An early look at the forecast performance of the Flow-Following Icosahedral Model (FIM)

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Configuration of FIM for real-time runs
What did we look at?
A few examples of forecasts
Summary

Forecast skill must be adequate to establish FIM's readiness to contribute to Global Ensemble Forecast System

SOME SPECIFICS

FIM running regularly twice daily at ESRL
- Initial conditions from 0000 and 1200 UTC initialized fields for the NCEP Global Forecast System (GFS) operational runs
- Computational polygons are ~ 30km in diameter, covering the globe
- 50 computational layers (bottom: earth's surface GFS terrain height; top: 20 hPa)
- GFS Physics

Sources of forecast imagery
- ALPS (Advanced Linux Prototype System of AWIPS)
- Good for putting fields together, creating images
- Primary source of images shown today

http://fim.noaa.gov > Global or CONUS

Example: FIM comparison with GFS, European Center (ECMWF) model

Next 2 slides: Four-panel images

    - 500 hPa height (contours)

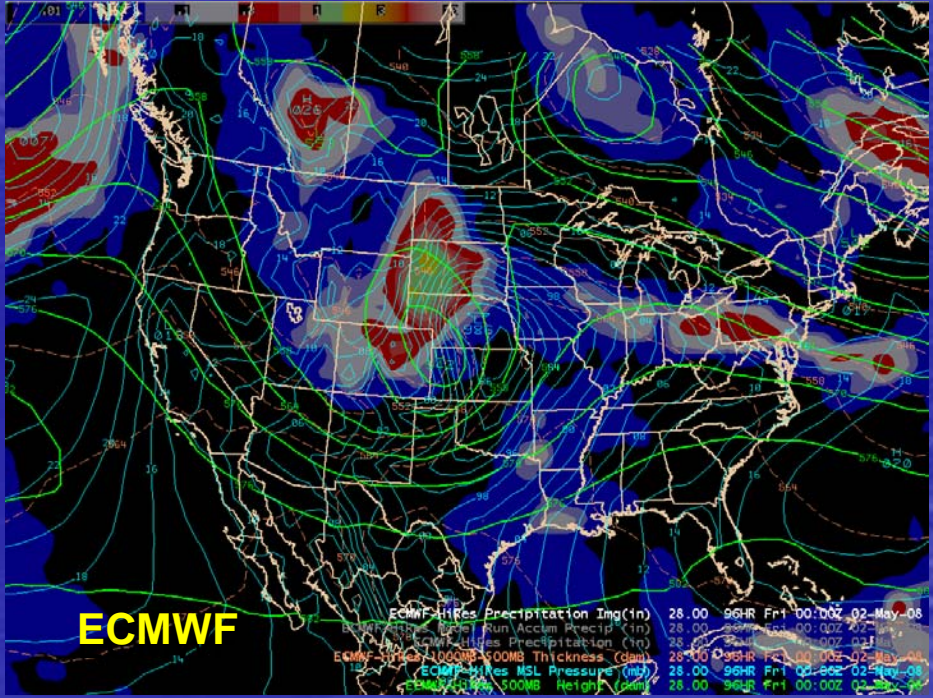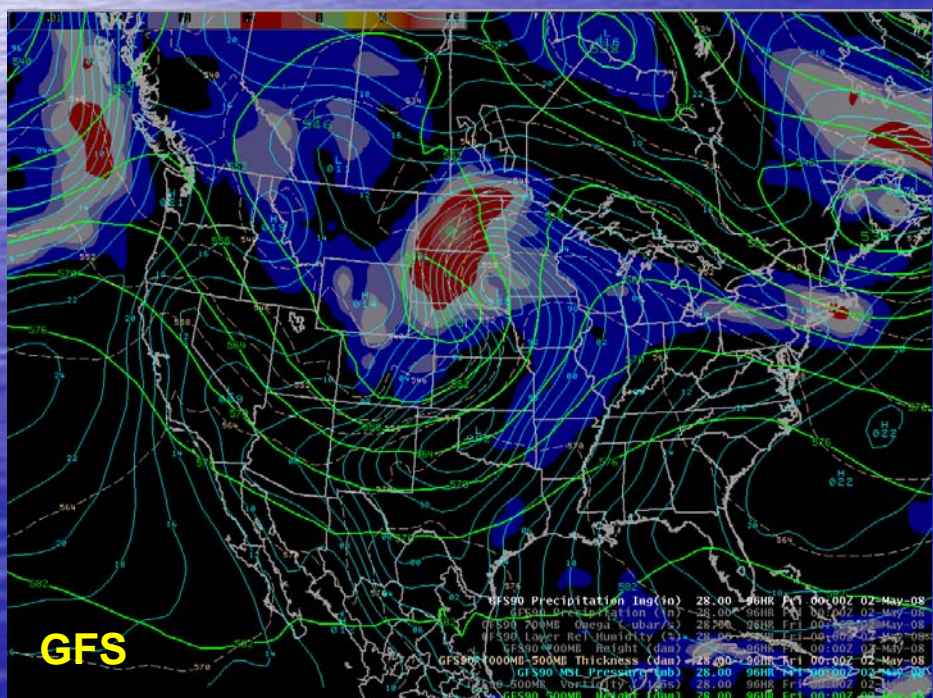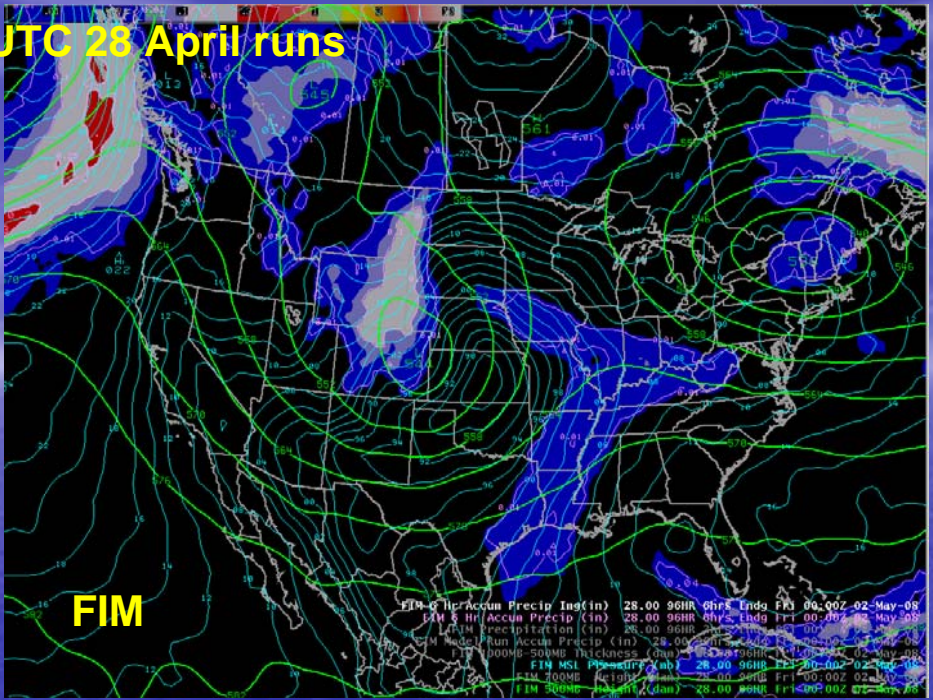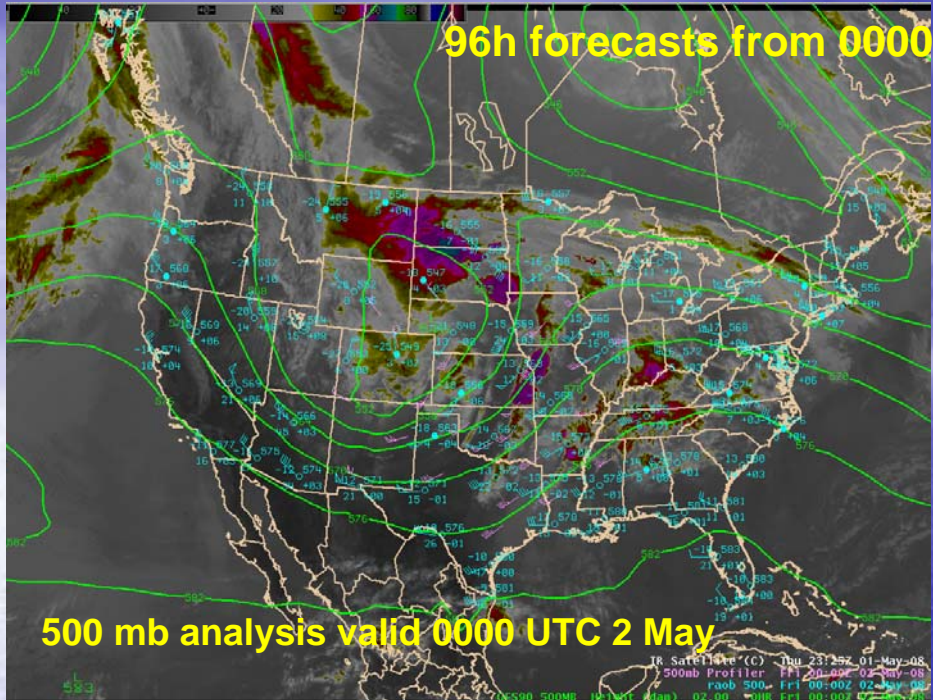   - Precipitation (image) [FIM is 3-h total, ECMWF and GFS are 6-h totals]
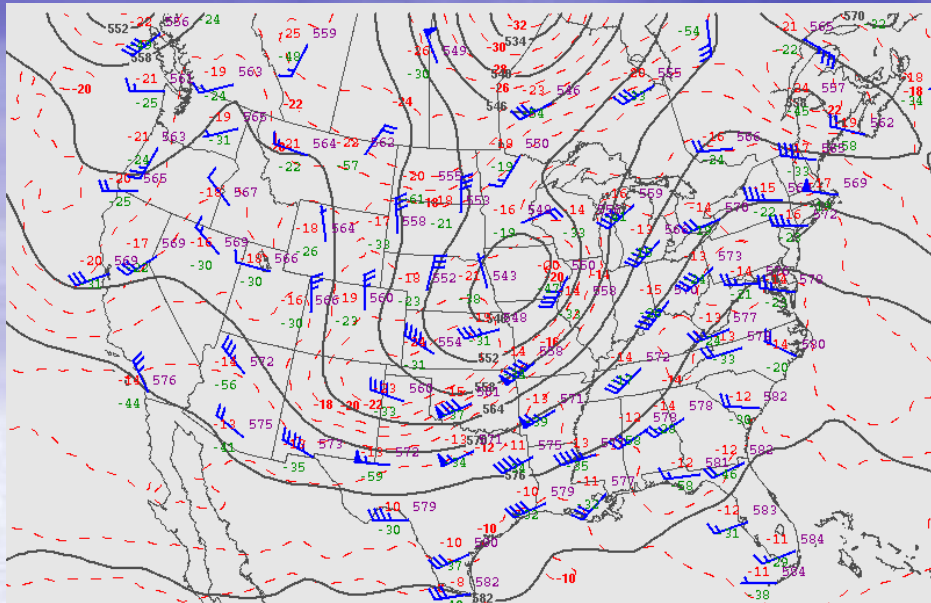
Initial time: 0000 UTC Mon 28 April 08

Valid time: 0000 UTC Fri 2 May 08 (96h forecast)

Initial time: 1200 UTC Mon 28 April 08

Valid time: 0000 UTC Sat 3 May 08 (108h forecast)
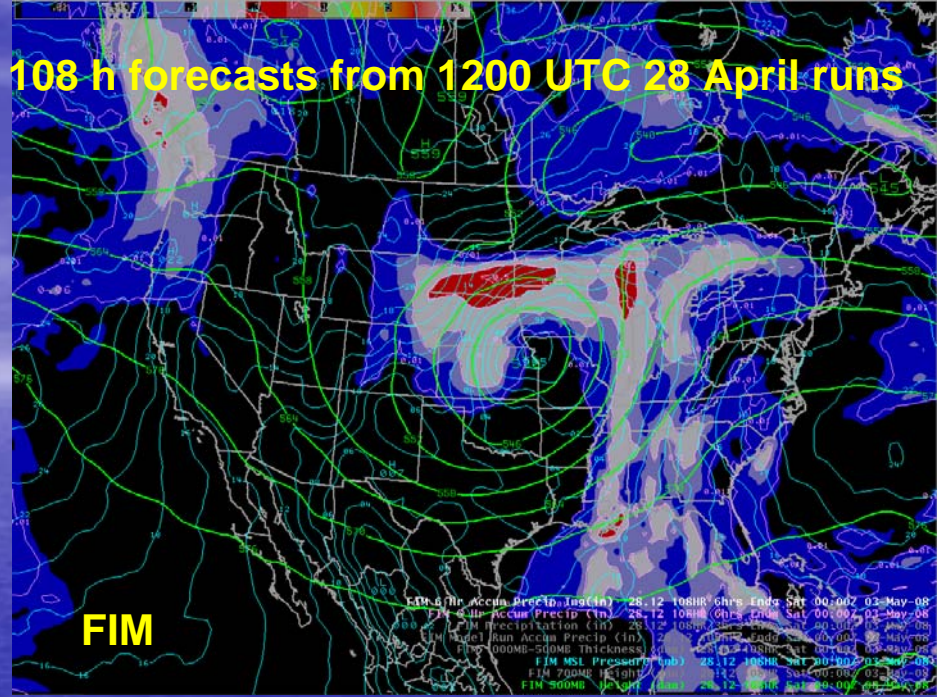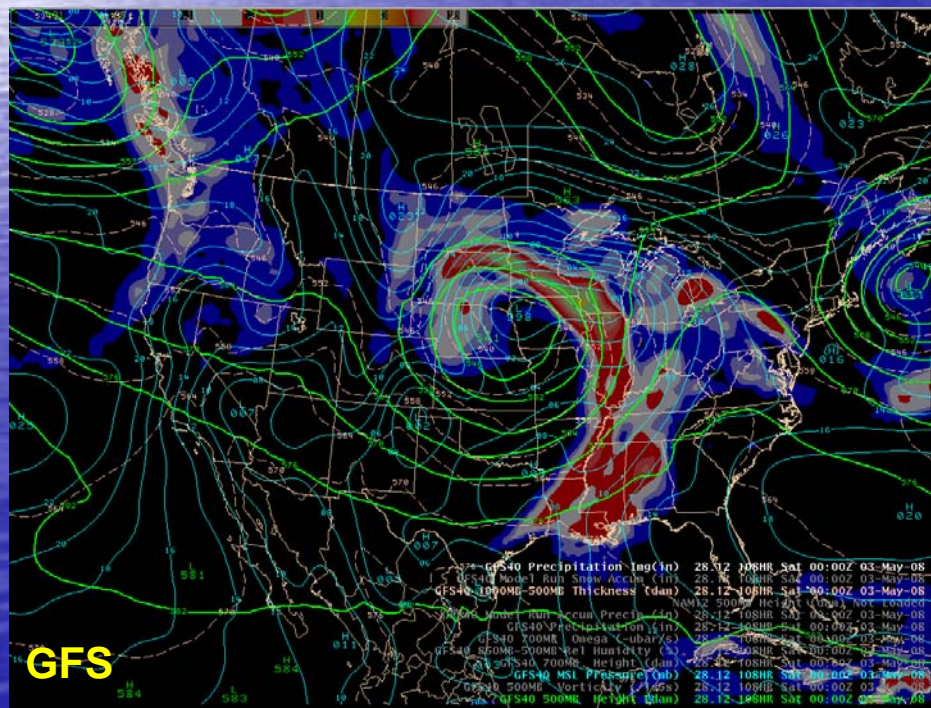
96h forecasts from 0000 UTC 28 April runs

500 mb analysis valid 0000 UTC 2 May

FIM

GFS

ECMWF

500 mb analysis valid 0000 UTC 3 May
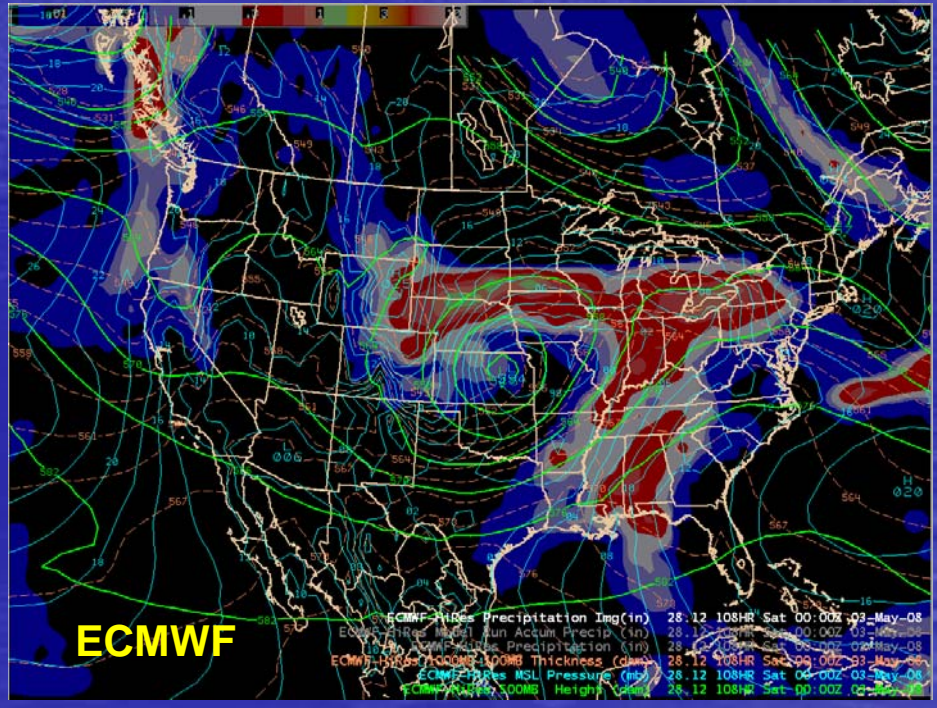
108 h forecasts from 1200 UTC 28 April runs
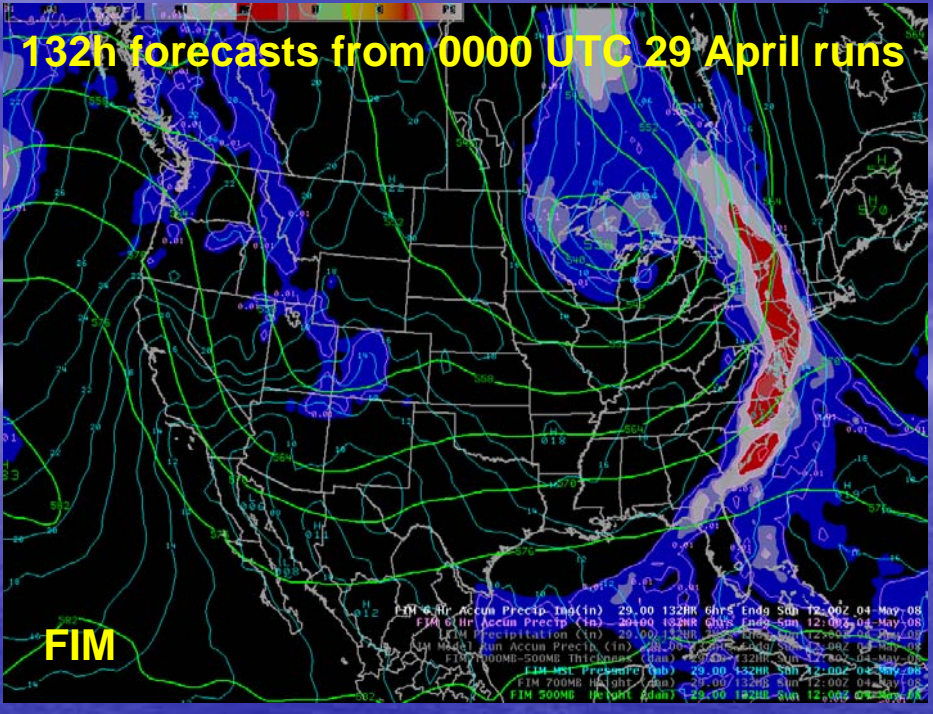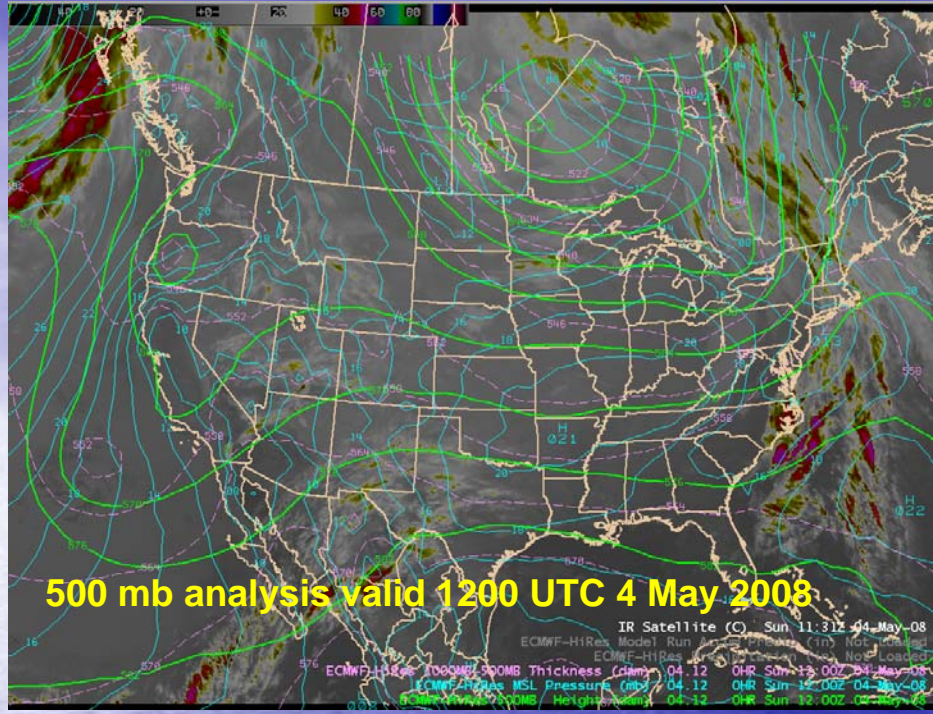
FIM

GFS

ECMWF

Example: FIM comparison with GFS, European Center (ECMWF) model

Four-panel images

- 500 hPa height (contours)
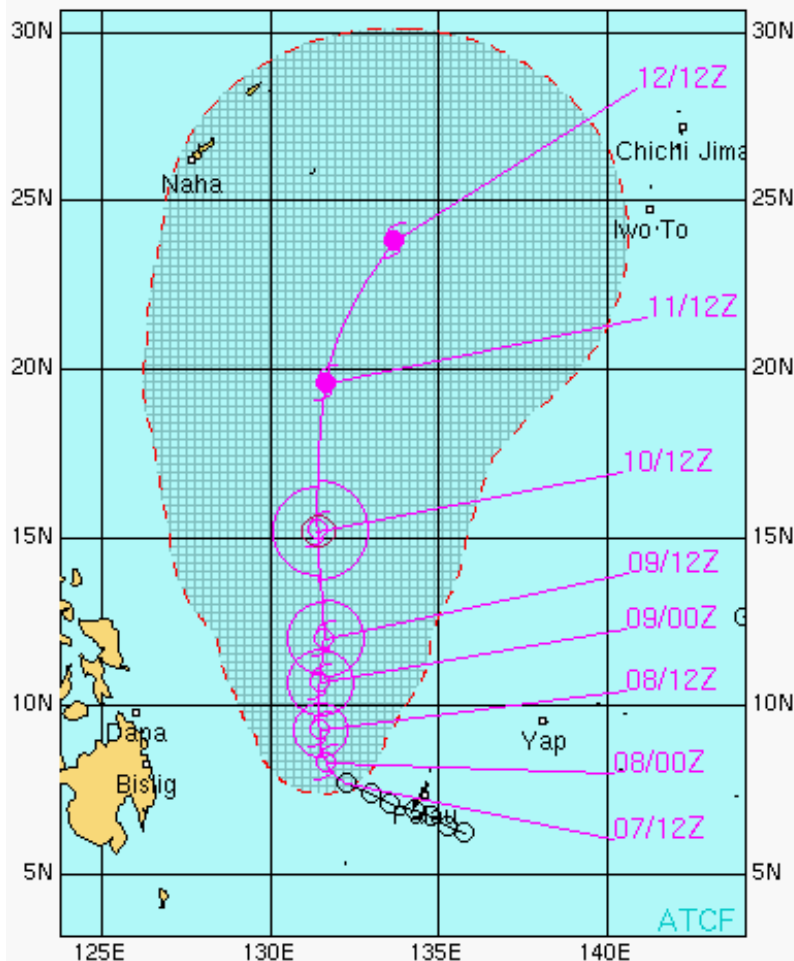- Precipitation (image) [FIM is 3-h total, ECMWF is 6-h]

Initial time: 0000 UTC Tue 29 April 08

Valid time: 1200 UTC Sun 4 May 08 (132h forecast)

500 mb analysis valid 1200 UTC 4 May 2008

132h forecasts from 0000 UTC 29 April runs

FIM

GFS

ECMWF
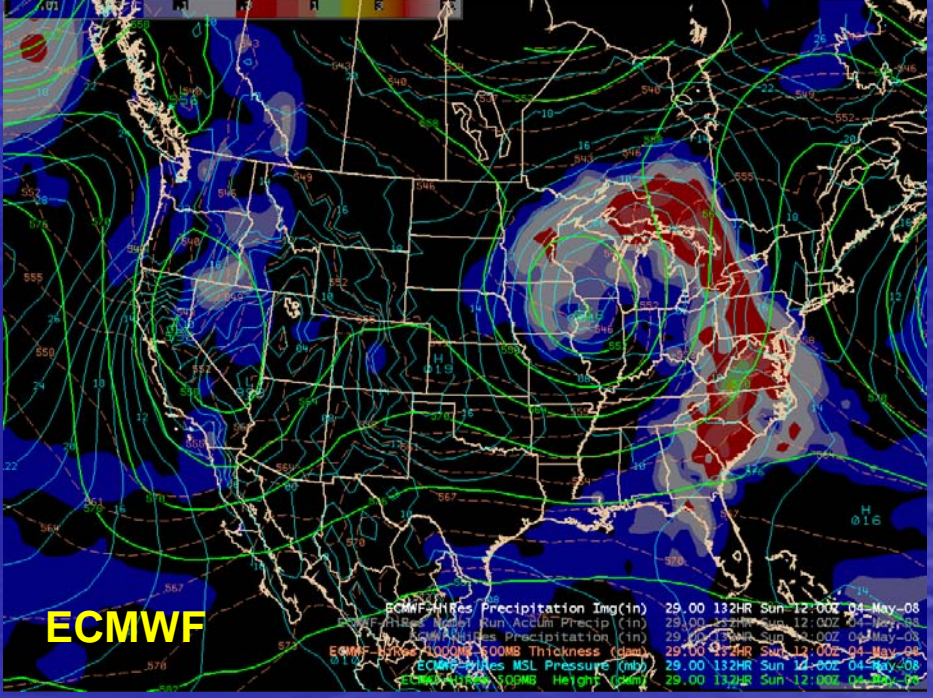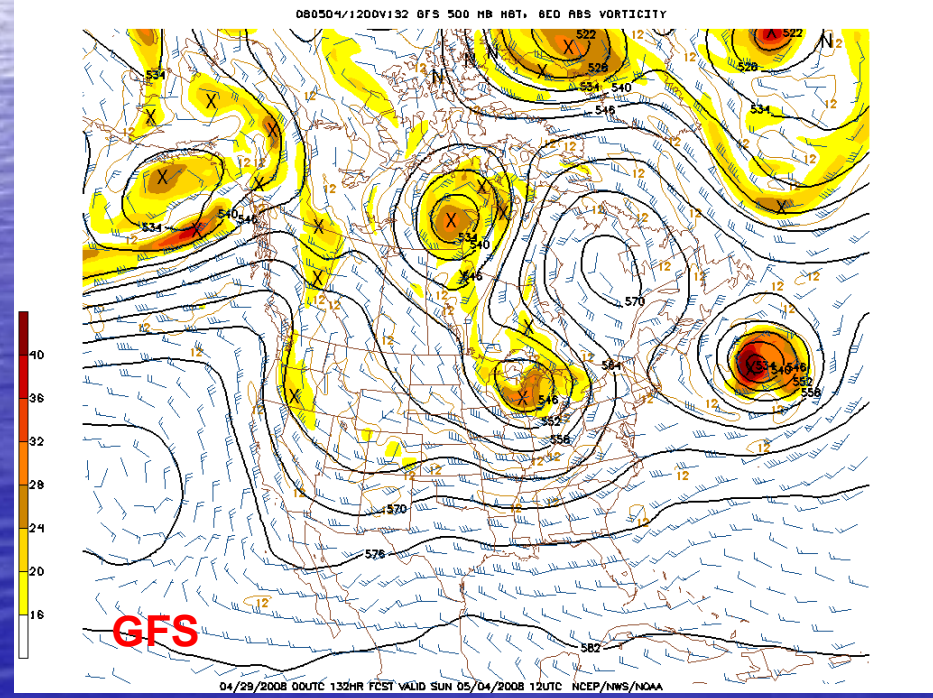
Example: Tropical Depression 03W Western Pacific (FIM and GFS forecasts from 1200 UTC Tue 6 May 2008)

Joint Typhoon Warning Center Warning#2 1200 UTC 7 May 2008

00h forecast of sea-level pressure (hPa - 1000)
FIM
GFS

Valid time: 1200 UTC Tue 7 May 2008

GFS-0p5degGb1 MSL Pressure (mb) 06.12 0HR Tue 12:00Z 06-May-08
FIM MSL Pressure (mb) 06.12 0HR Tue 12:00Z 06-May-08

24h forecast of sea-level pressure (hPa - 1000)
FIM
GFS

Valid time: 1200 UTC Wed 7 May 2008

48h forecast of sea-level pressure (hPa - 1000)
FIM
GFS

Valid time: 1200 UTC Thu 8 May 2008

72h forecast of sea-level pressure (hPa - 1000)
FIM
GFS

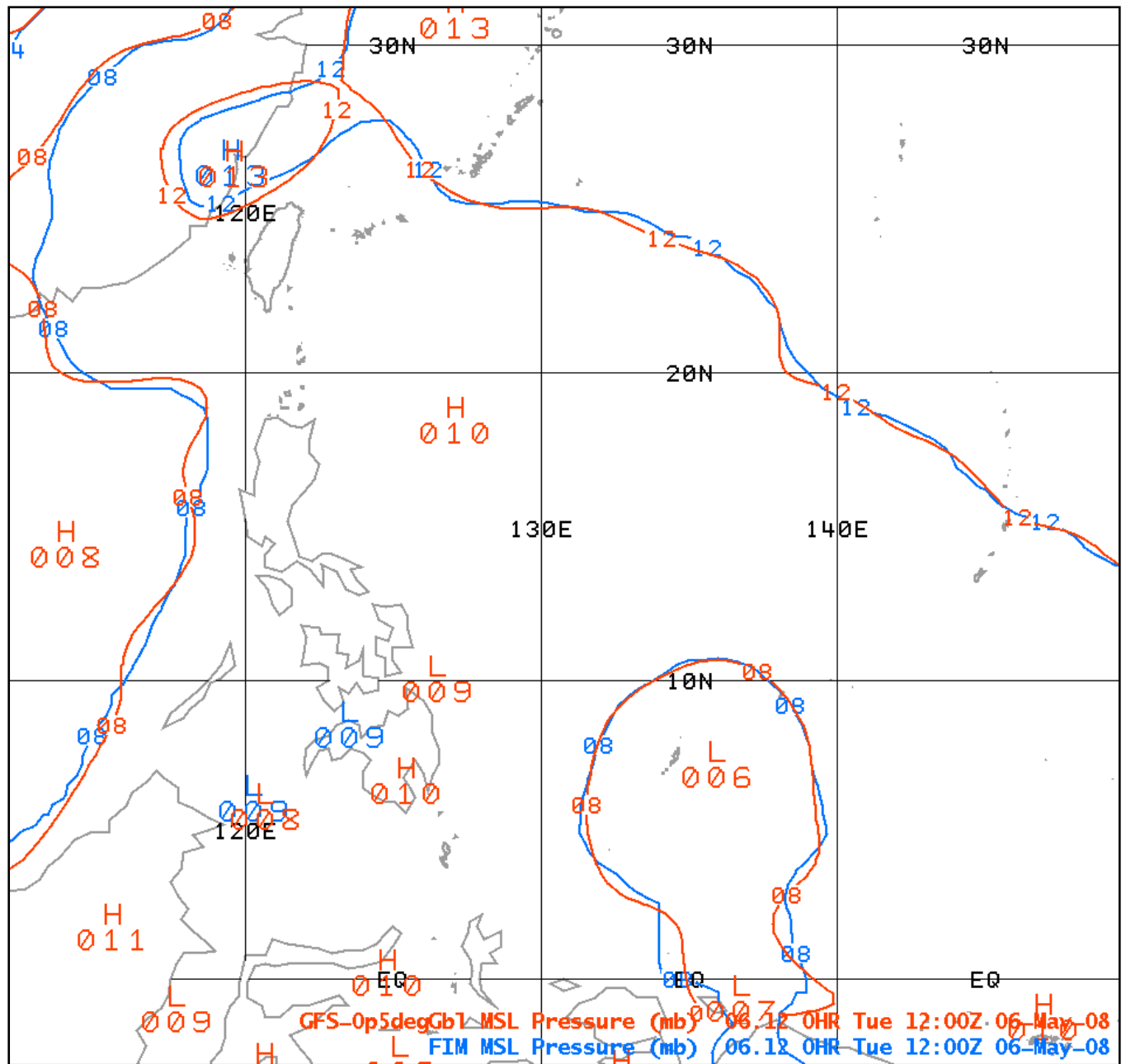Valid time: 1200 UTC Fri 9 May 2008

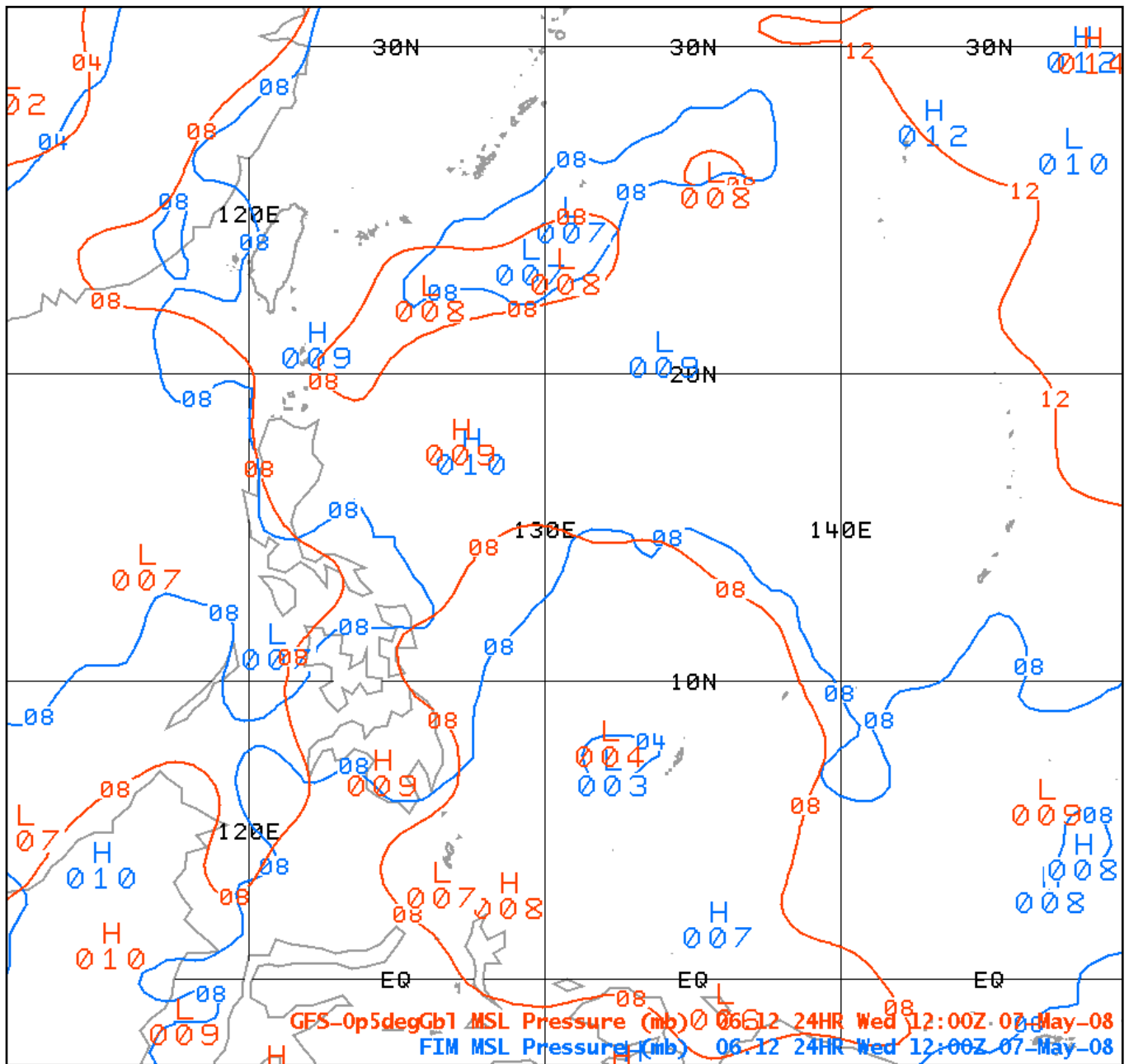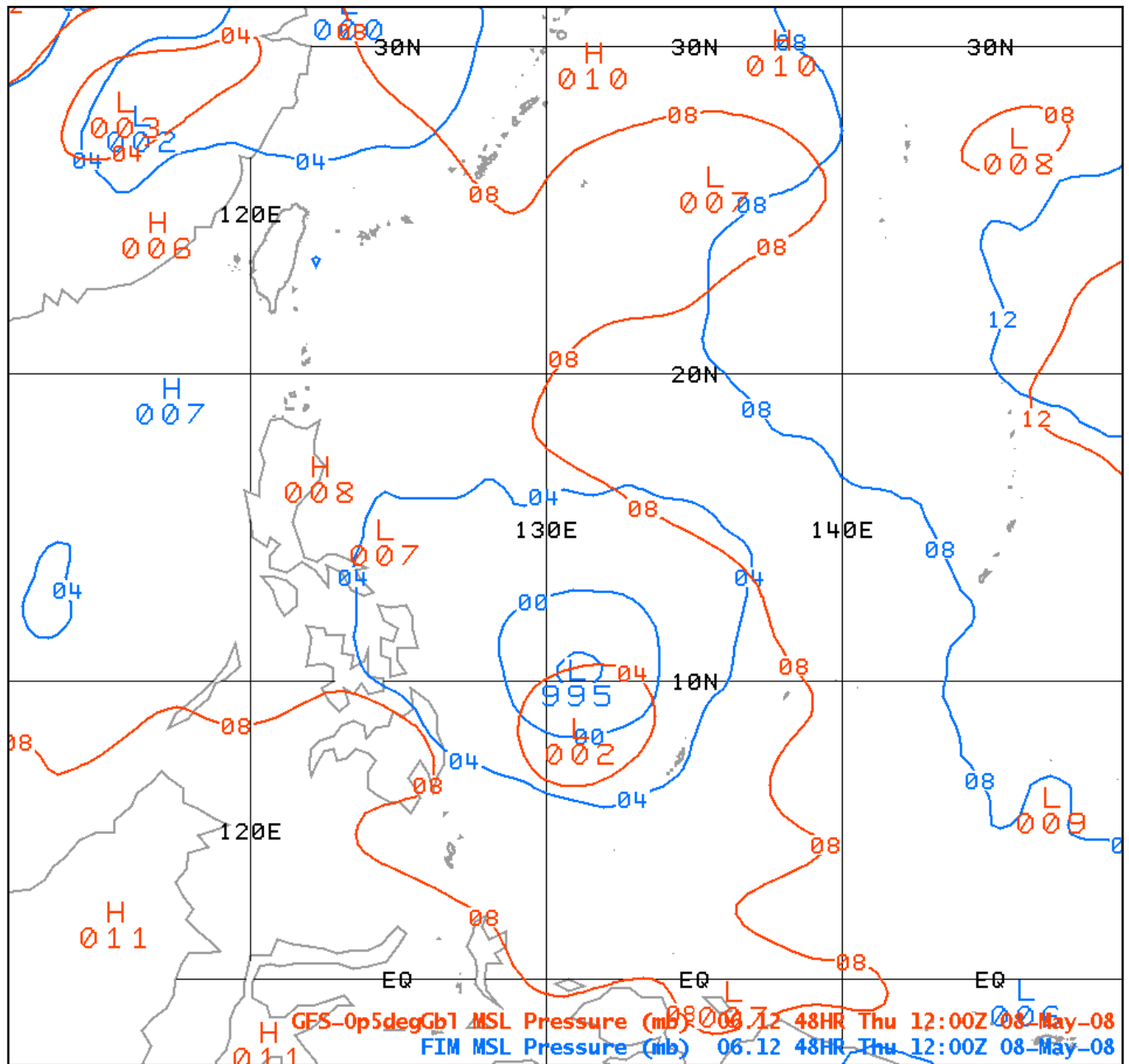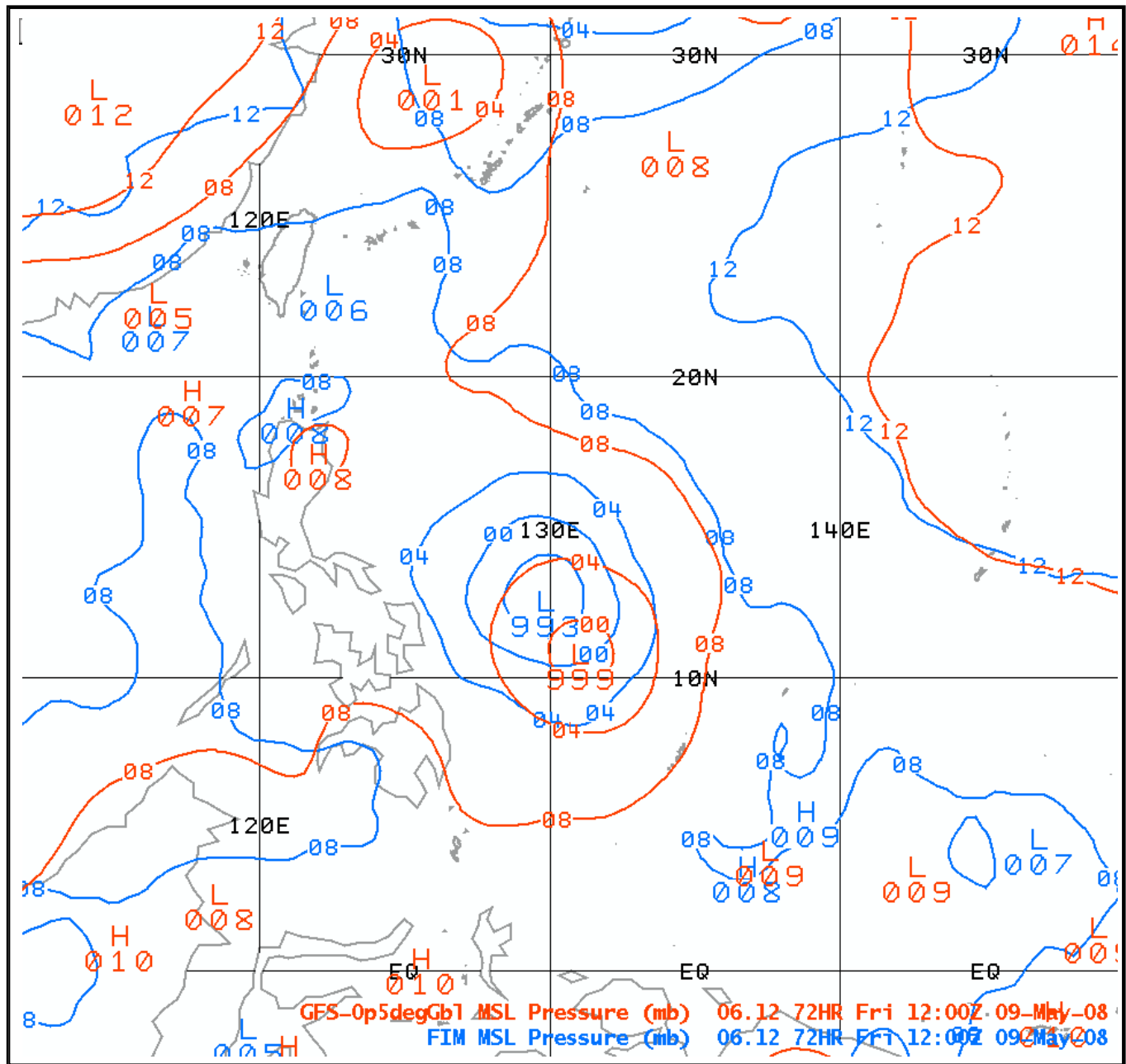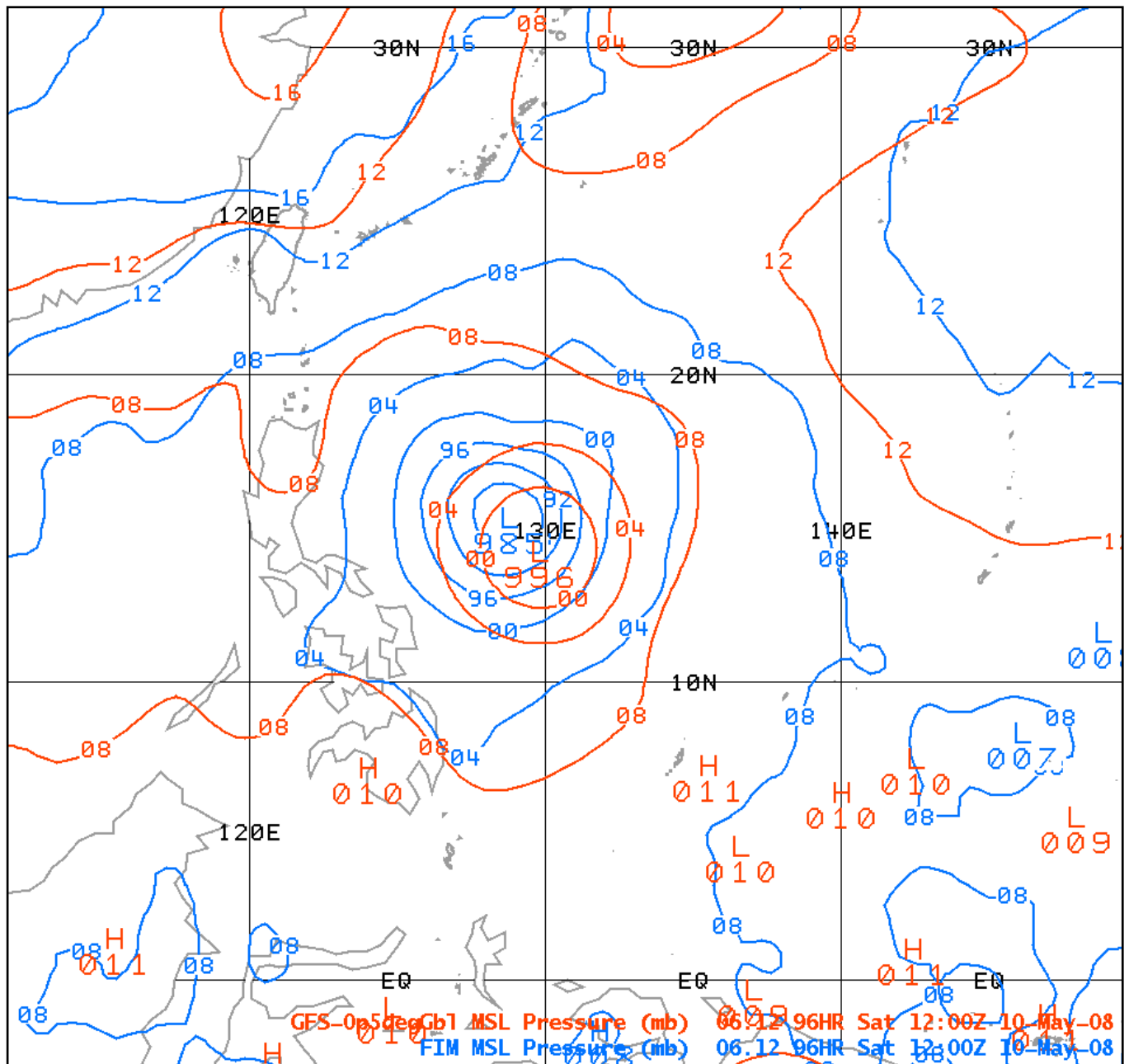96h forecast of sea-level pressure (hPa - 1000)
FIM
GFS

Valid time: 1200 UTC Sat 10 May 2008

120h forecast of sea-level pressure (hPa - 1000)

FIM

GFS
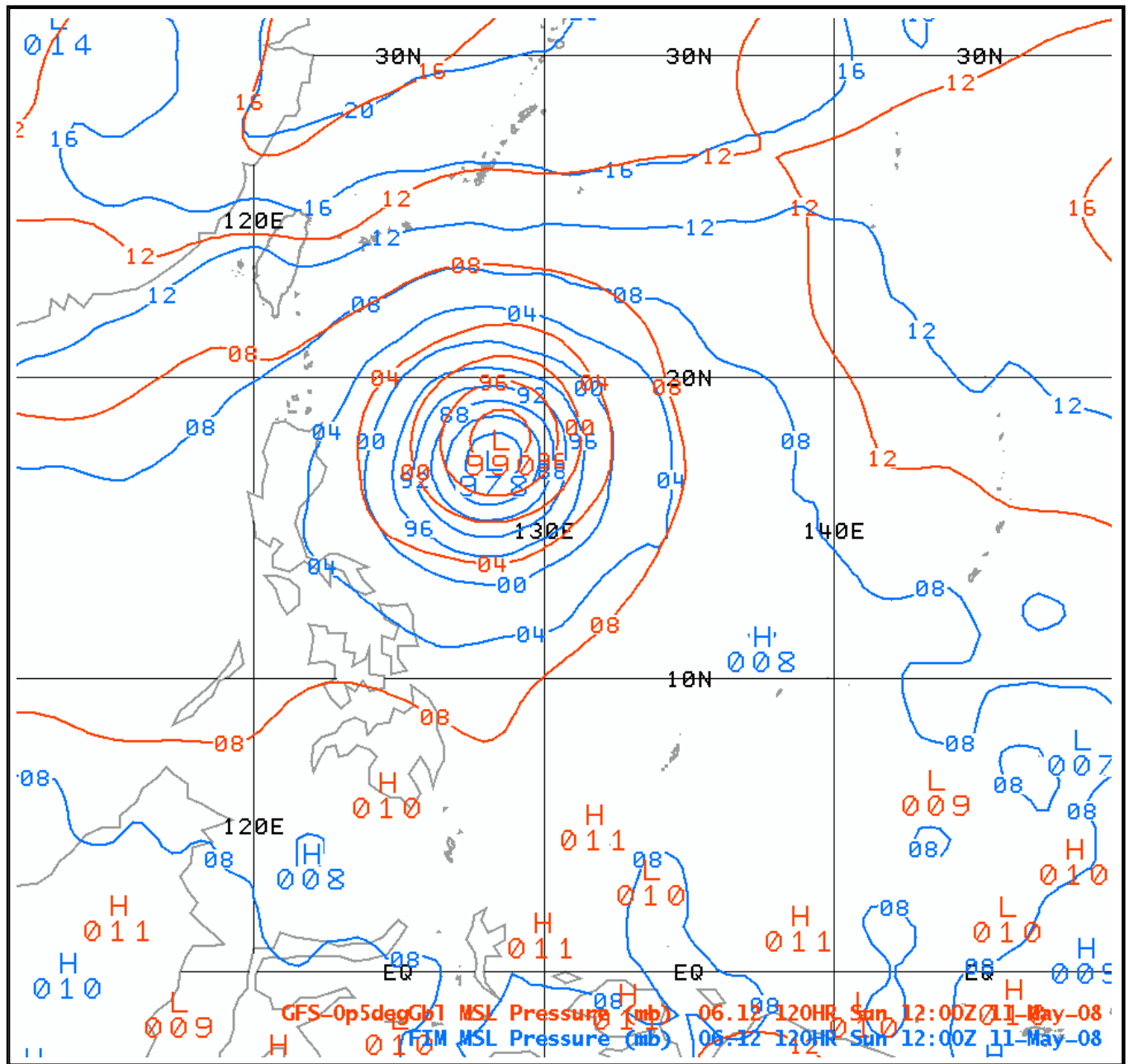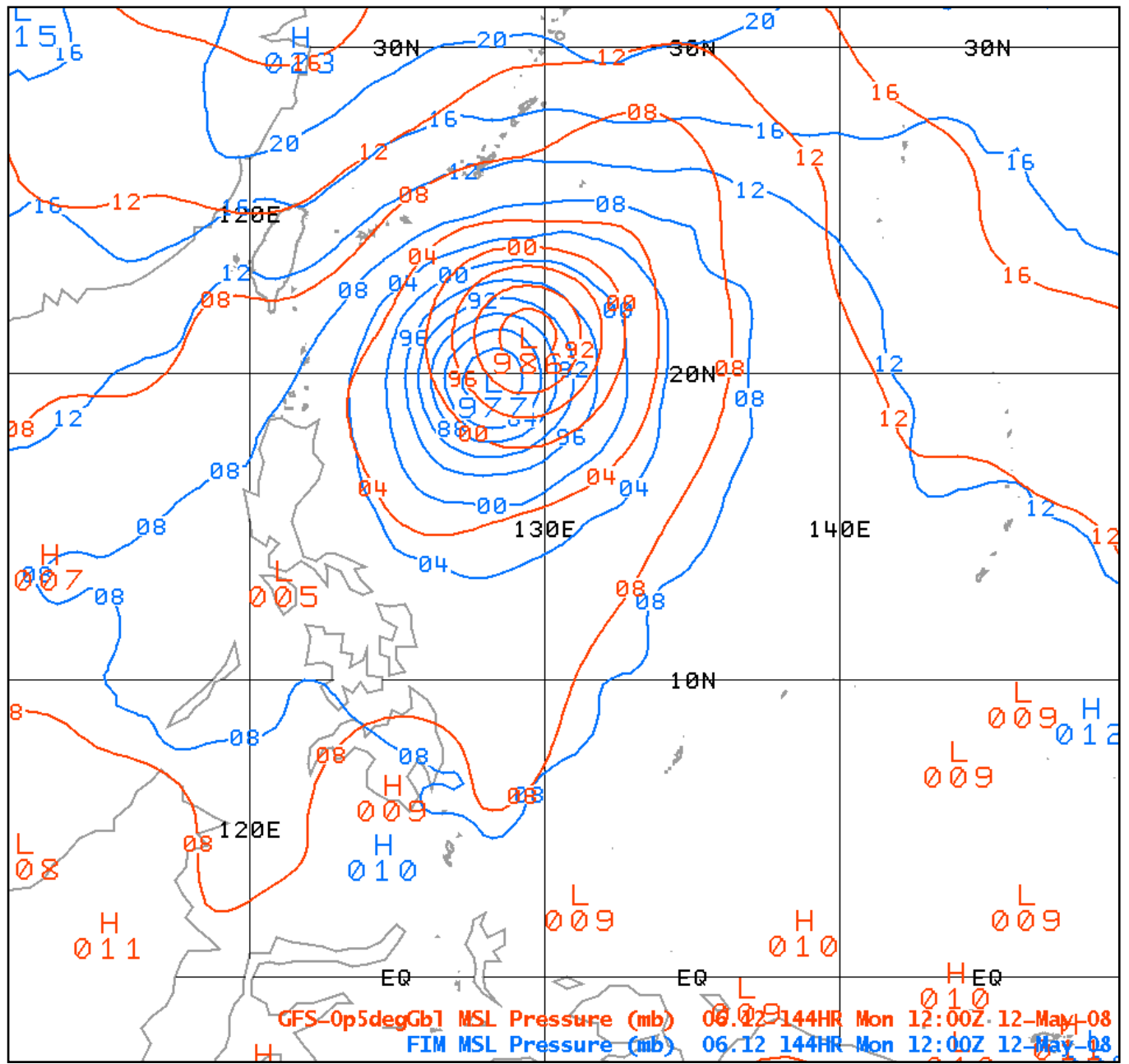
Valid time: 1200 UTC Sun 11 May 2008

144h forecast of sea-level pressure (hPa - 1000)
FIM
GFS

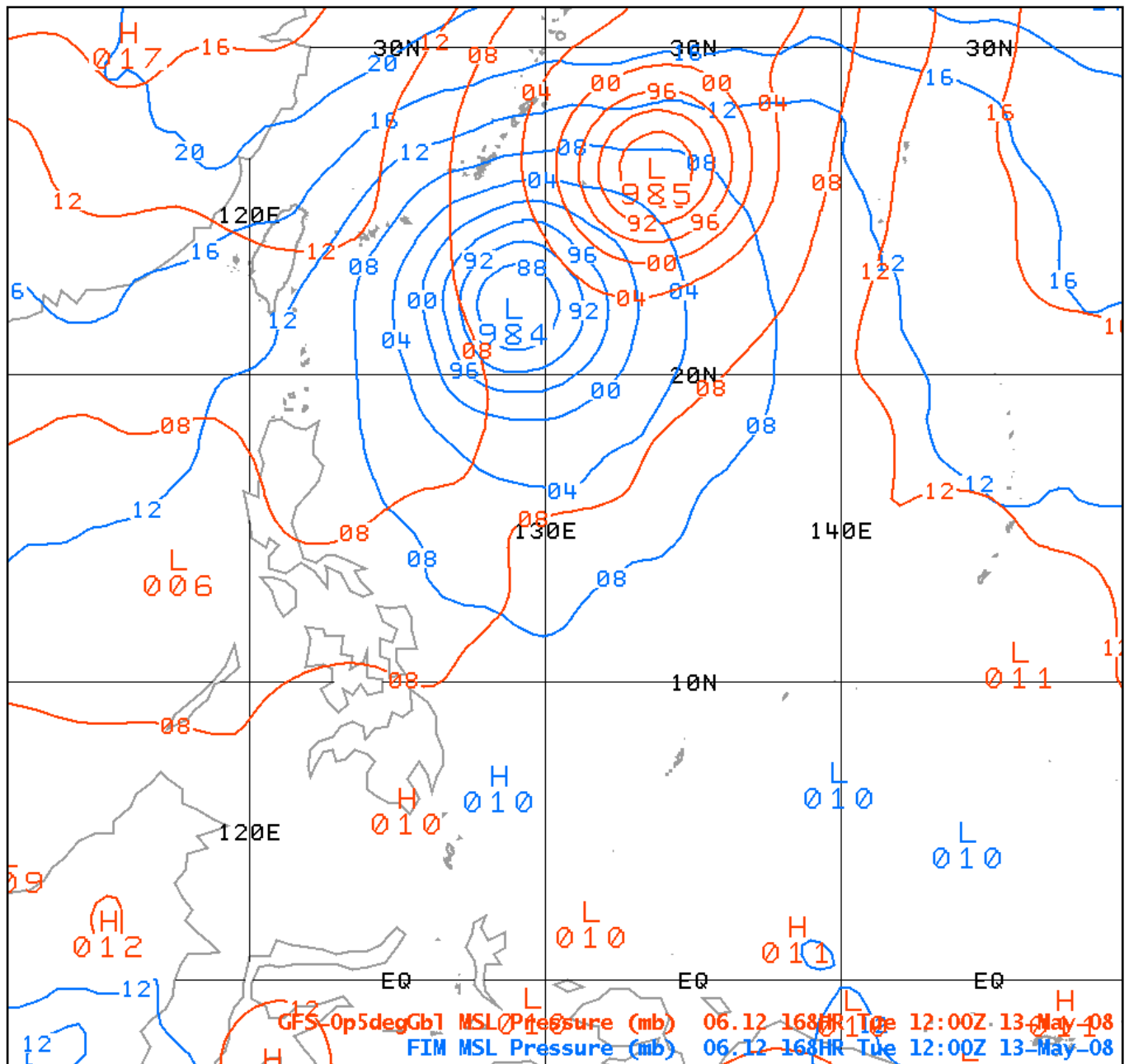Valid time: 1200 UTC Mon 12 May 2008

GFS-0p5degGb1 MSL Pressure (mb)   06.12 144HR Mon 12:00Z 12-May-08
FIM MSL Pressure (mb)   06.12 144HR Mon 12:00Z 12-May-08

168h forecast of sea-level pressure (hPa - 1000)
FIM
GFS

Valid time: 1200 UTC Tue 13 May 2008

Summary and Future Work

- FIM is robust, and produces credible forecasts relative to other global weather forecast models.

- FIM is able to produce reasonable dynamical structures, given its resolution
    - Great Plains low-level jet
    - Terrain-modulated flows
    - Tropical Cyclones
    - Cutoff lows aloft; upper-level jet streaks
        …

Summary and Future Work

- Performance of hybrid theta-sigma *versus* pure sigma vertical coordinate

- Upper-troposphere/Lower Stratosphere features (upper fronts, PV structures, etc.)

- Extratropical latent-heat driven phenomena (Mesoscale Convective Systems, oceanic cyclogenesis)

- Tropical cyclones

  - Genesis and track compared to GFS?

- Forecast drift: what are systematic biases; do extremes of MSLP, max winds in subtropical and polar jets, precipitation, tend to increase or decrease during forecast?

Radar and observations for 0000 UTC 3 May 2008. A blizzard warning was still in effect for far northeastern Colorado into western Nebraska.
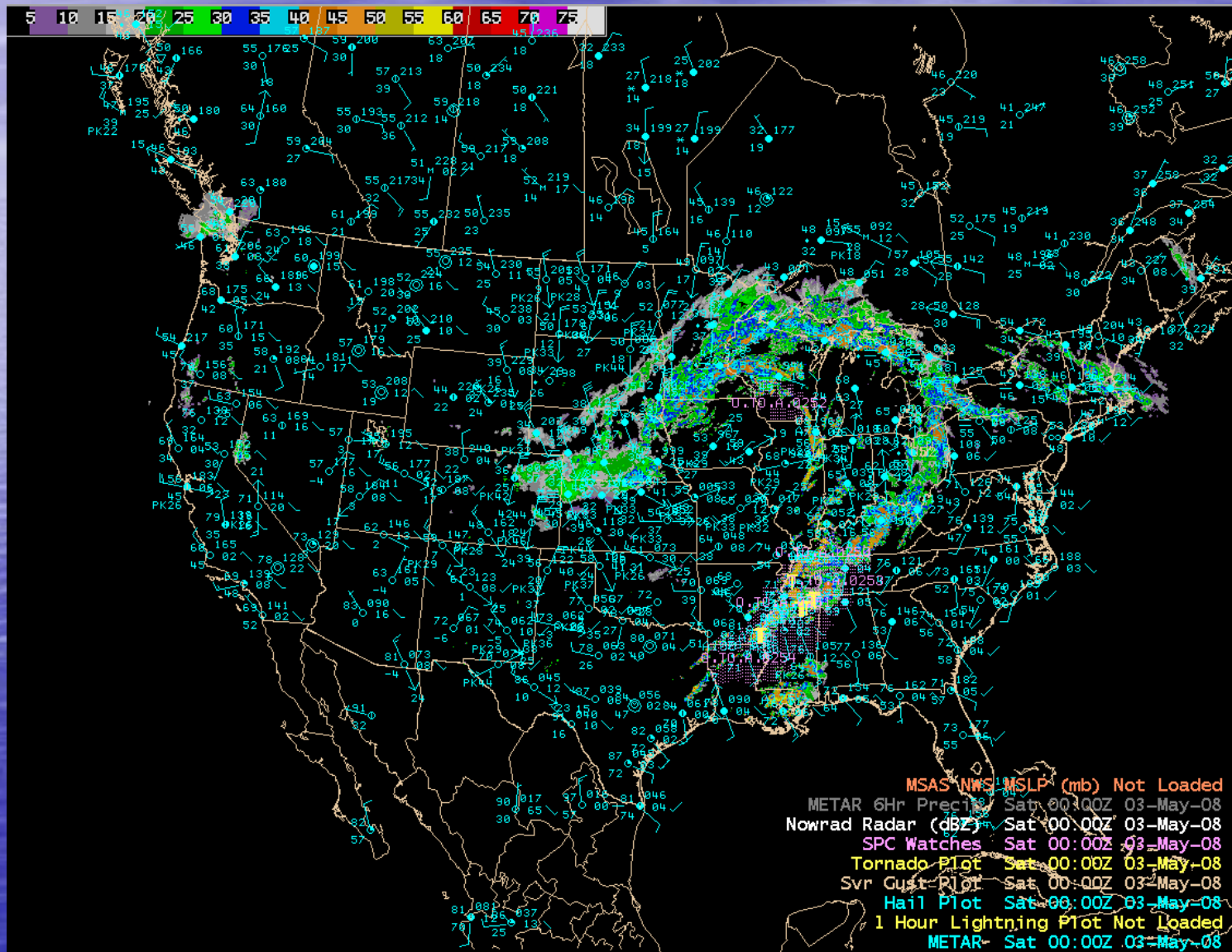
Radar and obs at 0000 UTC 2 May: still snowing all the way back to DIA.