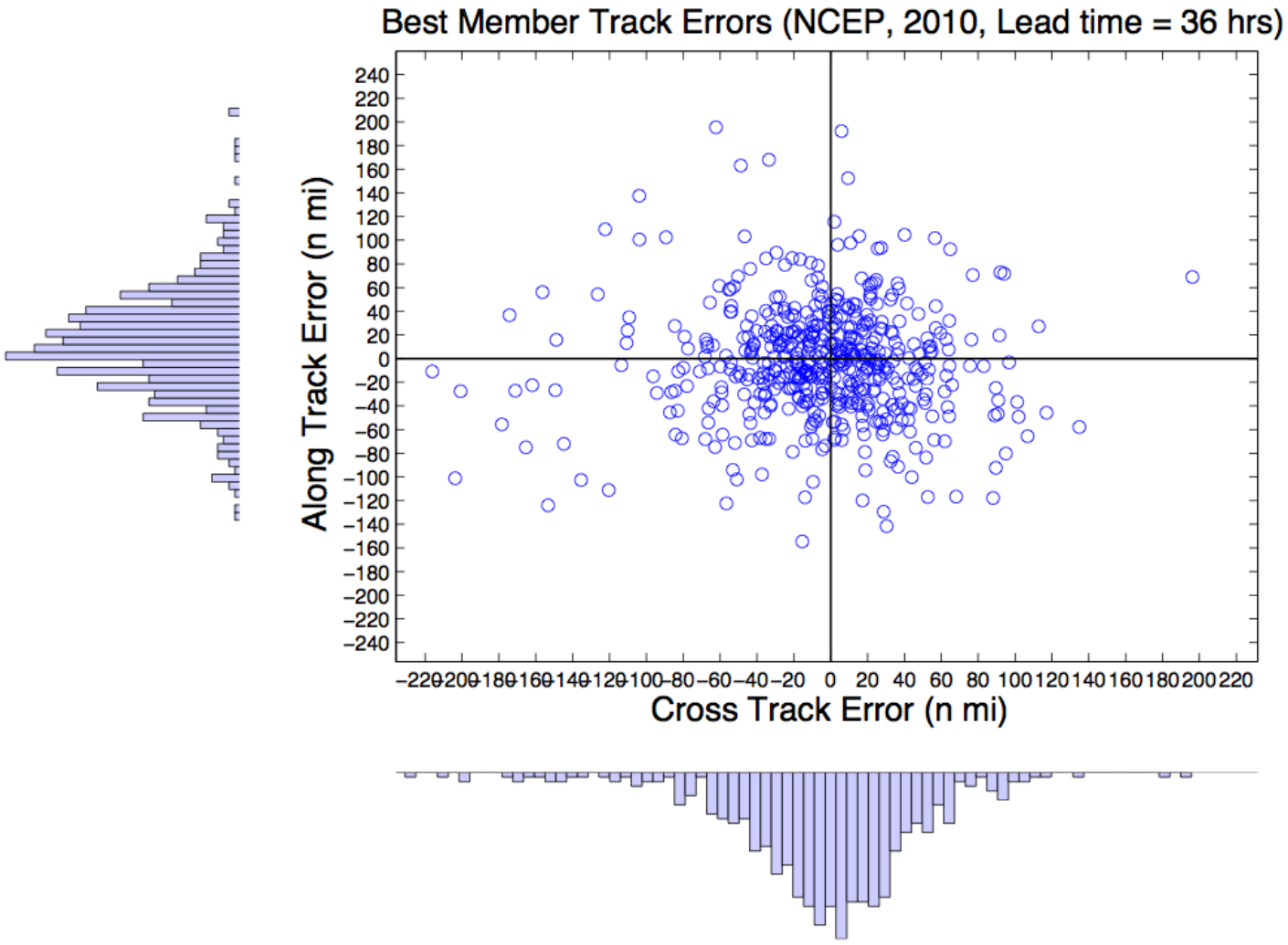


Figure: Forecast case for Hurricane Earl at 08/25/2010, 6:00 pm.

Example: Aggregated Errors

- 2-dimensional normal distributions can be fit to error statistics of best members aggregated over a period of time.



Example: Hurricane Irene (Initial time)

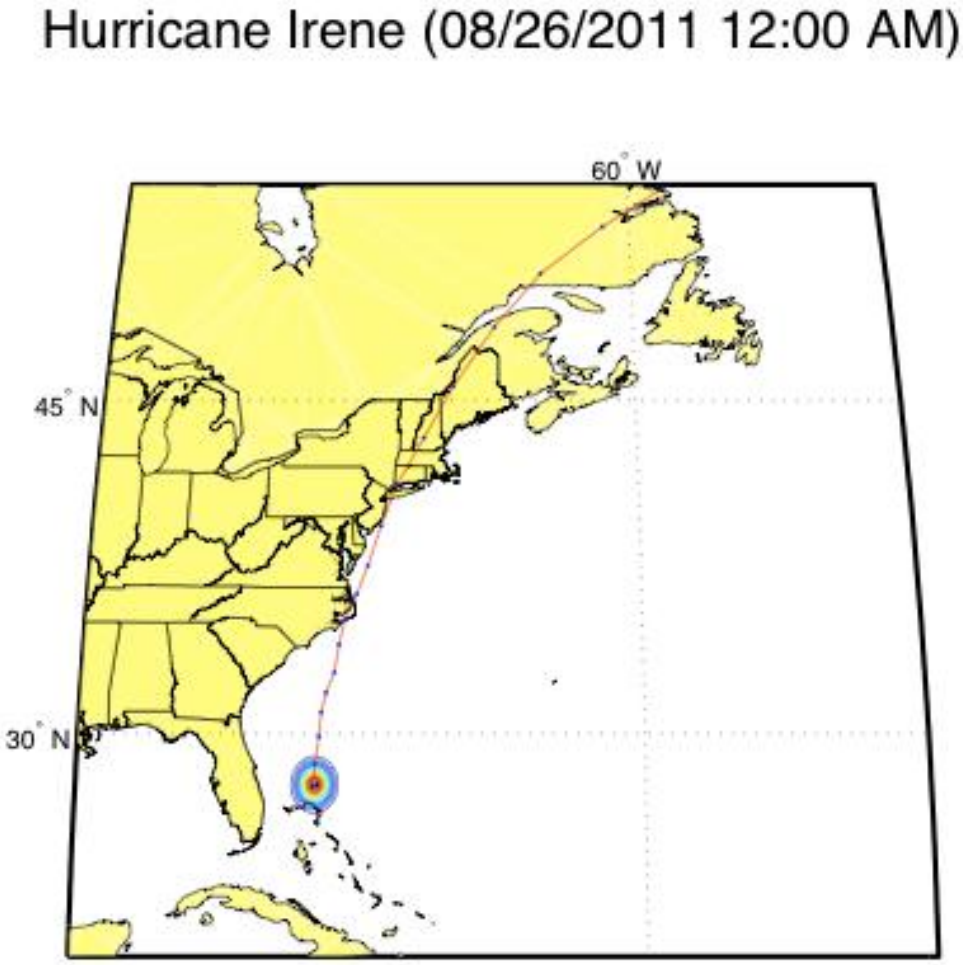


Figure: GEFS 20-member ensemble mean and storm position probability distribution at the initial time.

Example: Hurricane Irene SPPD (12 hrs)

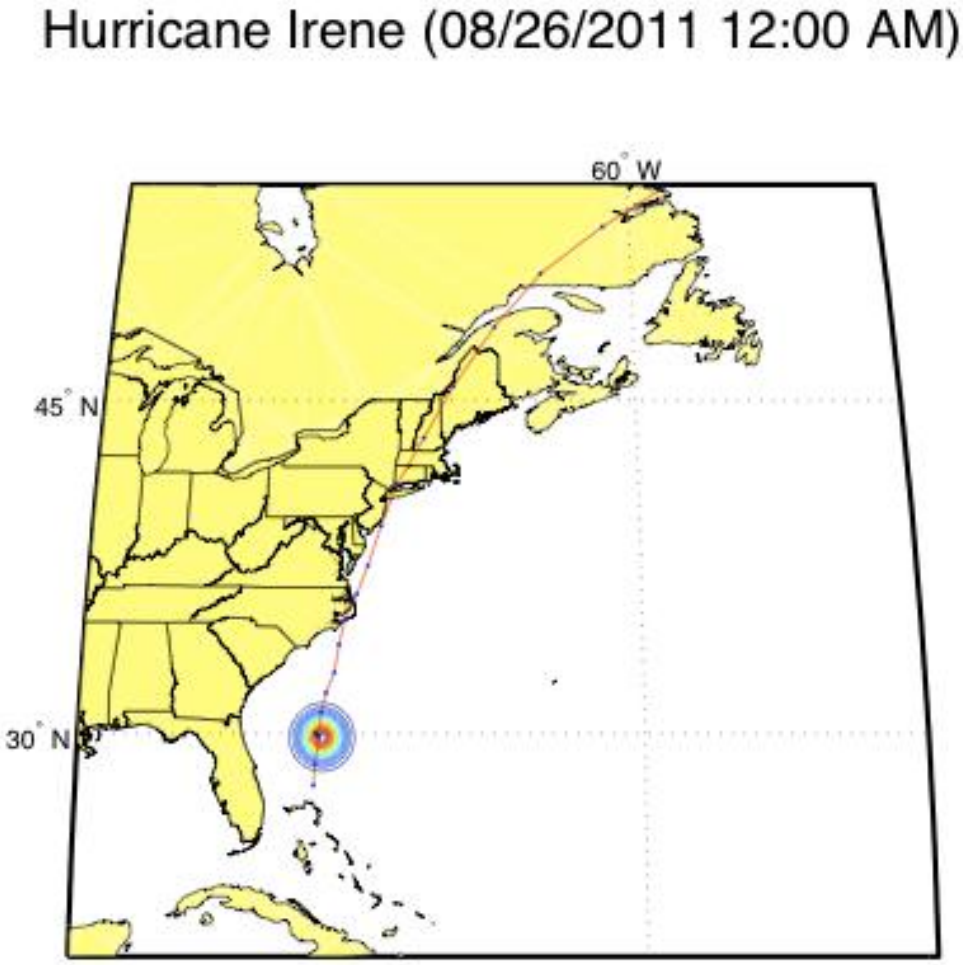


Figure: GEFS 20-member ensemble mean and storm position probability distribution at 12 hours of lead time.

Example: Hurricane Irene SPPD (24 hrs)

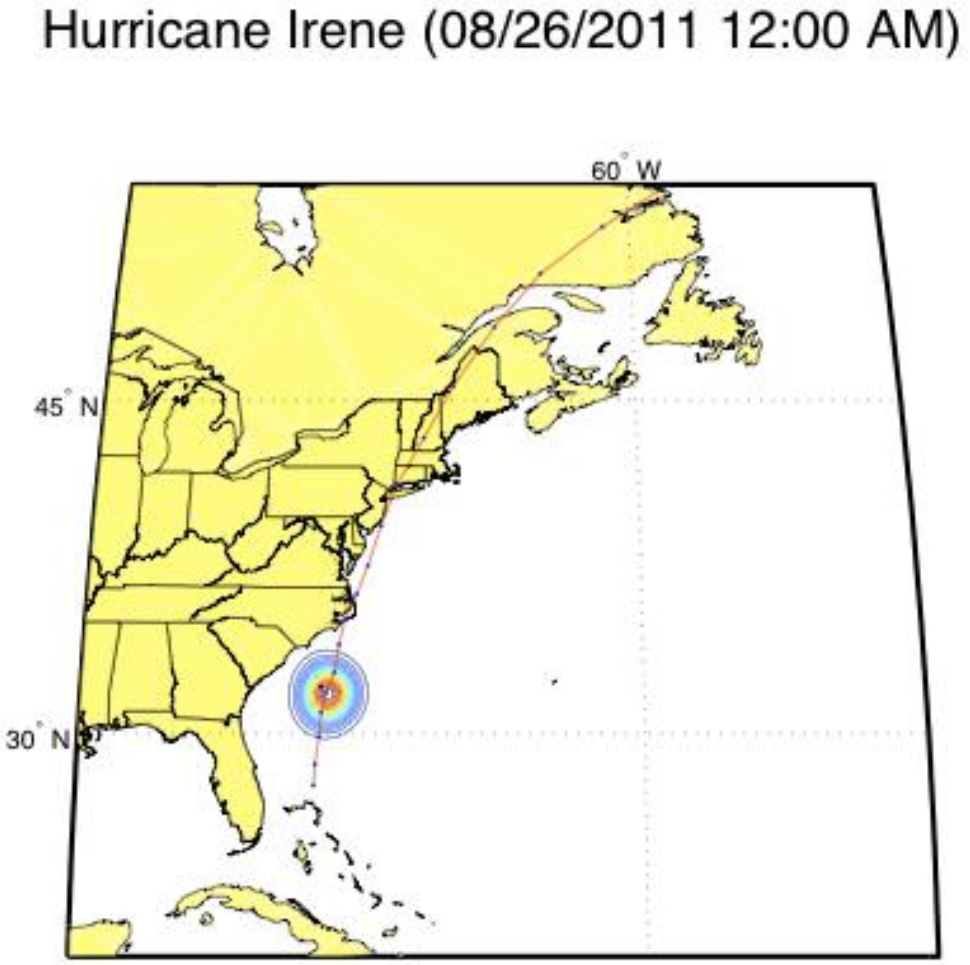


Figure: GEFS 20-member ensemble mean and storm position probability distribution at 24 hours of lead time.

Example: Hurricane Irene SPPD (36 hrs)

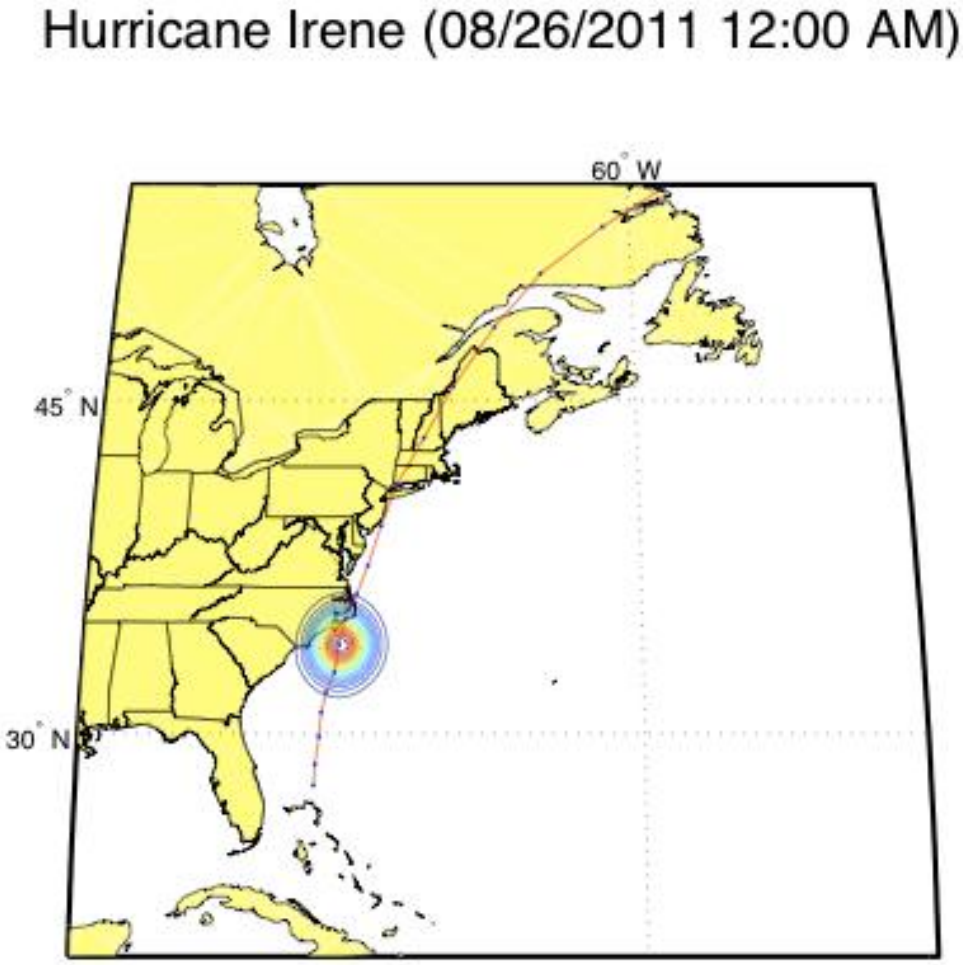


Figure: GEFS 20-member ensemble mean and storm position probability distribution at 36 hours of lead time.

Example: Hurricane Irene SPPD (48 hrs)

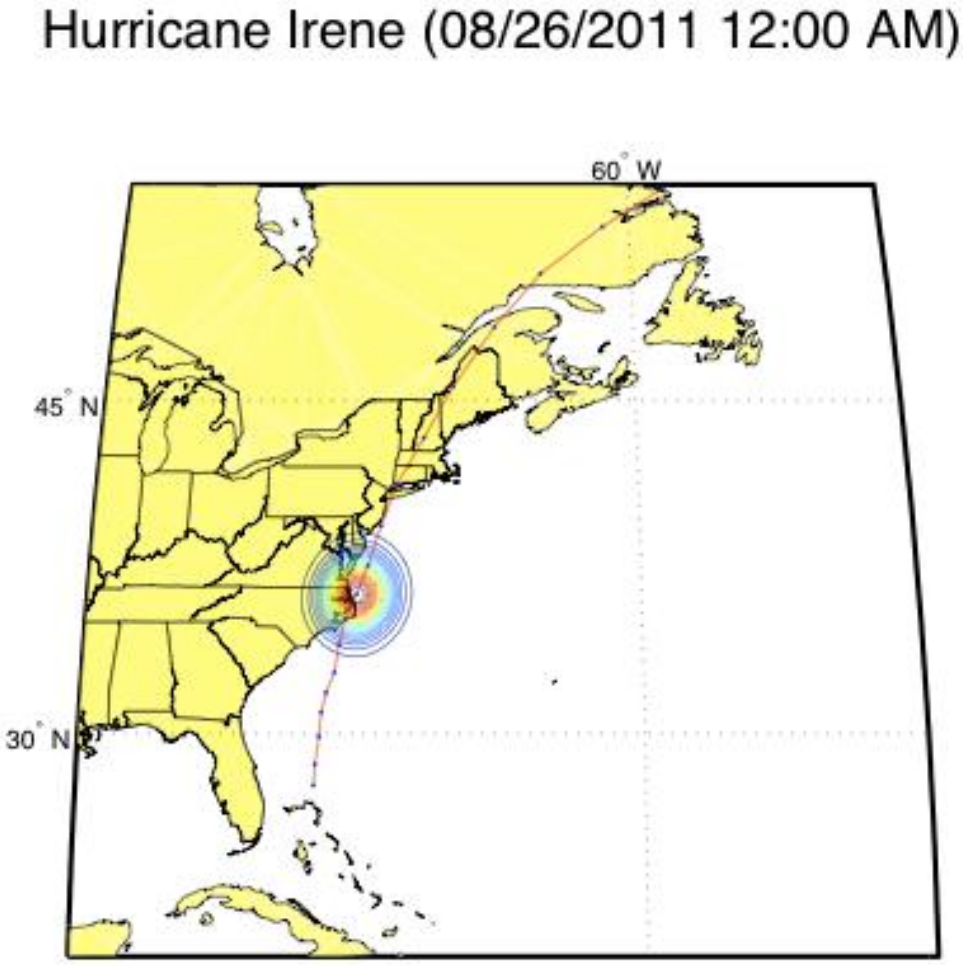


Figure: GEFS 20-member ensemble mean and storm position probability distribution at 48 hours of lead time.

Example: Hurricane Irene SPPD (60 hrs)

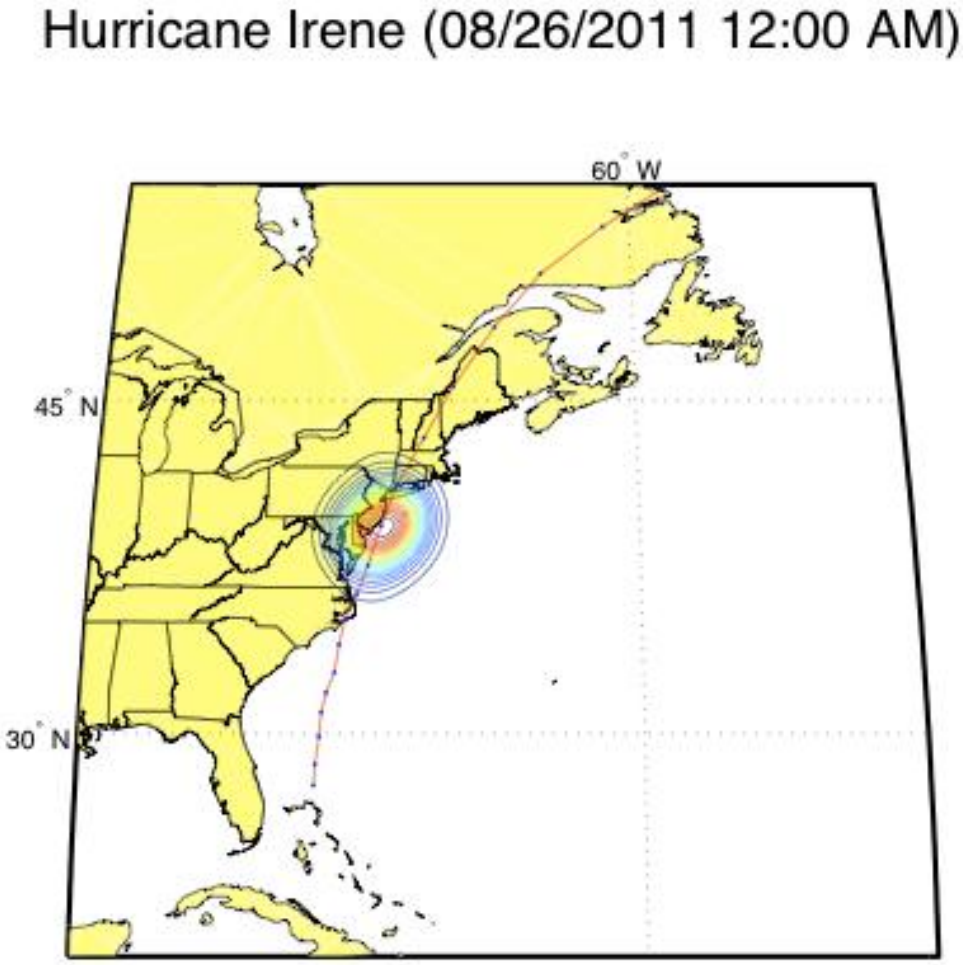


Figure: GEFS 20-member ensemble mean and storm position probability distribution at 60 hours of lead time.

Example: Hurricane Irene SPPD (72 hrs)

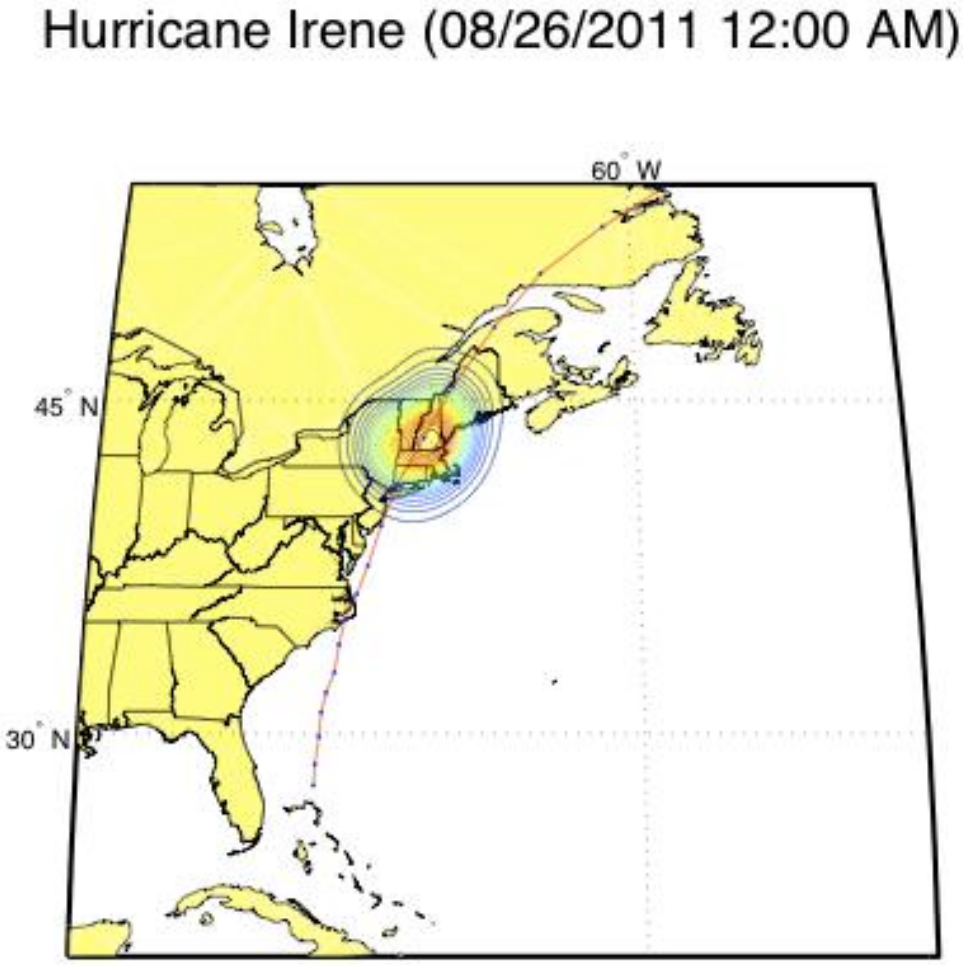


Figure: GEFS 20-member ensemble mean and storm position probability distribution at 72 hours of lead time.

Example: Hurricane Irene SPPD (84 hrs)

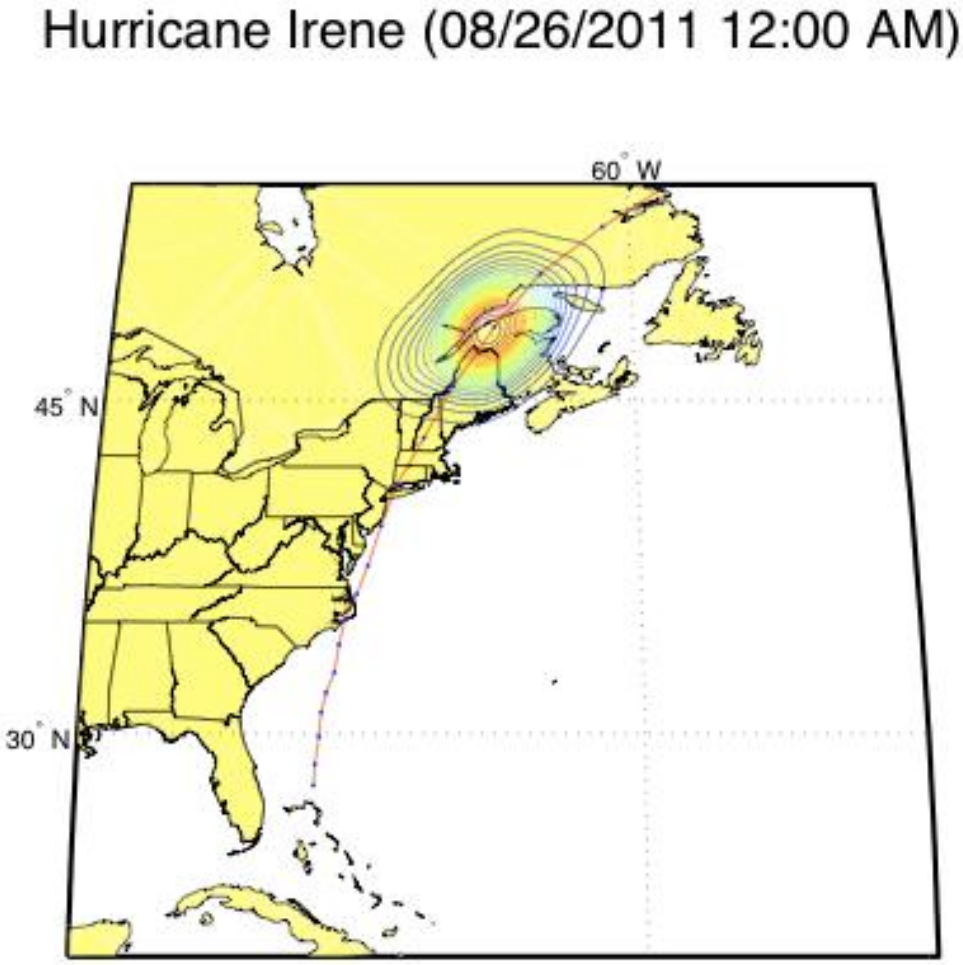


Figure: GEFS 20-member ensemble mean and storm position probability distribution at 84 hours of lead time.

SUMMARY

- FAB Ongoing SPPDF Work
  - Verification, 2-D continuous rank probability scores
  - Application to multi-model ensembles
  - Comparison with NHC track forecast cones

- GSD & DTC to host 10th International THORPEX GIFS TIGGE Workshop
  - Boulder, July 2012
  - Please consider attending, engaging on the international level