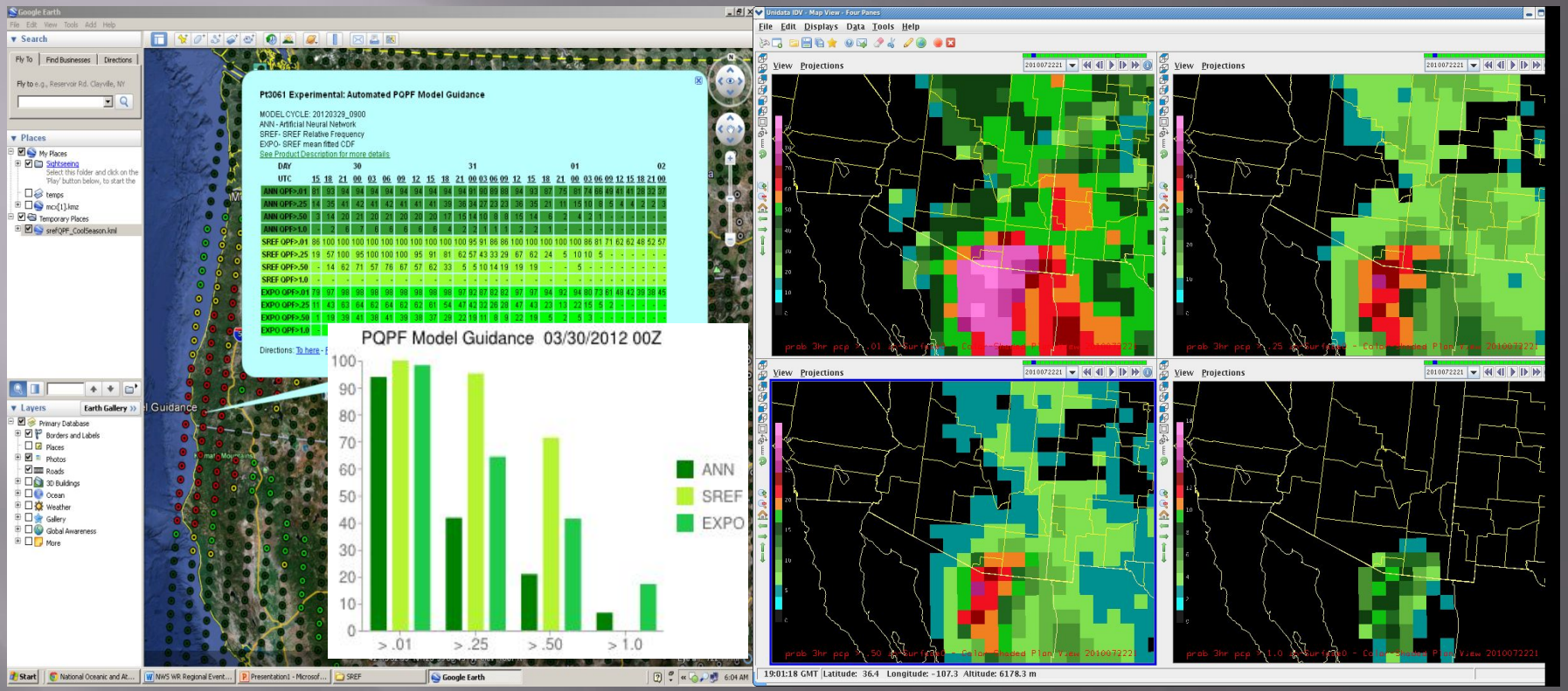
Local PQPF Products Derived from NCEP's SREF

Probabilistic Quantitative Precipitation Forecasts (PQPF)



Jeffrey T. Davis
WFO Tucson, AZ

Local PQPF Products Derived from NCEP's SREF

Artificial Neural Network (ANN)…Exponential Method (EXPO)

- Gridded PQPF in AWIPS using IDV

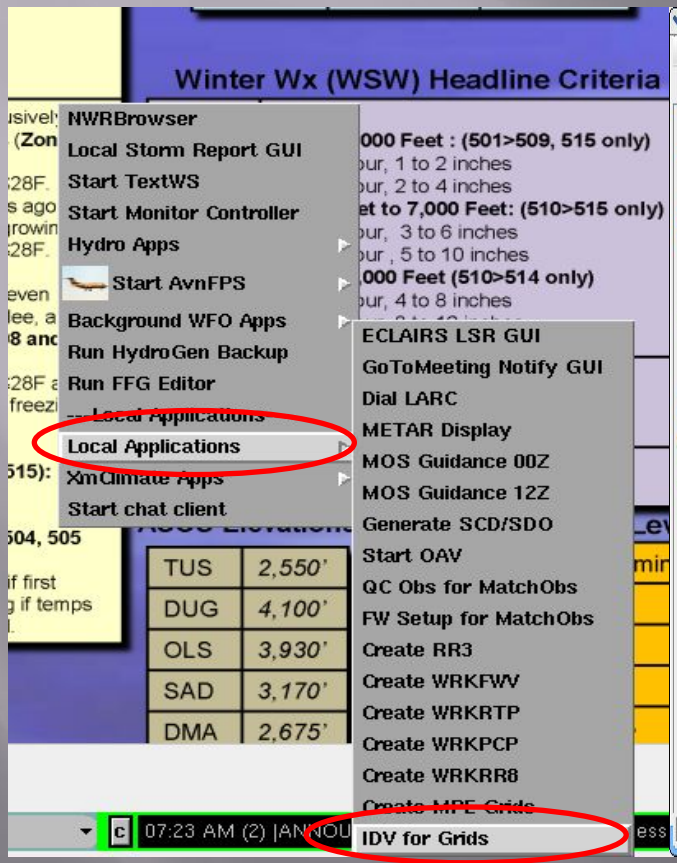
  Includes: Calibrated SREF PQPF using an Artificial Neural Network, version of WFO Tulsa PQPF method, and the raw SREF PQPF.

- Threat Color Coded KML File in Google Earth

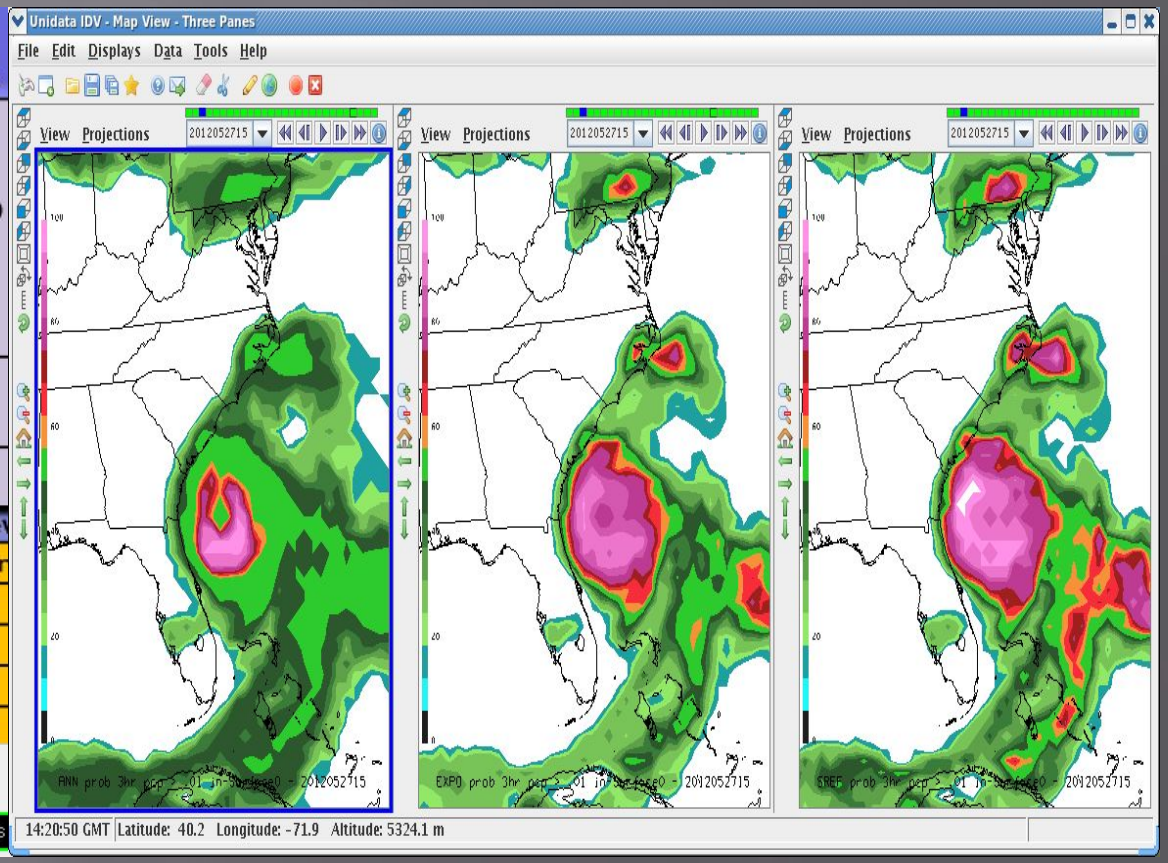
  Includes: Tabular and histogram charts of the Artificial Neural Network, Tulsa method, and raw SREF for grid points. Designed for situational awareness. Threat color coded for the 87 hour forecast period of the SREF.

Local PQPF Products Derived from NCEP's SREF

Gridded PQPF in AWIPS using IDV



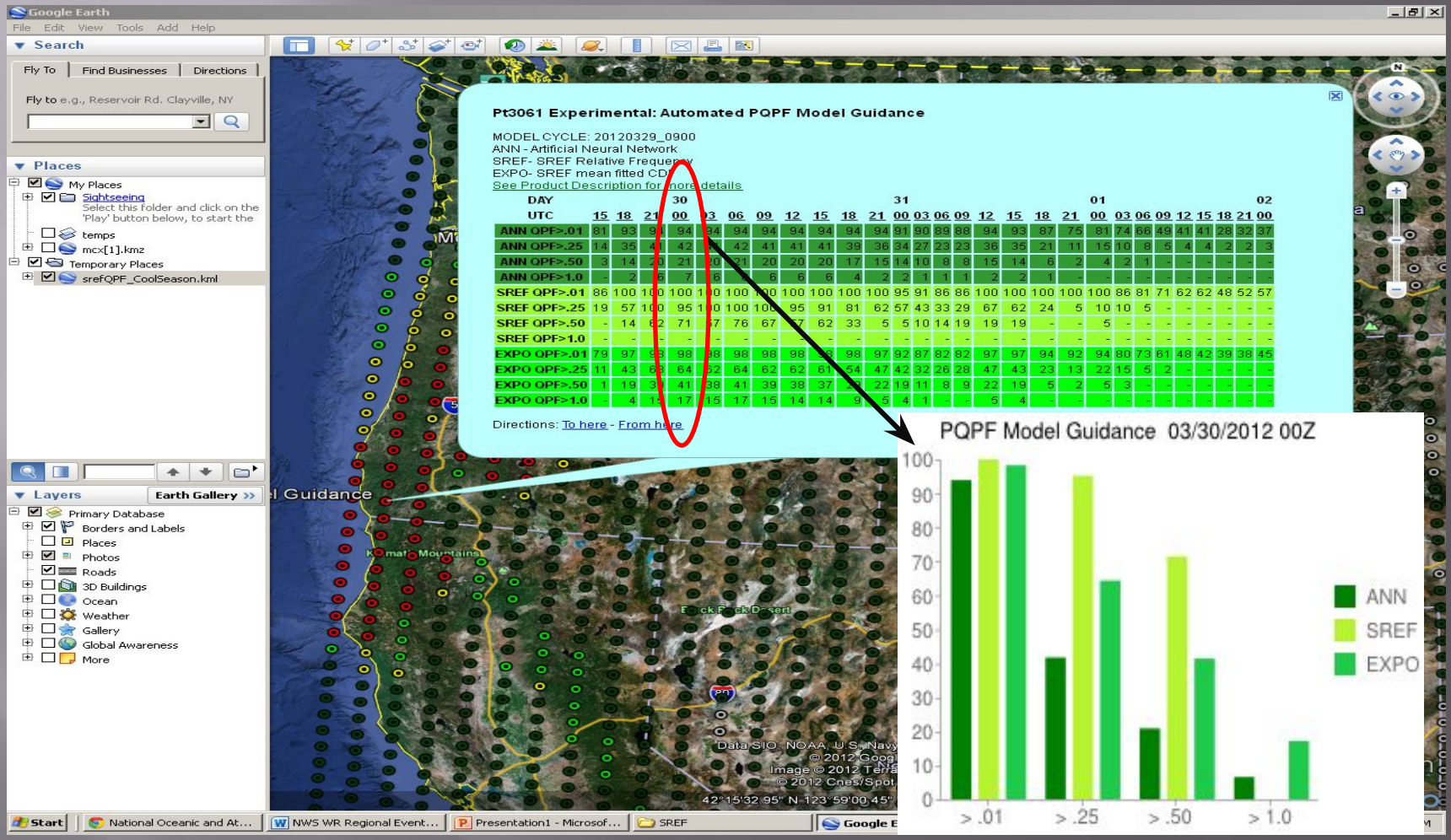
AWIPS Start-up Menu



IDV Software

Local PQPF Products Derived from NCEP's SREF

Threat Color Coded KML File in Google Earth



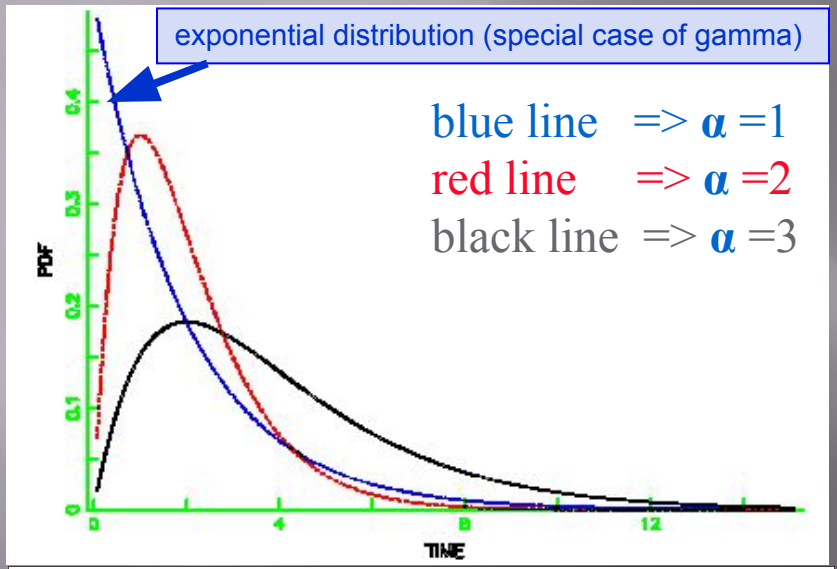
KML files are on LAN under Linux\\204.228.177.157\data\SREF

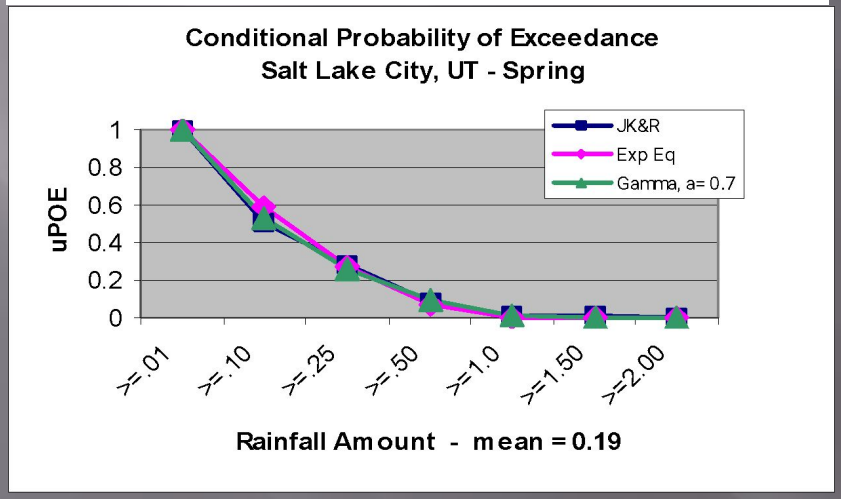
More info: http://www.wrh.noaa.gov/twc/monsoon/SAP.pdf

Local PQPF Products Derived from NCEP's SREF

WFO Tulsa Probability of Exceedance (POE) Method

Ensemble Mean Dressing Approach





Unconditional uPOE

$$uPOE(x) = (PoP) * (e^{-x/\mu})$$

μ is the Raw SREF mean QPF

PoP is the Raw SREF PQPF value for greater than .01 of an inch

x is the POE threshold value:

- QPF > .01 of an inch
- QPF > .25 of an inch
- QPF > .50 of an inch
- QPF > 1.0 of an inch

More Info on Tulsa's Method:

http://www.esrl.noaa.gov/gsd/ProbFcst/Meeting_notes/Workshop.html

Local PQPF Products Derived from NCEP's SREF

Artificial Neural Network (ANN) Calibration Method

Why the Need for Calibration?

Results of Stensrud & Yussouf study of NCEP's SREF PQPF
http://journals.ametsoc.org/doi/pdf/10.1175/WAF968.1

Found: Raw SREF forecasts over predict the probability of precipitation for all thresholds.

Results of Edman & Coauthors study of NCEP's SREF WR PoP
www.emc.ncep.noaa.gov/gmb/ens/ens2008/Edman_WR_Ensemble_Pres.ppt

Found: Raw SREF forecasts over predict the probability of precipitation greater than .01 of an inch. PoPs of 100% calibrate to 70-80 percent verification.

Thus… lower adjusted (by a calibration method) probabilities are greatly desired for all thresholds.

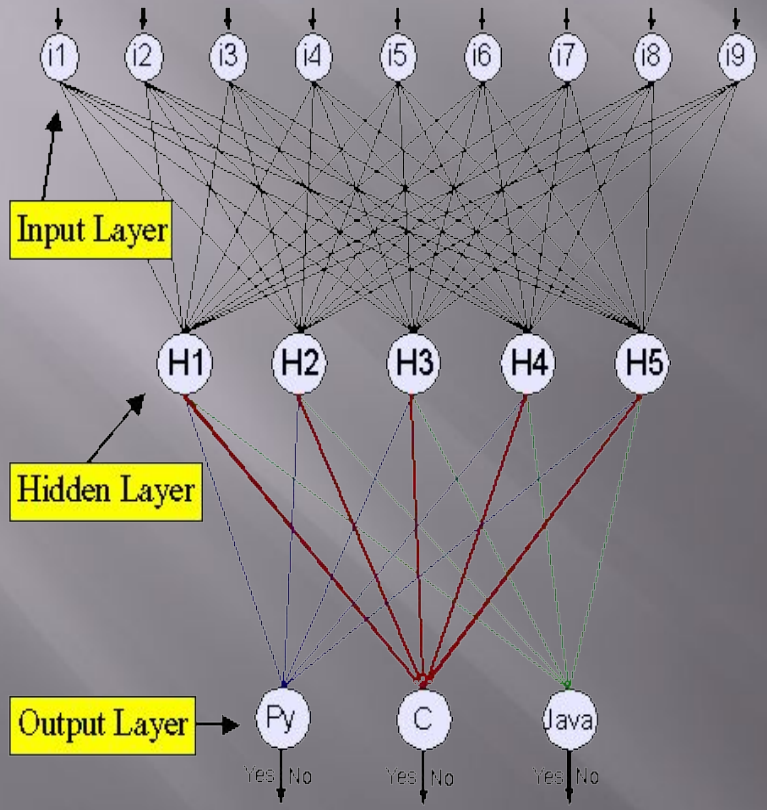
Local PQPF Products Derived from NCEP's SREF

Artificial Neural Network (ANN) Calibration Method

- **Non-linear algorithm**
- **Good for pattern recognition**

- **ANN for each SREF cycle(03,09,15,21)**
- **ANN for both cool and warm seasons**

Typical Network Structure



SREF PQPF Network

Elev, Fcst hr, Cape POEs, mean pwater, 4 QPF POEs

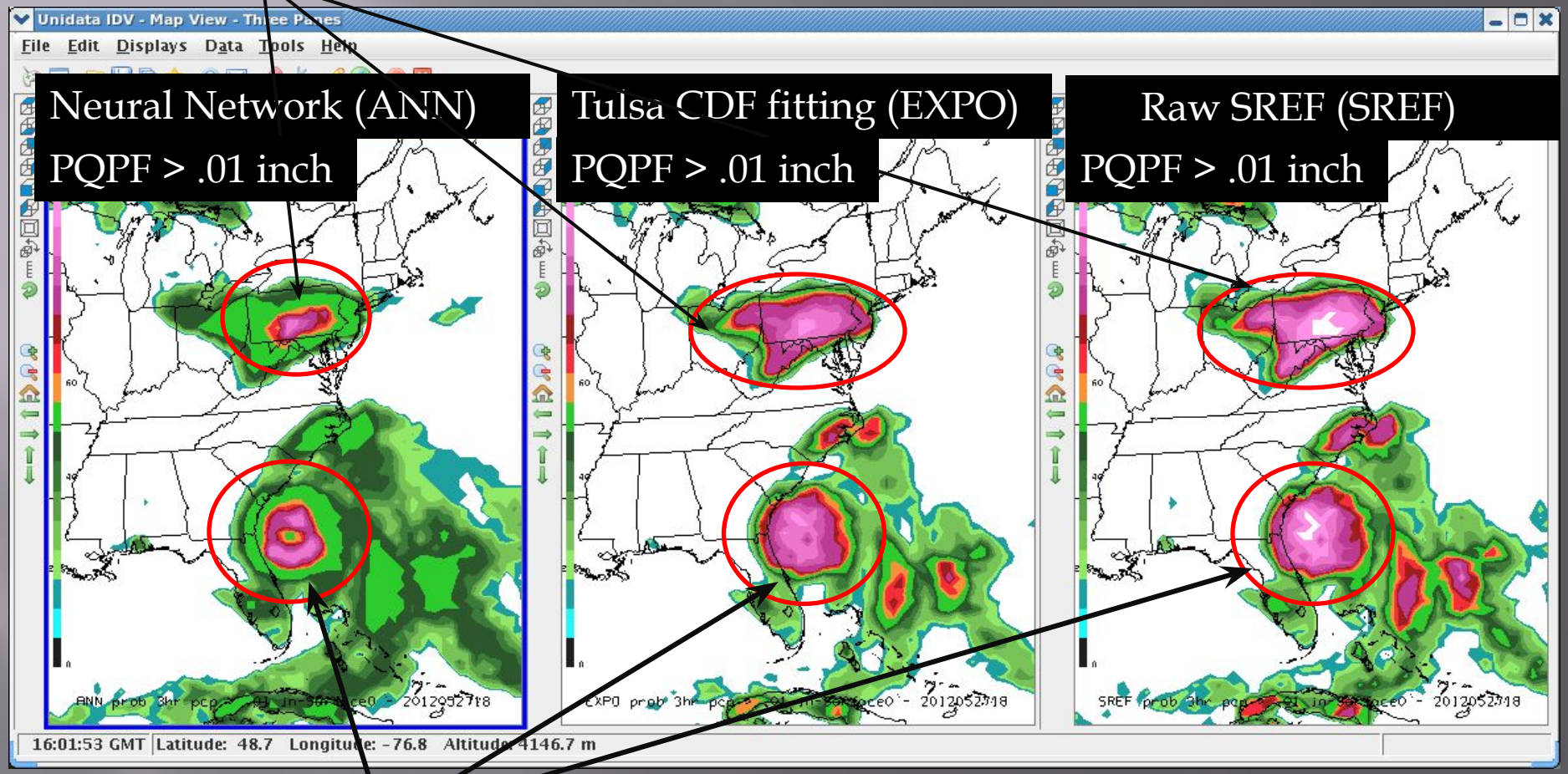
4 to 8 nodes…depending on Network

Values between 0 and 1 for all 4 POEs

Tropical Storm Beryl Case

May 27, 2012 …SREF 09Z run… Valid at 18Z

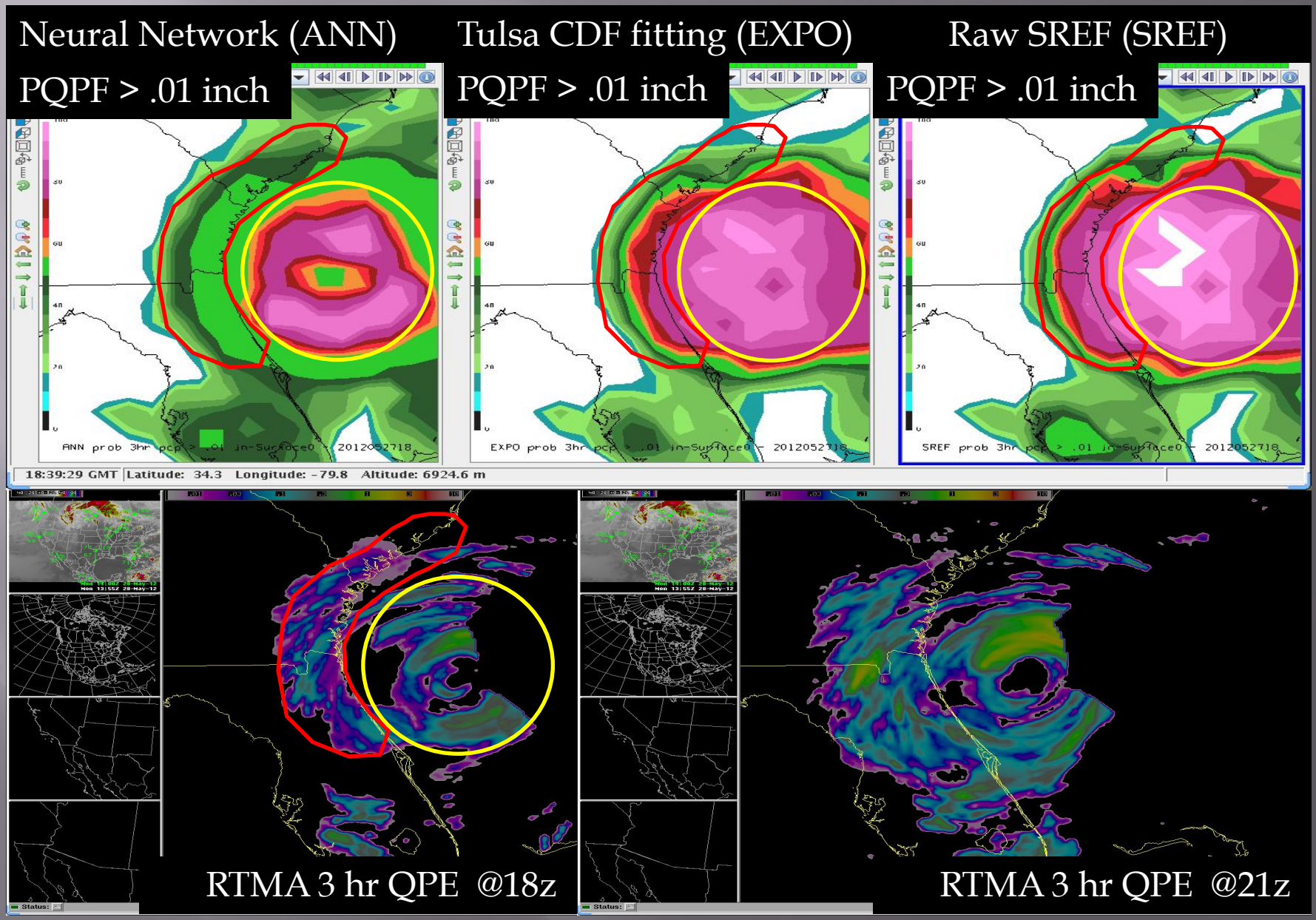
ANN lowers PQPF values…Decreases areal coverage of highest probabilities



ANN lowers PQPF values creating an eye feature in the Tropical Storm…
Decreases areal coverage of highest probabilities

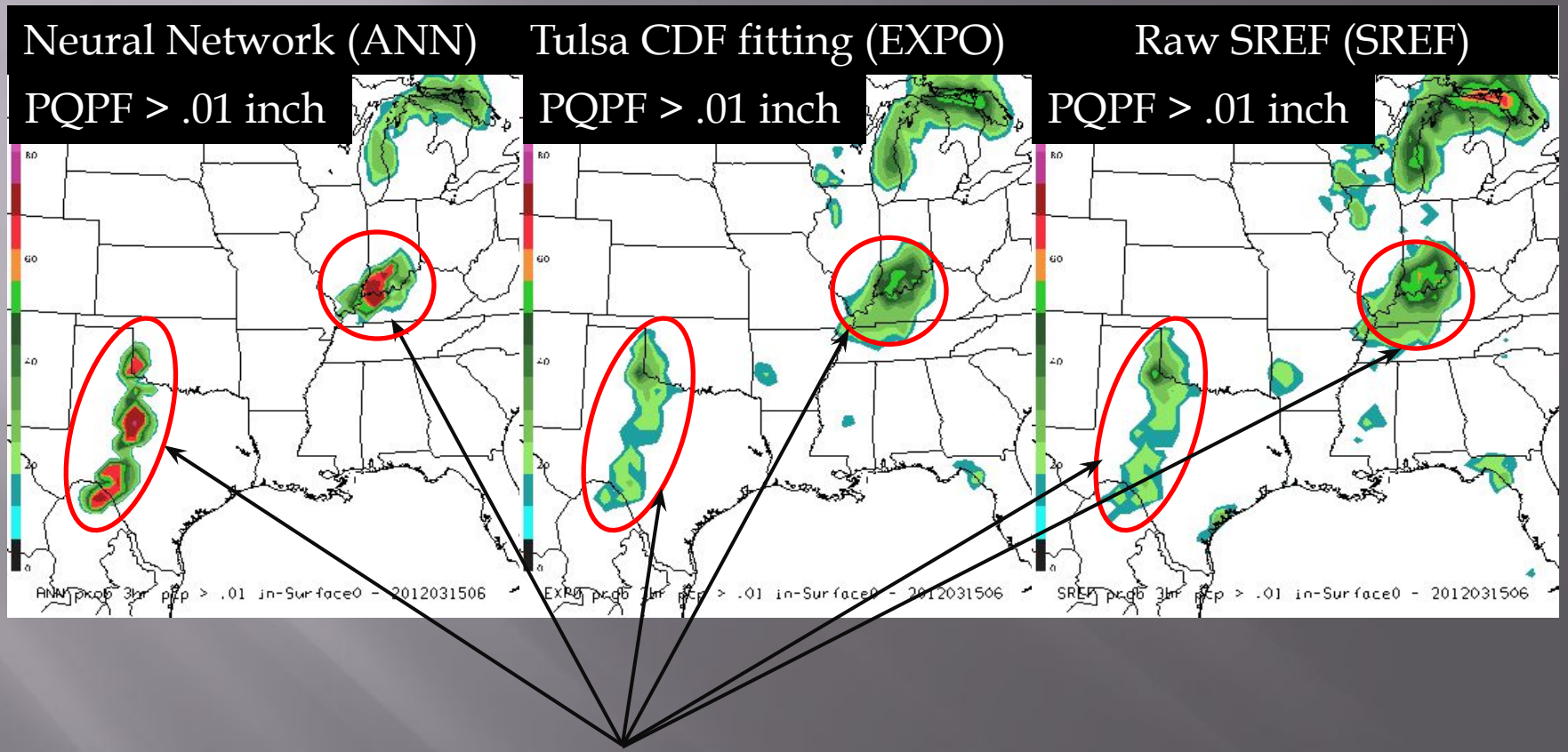
Closer Look at Tropical Storm Beryl

May 27, 2012…SREF 09Z run….Valid at 18Z



Deep Convection Case

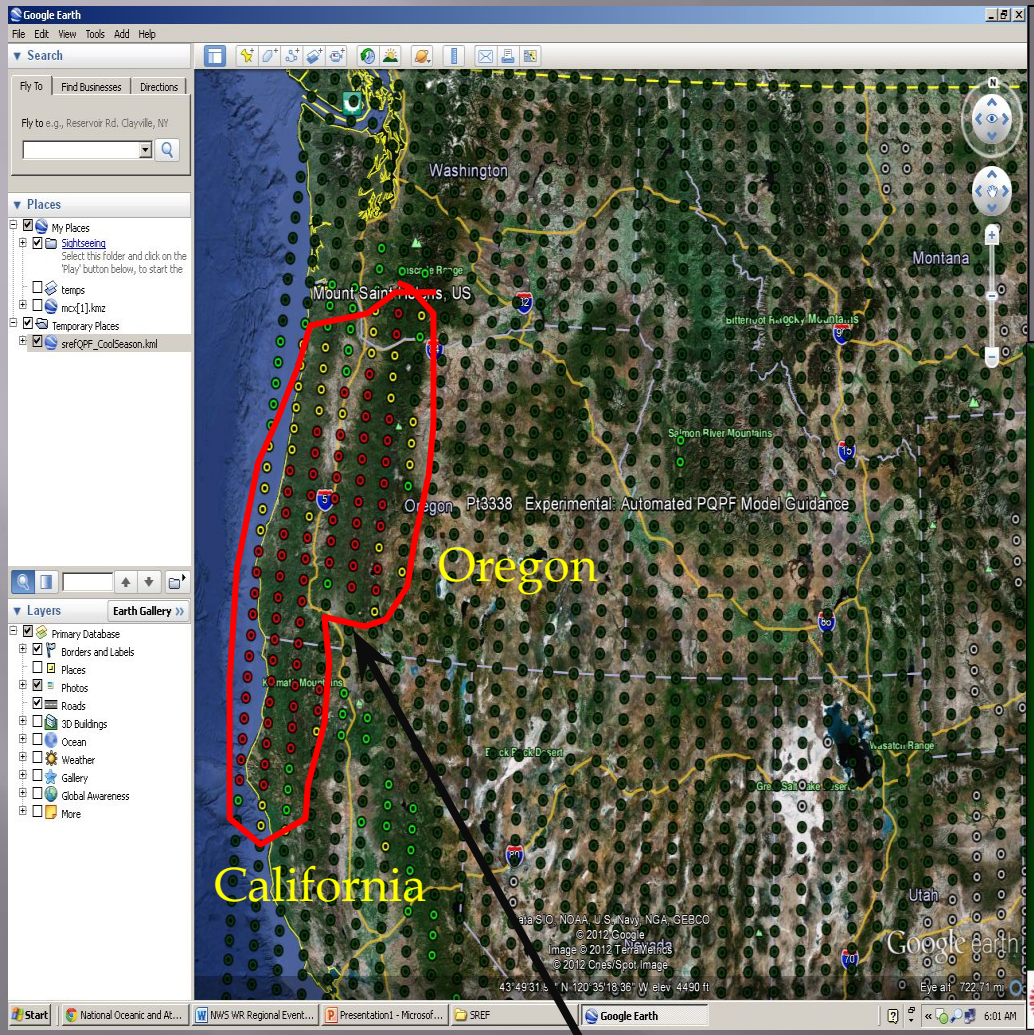
Mar 14, 2012 …SREF 03Z run
Time Step 9…valid Mar 15 at 06Z



ANN increases…rather than lowers…PQPF values over both the RAW and EXPO

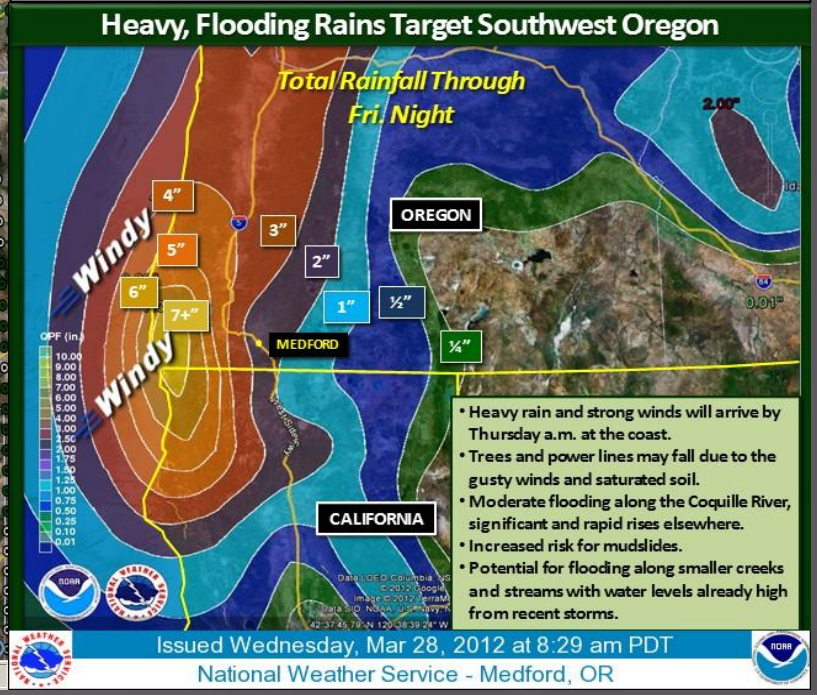
WR High Impact Event Case

March 28, 2012 – 3:30 PM MDT



Heavy Precipitation Expected over Pacific Northwest and northern California through Saturday March 31, 2012

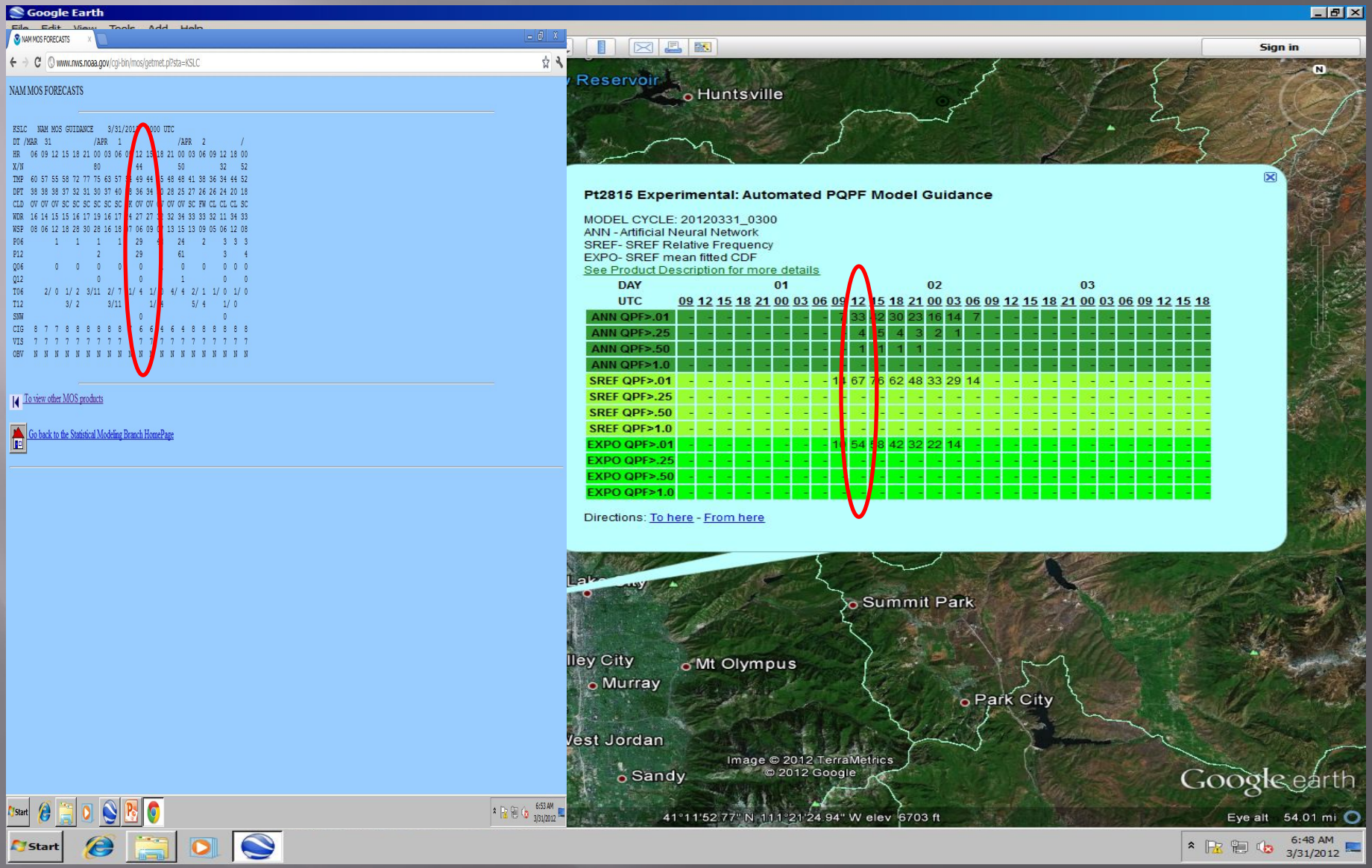
Event: A series of Pacific storms will impact the Pacific Northwest and northern California through Saturday, March 31, 2012.



Threat color coded Situational Awareness Product (SAP)
Highlighted heavy precipitation areas for this WR event

PQPF versus MOS POP: Comparing Apples to Oranges

SREF 3 hrly vs 6 and 12 hrly MOS…Point vs 40km grid cell average…etc.



Questions?