The Little Cyclone That (Hopefully) Could

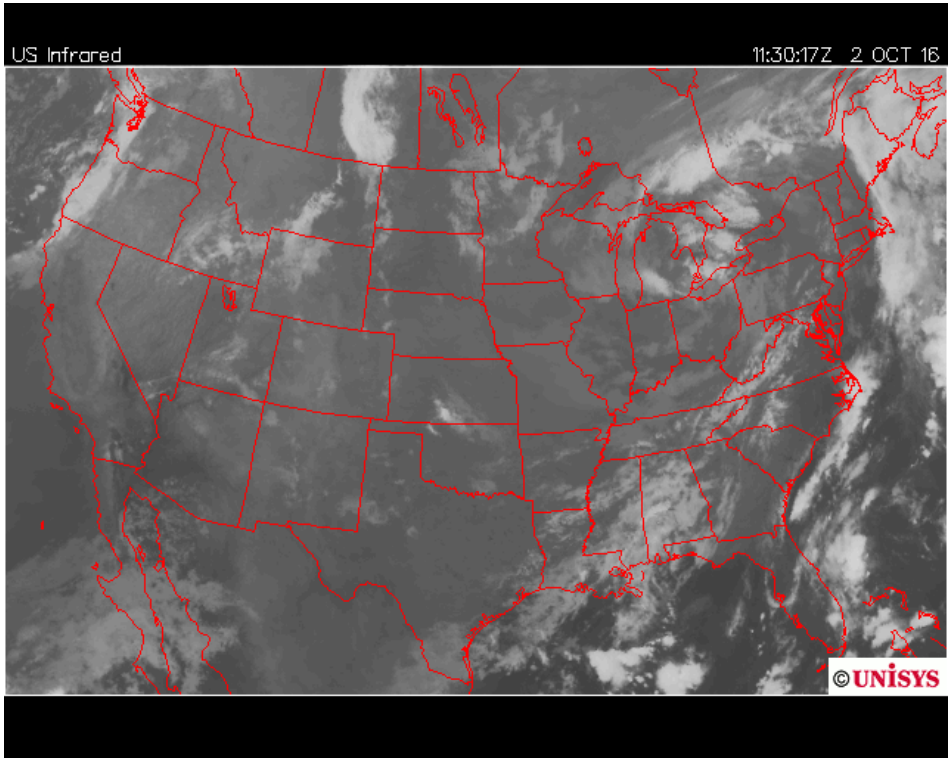
Bill Cassell and Jingjing Tian

10/03/2016

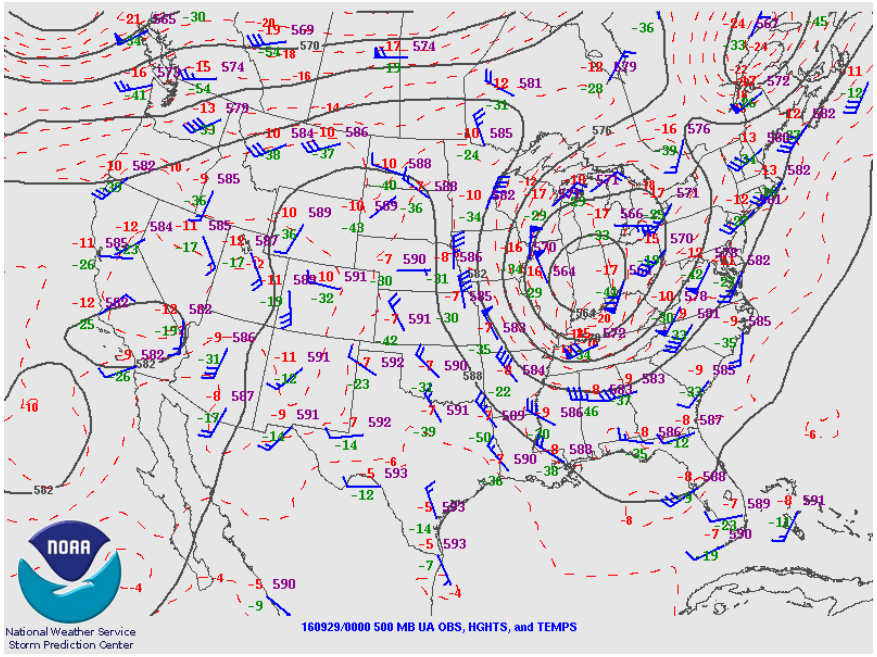
Outline

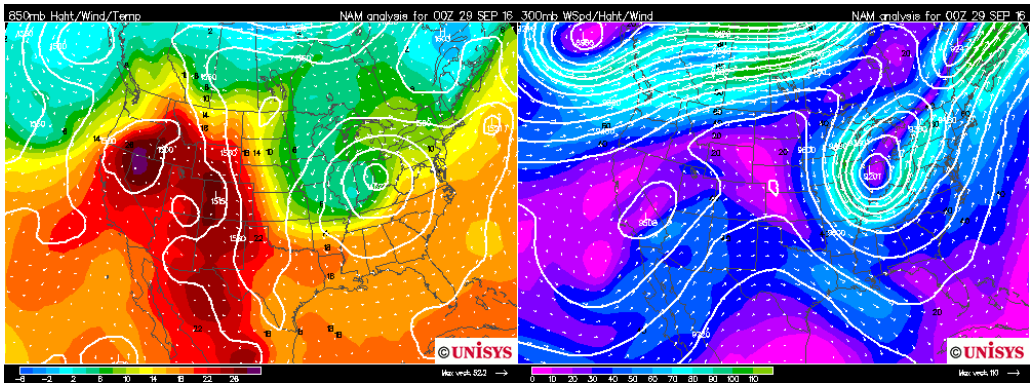
- Synopsis
  - Upper level low
  - Fronts and cyclogenesis
- Current Weather
  - With QG theory implications
- Forecast
- Verification

Synopsis – IR Loop



00Z 29 Sept 16





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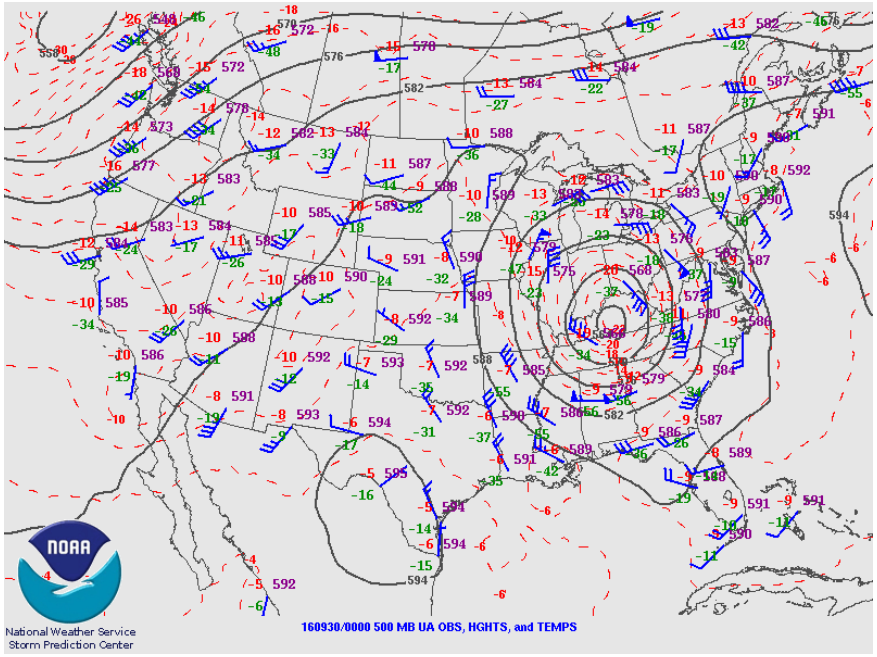
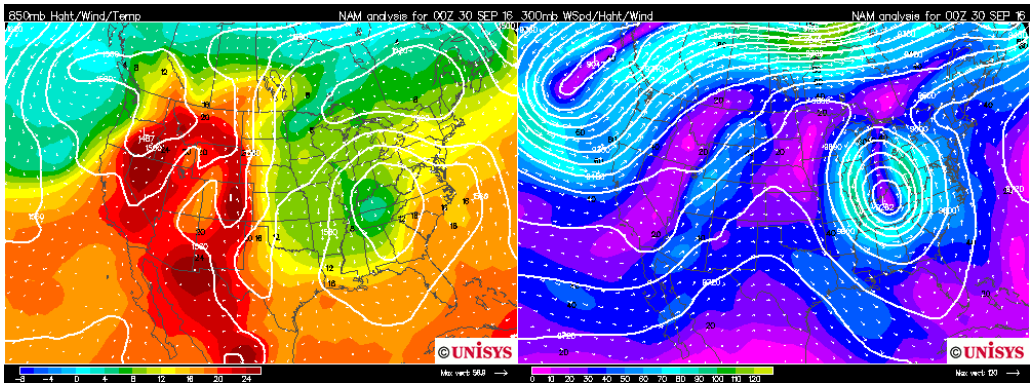
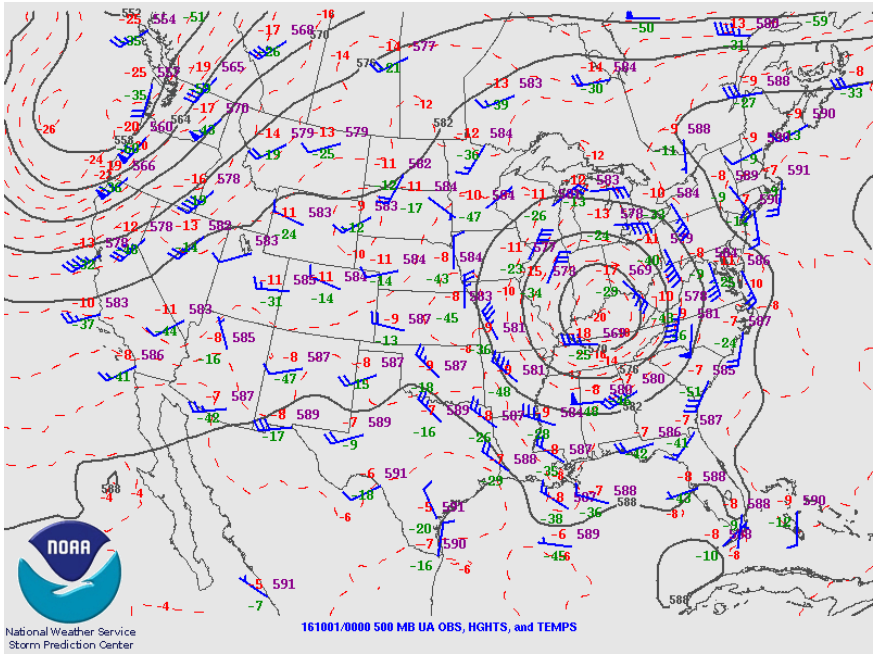




00Z 01 Oct 16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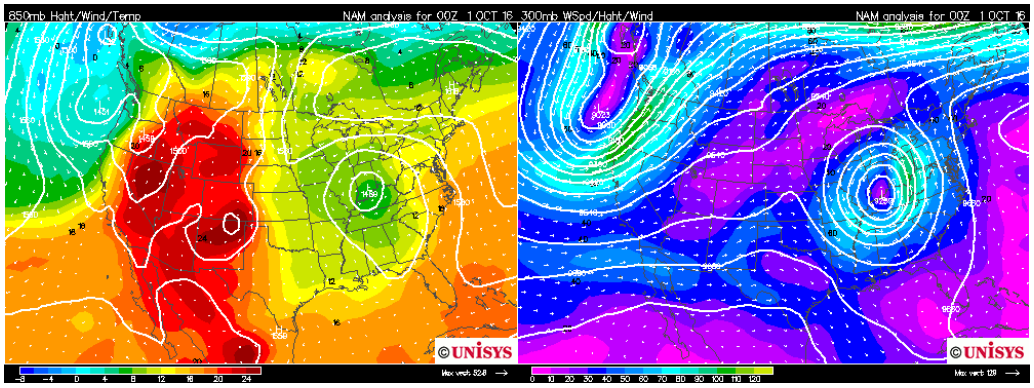
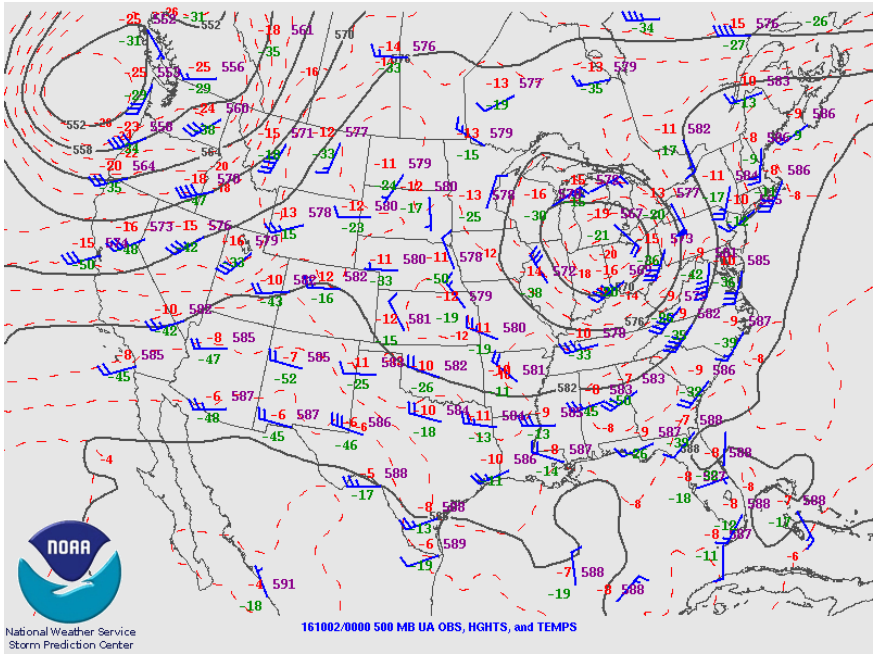
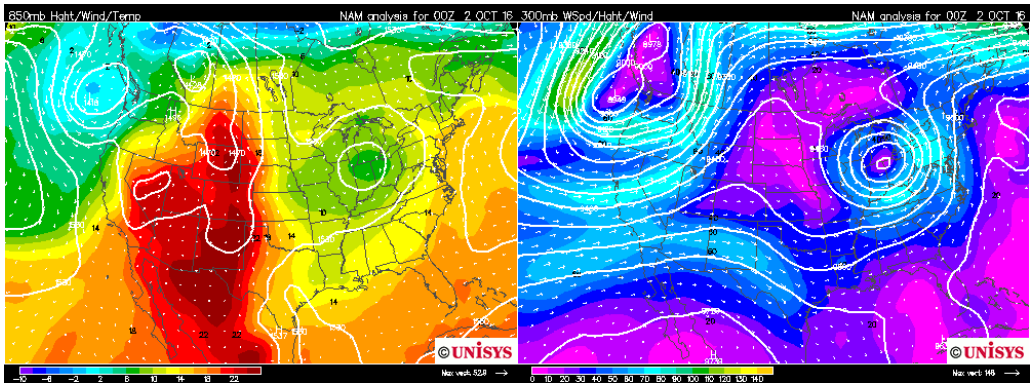
Storm Prediction Center
161001/0000 500 MB UA OBS, HGHTS, and TEMPS

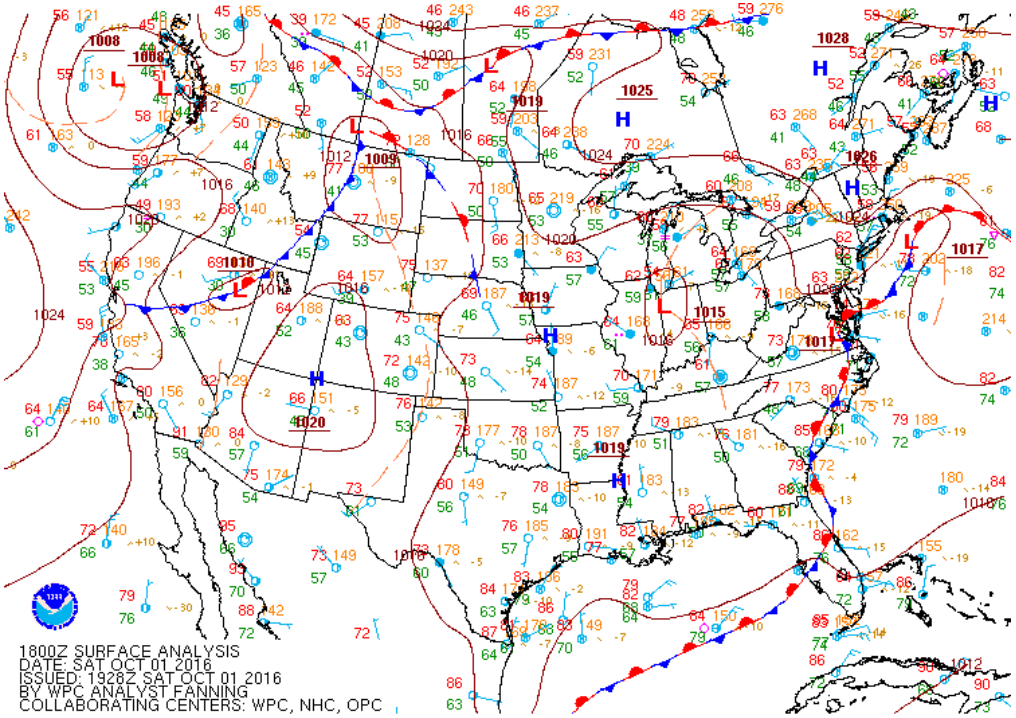

850mb Hght/Wind/Temp
NAM analysis for 00Z 1 OCT 16
300mb WSpd/Hght/Wind
NAM analysis for 00Z 1 OCT 16
©UNISYS
©UNISYS

00Z 02 Oct 16


National Weather Service
Storm Prediction Center
161002/0000 500 MB UA OBS, HGHTS, and TEMPS


850mb Hght/Wind/Temp
NAM analysis for 00Z 2 OCT 16
300mb WSpd/Hght/Wind
NAM analysis for 00Z 2 OCT 16
©UNISYS
©UNISYS

18Z Oct 1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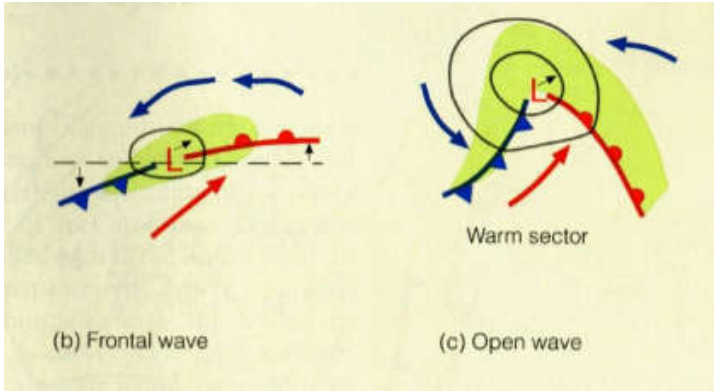
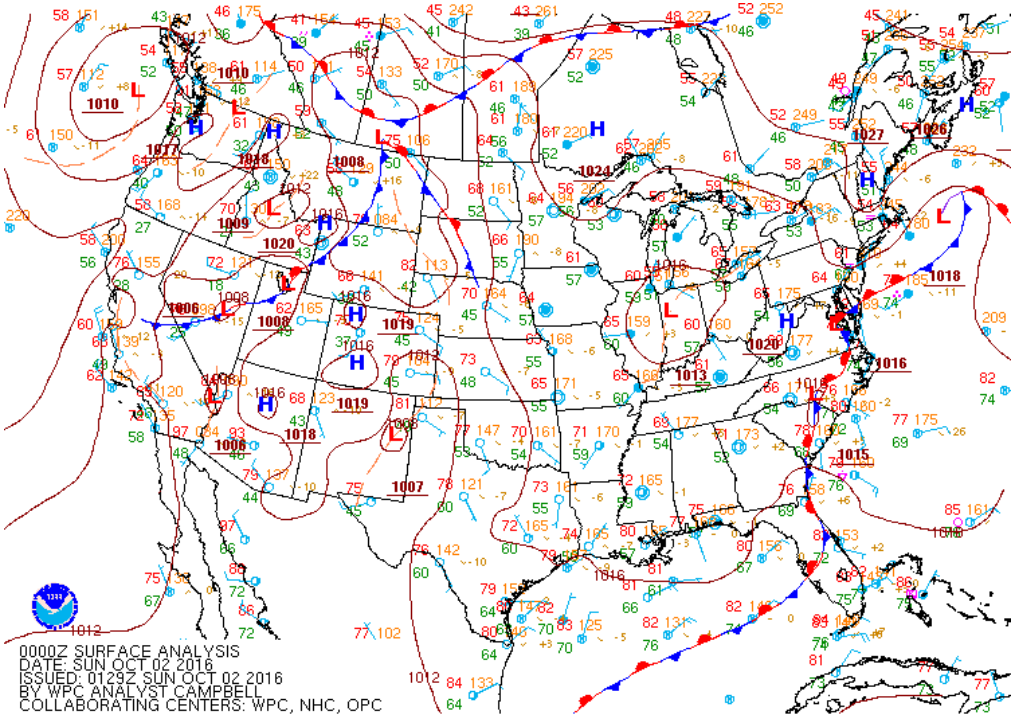
COLLABORATING CENTERS: WPC, NHC, OPC


Warm sector
(b) Frontal wave
(c) Open wave

00Z Oct 2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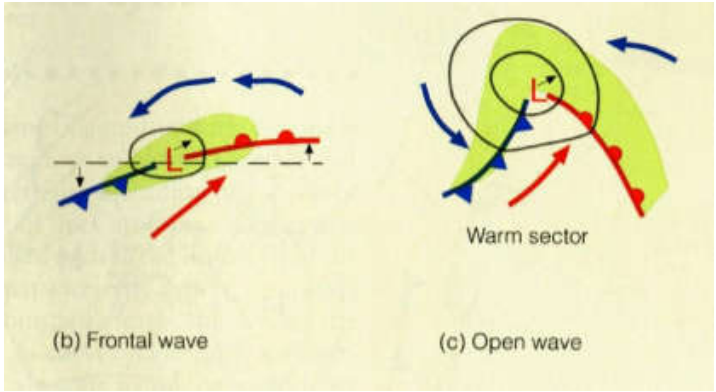
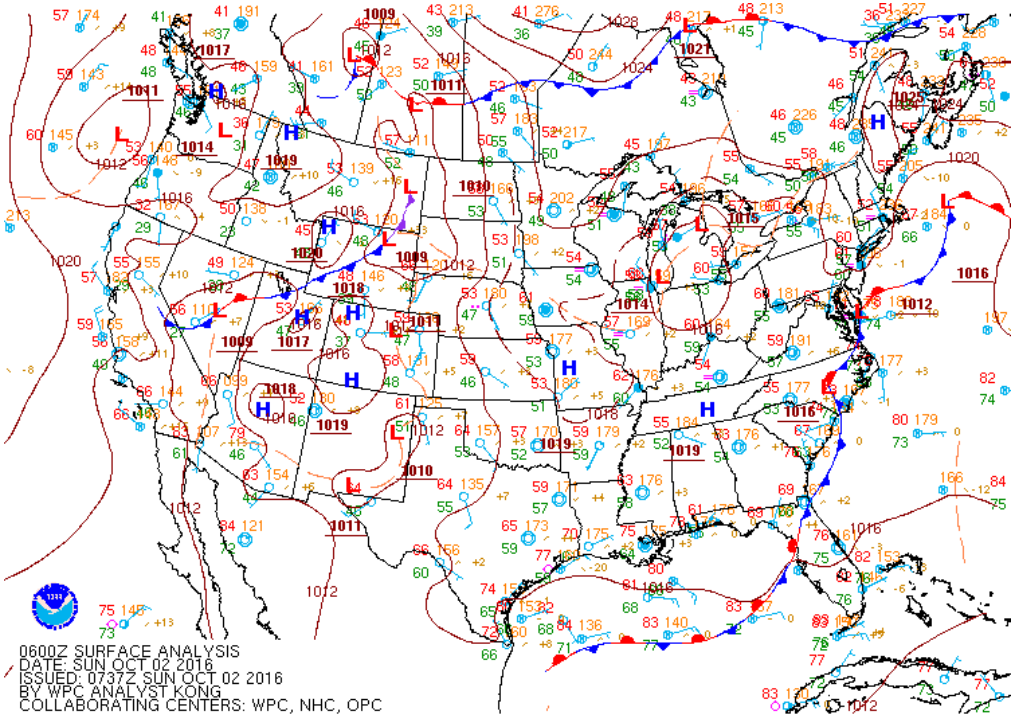
BY WPC ANALYST CAMPBELL
COLLABORATING CENTERS: WPC, NHC, OPC


Warm sector
(b) Frontal wave
(c) Open wave

06Z Oct 2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BY WPC ANALYST KONG
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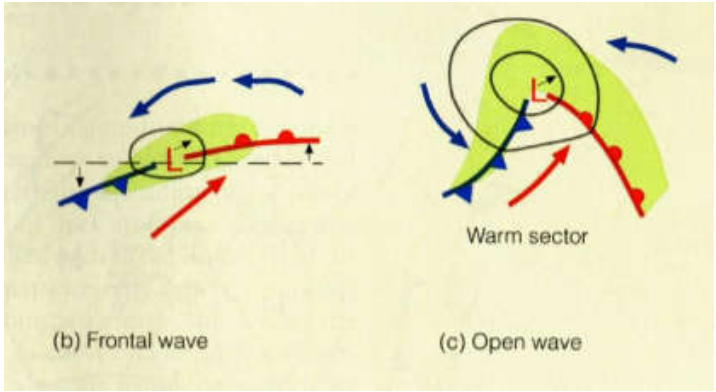
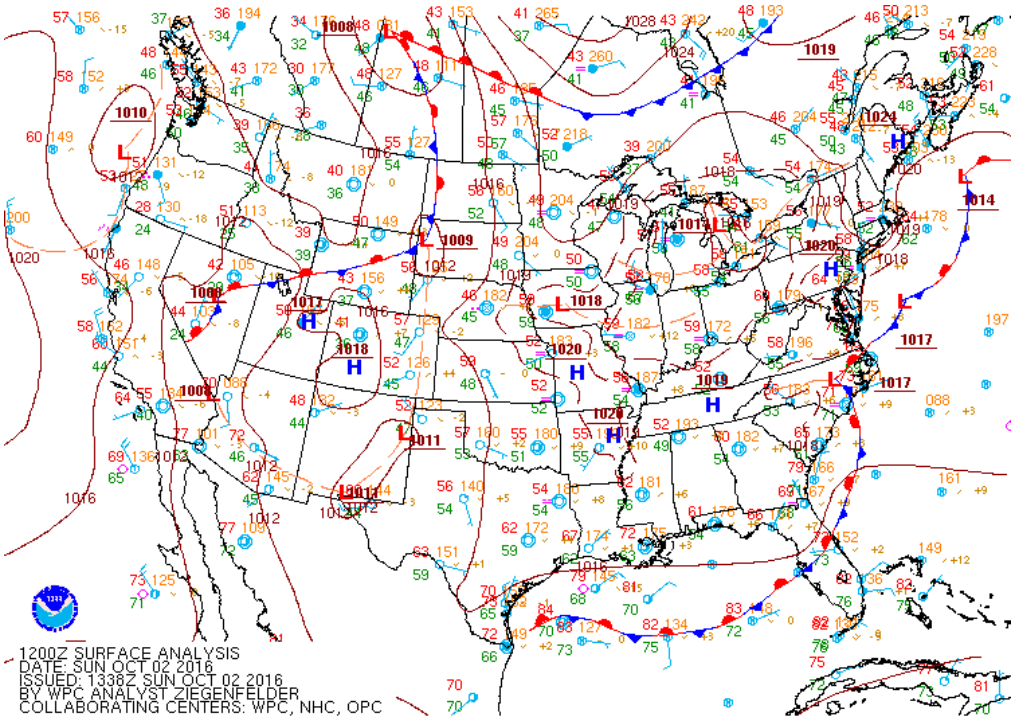

Warm sector
(b) Frontal wave
(c) Open wave

12Z Oct 2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BY WPC ANALYST ZIEGENFELDER
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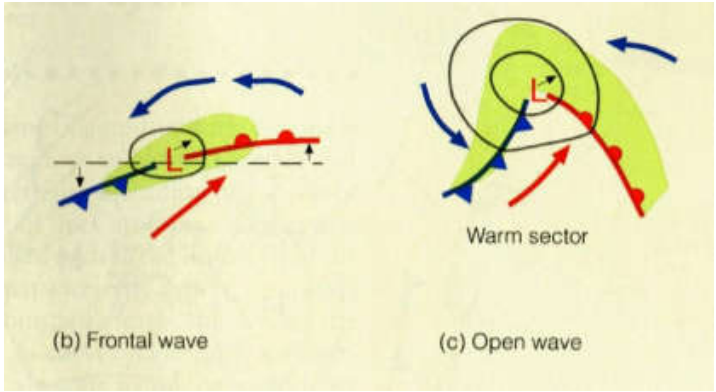
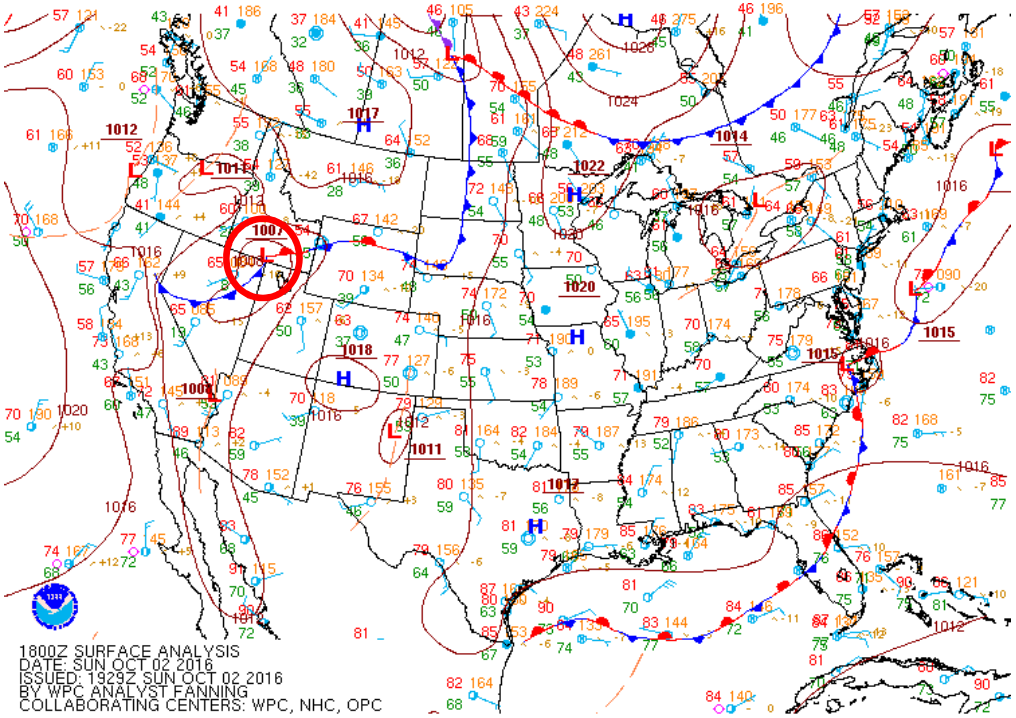
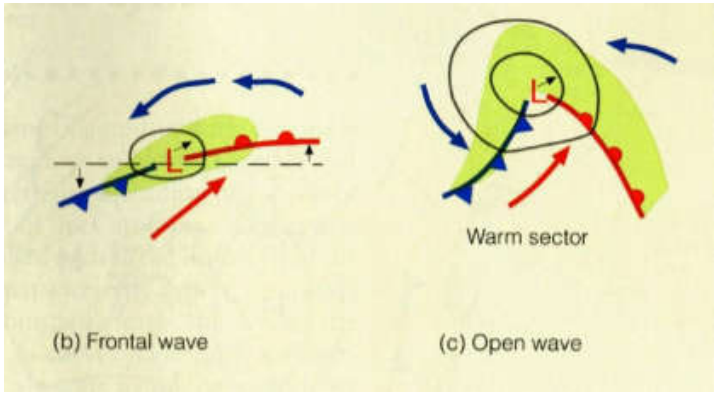
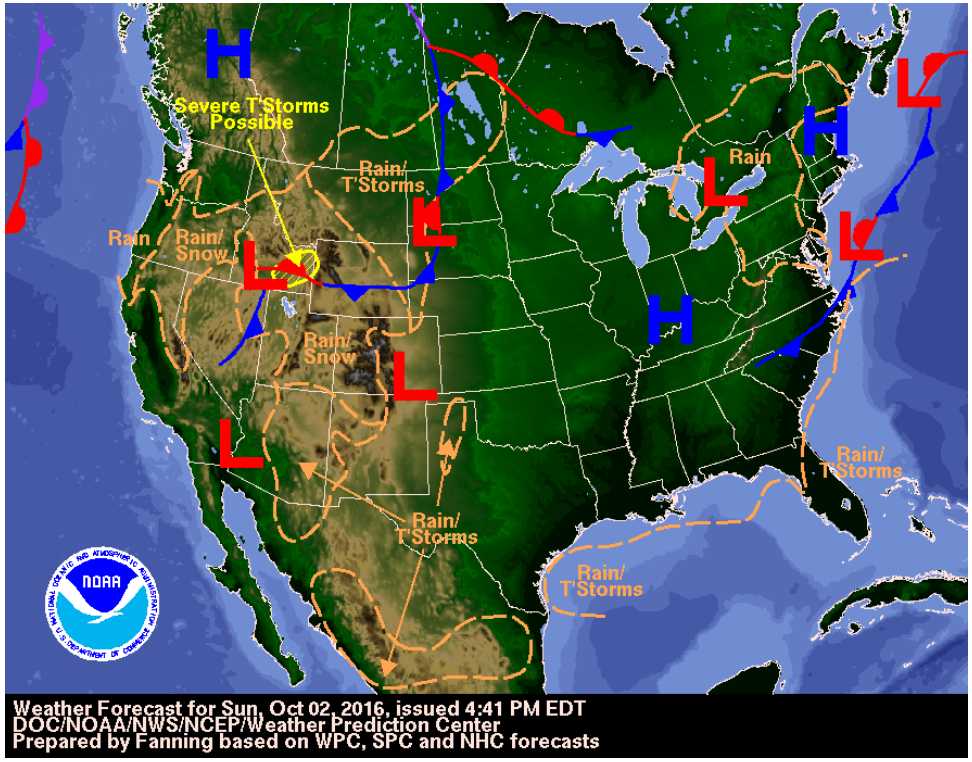

Warm sector
(b) Frontal wave
(c) Open wave

18Z Oct 2 – Forecast Time

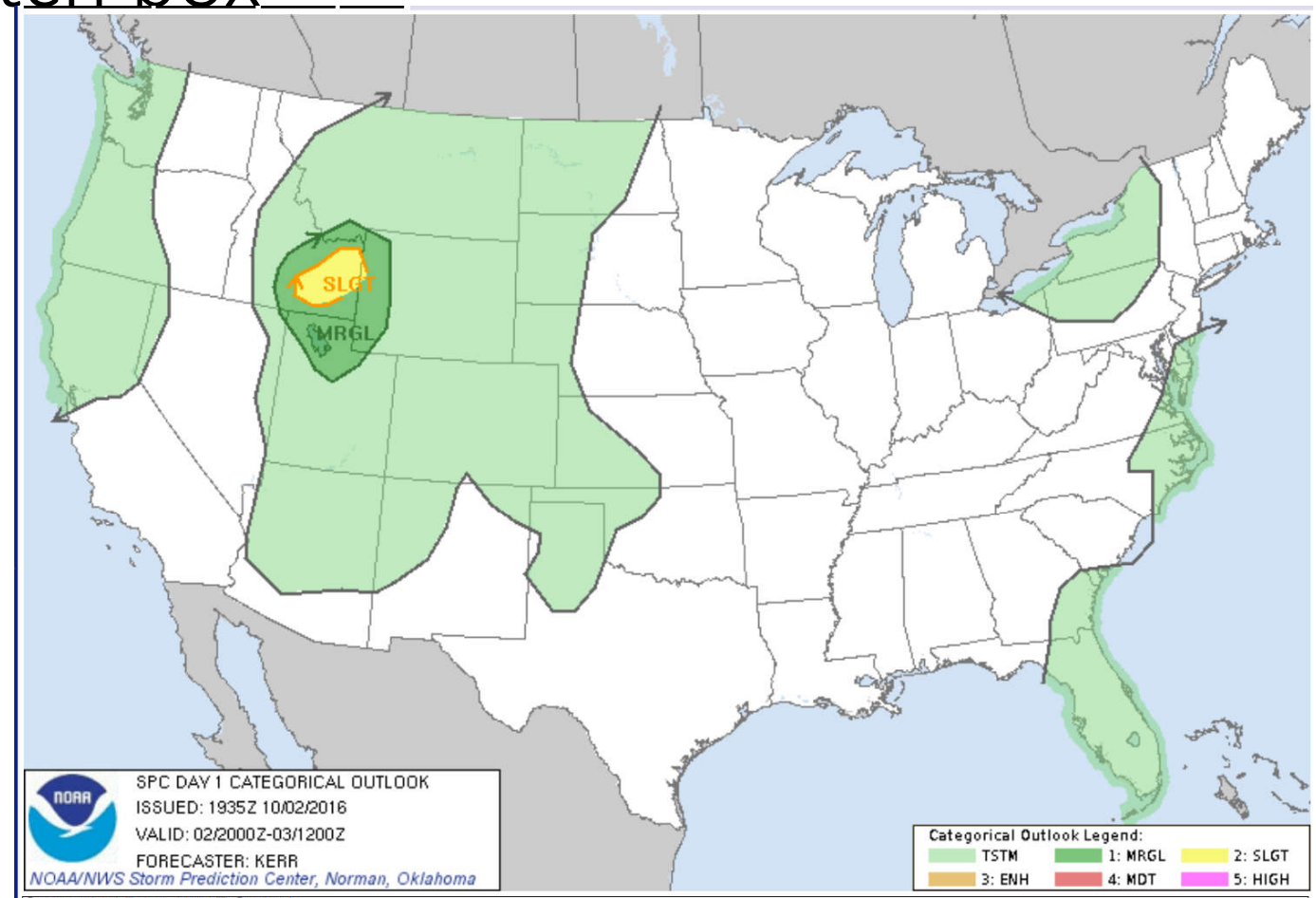




Forecast precipitation impact



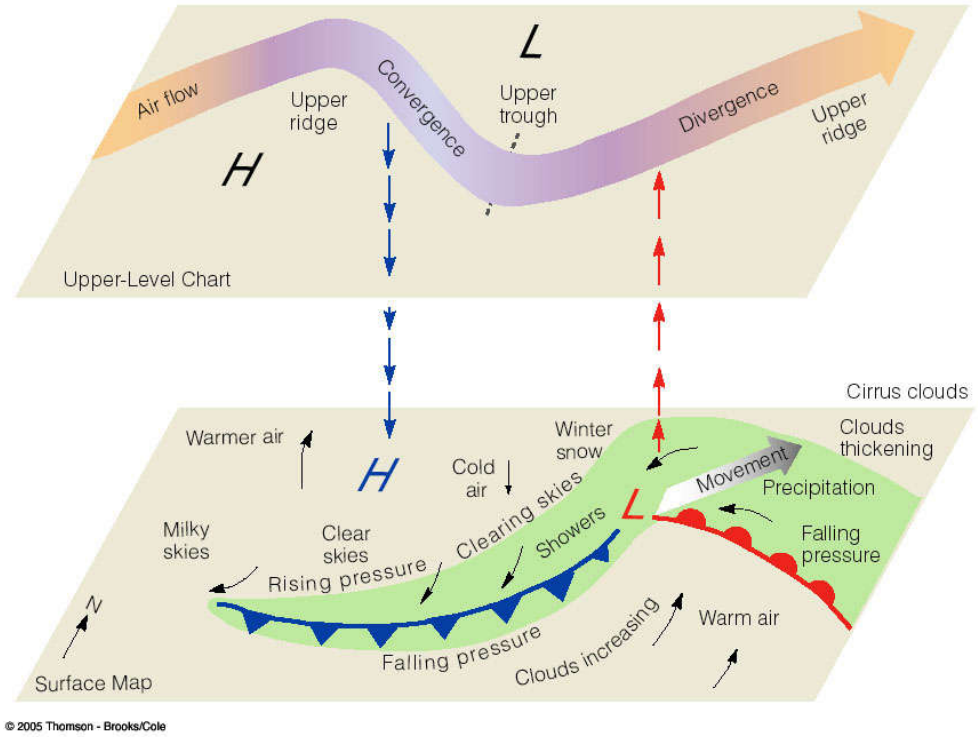
1 day watch box___



Categorical Day1 2000Z Outlook

Day 1 Risk	Area (sq. mi.)	Area Pop.	Some Larger Population Centers in Risk Area
SLIGHT	13,851	374,421	Idaho Falls, ID...Pocatello, ID...Rexburg, ID...Blackfoot, ID...Ammon, ID...
MARGINAL	53,274	2,599,812	Salt Lake City, UT...West Valley City, UT...Provo, UT...West Jordan, UT...Orem, UT...

For deepening of system, trough support needed

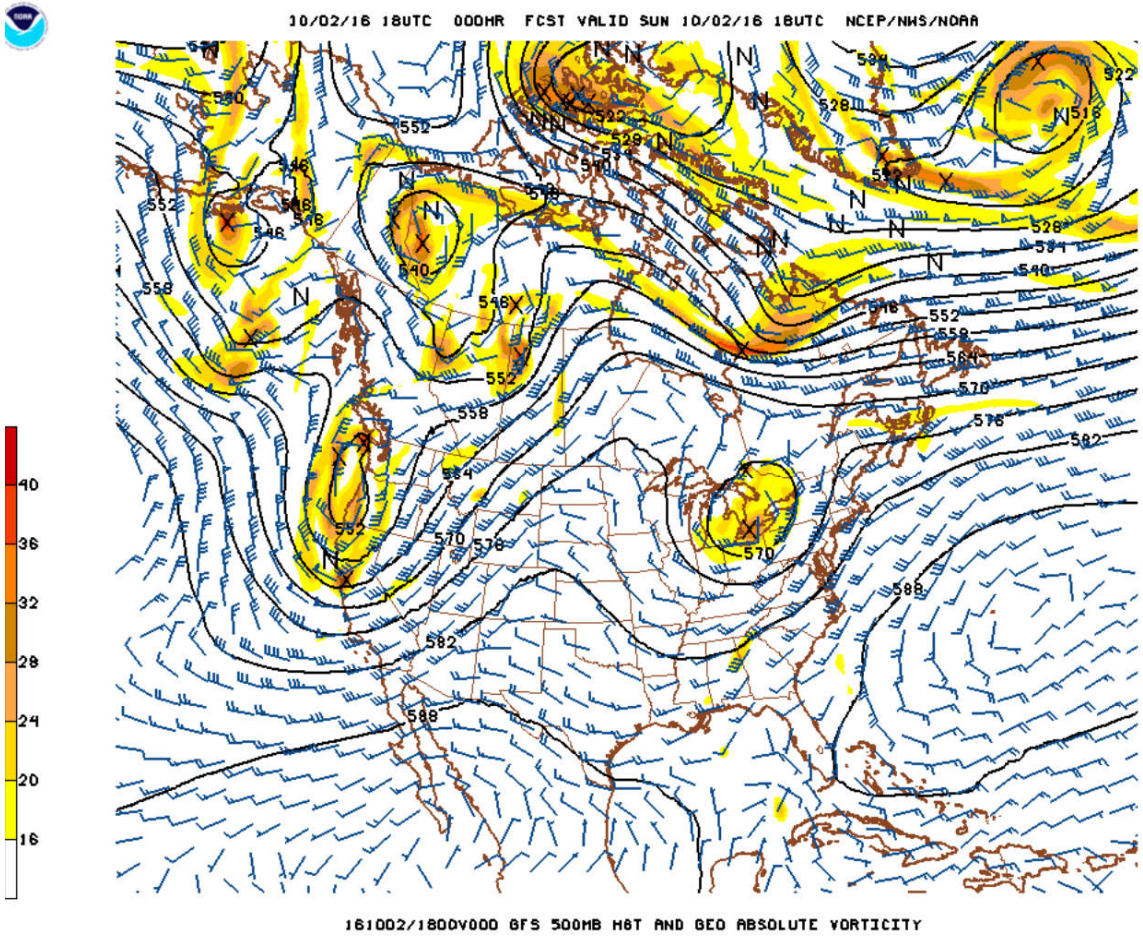


“Forecast it from the observed upper-air analysis data from a QG perspective! “

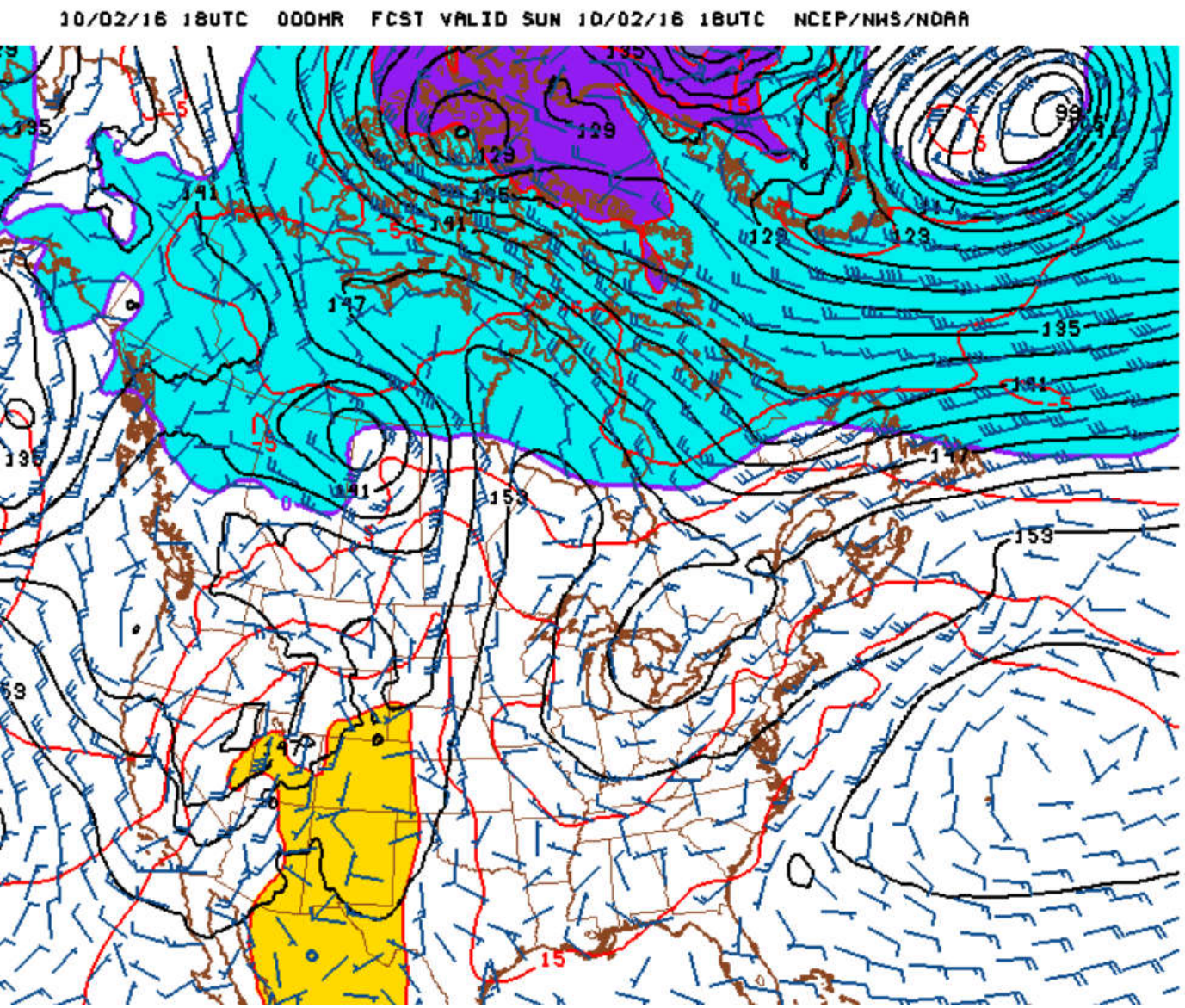
1) Precipitation/ upward motion: Omega equation/ Q-vector
2) Moving and development of system: Height tendency equation

A. Omega equation, vertical motion @ 10/02/16 18 UTC
B. Height tendency equation, system develop to 10/03/16 06 UTC
   Compare with model forecast
C. Omega equation, vertical motion @ 10/03/16 06 UTC

Upper-Air Analyses 10/02/16 18UTC
500 hpa height and vorticity



PVA in front of trough (rising) @ Idaho Wyoming and Utah



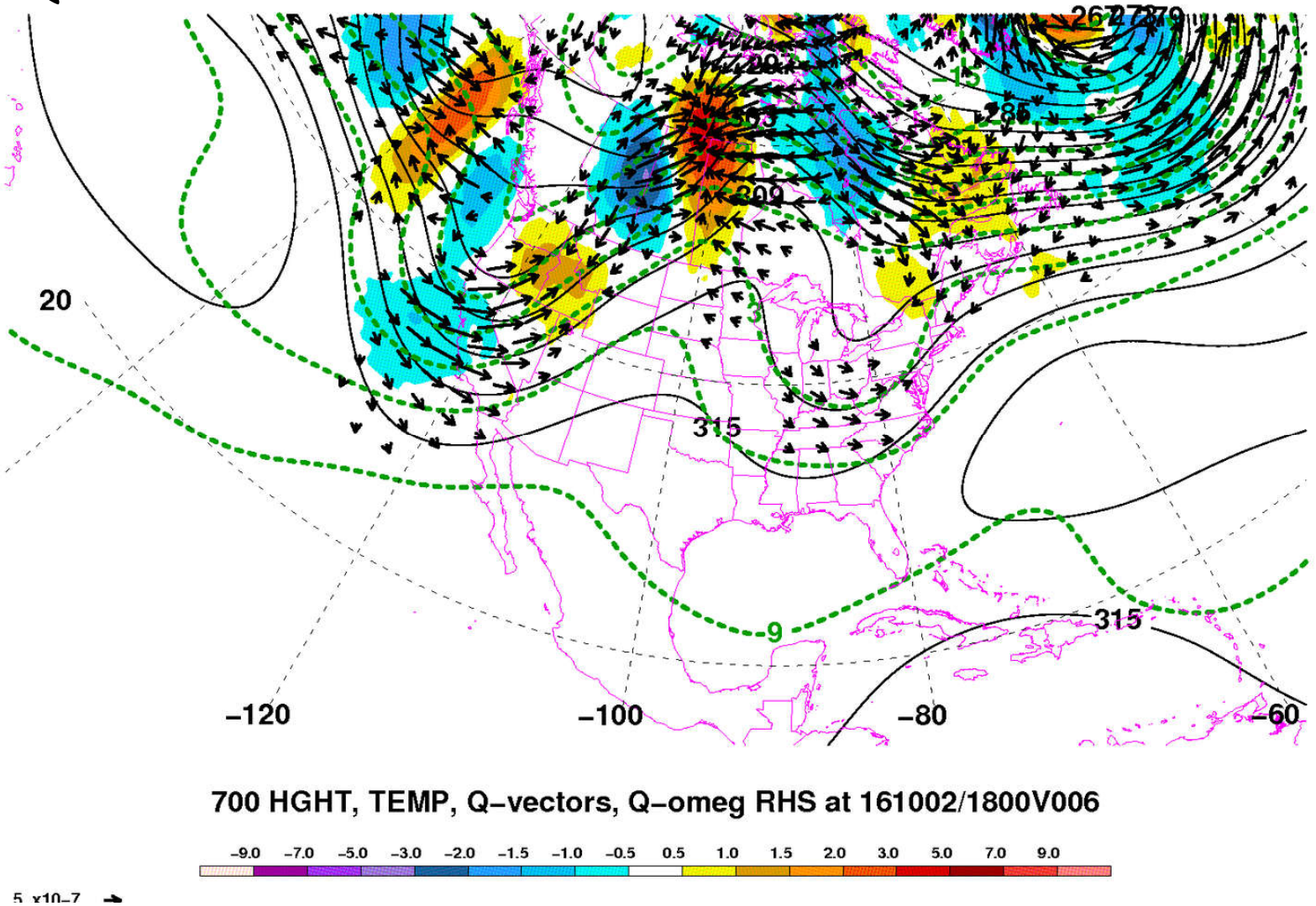
Upper-Air Analyses 10/02/16 18UTC 850 hpa isobar and isotherm

Wind blow cross the isotherm

Warm air advection @ Idaho Montana and Wyoming Utah

Rising motion

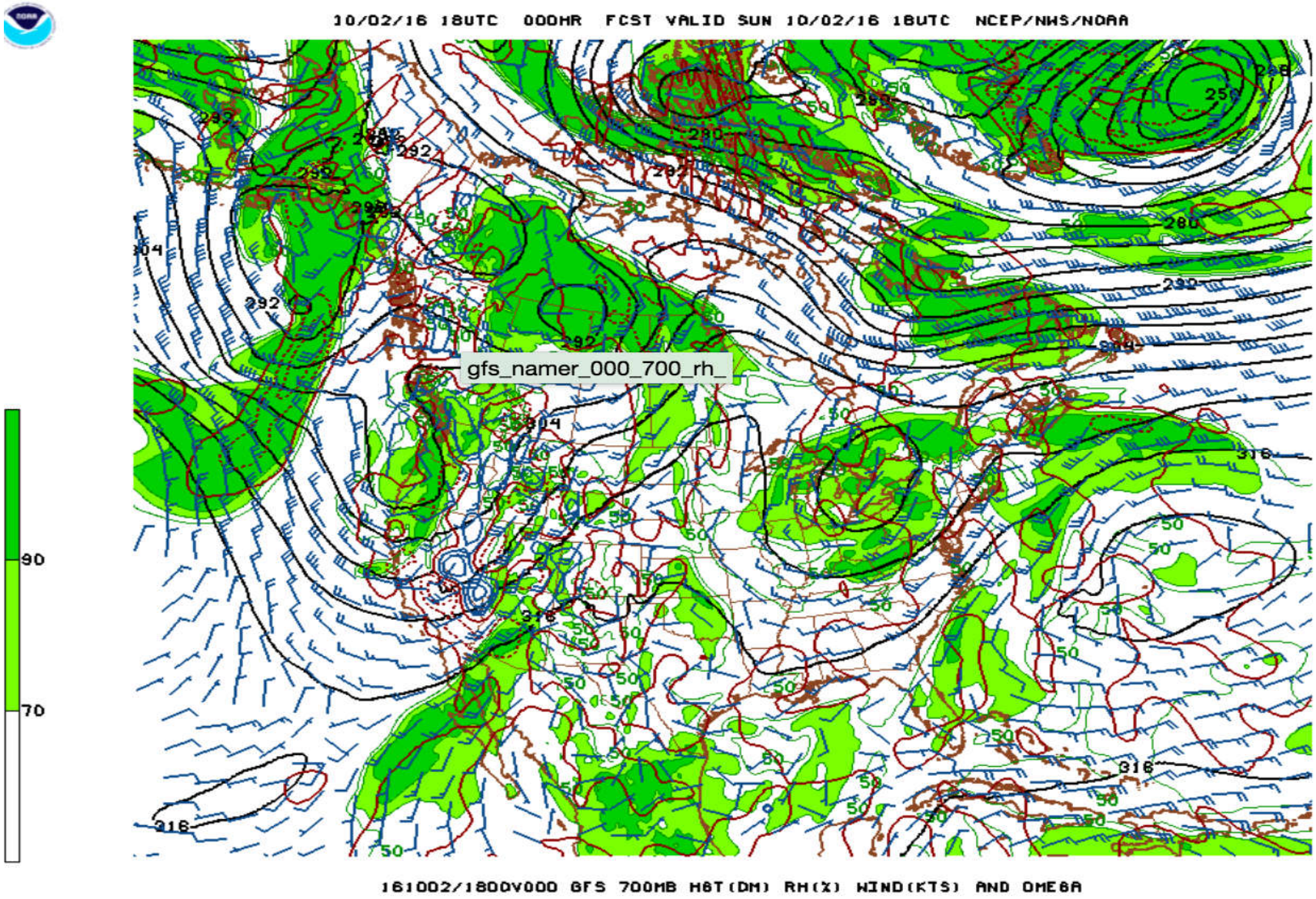
Q vector



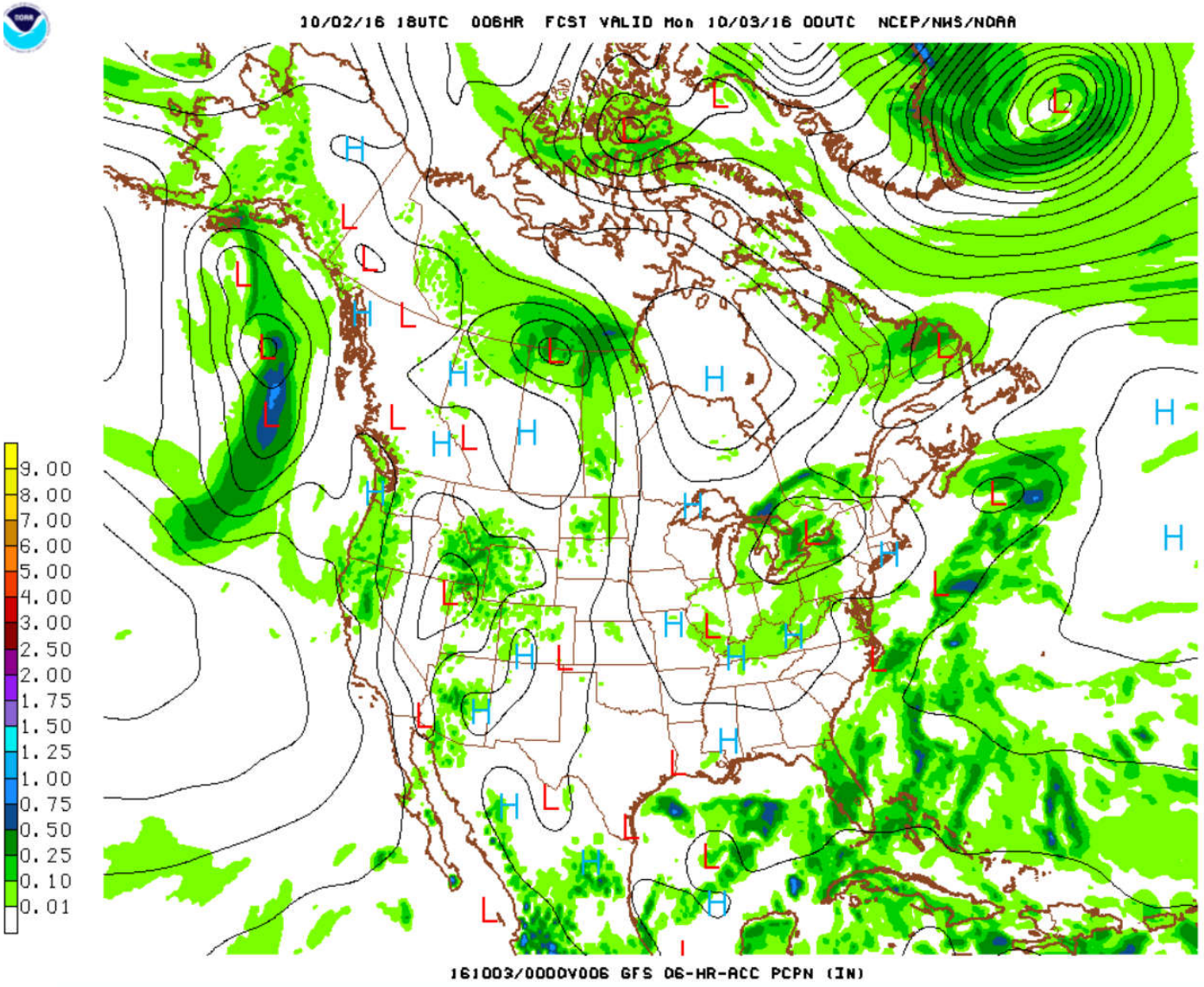
Coverage Q rising motion

Rising motion @ Idaho
And northwest of Utah

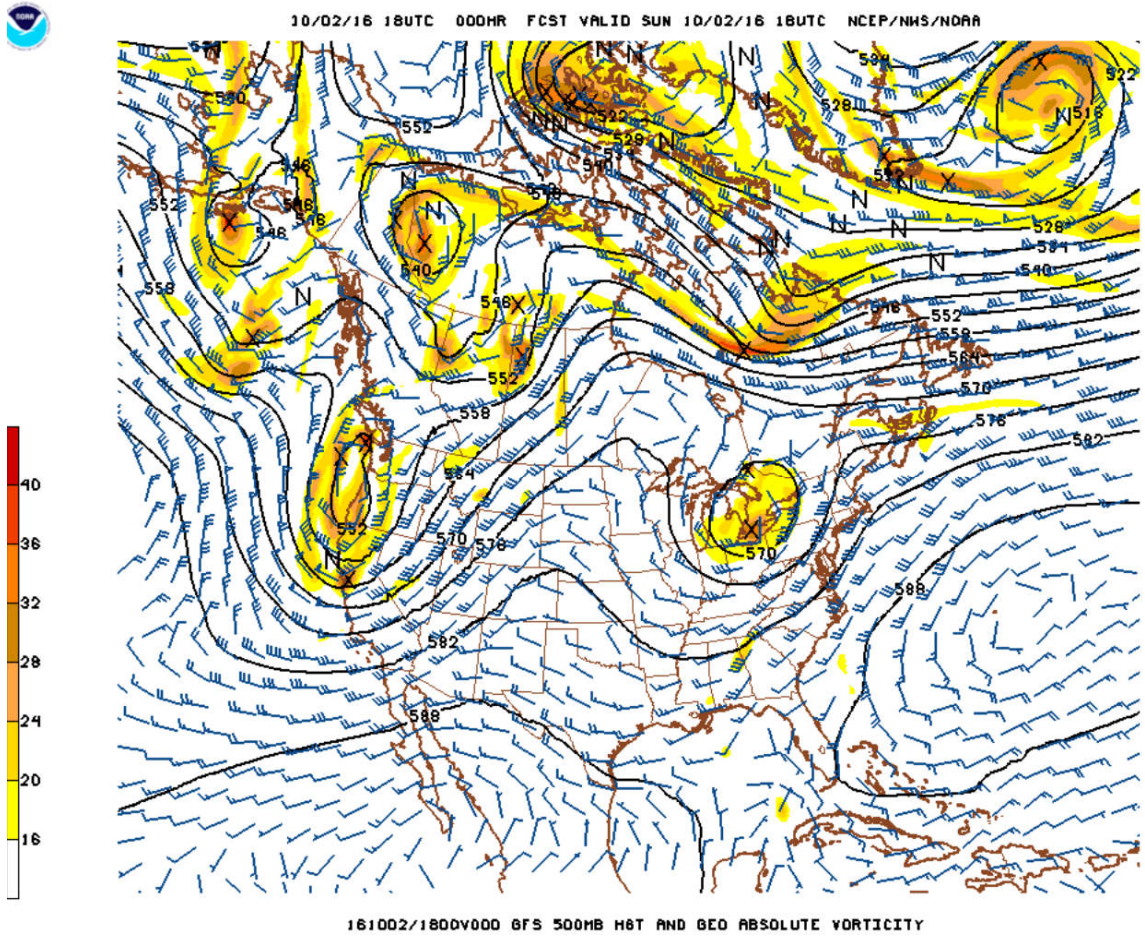
700 hpa RH


10/02/16 18UTC 000HR FCST VALID SUN 10/02/16 18UTC NCEP/NWS/NOAA
gfs_namer_000_700_rh_
90
70
161002/1800V000 GFS 700MB HGT(DM) RH(%) WIND(KTS) AND OMEGA

6hr precipitation



Upper-Air Analyses 10/02/16 18UTC
500 hpa height and vorticity

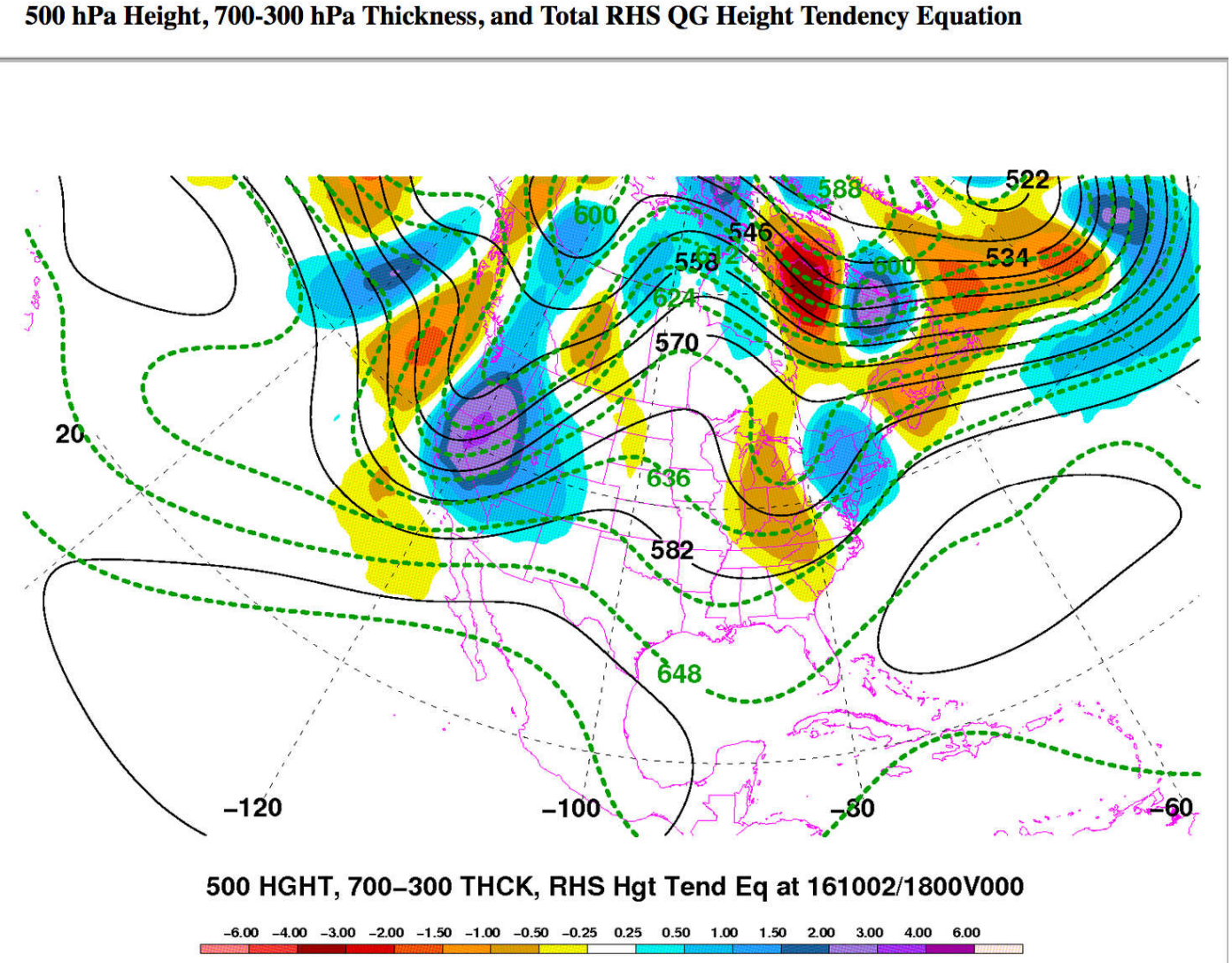


500 hpa Low center @ Oregon.

NVA left side of the trough (height rises);
PVA right side of the trough (height falls)

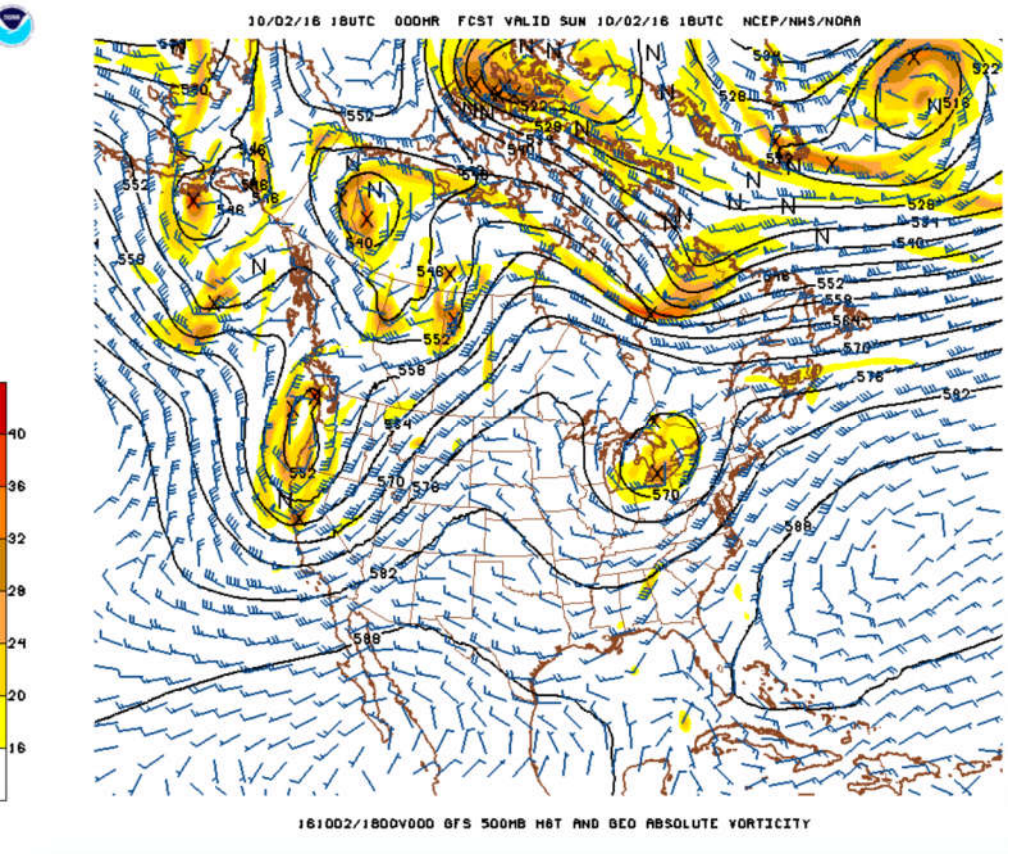
NVA = PVA

Trough will move forward

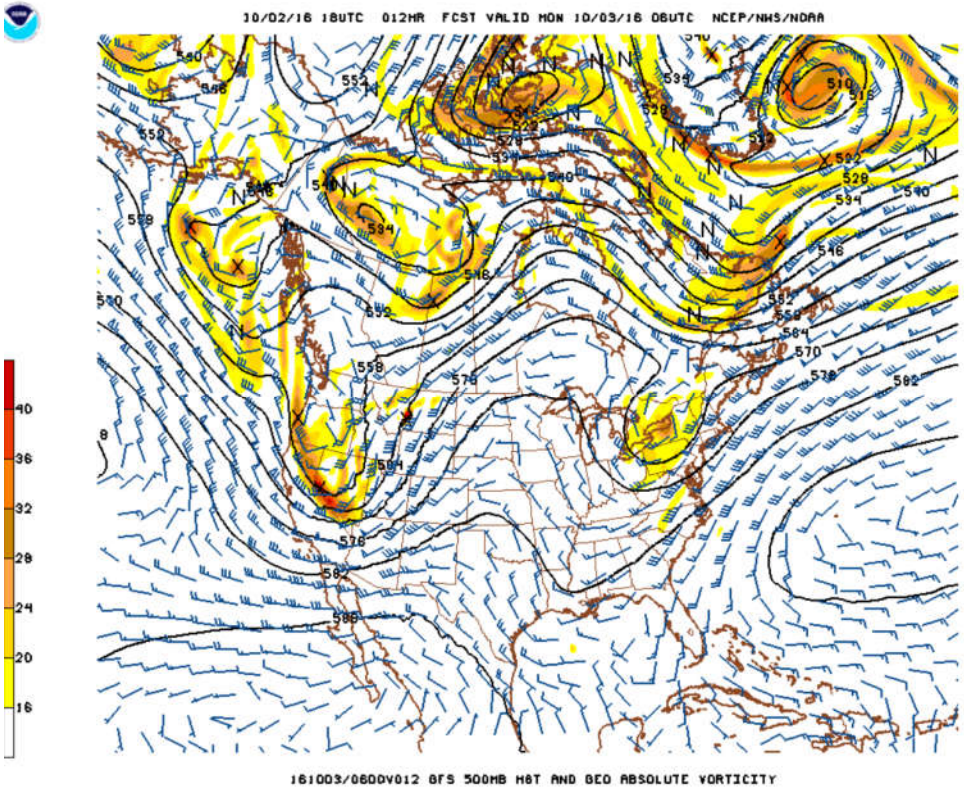


Upper-Air Analyses 10/02/16 18UTC 700 hpa isobar and isotherm

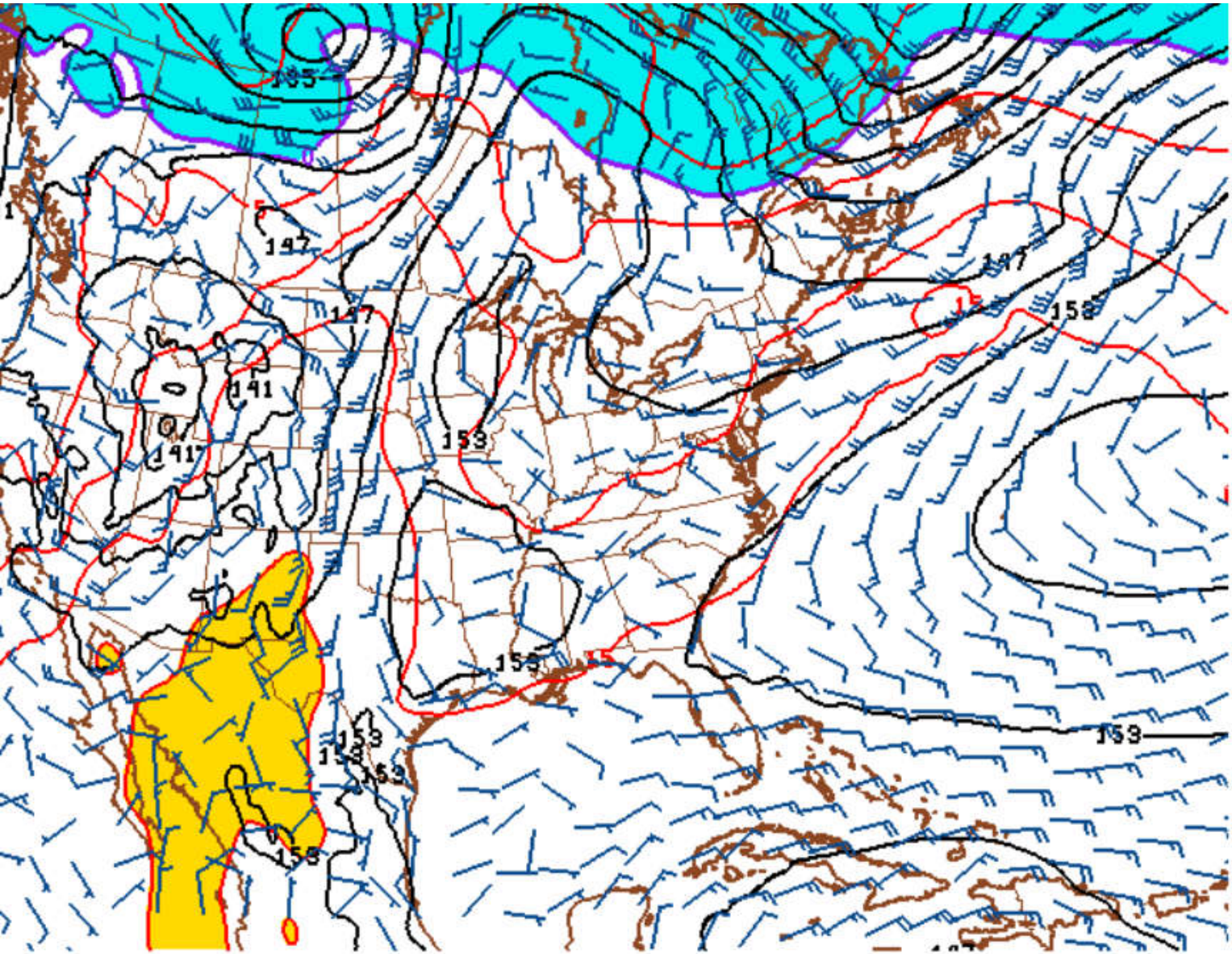
10/02/16 18UTC



10/03/16 6UTC



PVA in front of trough (rising) @ Idaho Wyoming and Utah

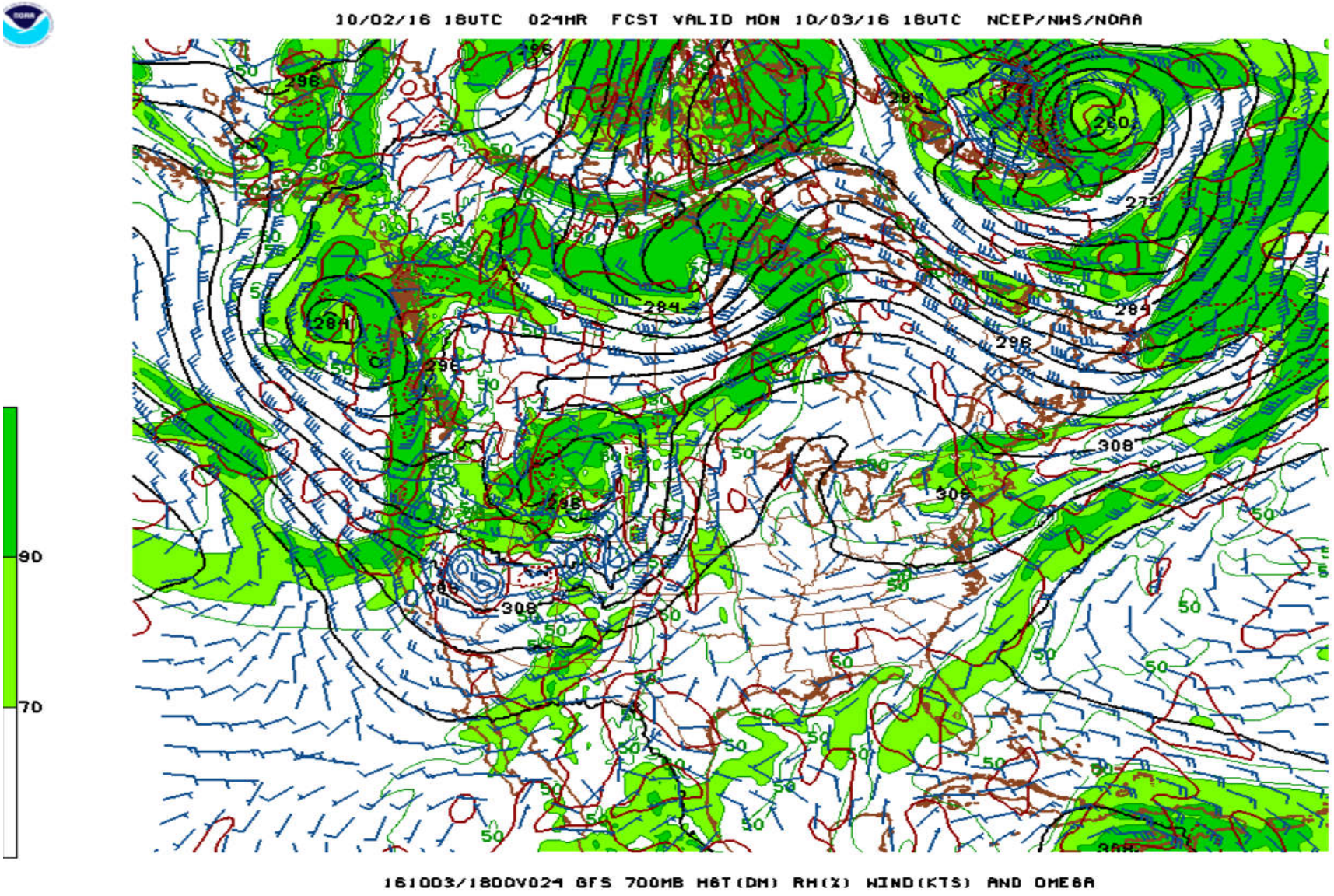


Upper-Air 10/03/16 06UTC 850 hpa isobar and isotherm

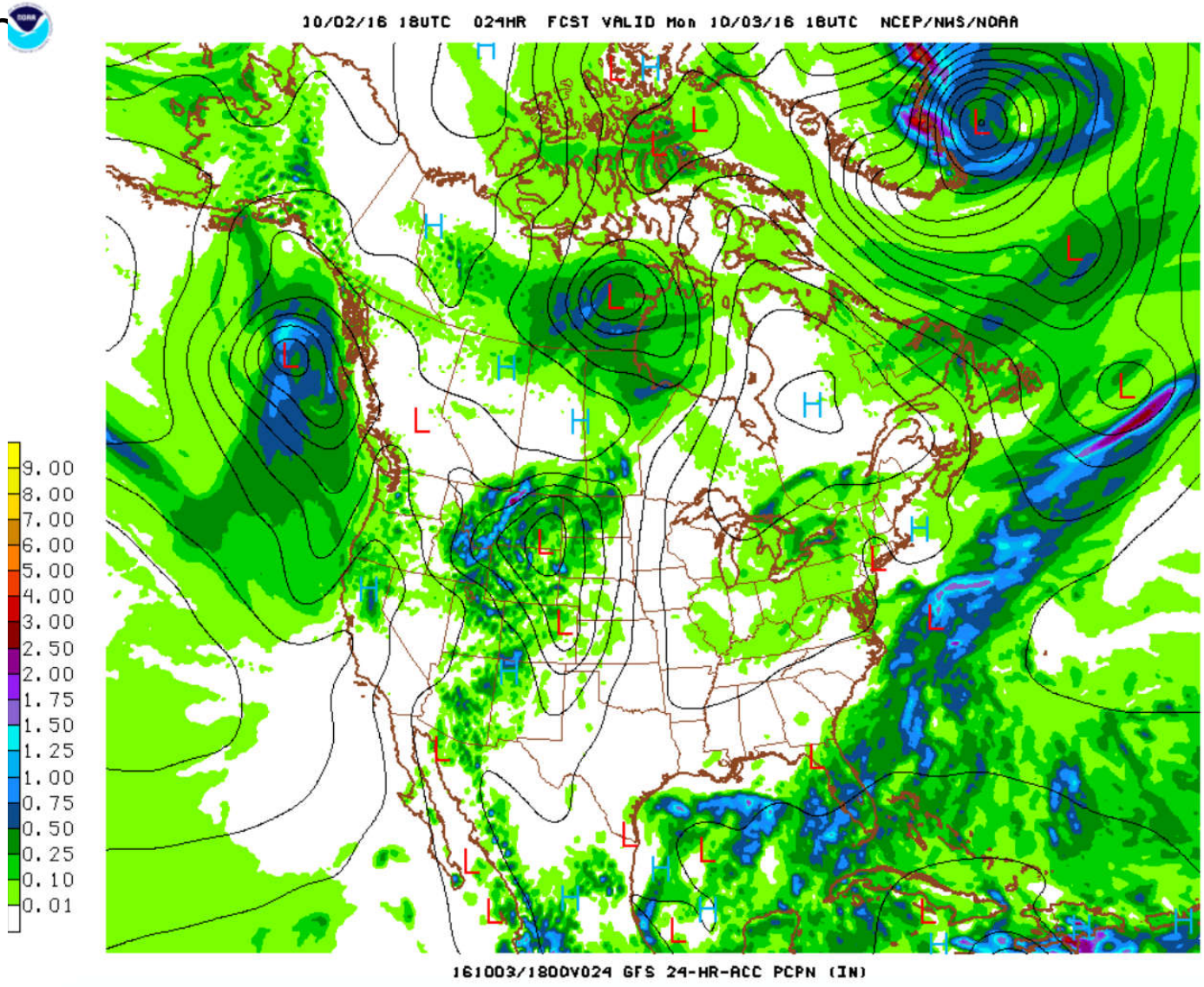
Not significant temperature advection @ Salt lake

Warm air advection @ boundary of Idaho and Montana

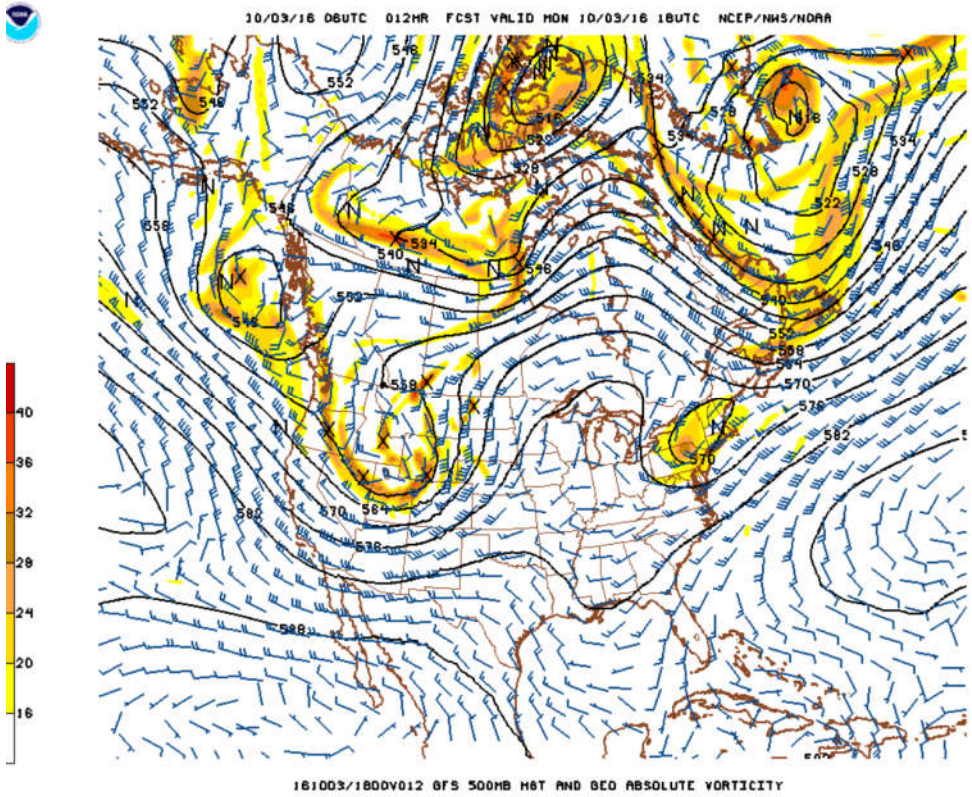
700 hpa RH


10/02/16 18UTC 024HR FCST VALID MON 10/03/16 18UTC NCEP/NWS/NOAA
90
70
161003/1800V024 GFS 700MB H8T(DM) RH(%) WIND(KTS) AND OMEGA

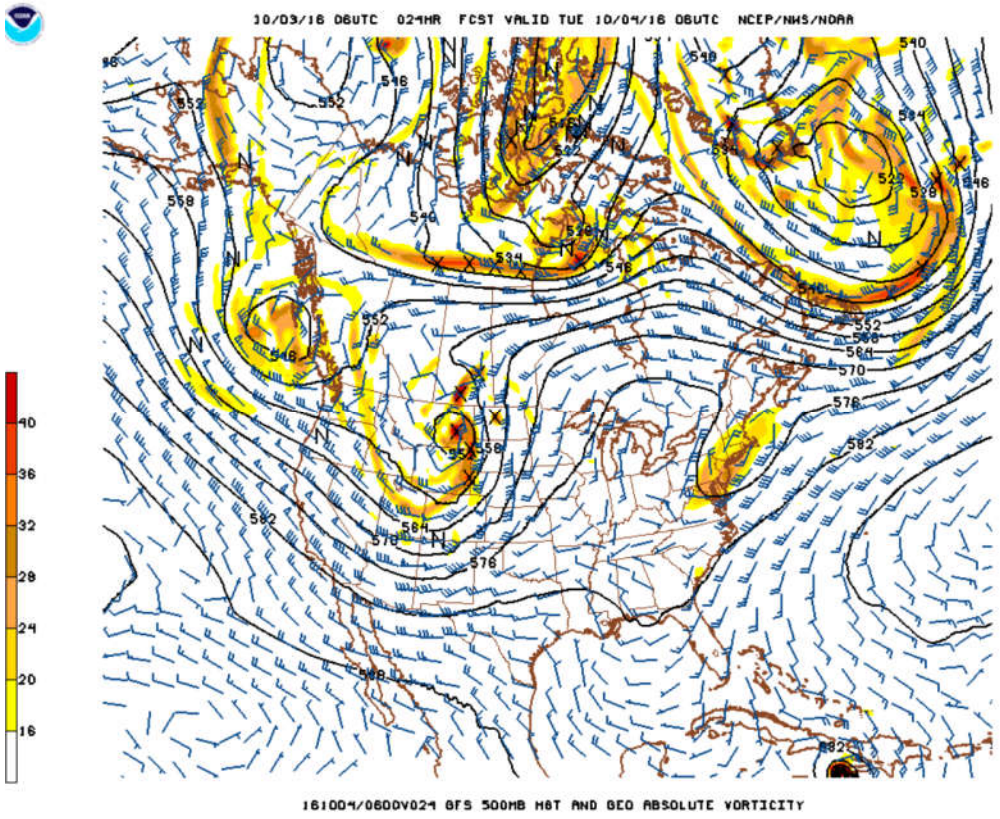
24hr precipitation



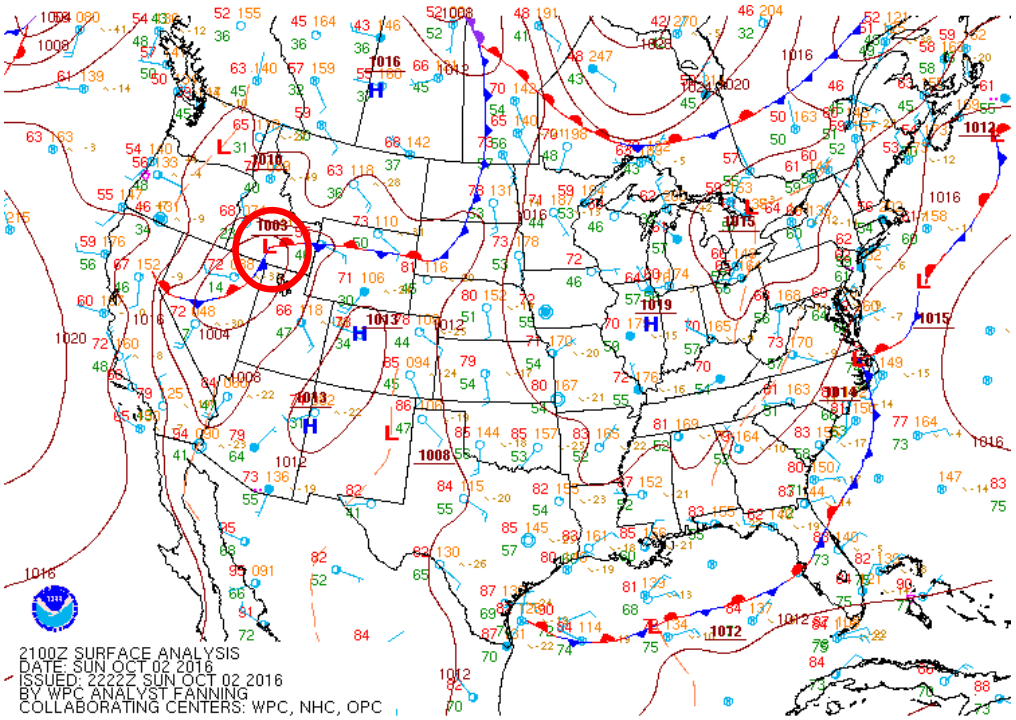
10/03/16 18 UTC



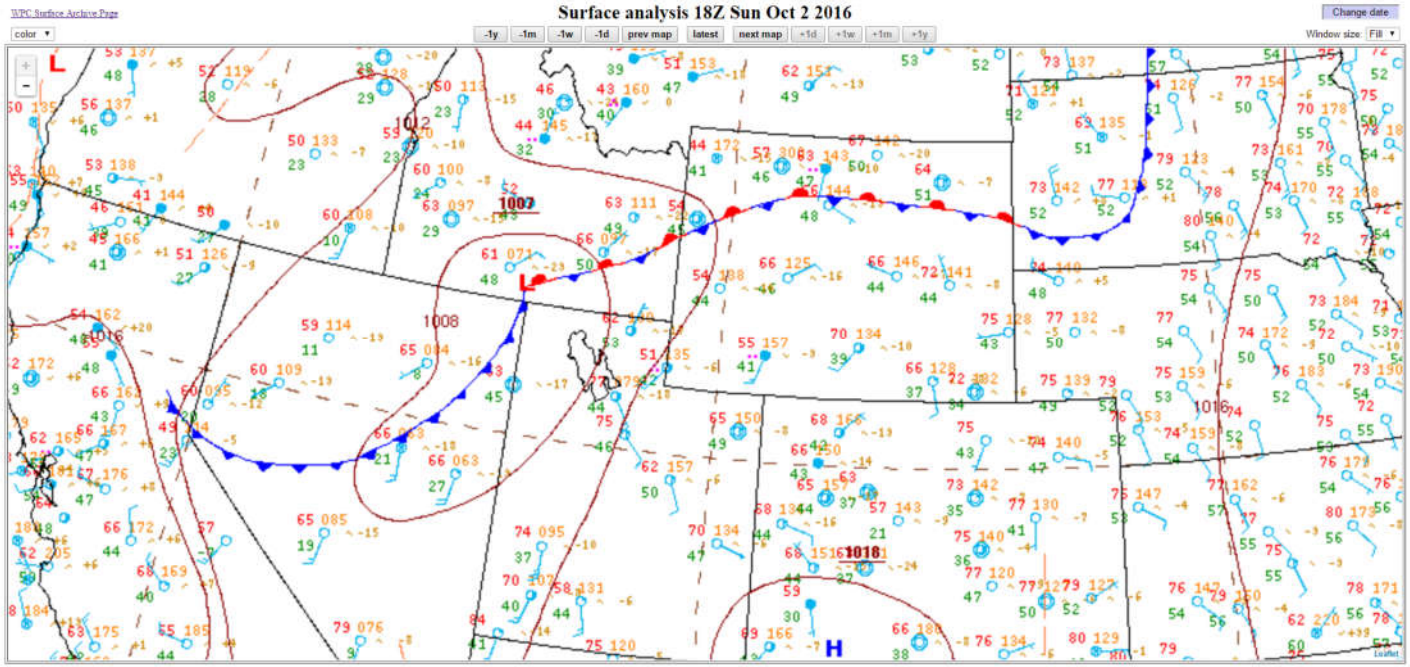
10/04/16 06 UTC



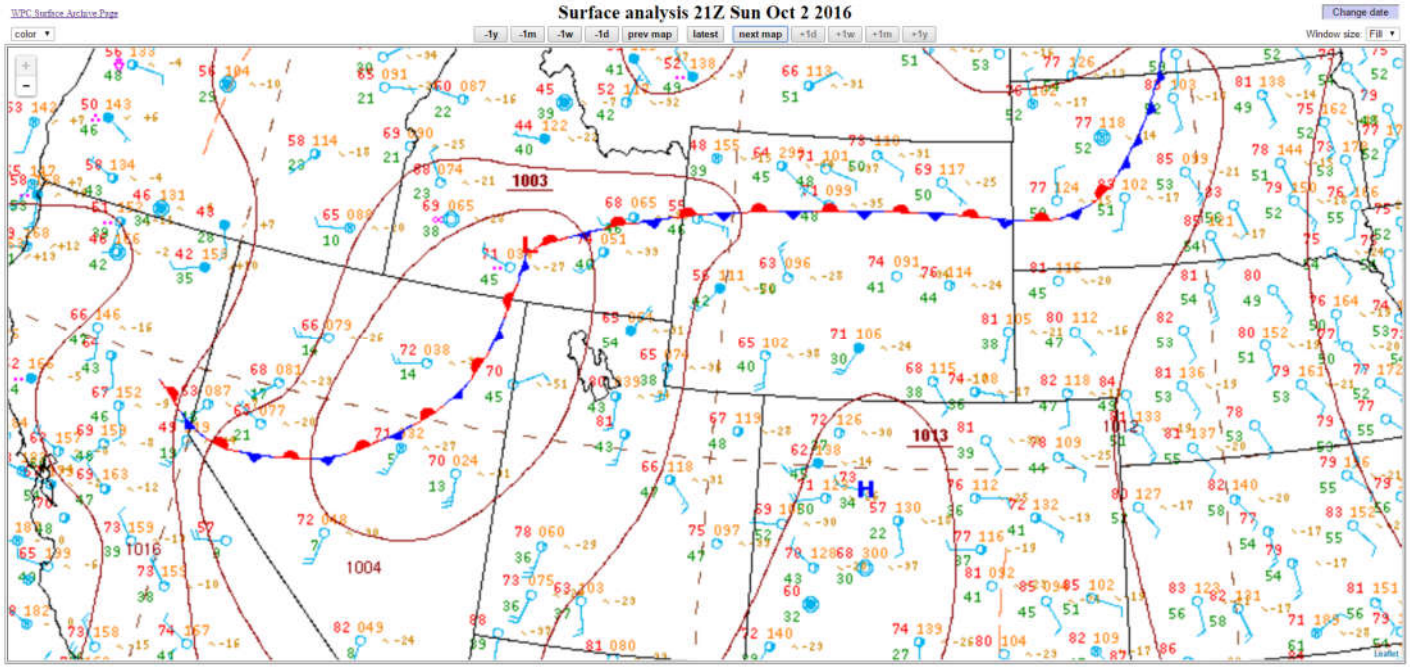
Verification



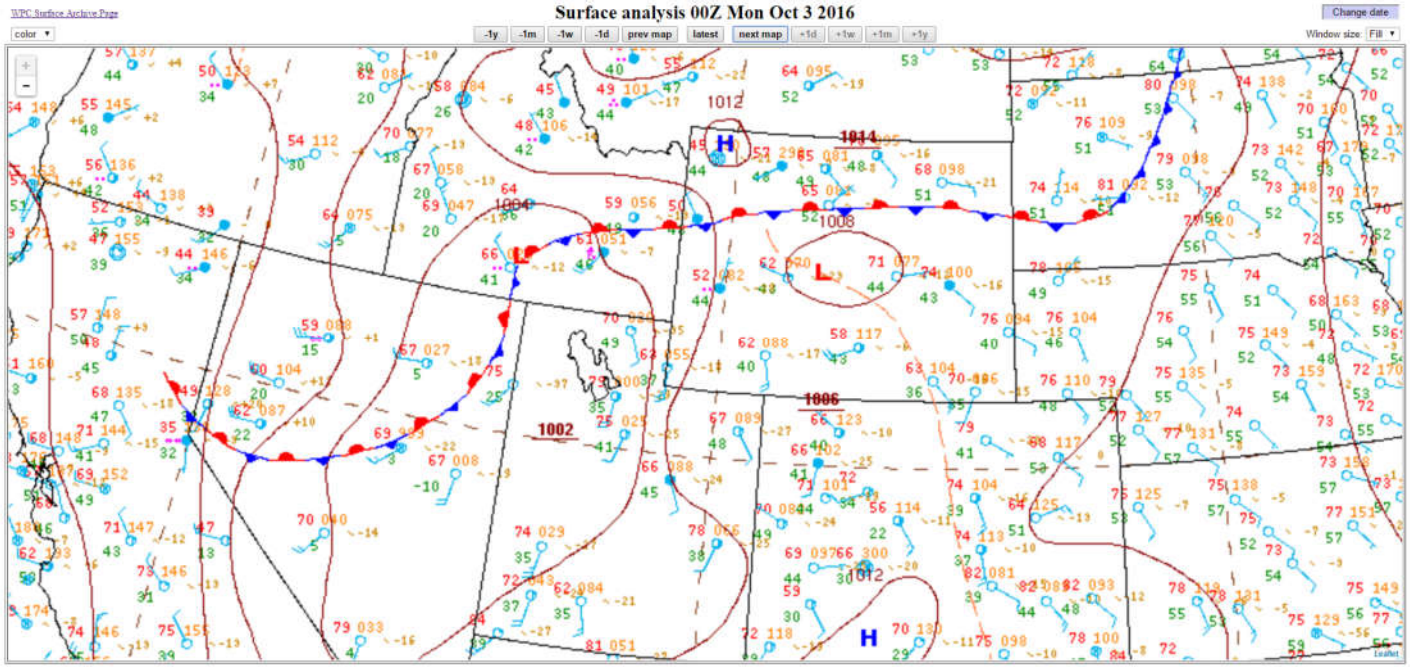
18Z Oct 2 surface analysis



21Z Oct 2 surface analysis

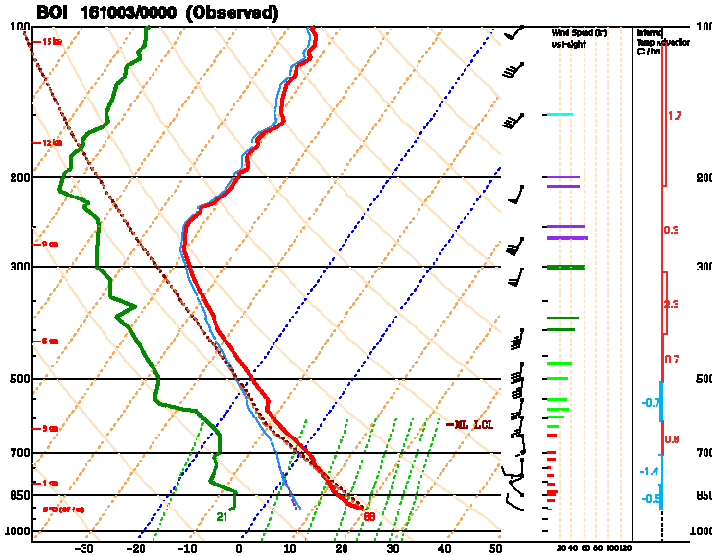


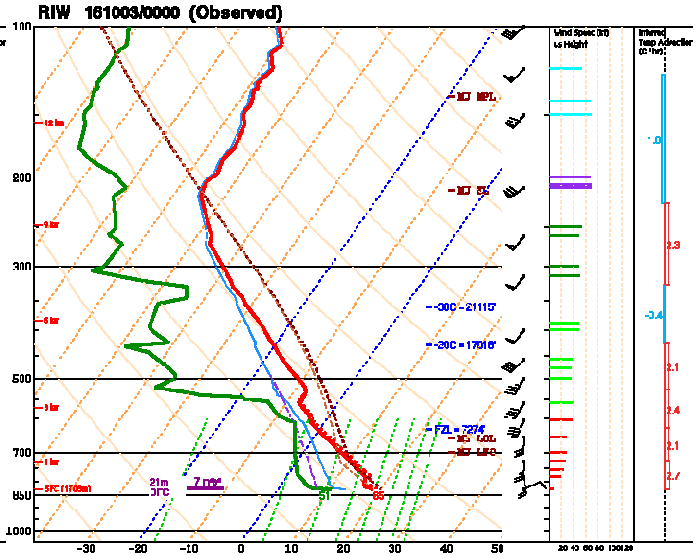
00Z Oct 3 surface analysis

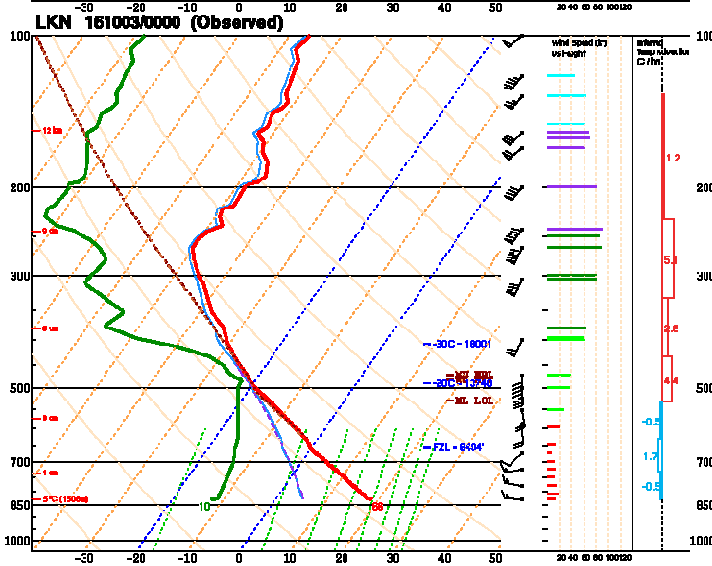


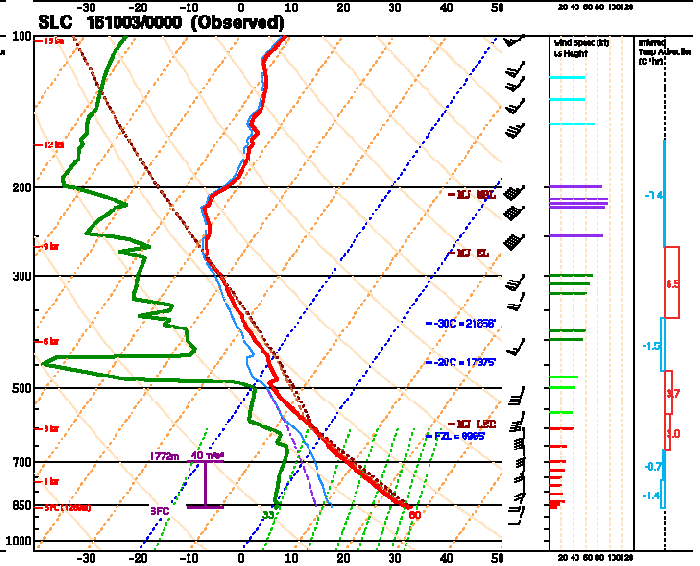
00Z Oct 3


Sounding Stations 10/02/2016 12 UTC

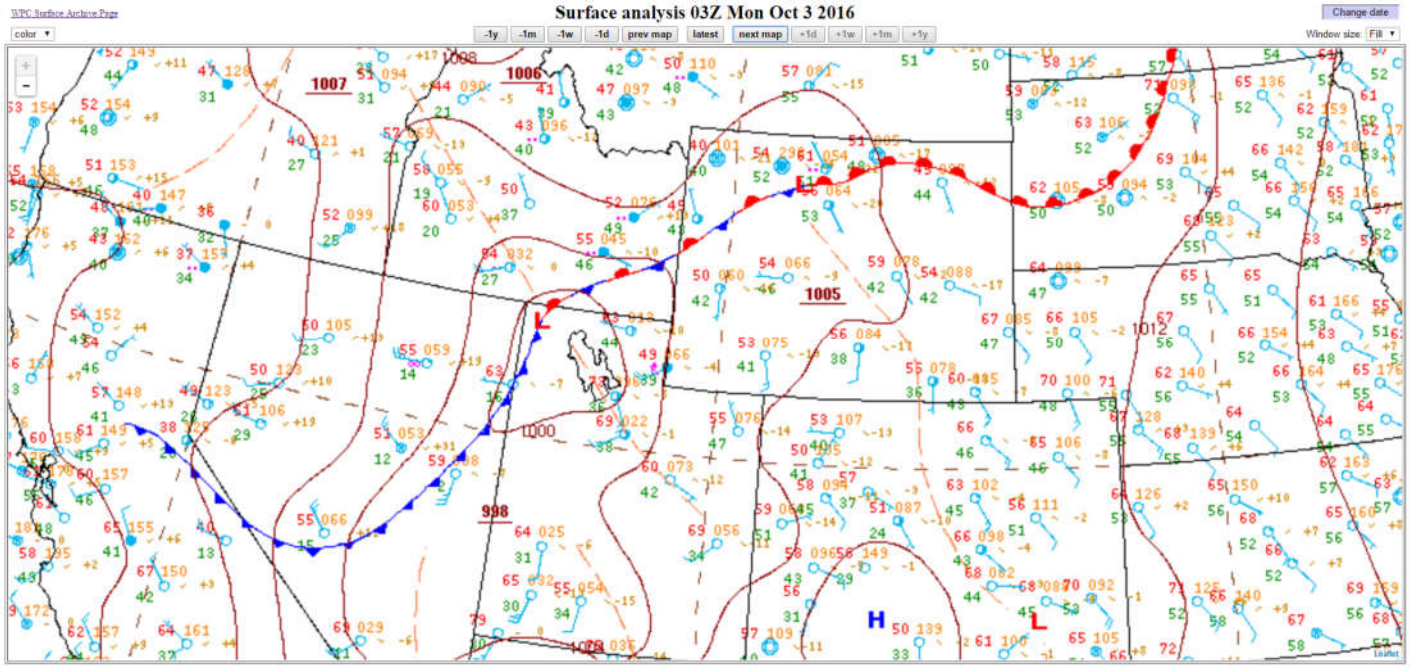




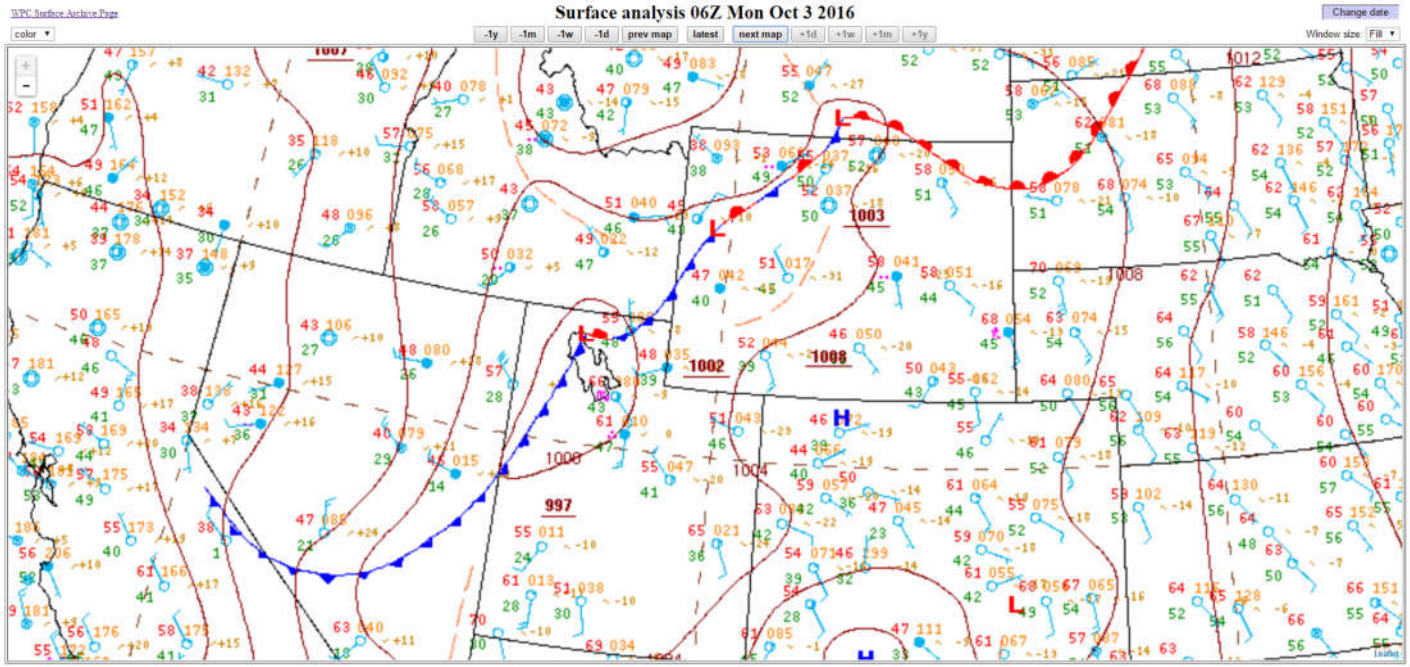




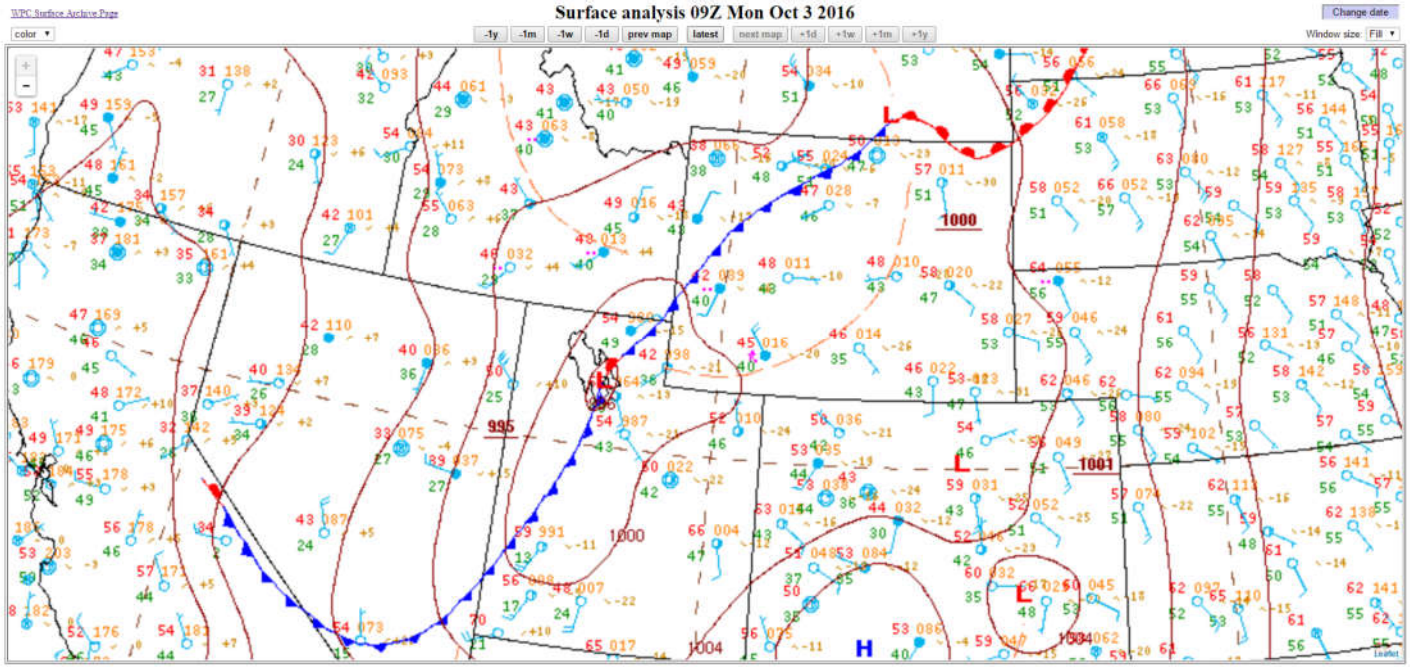
03Z Oct 3 surface analysis



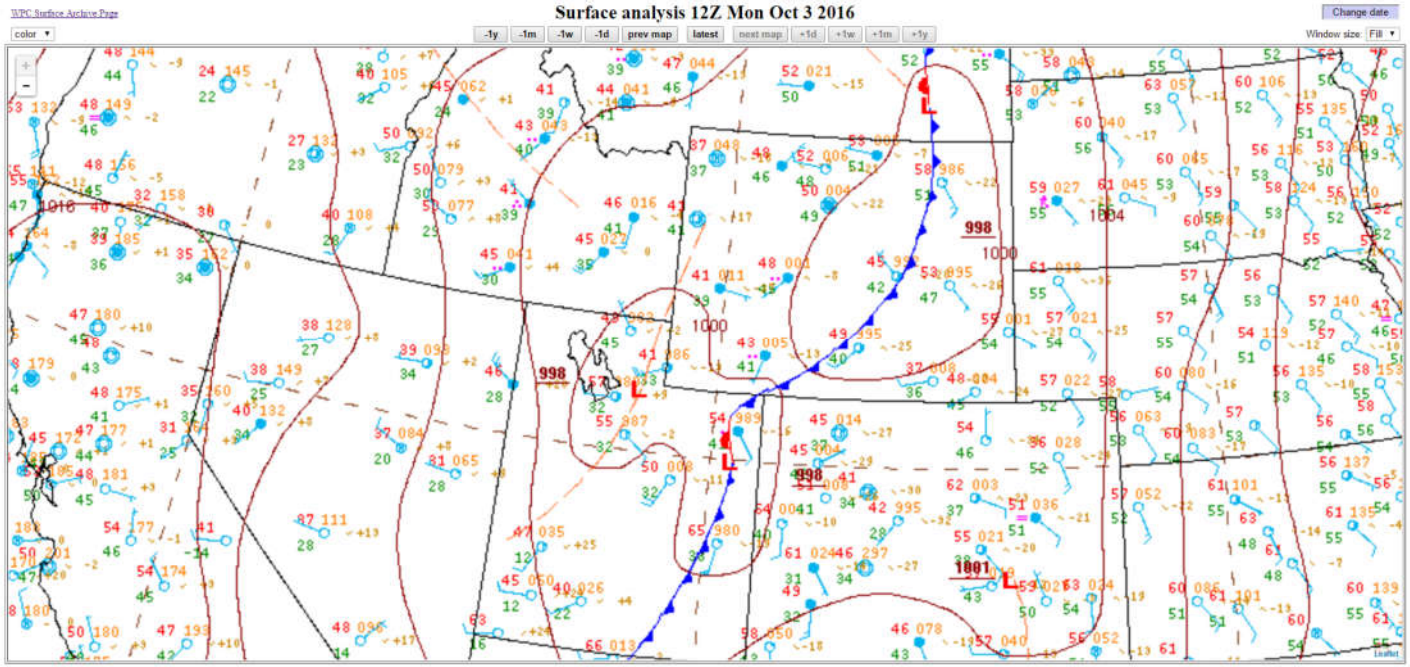
06Z Oct 3 surface analysis



09Z Oct 3 surface analysis

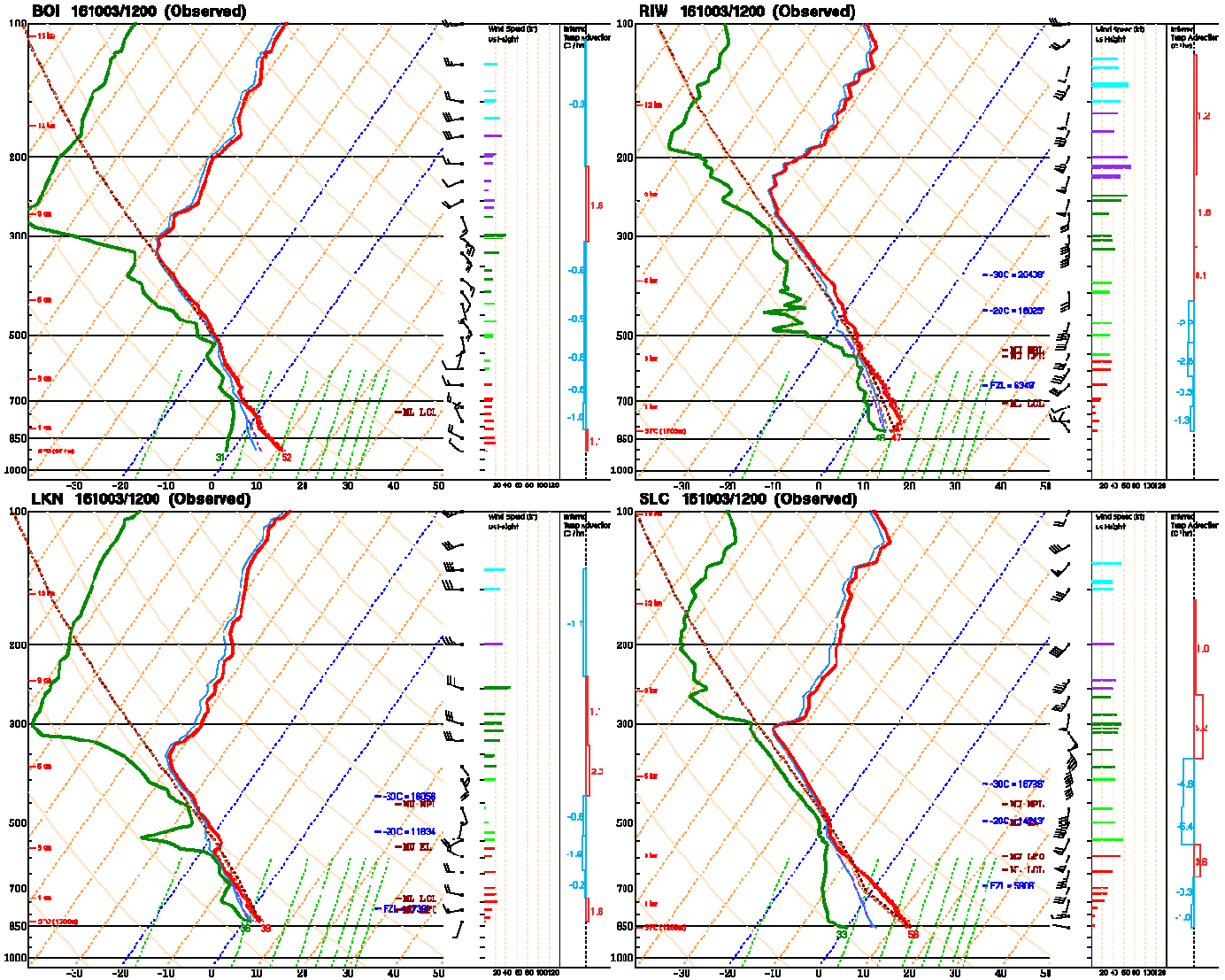


12Z Oct 3 surface analysis

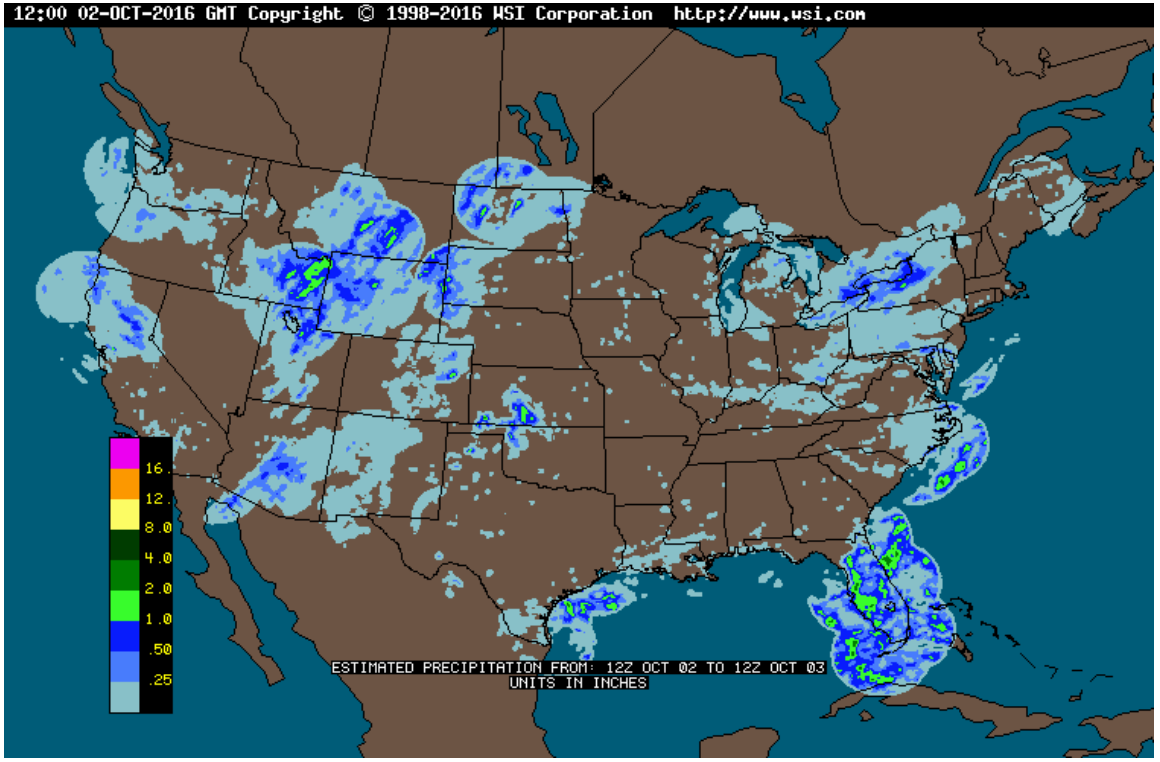


12Z Oct 3


Sounding Stations 10/02/2016 12 UTC


BOI 161003/1200 (Observed)
RIW 161003/1200 (Observed)
LKN 161003/1200 (Observed)
SLC 161003/1200 (Observed)

24 hr accumulated precip



Storm reports