Q3FY16 GFS Retrospective Case studies

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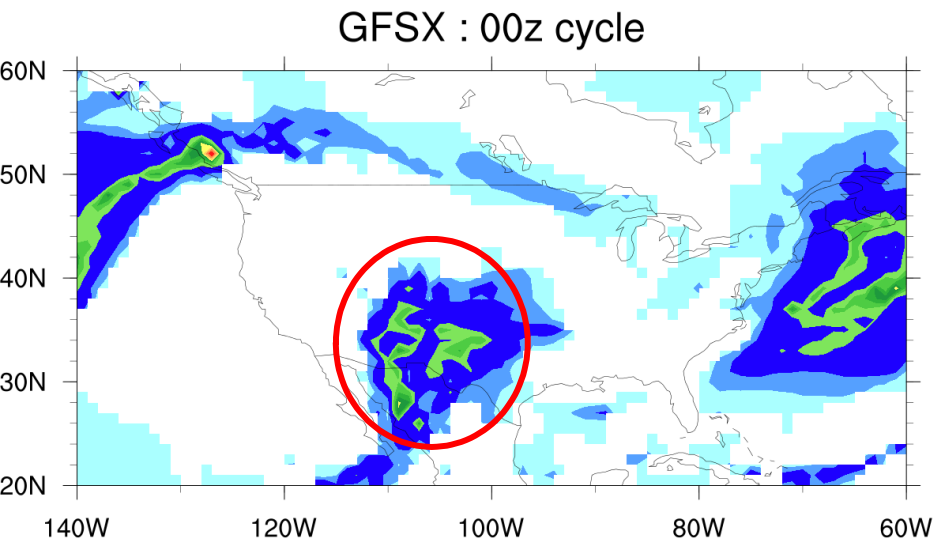
Q3FY16 GFS Retrospective Case studies

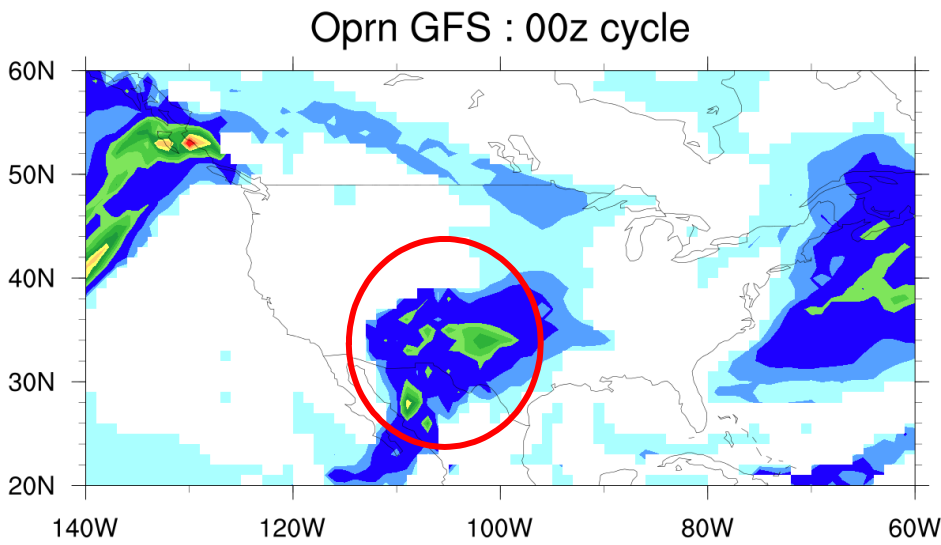
- 1 Central Region (CR) and 4 Western Region (WR) cases
- Link to view the maps :
  https://drive.google.com/a/noaa.gov/folderview?id=0B8-sH913lbhOOUE0Y1JWQXBqVVU&usp=drive_web
  and
  https://drive.google.com/a/noaa.gov/folderview?id=0B8-sH913lbhOa3lFUUNKRm9yNk0&usp=drive_web
- Mean sea level Pressure (MSLP), Geopotential Height (500mb), 2m Temperature, precipitation at regular intervals for 12 – 240 hour forecasts are plotted
- For 2 WR cases, 10m wind speed maps are also produced
- 1 degree data for GFSx and Operational GFS are used ; CCPA precipitation (0.125 degree) used for verification
- NCAR Command Language (NCL) software is used to generate all the plots.

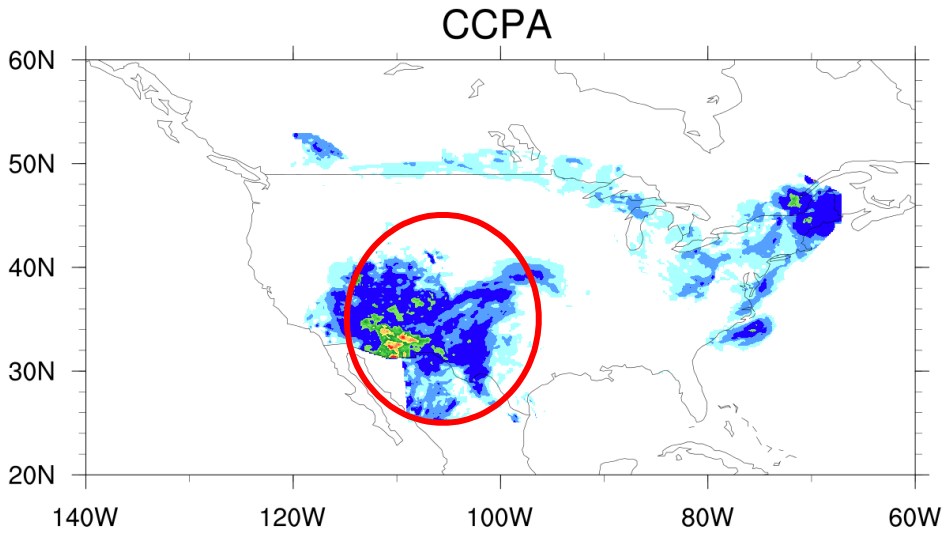
CR Case Study # 1 : 1200 UTC 29 January 2015 - 0000 UTC 2 February 2015

Probably an obvious candidate, but storm affected much of central/northern Plains into upper Midwest and then southern Great Lakes and eventually NE US.

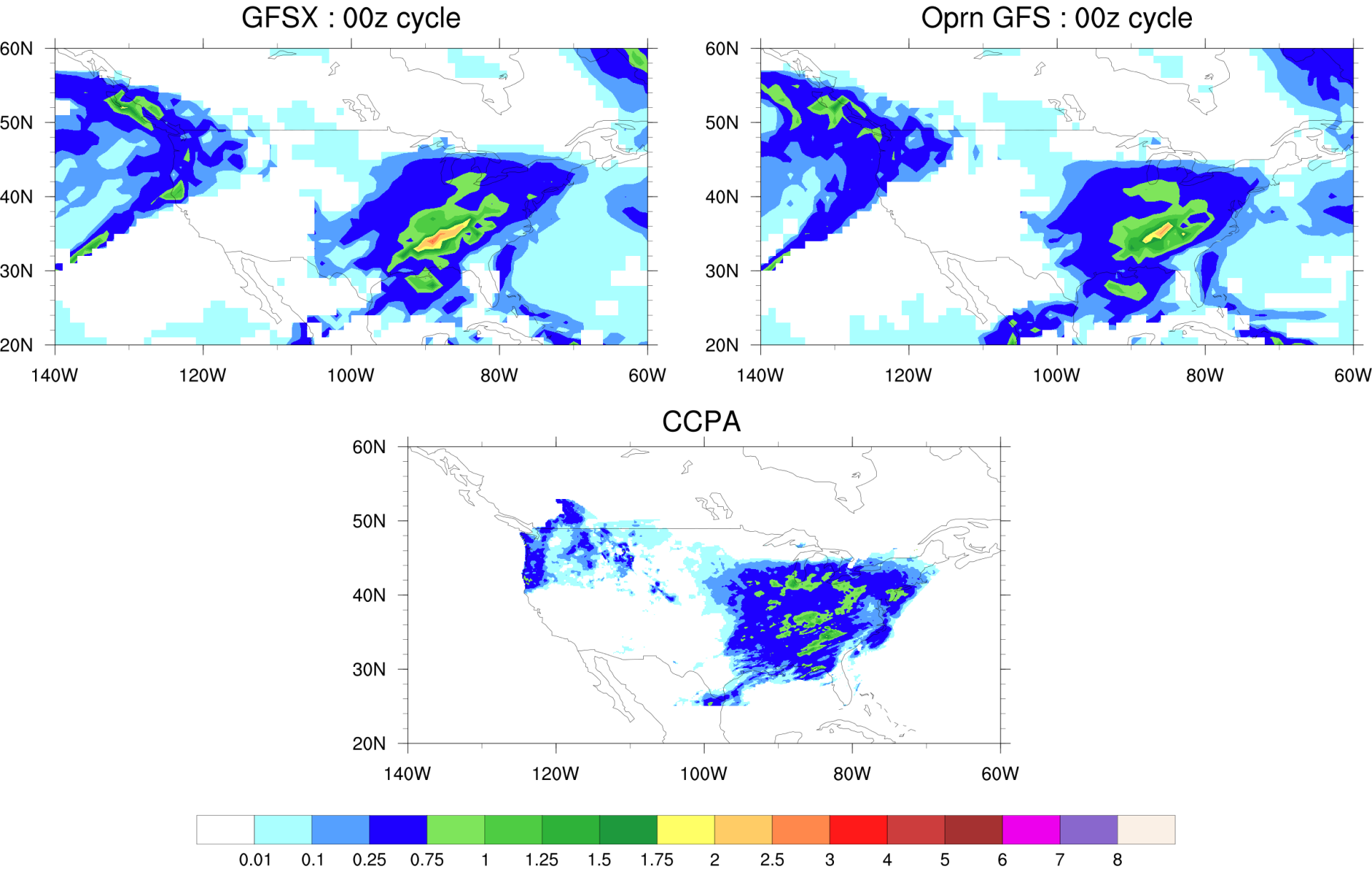
24-hr Accumulated Precip (inch) valid : 2015013012 - 2015013112 ; 108 - 132hr Forecast from 2015012600



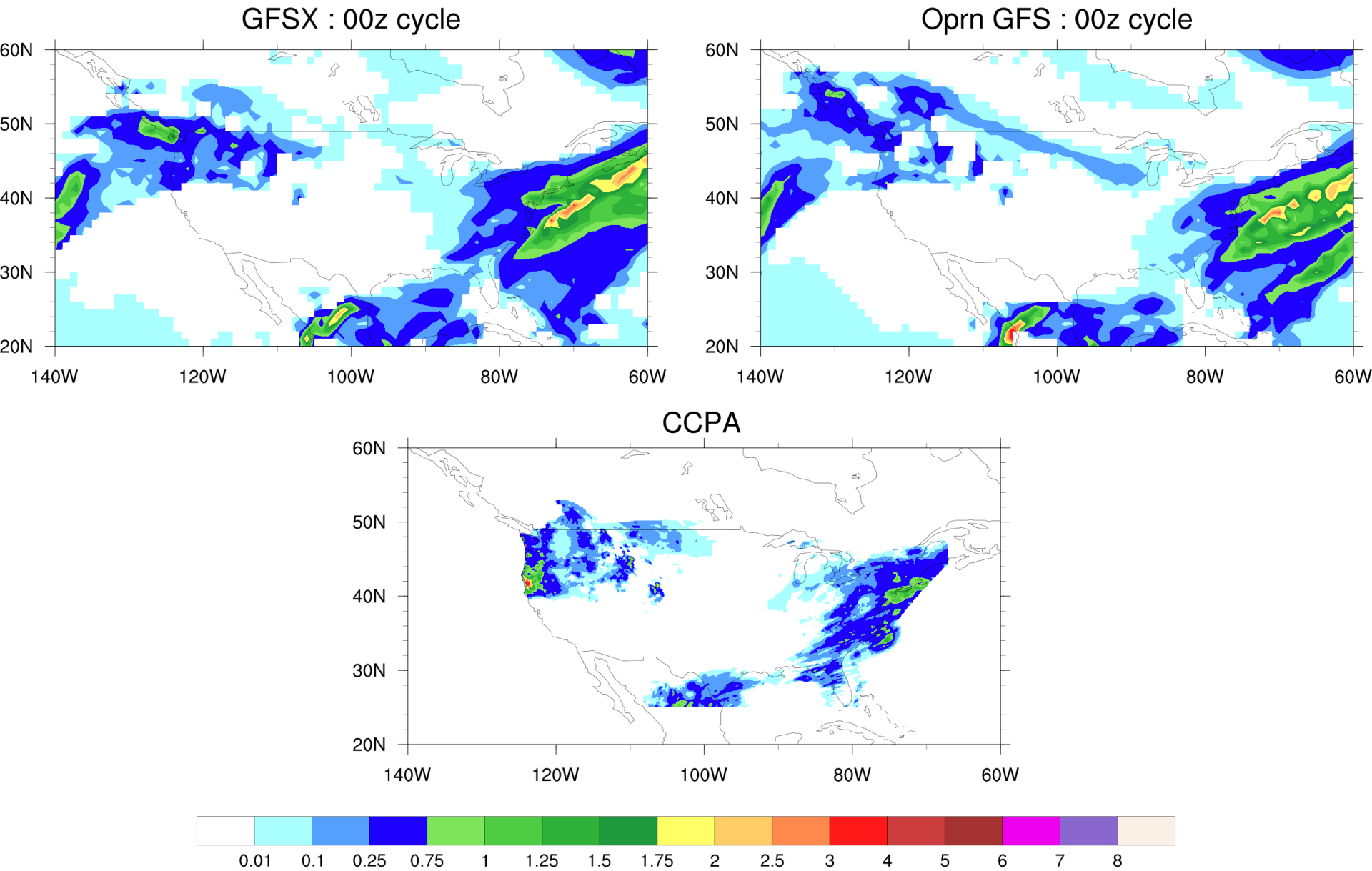




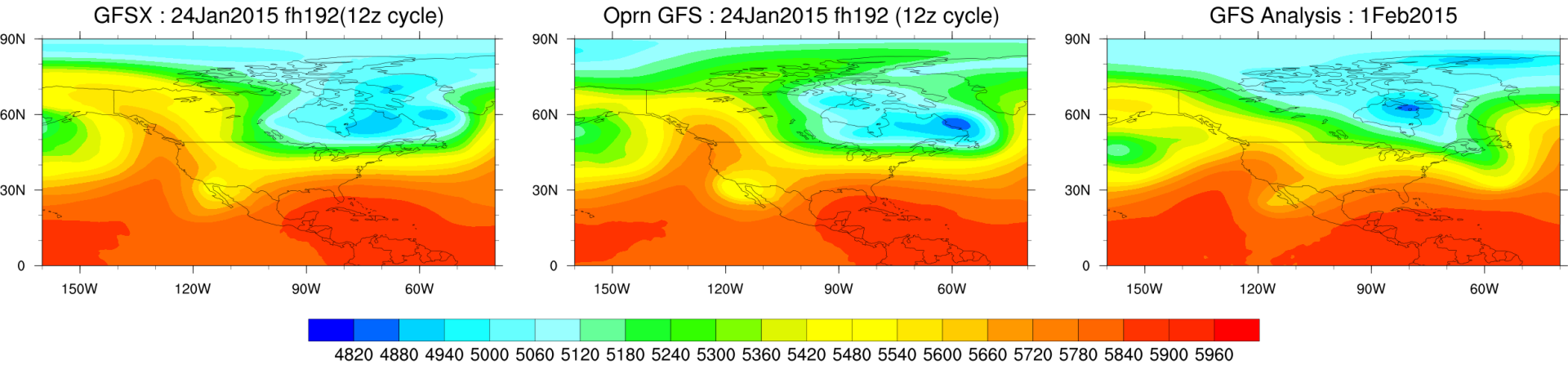
24-hr Accumulated Precip (inch) valid : 2015020112 - 2015020212 ; 108 - 132hr Forecast from 2015012800

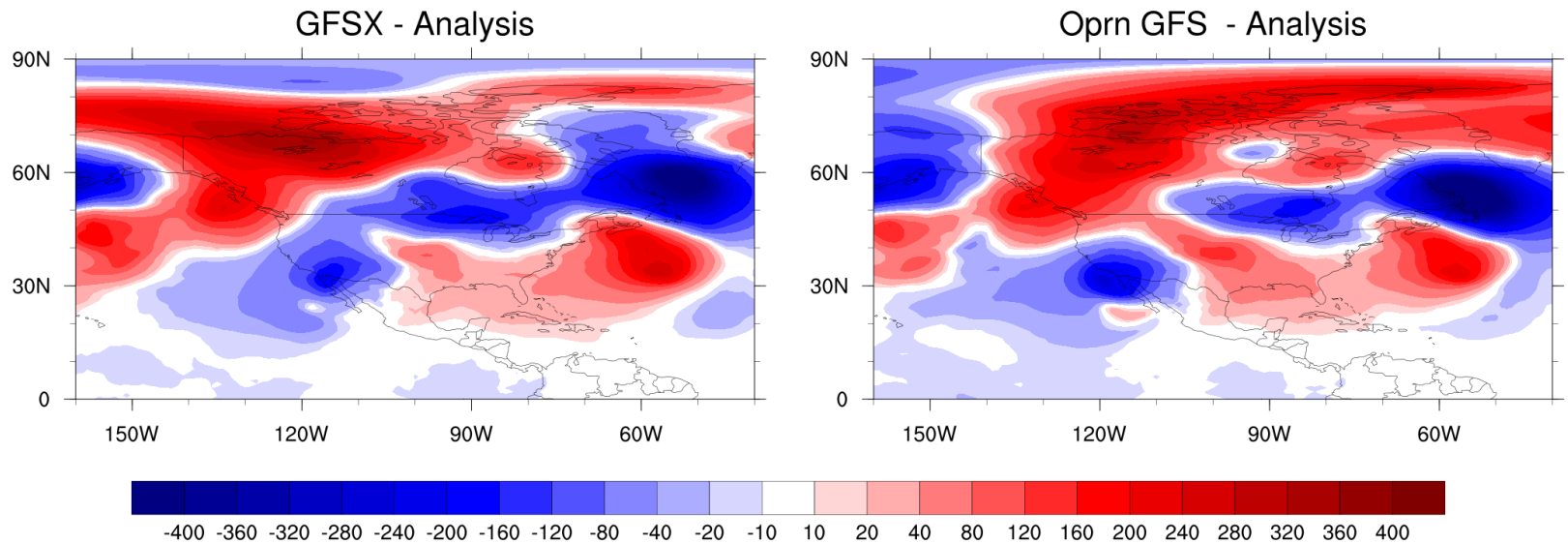


24-hr Accumulated Precip (inch) valid : 2015020212 - 2015020312 ; 108 - 132hr Forecast from 2015012900



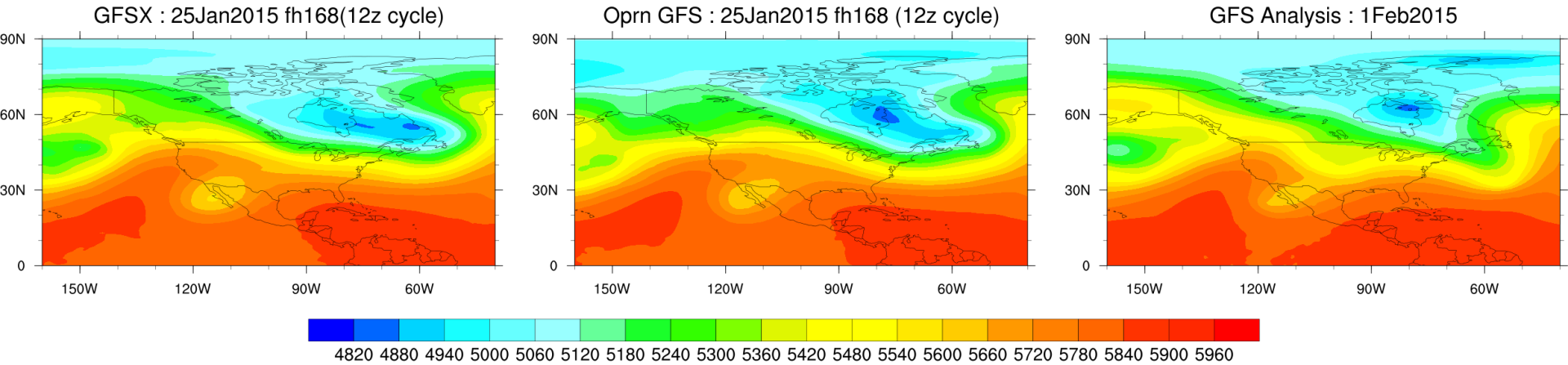
500mb Geopotential Height (in meters) : 192 hours Forecast

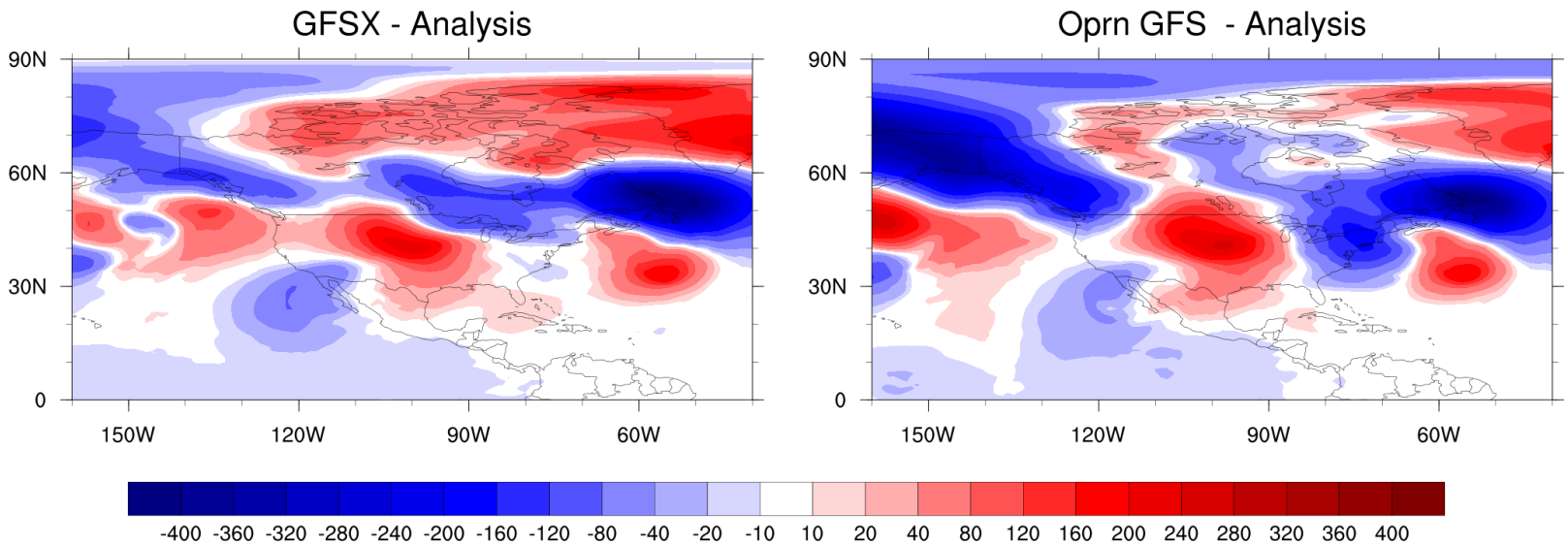




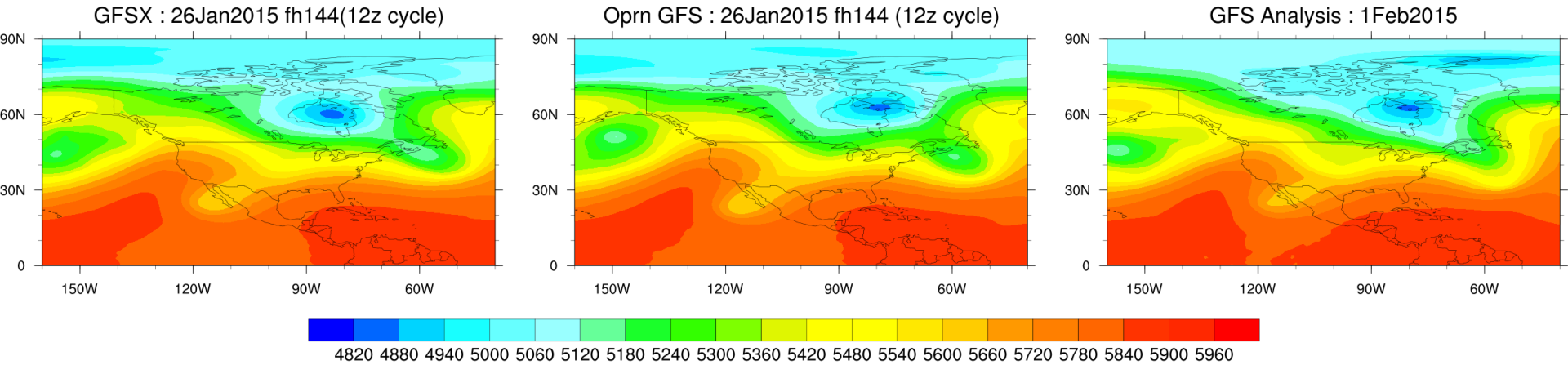
- Analysis shows lower GP heights (cold air) over N. America on 1st February

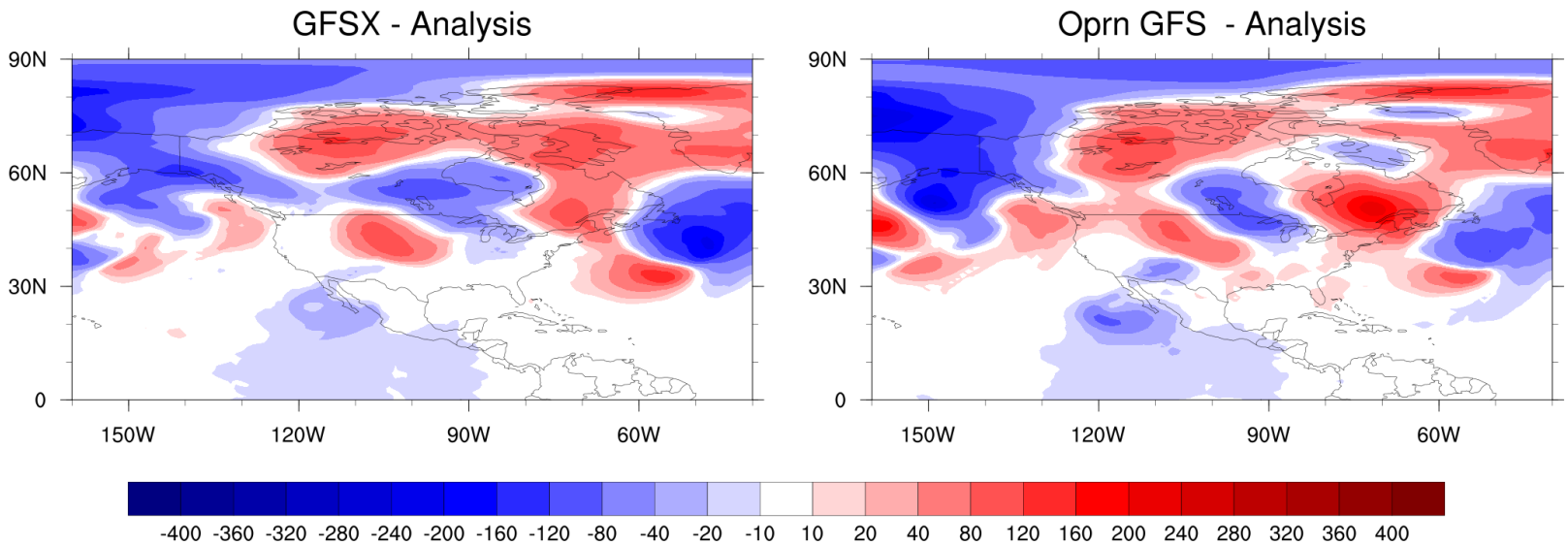
500mb Geopotential Height (in meters) : 168 hours Forecast



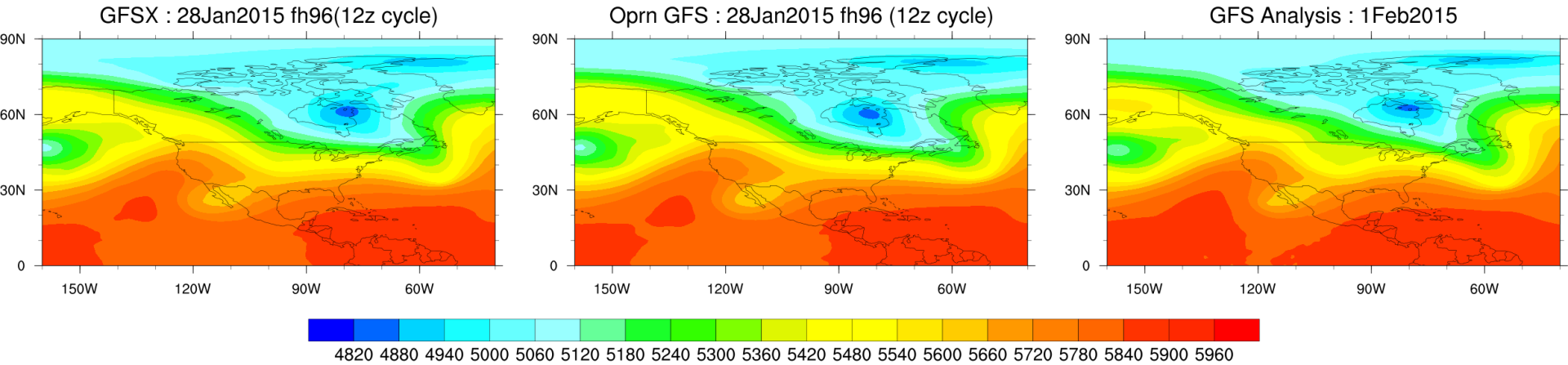


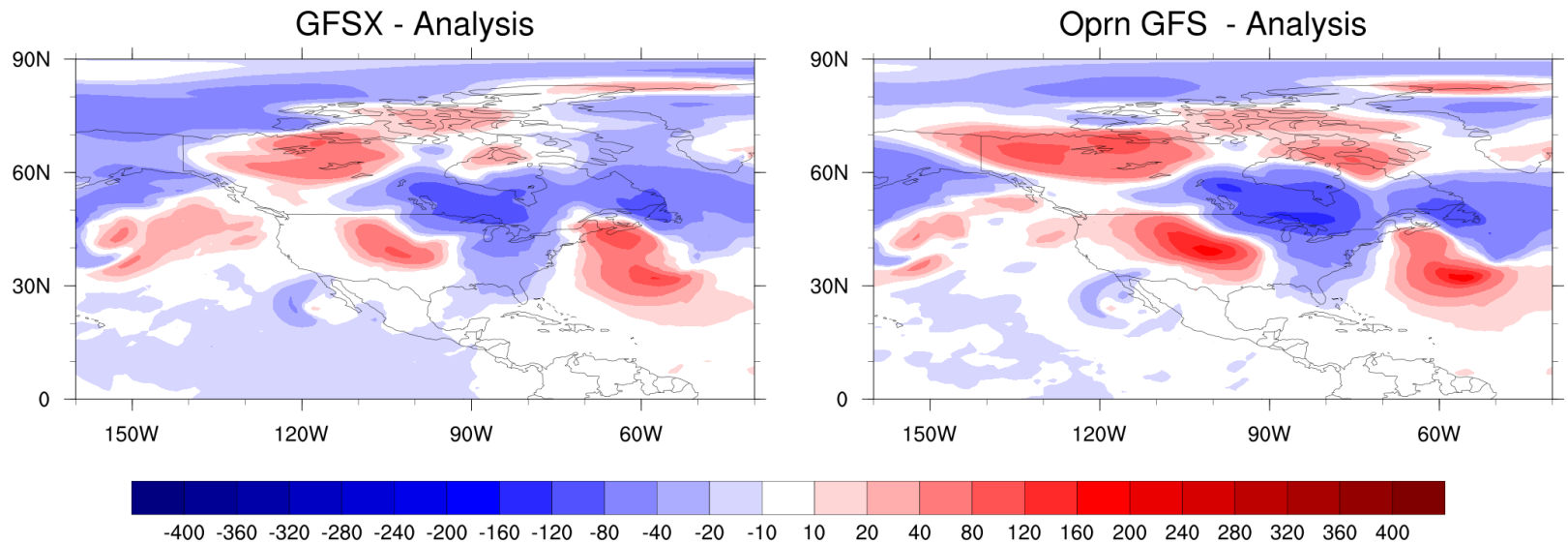
500mb Geopotential Height (in meters) : 144 hours Forecast





500mb Geopotential Height (in meters) : 96 hours Forecast





Quick Assessment for **<u>CR Case 1</u>** (based on 96 – 192 hr forecast maps) :

- 24 hour Precipitation for 12ZJan 28-12ZJan29 to 12Z Feb.3-12Z Feb 4 GFSX looked better in 13 cases, operational in 8 for 24 hr amounts

- SLP for 0Z Jan. 29-Feb : 3 Operational looked better in 5 cases, GFSX better in 10

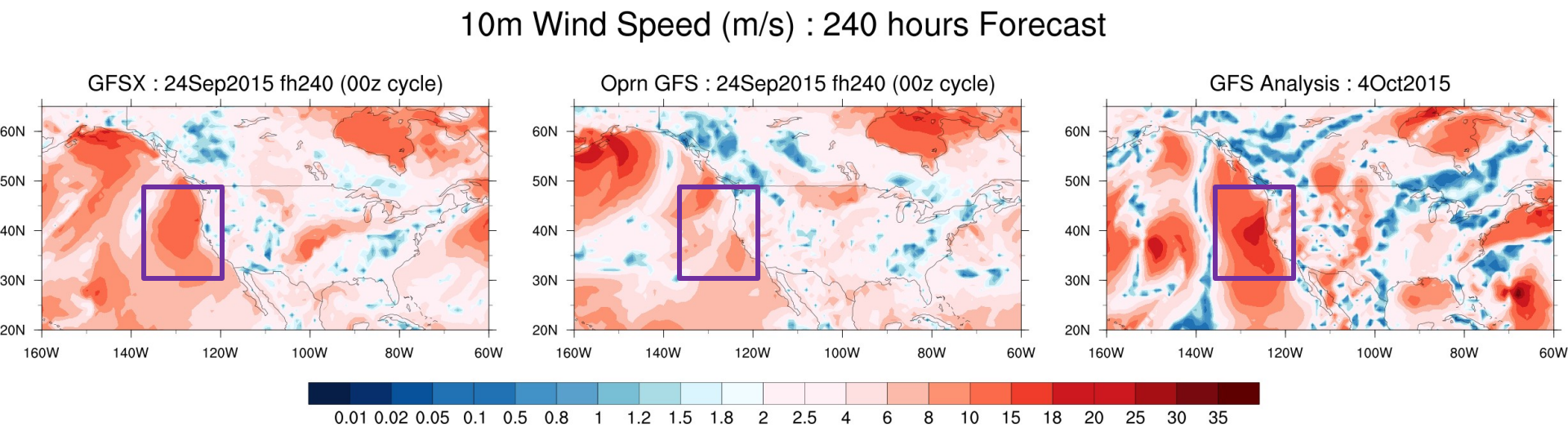
- 500mb heights for 0z Jan. 29-Feb : 3 GFSX better at 9 forecast lengths, operation better in 9.

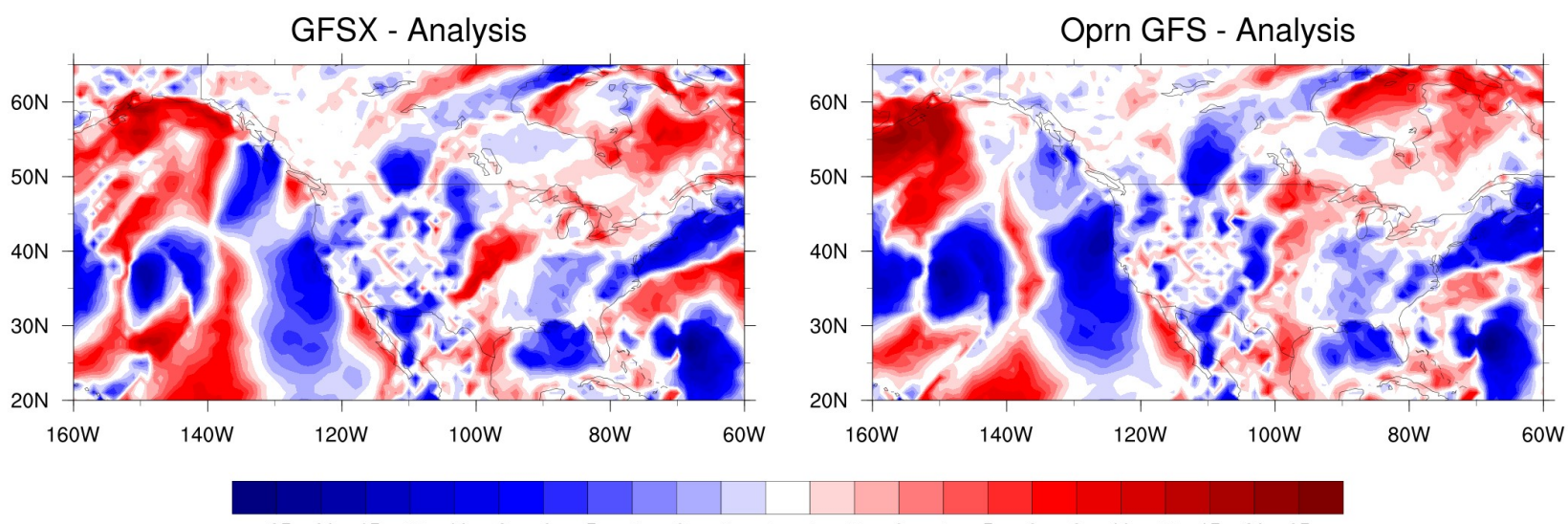
- 2 m temperatures for 0z Jan. 29-Feb : 3 GFSX better in 10 operational in 11 (verification GFS f00 2m Temperature)

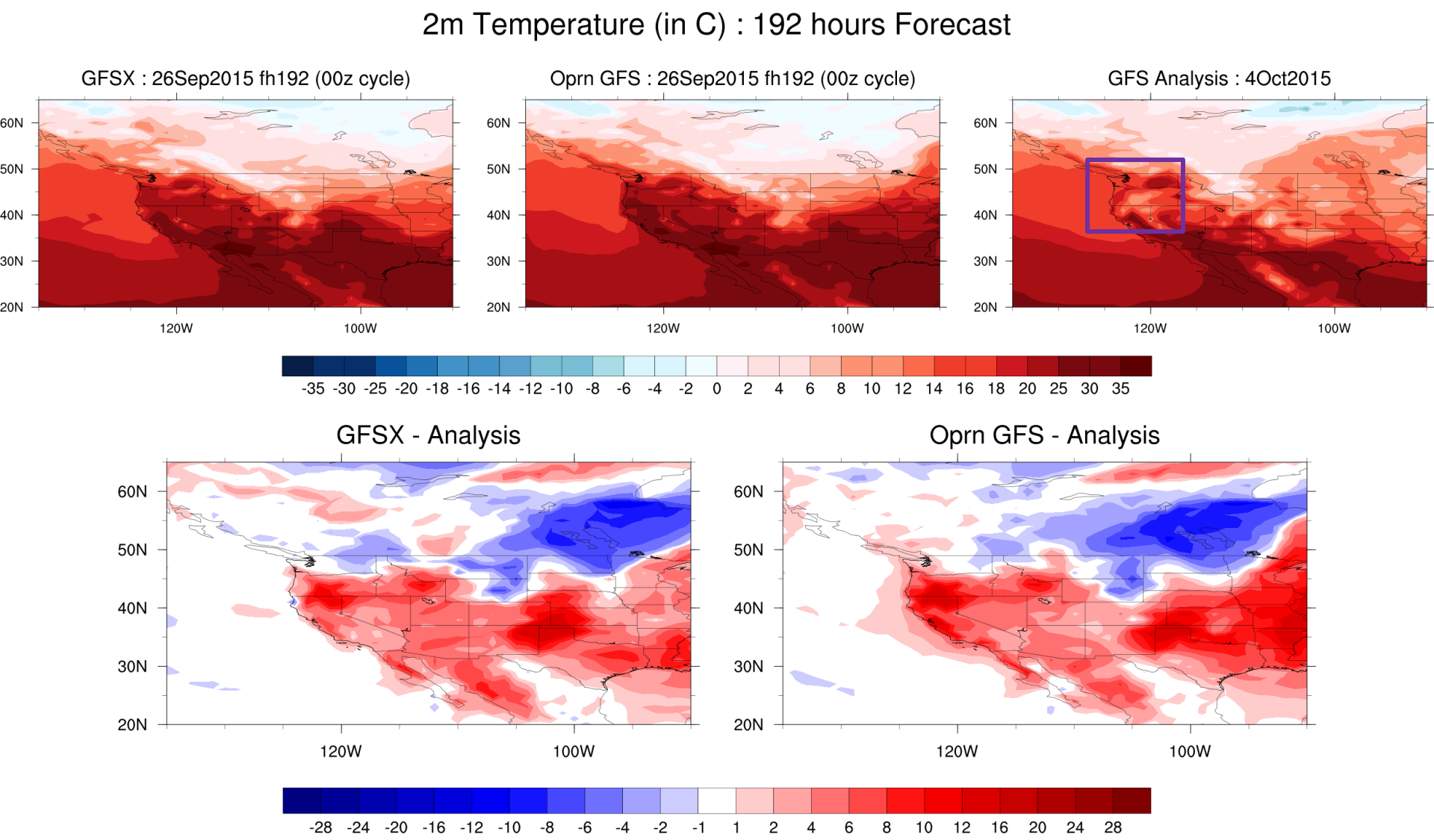
- GFSX somewhat better

<u>WR</u> Case Study # 1 : Event – Saturday Oct 3, 2015 to Sunday Oct 4, 2015

west coast storm over <u>PACNW fires</u> , Hurricane Oho passing near Hawaii and Hurricane Joaquin moving north along eastern seaboard -- a very high DSS visibility event Model run -- Should start Sep 24 and run thru Oct 4 . The issue requiring DSS lead time for these high profile set of events

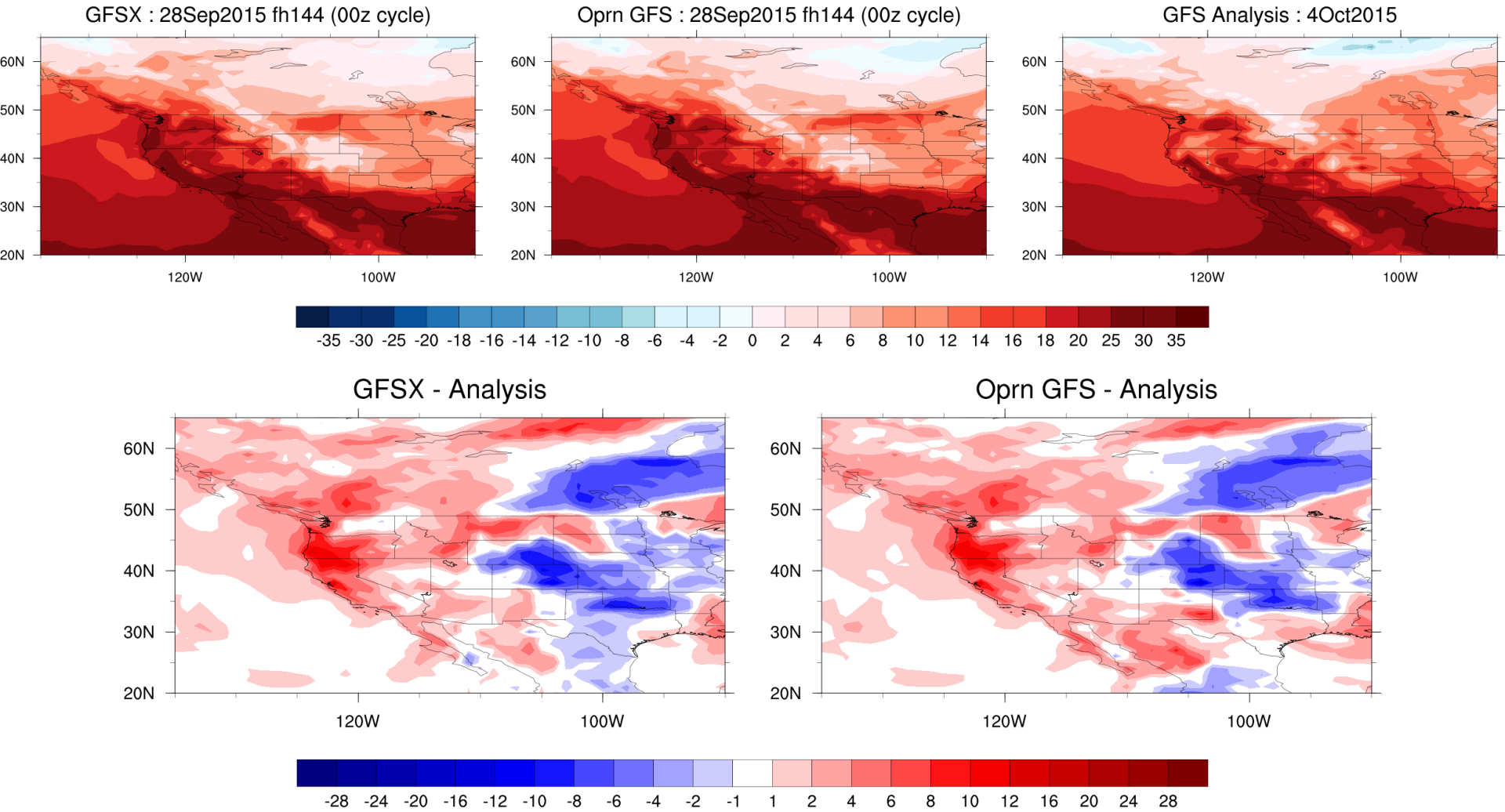




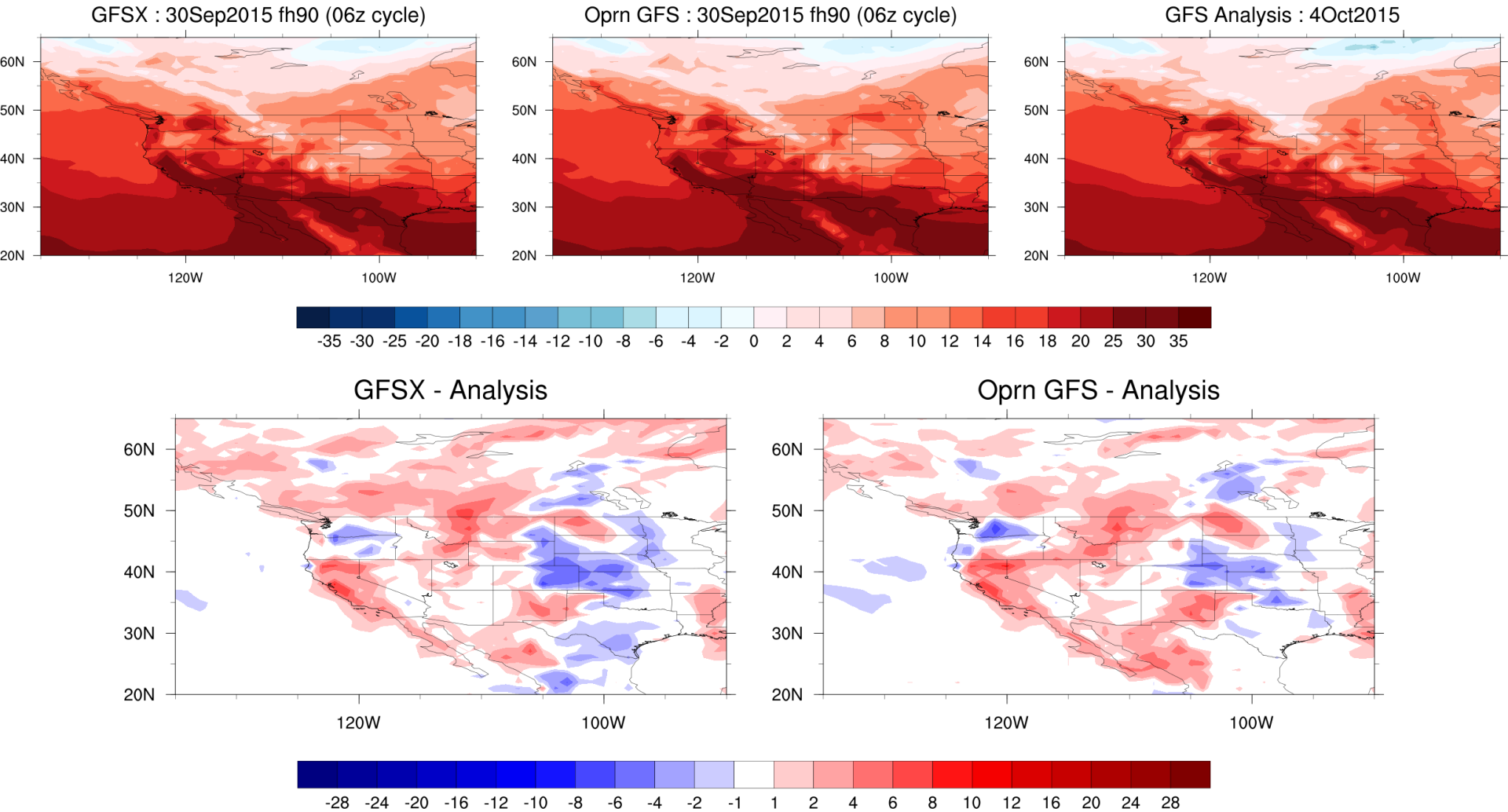


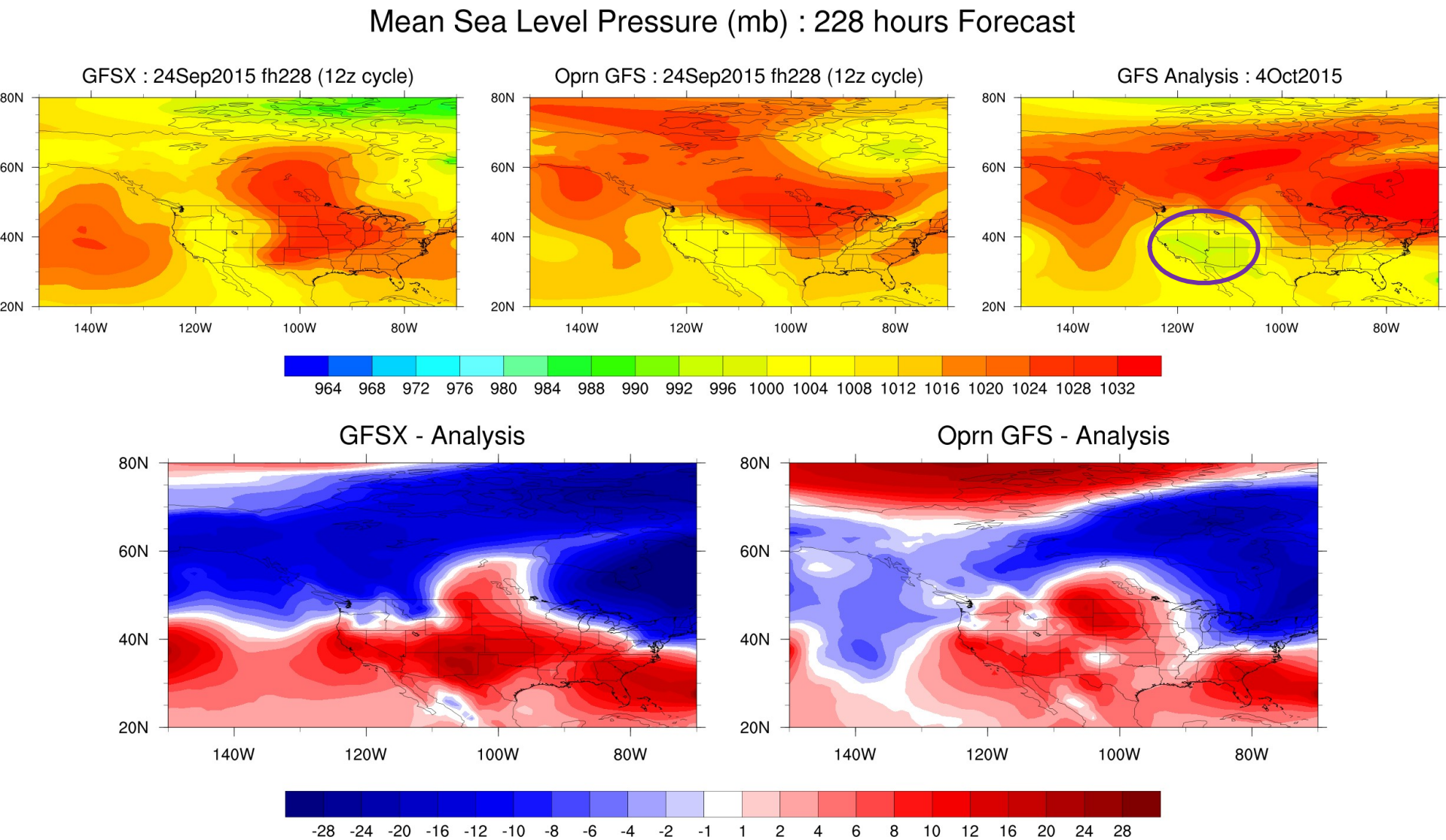
- Low 2m temperature on the west coast in analysis

2m Temperature (in C) : 144 hours Forecast



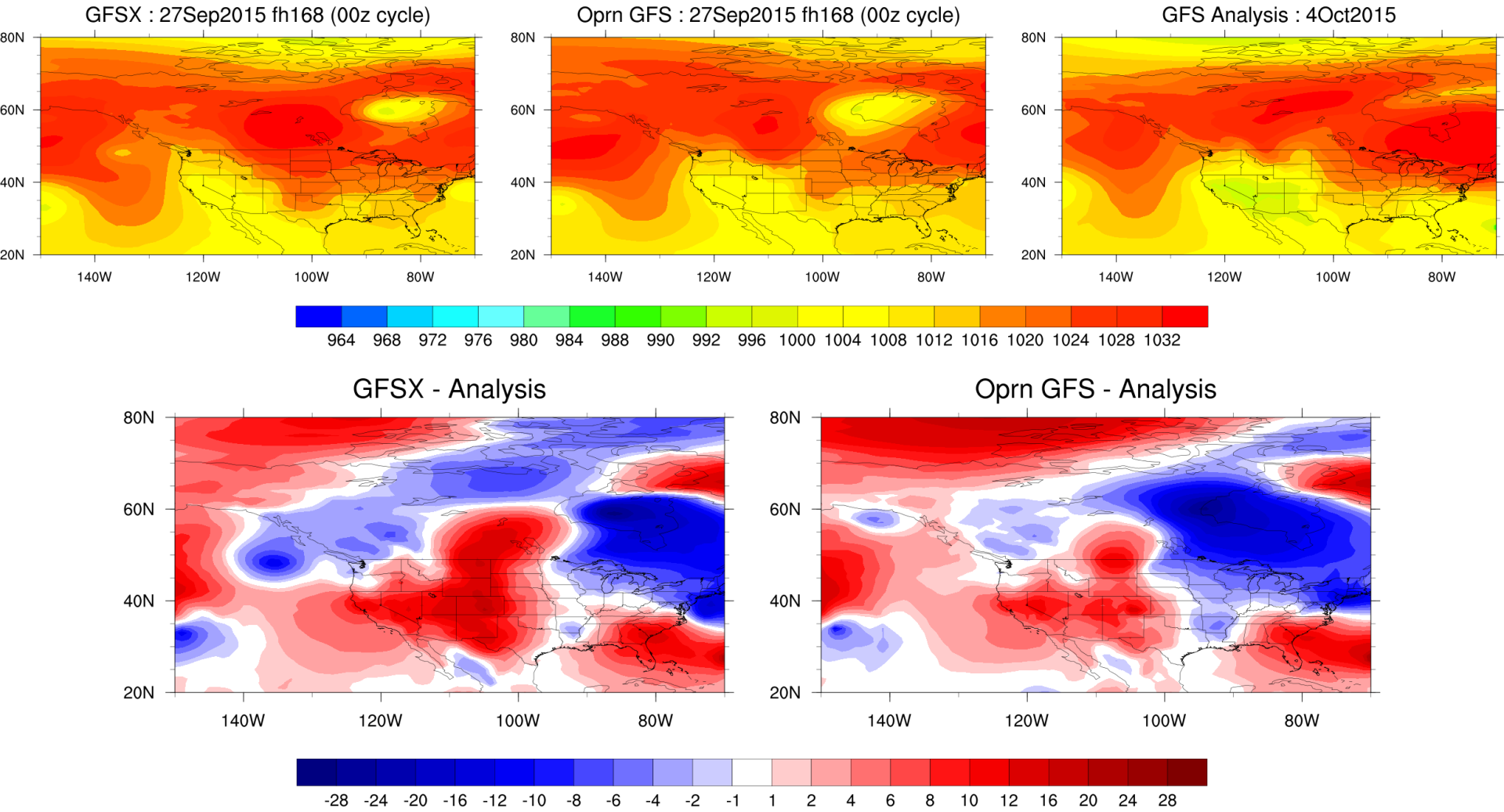
2m Temperature (in C) : 90 hours Forecast



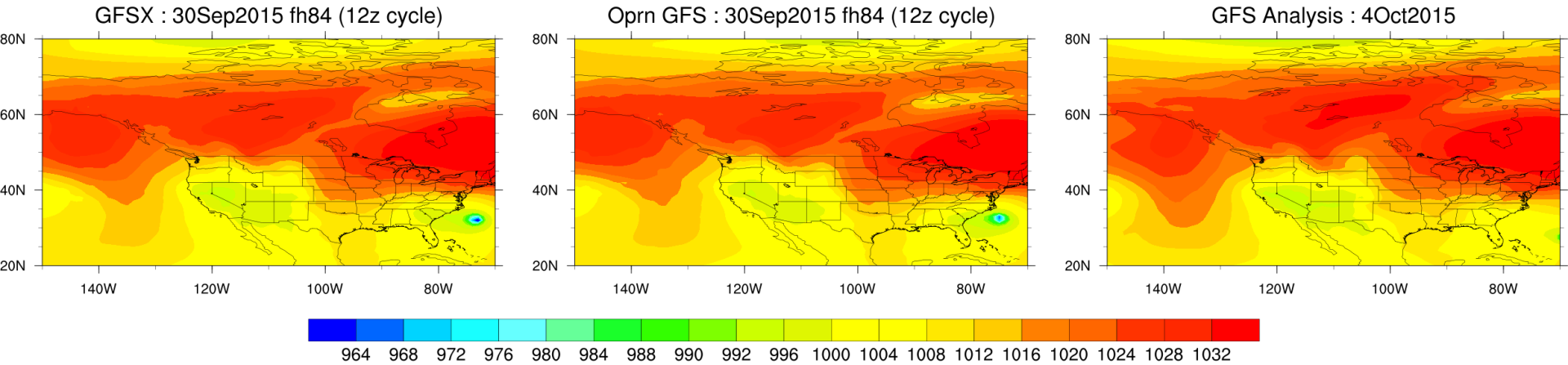


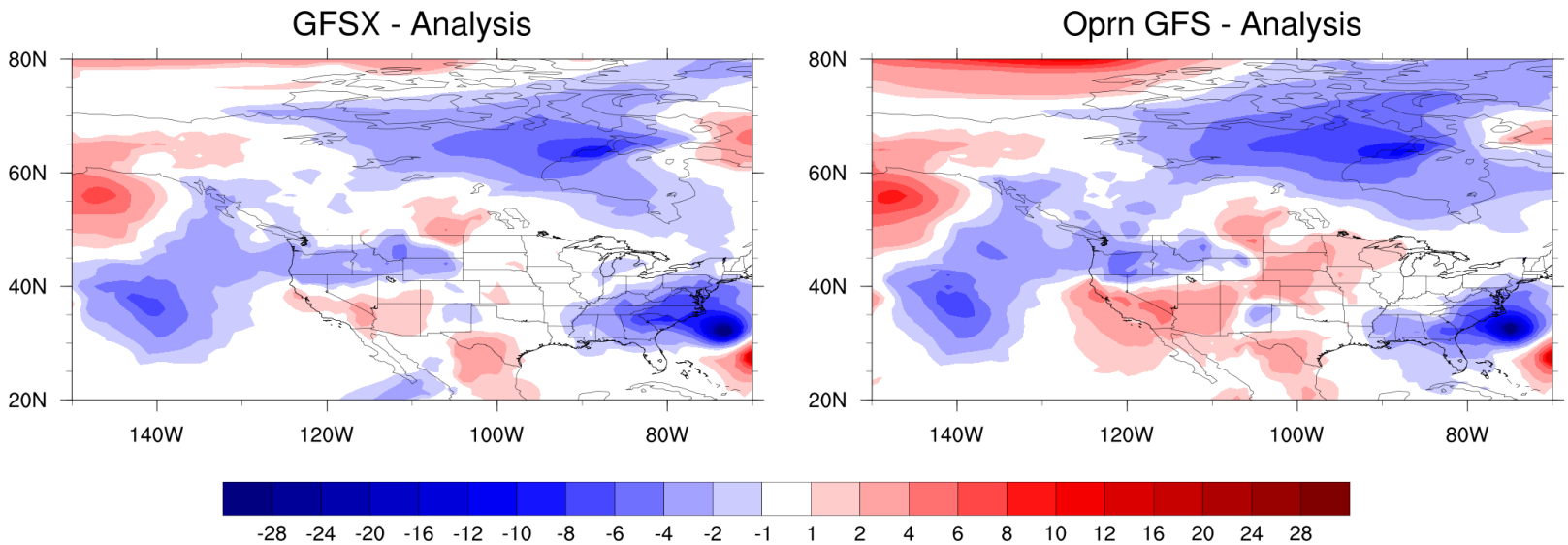
- Analysis shows formation of low MSLP over west coast

Mean Sea Level Pressure (mb) : 168 hours Forecast



Mean Sea Level Pressure (mb) : 84 hours Forecast





Quick Assessment for **WR Case 1** (based on 12 – 240 hr forecast maps) :

- Precipitation GFSX looked better in 6 cases, operational in 1 for 24 hour amounts Oct. 3 12Z-Oct. 4 12Z GFSX looked better for Joaquin

- SLP for Oct. 4 : 0Z Operational looked better in 6 cases, GFSX in 6

- 500 heights for Oct. 4 : 0Z GFSX better in 3, operational in 8

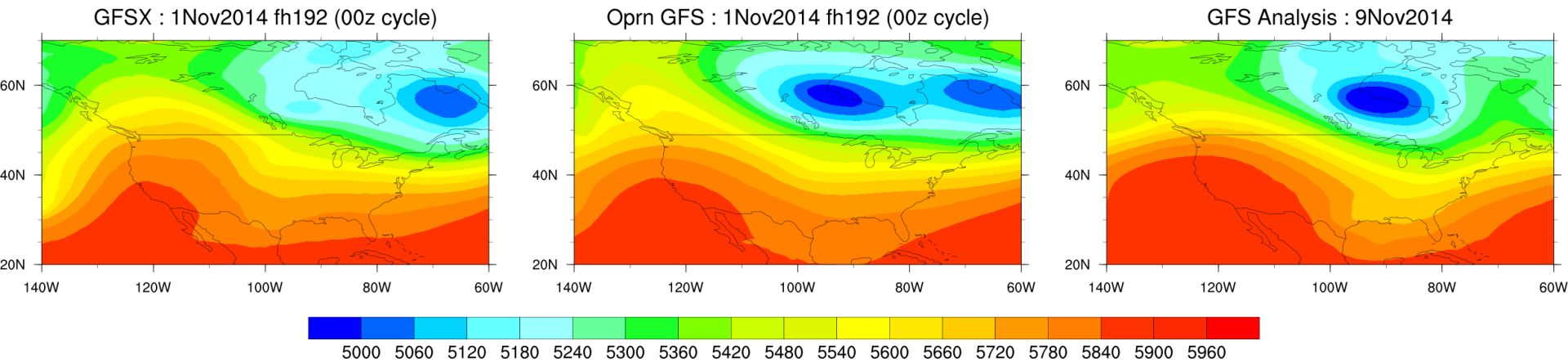
- 2 m temperatures for Oct. 4 : 0z GFSX better in 6 operational in 2. (verification GFS f00 2m Temperature)

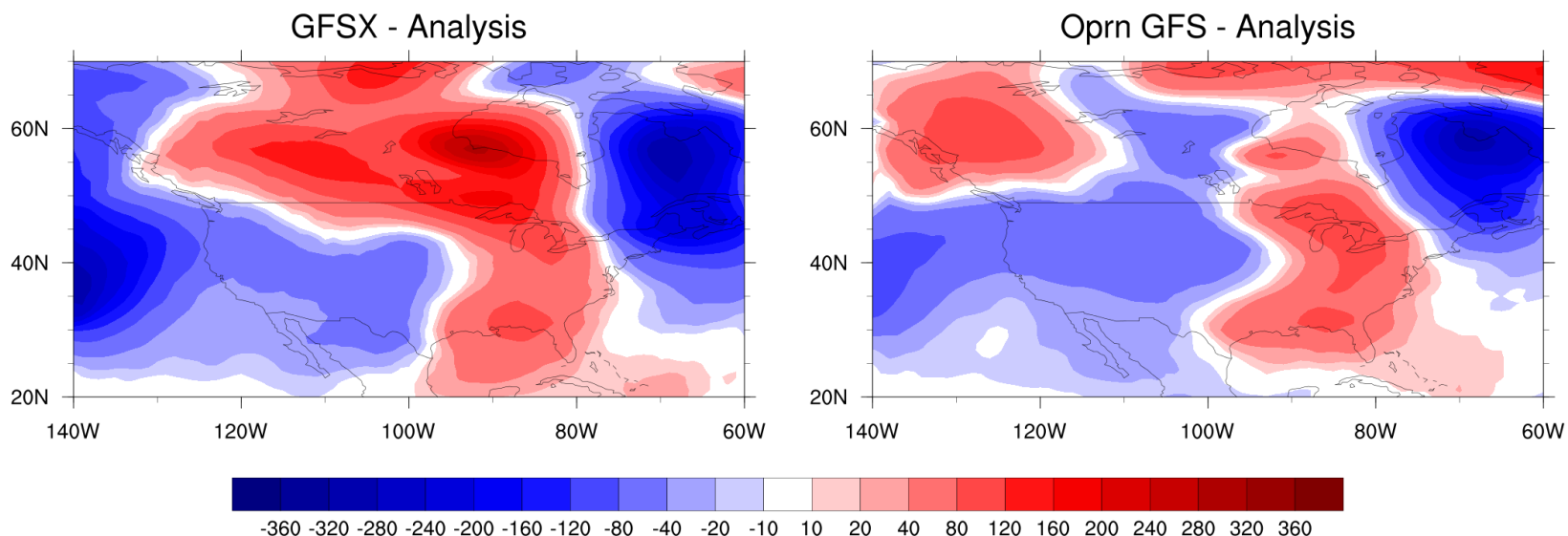
- 10 m winds for Oct. 4 0z GFSX better 8 forecast times, operational 6 forecast times

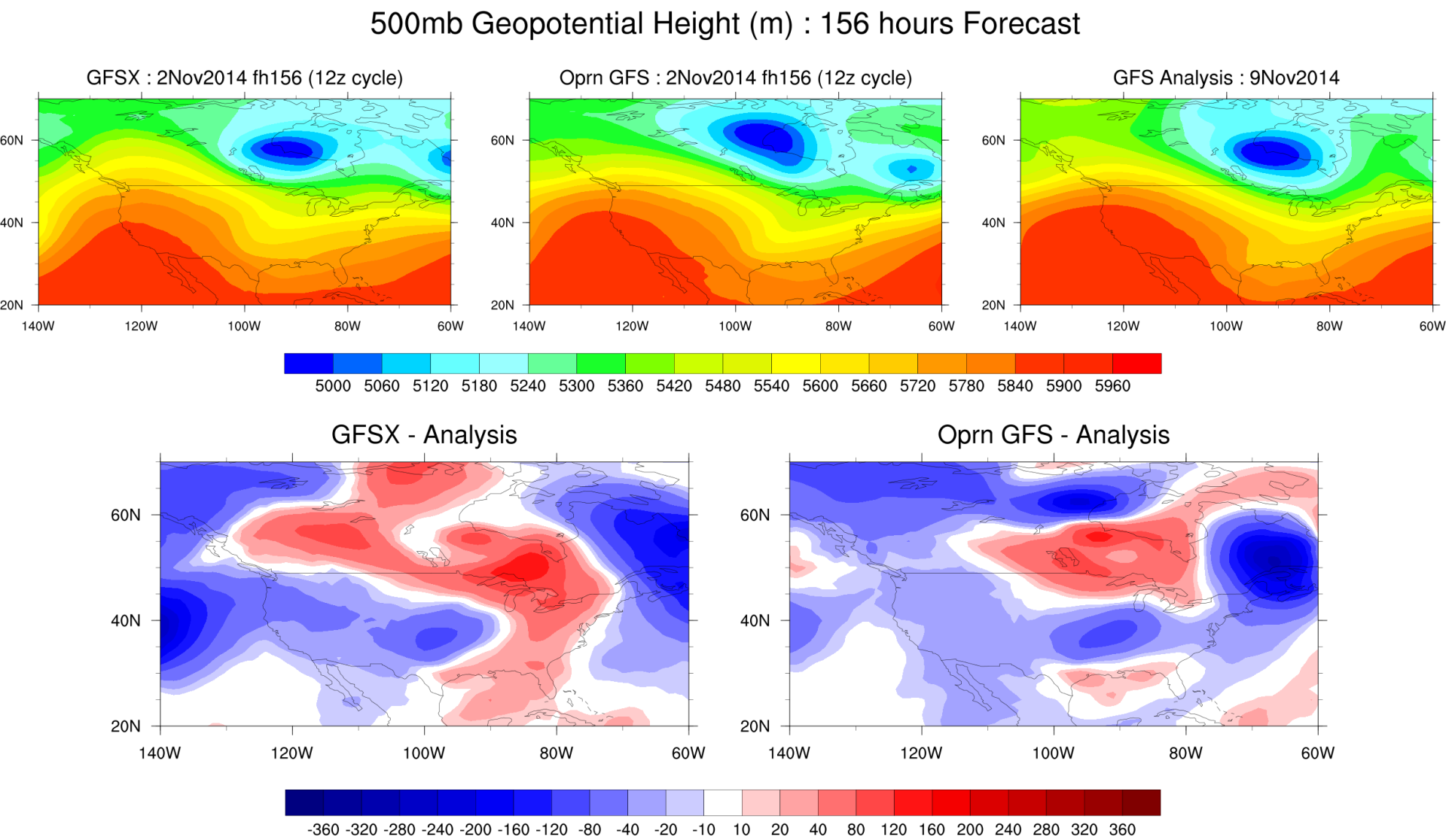
- GFSX slightly better

<u>WR</u> Case Study # 3 : Saturday Nov 8, 2014 to Monday Nov 10, 2014 – position of big low over the eastern US, with a shortwave rotating thru the base over the mid-Ohio area and a fast moving shortwave moving south into MT -- early models runs had low over PACNW then jumped to a building ridge Model run -- Should start Nov 1 and run thru Nov 10. The issue requiring DSS lead time for the event

500mb Geopotential Height (m) : 192 hours Forecast

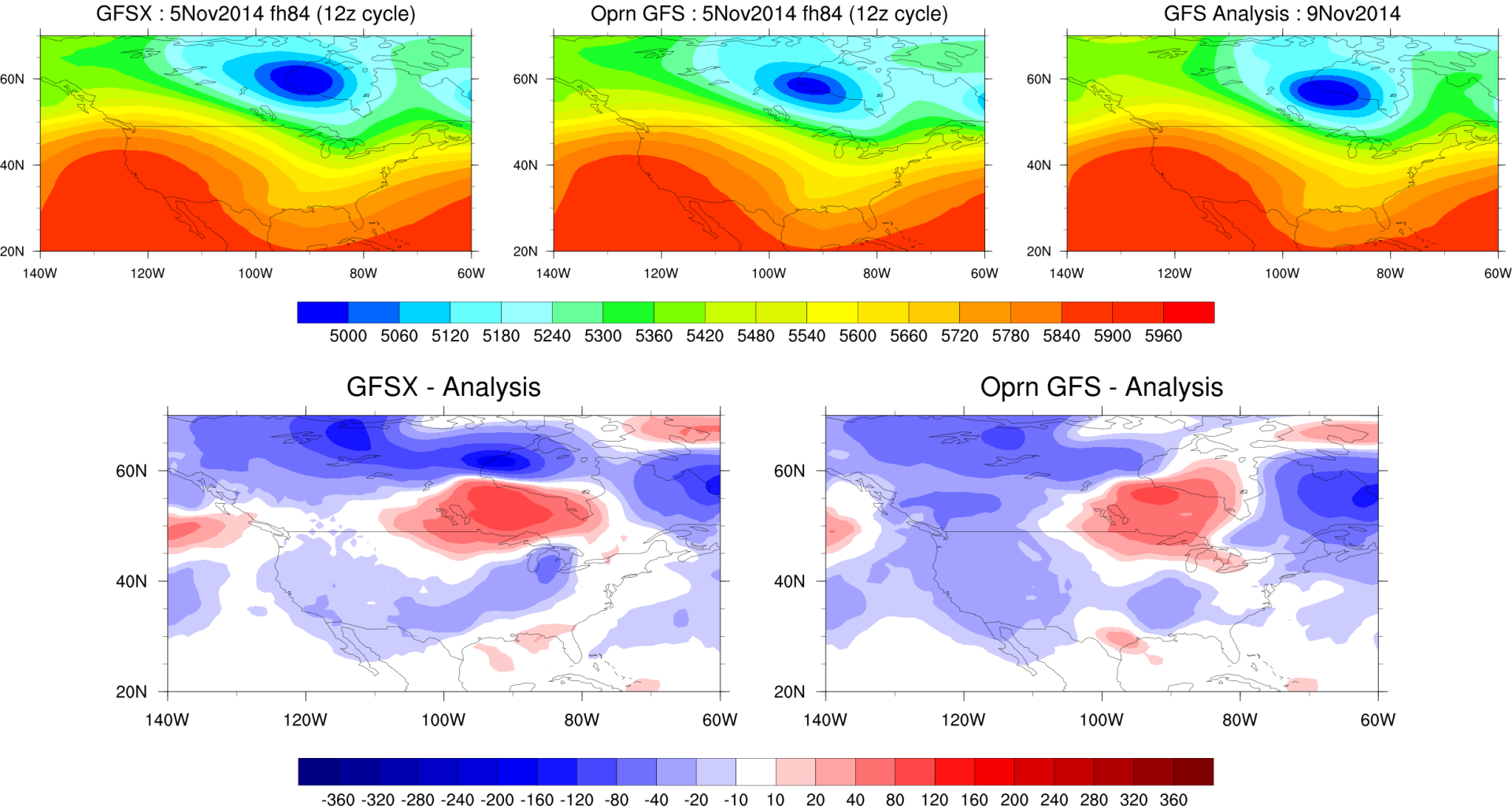




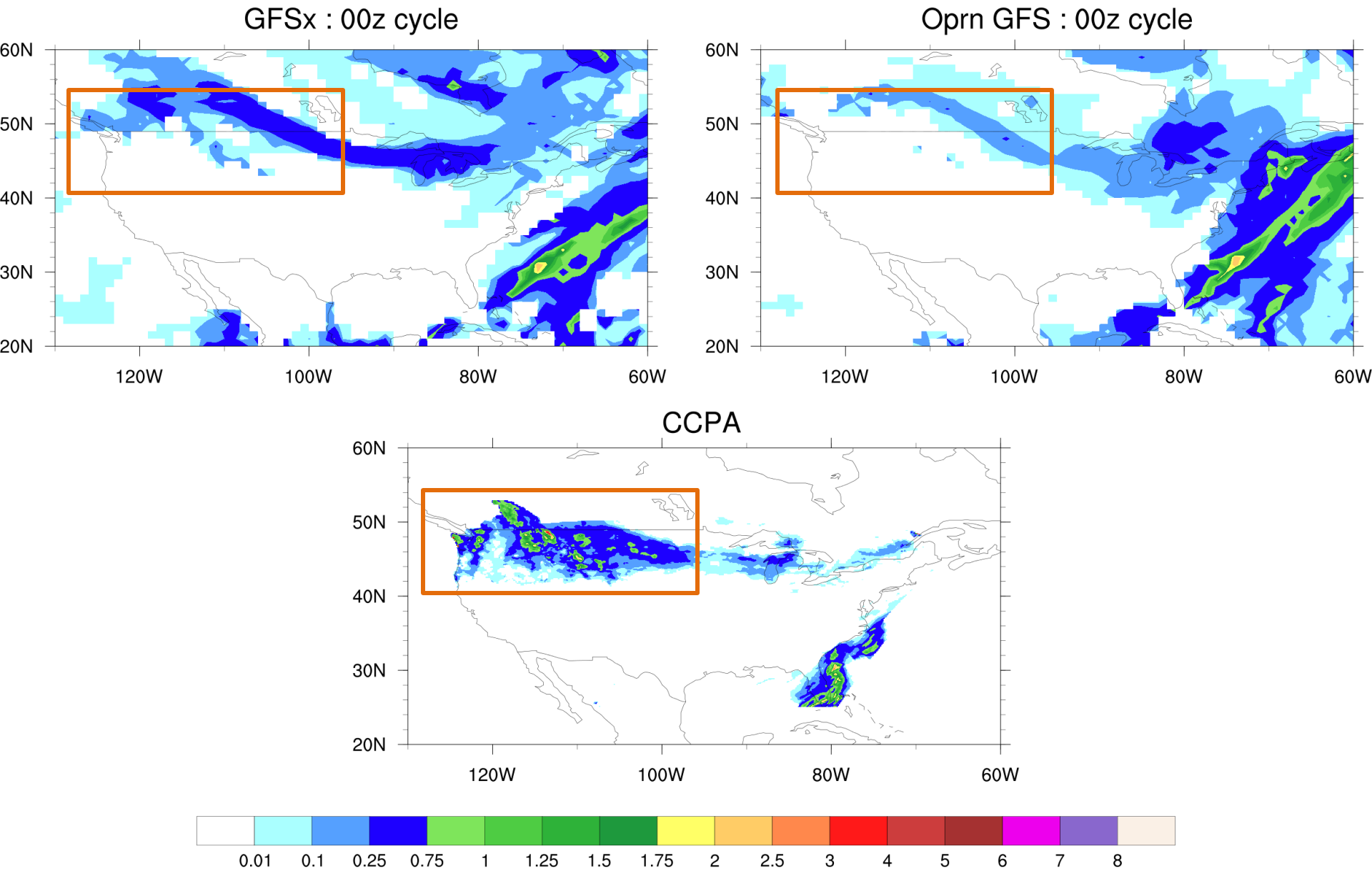


- GFSx brings the position of low comparable to analysis

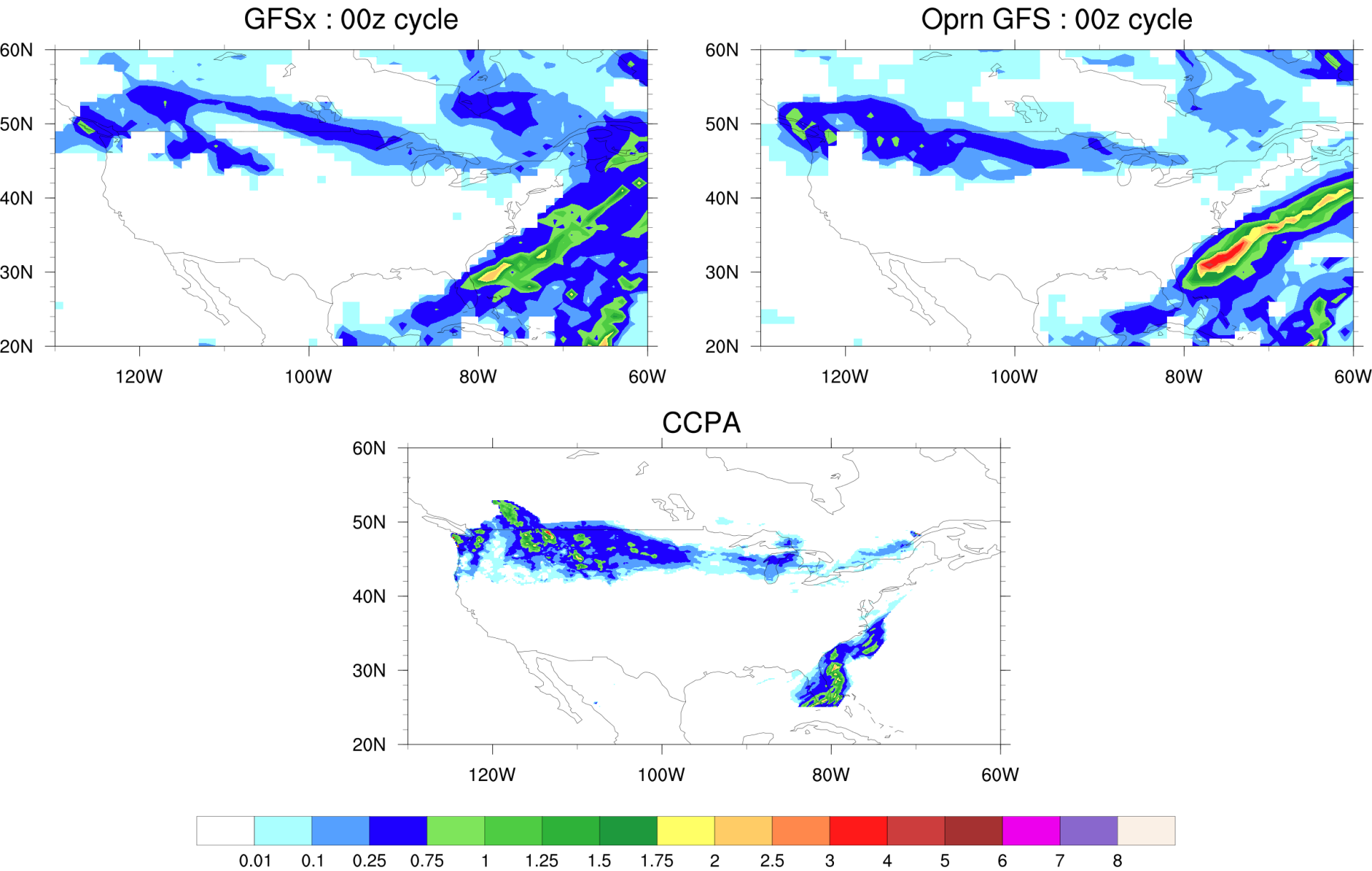
500mb Geopotential Height (m) : 84 hours Forecast



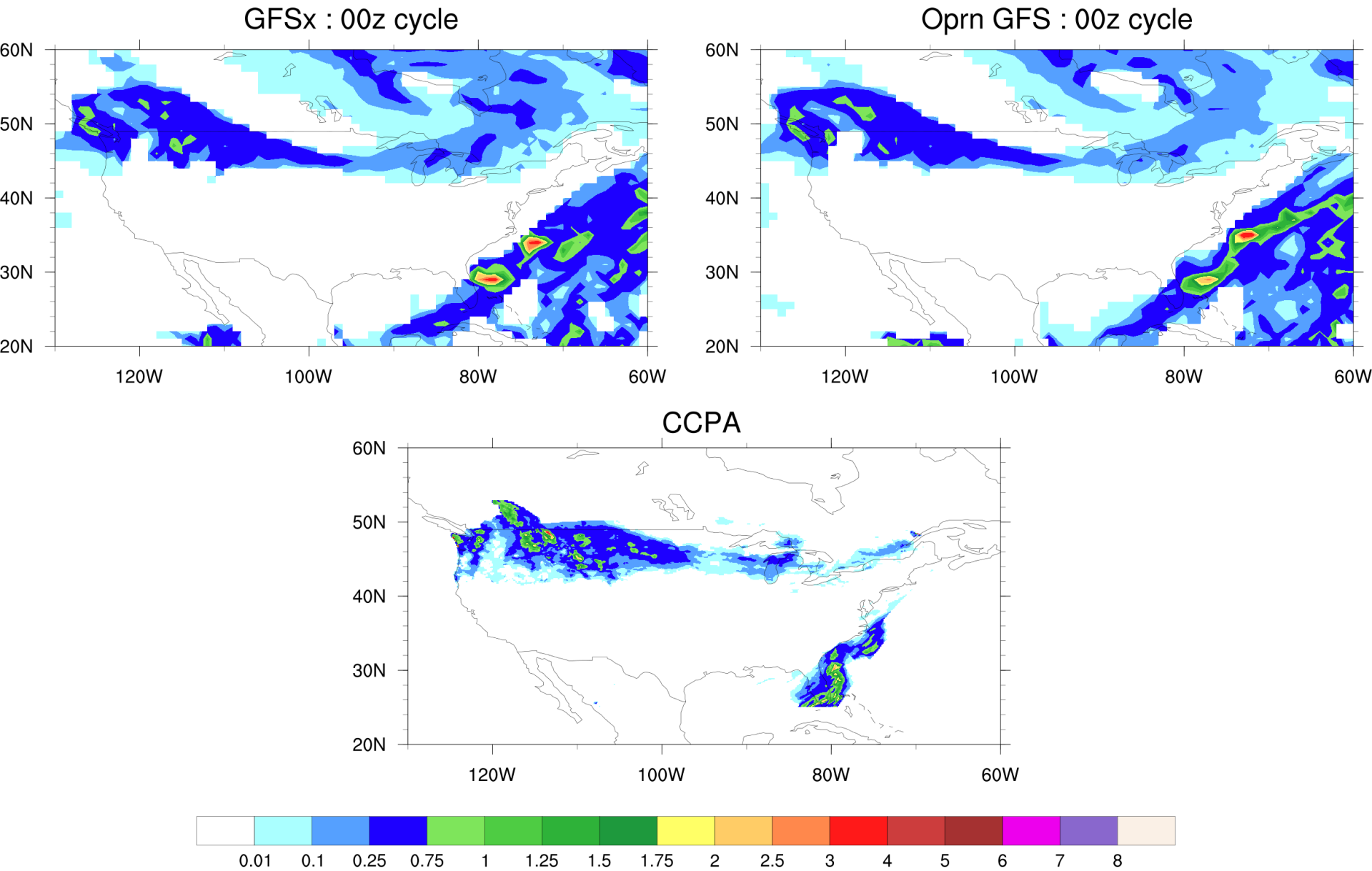
24-hr Accumulated Precip (inch) valid : 2014110912 - 2014111012 ; 156 - 180hr Forecast from 2014110300



24-hr Accumulated Precip (inch) valid : 2014110912 - 2014111012 ; 108 - 132hr Forecast from 2014110500



24-hr Accumulated Precip (inch) valid : 2014110912 - 2014111012 ; 36 - 60hr Forecast from 2014110800



Quick Assessment for **WR Case 3** (based on 12 – 192 hr forecast maps) :

- Precipitation GFSX looked better in 4 forecast lengths, operational in 3 for 24 hr amounts
  Nov. 8 12Z-Nov. 9 12Z and Nov. 9 12Z- Nov. 10 12Z

- SLP for Nov. 9 0Z : Operational looked better in 10 cases, GFSX better in 6

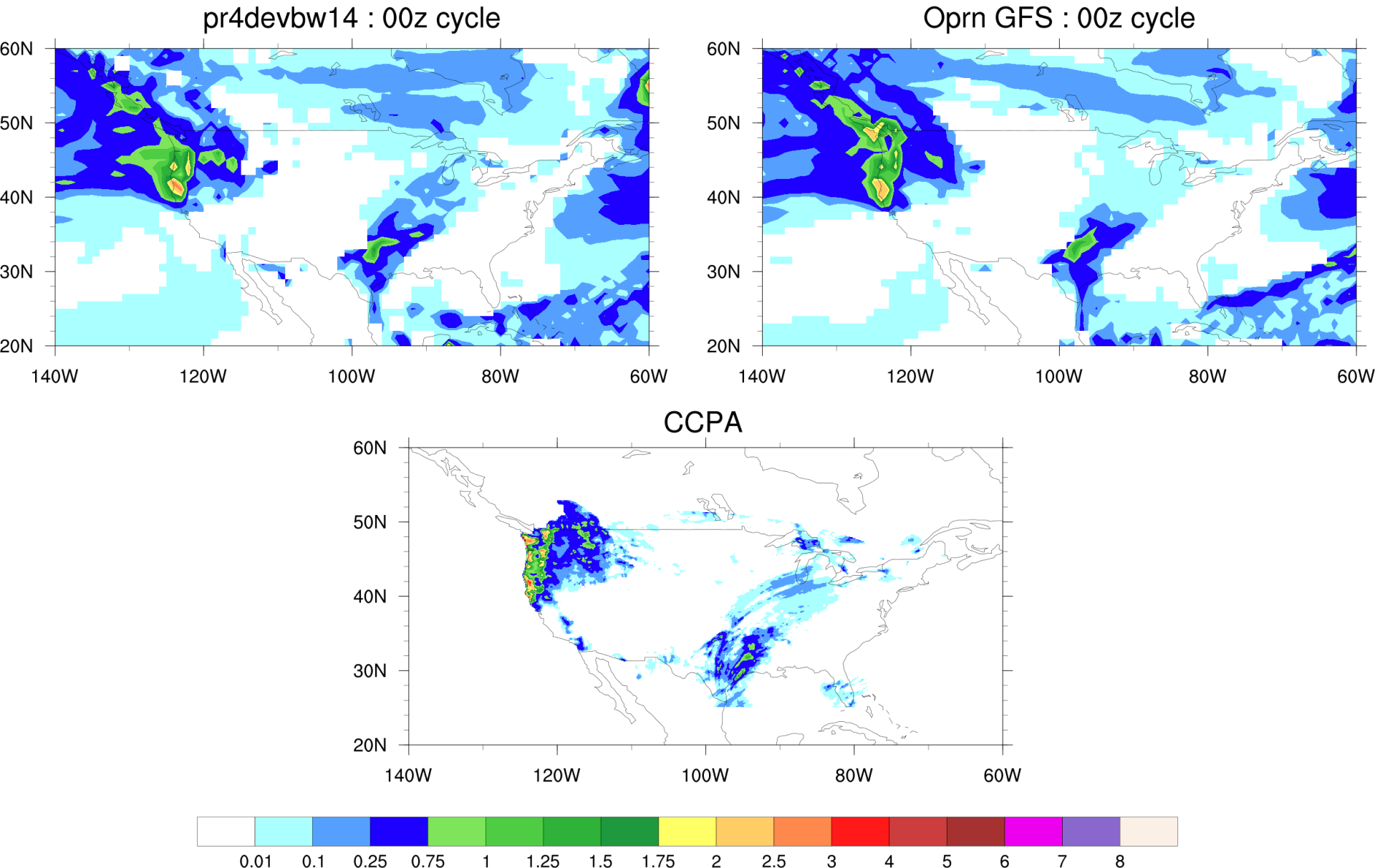
- 500 heights for Nov. 9 : 0z GFSX better in 8 cases GFS 10 cases

- 2 m temperatures for Nov. 9 0z : GFSX better in 6 operational in 6. (verification GFS f00 2m Temperature)

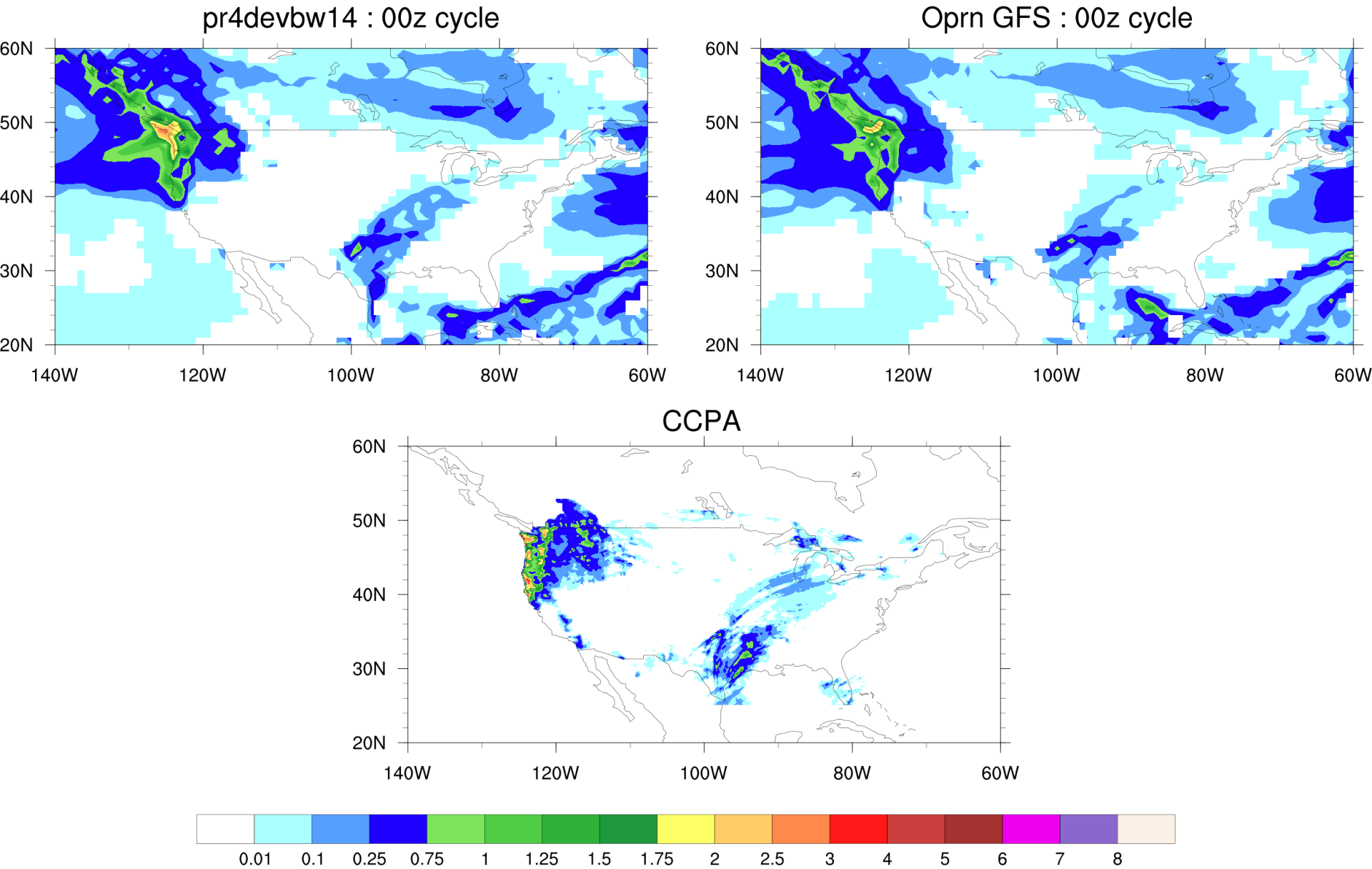
- Operational GFS slightly better

<u>WR</u> Case Study # 4 : Monday Nov 20, 2014 to Thursday Nov 23, 2014 -- big upper low developing over northwest.

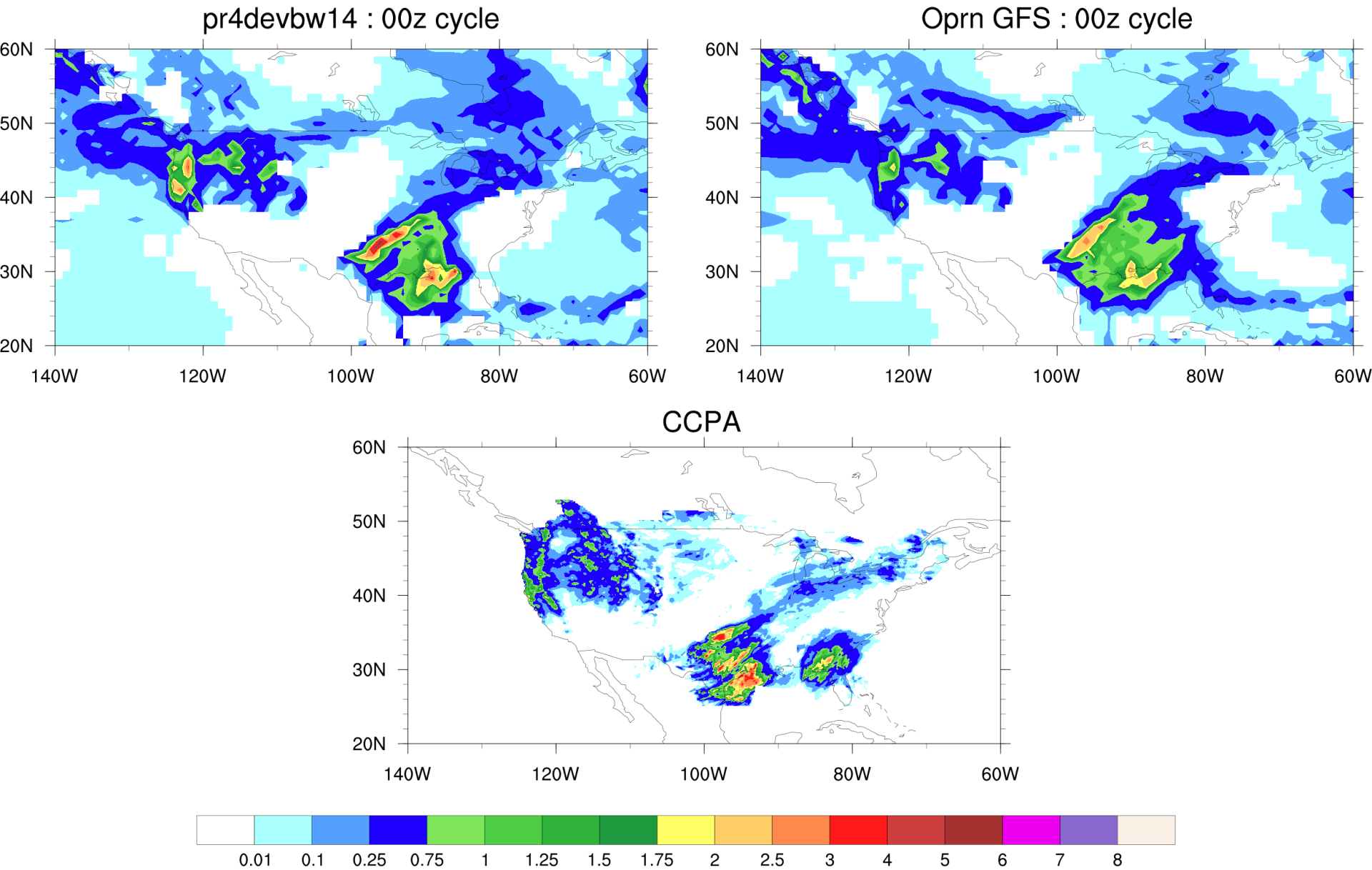
24-hr Accumulated Precip (inch) valid : 2014112112 - 2014112212 ; 84 - 108hr Forecast from 2014111800



24-hr Accumulated Precip (inch) valid : 2014112112 - 2014112212 ; 36 - 60hr Forecast from 2014112000



24-hr Accumulated Precip (inch) valid : 2014112212 - 2014112312 ; 108 - 132hr Forecast from 2014111800



- Gradual progression of precipitation band to the south

Quick Assessment for **WR Case 4** (based on 12 – 192 hr forecast maps) :

- 24 hour Precipitation for 12ZNov19-12ZNov 20 to 12Z Nov.23-12Z Nov.24 GFSX looked better in 11 cases, operational in 7 for 24 hr amounts

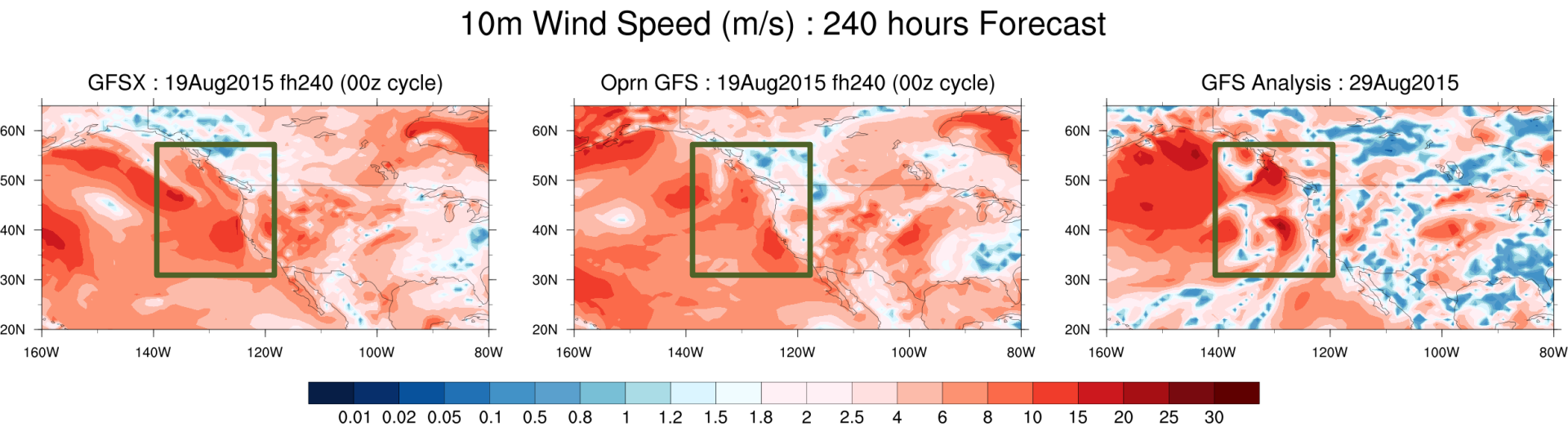
- SLP for 0Z Nov 20-23 : Operational looked better in 5 cases, GFSX better in 14

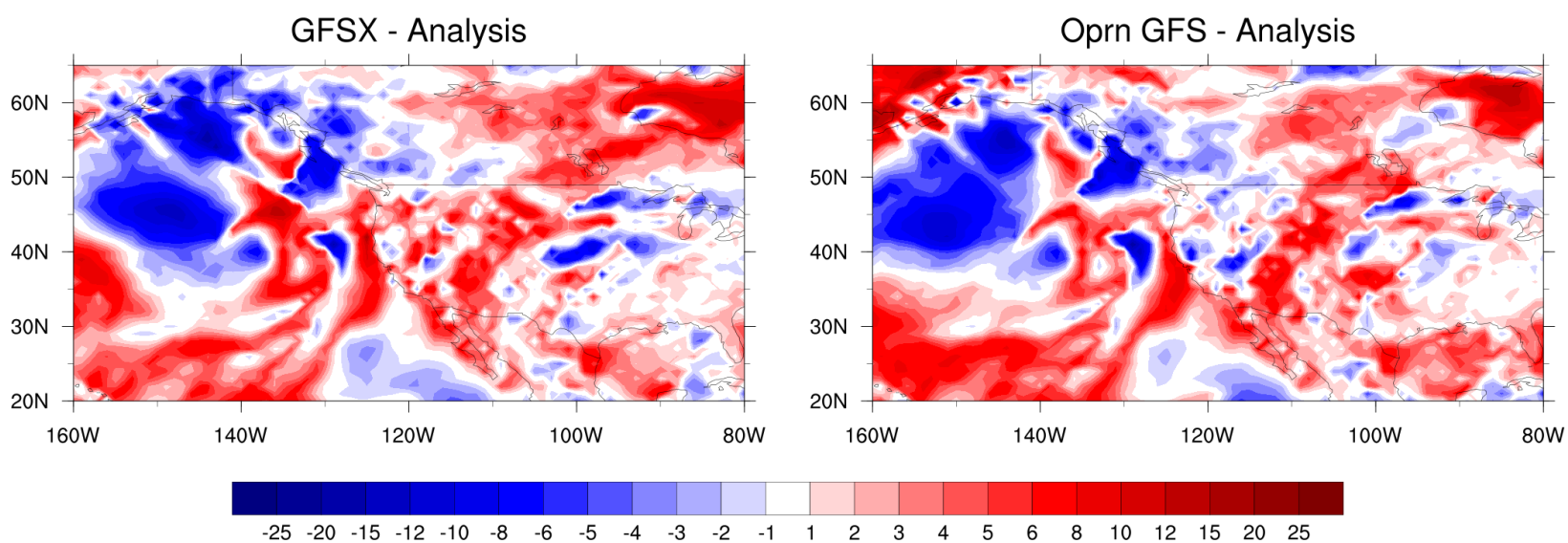
- 500 heights for 0z Nov. 20-23 : GFSX better at 16 forecast lengths, operation better in 3

- 2 m temperatures for 0z Nov. 20-23 : GFSX better in 10 operational in 8 (verification GFS f00 2m Temperature)

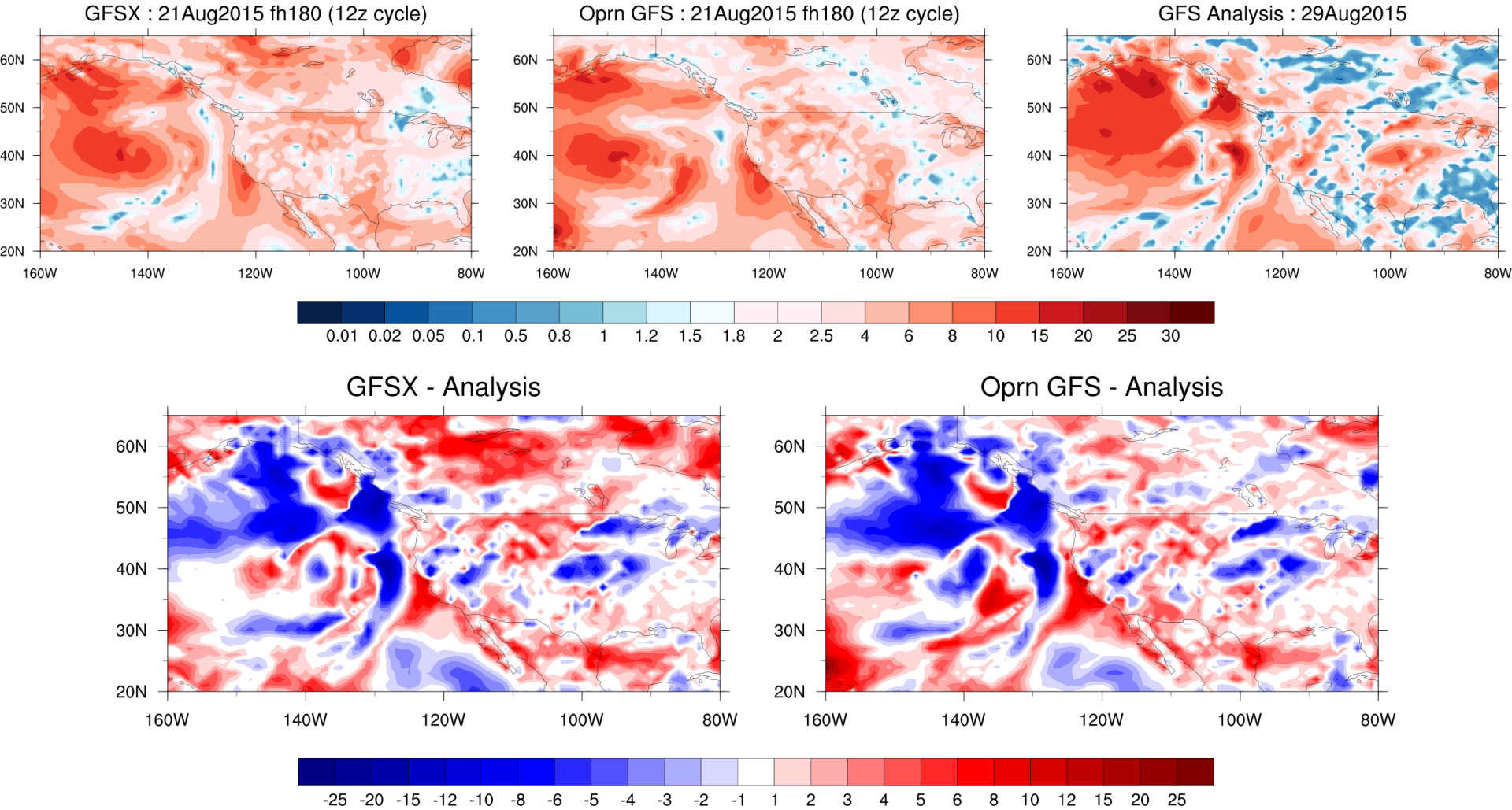
- GFSX performed better

<u>WR</u> Case Study # 2 : Friday Aug 28, 2015 to Sunday Aug 30, 2015 -- high wind event over the PACNW . There were 60 major Type 1 fire and 40 plus IMET deployed Model run -- Should start Aug 19 and run thru Aug 30th. The issue requiring DSS lead time for the event -- potential for loss of life/structures at fires

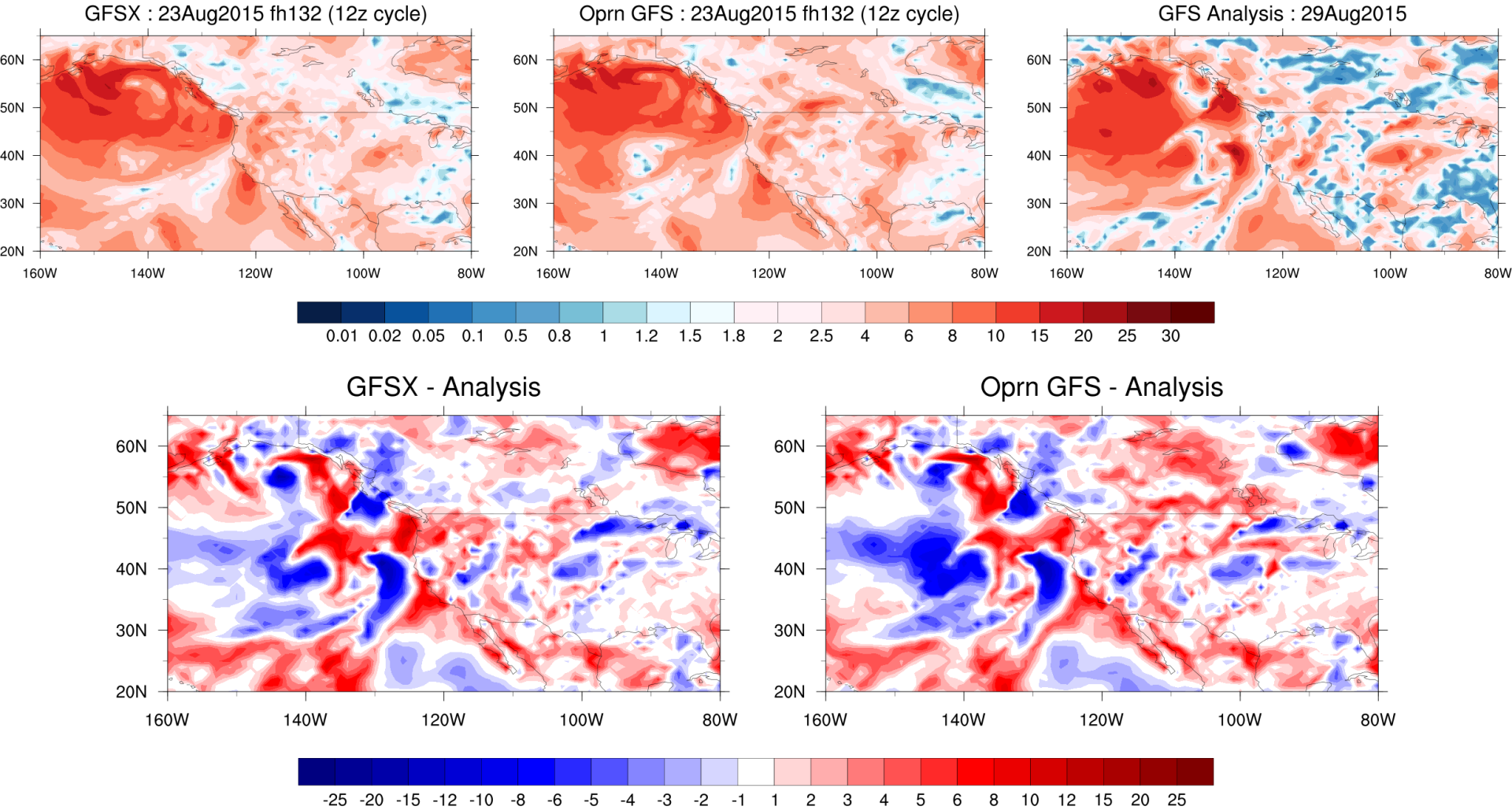




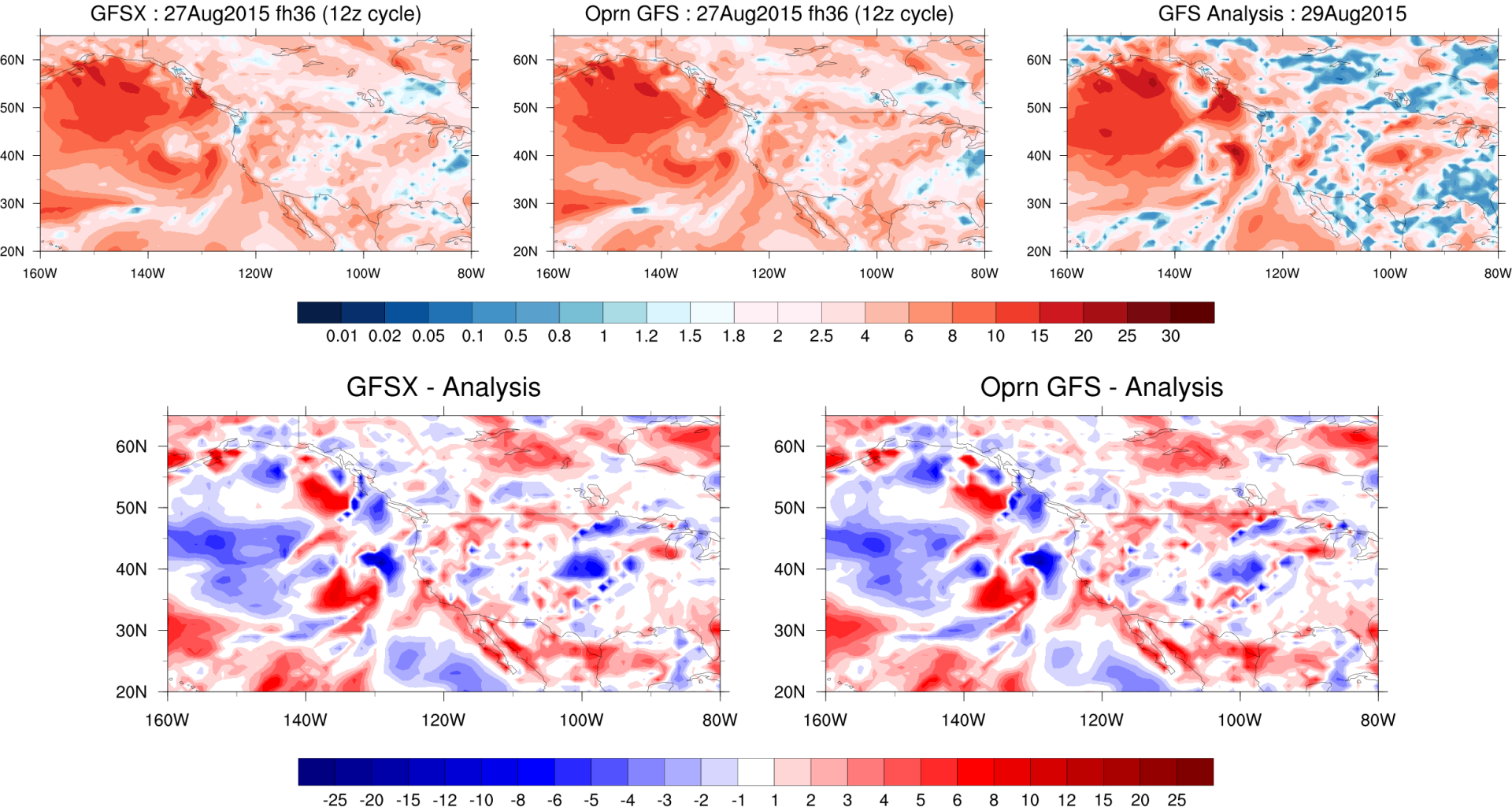
10m Wind Speed (m/s) : 180 hours Forecast



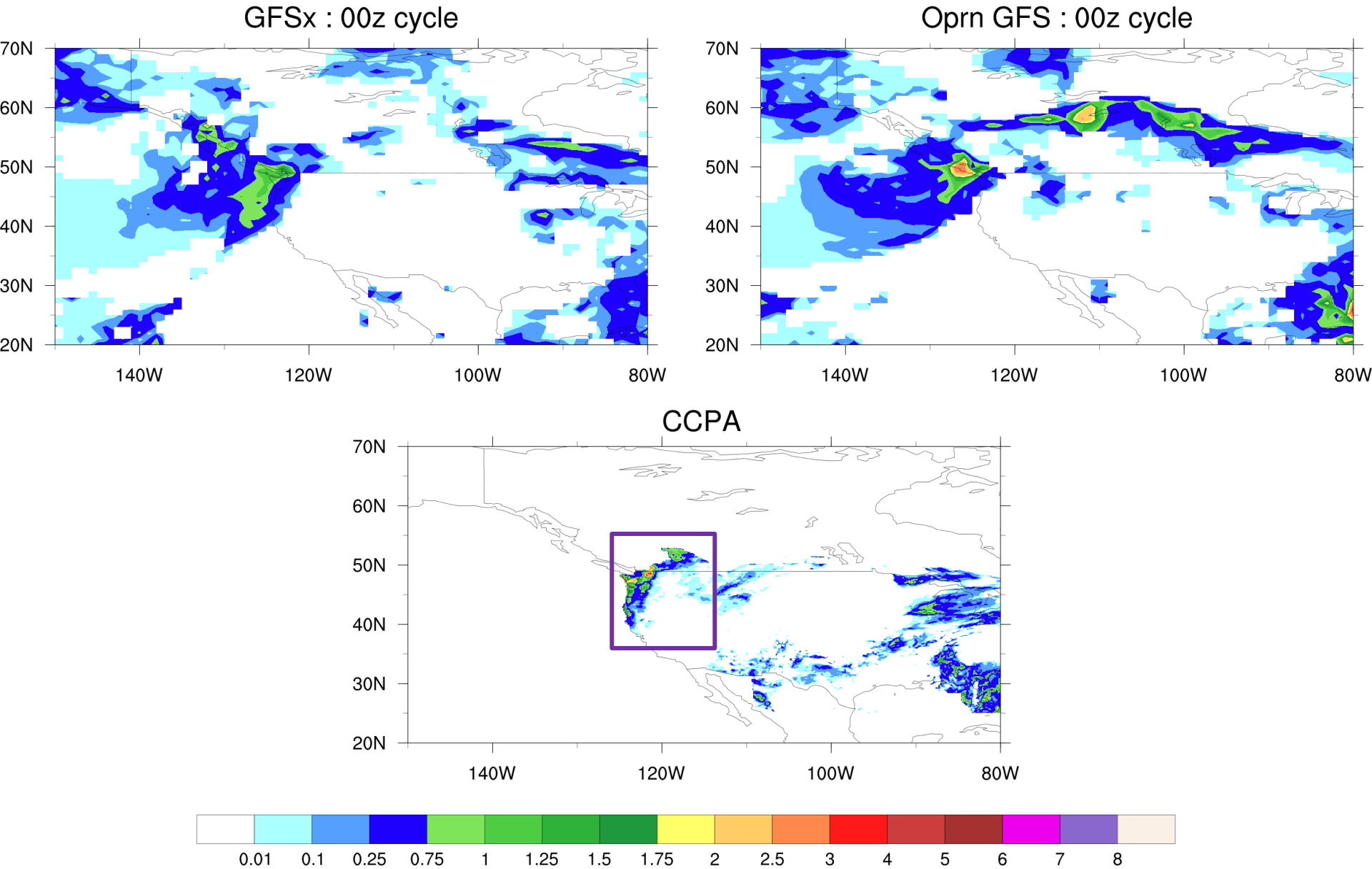
10m Wind Speed (m/s) : 132 hours Forecast



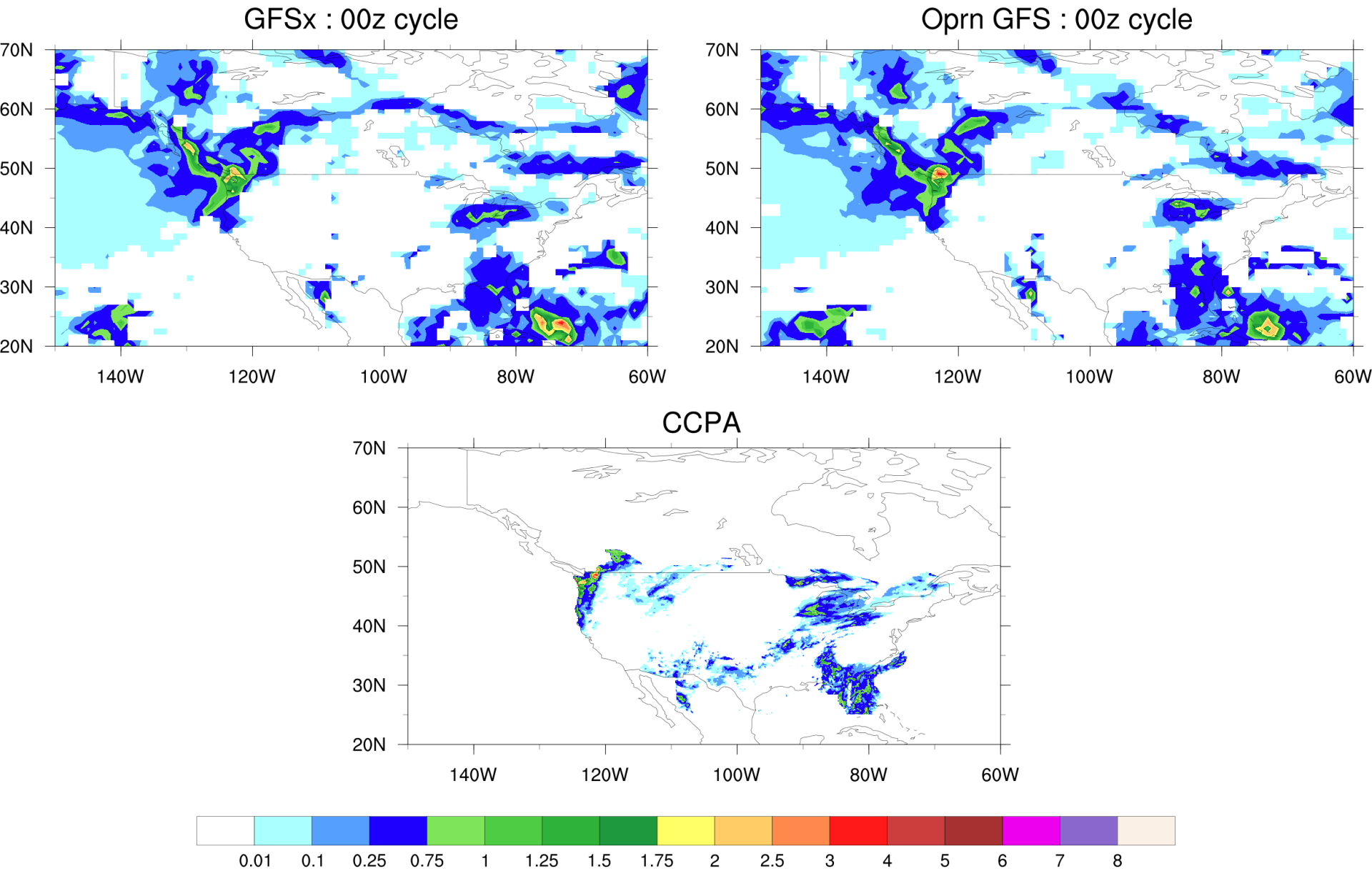
10m Wind Speed (m/s) : 36 hours Forecast



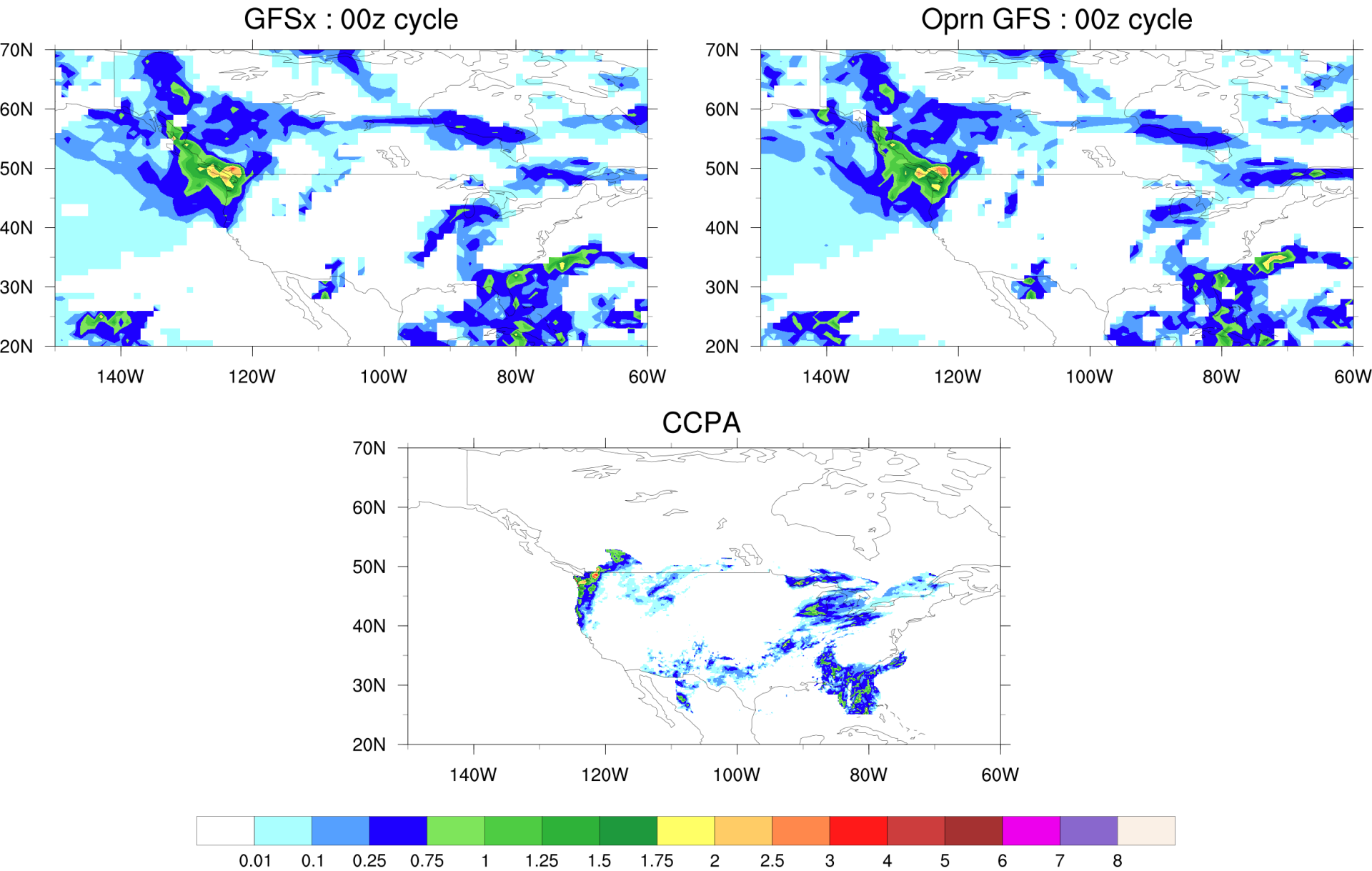
24-hr Accumulated Precip (inch) valid : 2015082912 - 2015083012 ; 132 - 156hr Forecast from 2015082400



24-hr Accumulated Precip (inch) valid : 2015082912 - 2015083012 ; 60 - 84hr Forecast from 2015082700



24-hr Accumulated Precip (inch) valid : 2015082912 - 2015083012 ; 12 - 36hr Forecast from 2015082900



Quick Assessment for **WR Case 2** (based on 12 – 240 hr forecast maps) :

- Precipitation GFSX looked better in 10 cases, operational in 5 for 24 hr amounts Aug. 28 12Z-Aug. 29 12Z and Aug. 29 12Z- Aug 30 12Z

- SLP for Aug 29 0Z : Operational looked better in 11 cases, GFSX in 6

- 500 heights for Aug 29 : 0Z GFSX better in 8, operational in 7

- 2 m temperatures for Aug 29 : 0z GFSX better in 14 operational in 11. (verification GFS f00 2m Temperature)

- 10 m winds : for Aug. 29 0z GFSX better 9 forecast times, operational 6 forecast times

- GFSX slightly better

GFSx vs GFS plume plots (still some work need to be done)

Visit : http://www.emc.ncep.noaa.gov/gc_wmb/parthab/Plume_test/GFSx/EMCGEFSplumes.html