

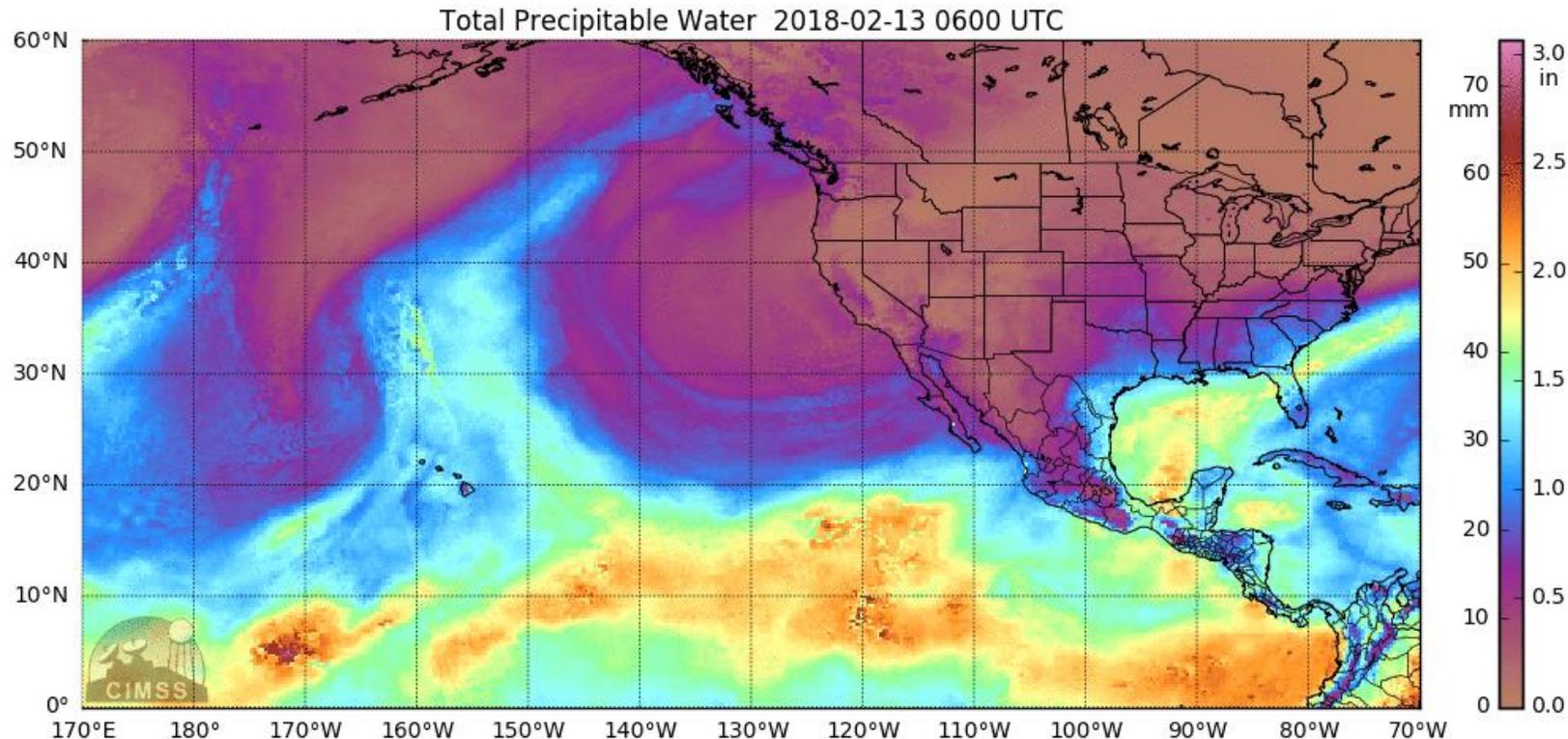
CW3E Post Event Summary: Arizona AR



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Atmospheric River Impacts Southern Arizona

- An AR made landfall over the Mexican Baja peninsula on 14 February 2018
- Due to the favorable orientation of IVT relative to gaps in elevation along the Baja, the AR was able to penetrate inland and bring AR conditions and precipitation to Southern Arizona
- Tucson, Arizona received ~1.3 inches of precipitation in 24 hours, ~10% of the average annual precipitation total, with storm total precipitation reaching ~1.5 inches
- Precipitation from this event nearly doubled the water year precipitation to date for the City of Tucson
- Mt. Lemmon, to the northeast of Tucson, received 8.66 inches of precipitation over the course of the event



Prepared by C. Hecht and F.M. Ralph

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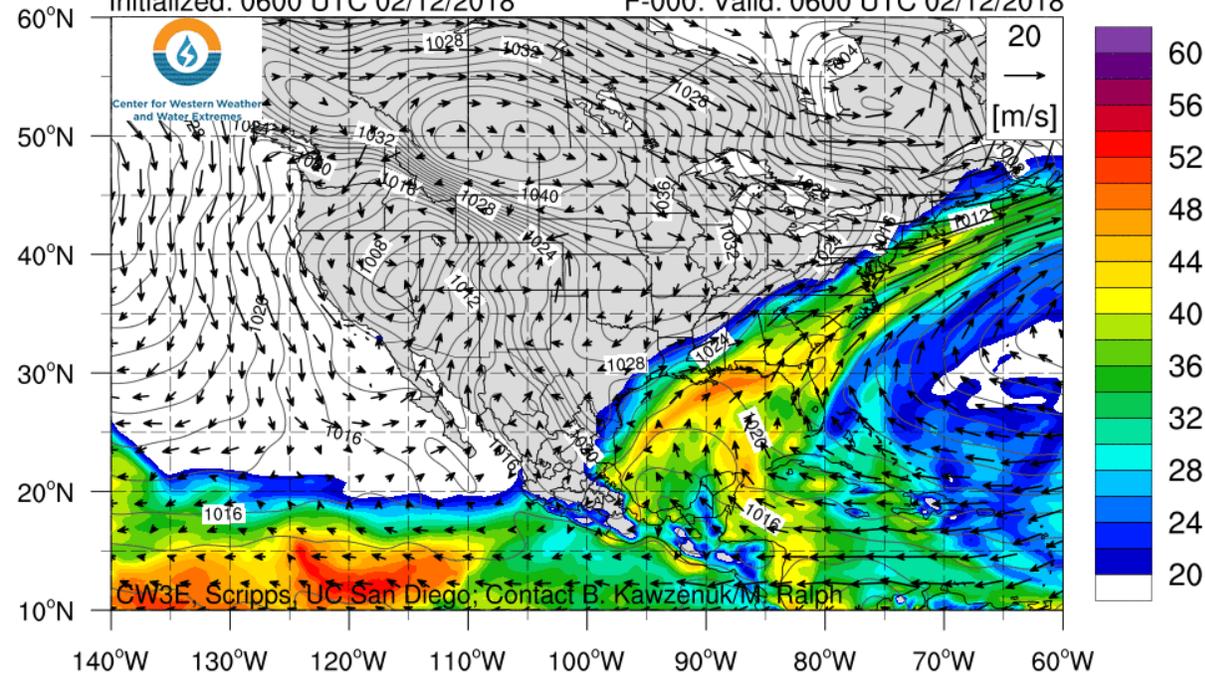


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NCEP GFS Analysis 6 UTC 12 February to 6 UTC 16 February 2018

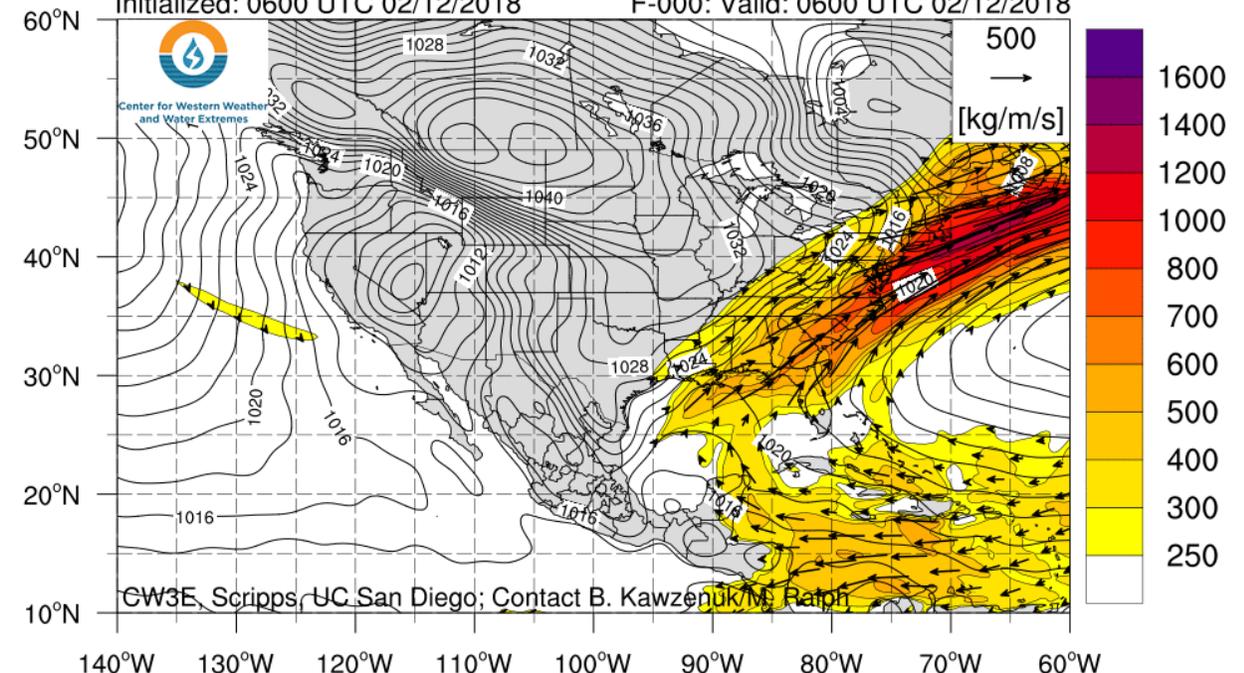
SLP, IWV and 850-hPa Wind

NCEP GFS IWV (mm; shaded), 850-hPa Wind (vectors), and SLP (hPa; contours)
Initialized: 0600 UTC 02/12/2018 F-000: Valid: 0600 UTC 02/12/2018

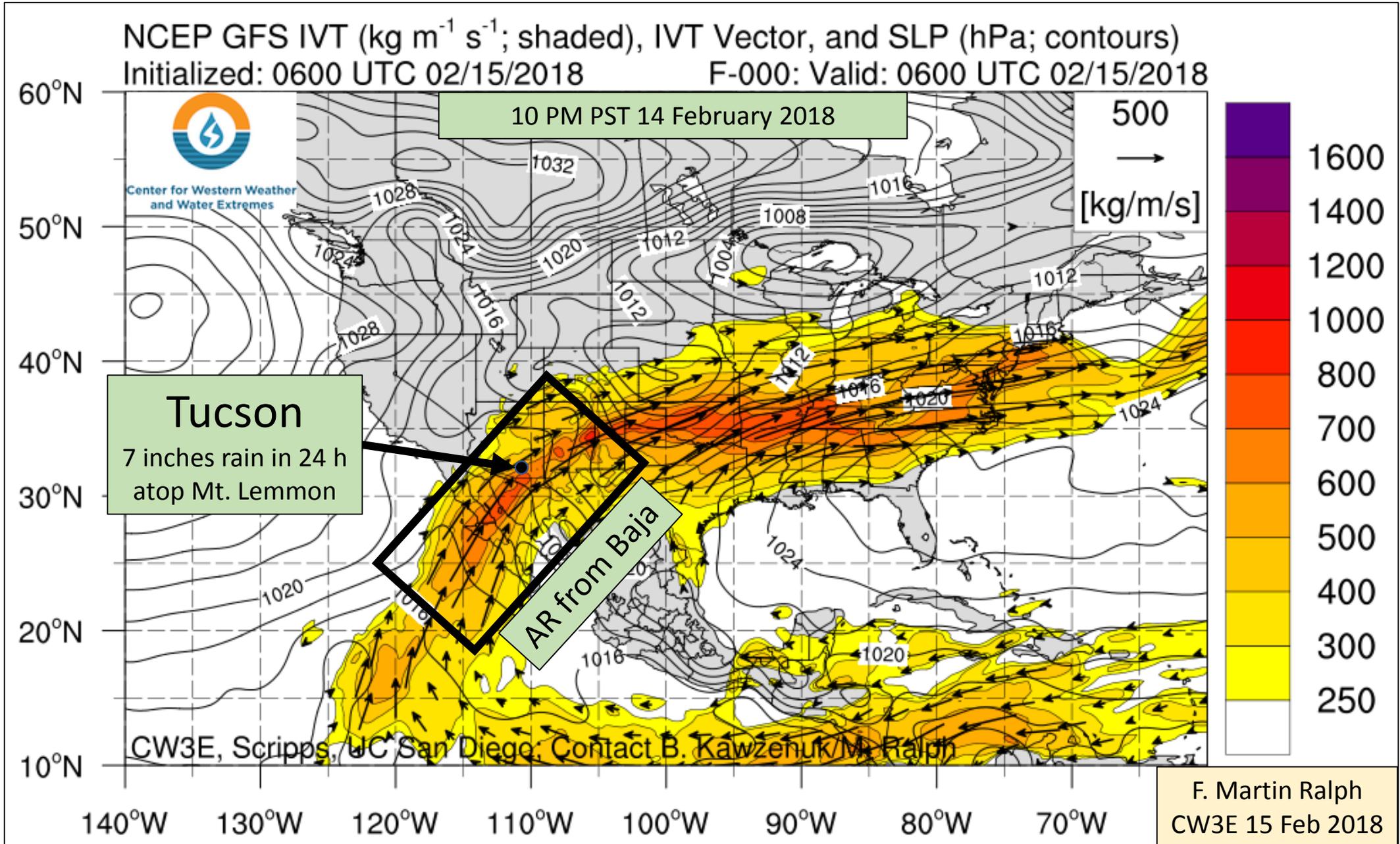


SLP, IVT, and IVT Vector

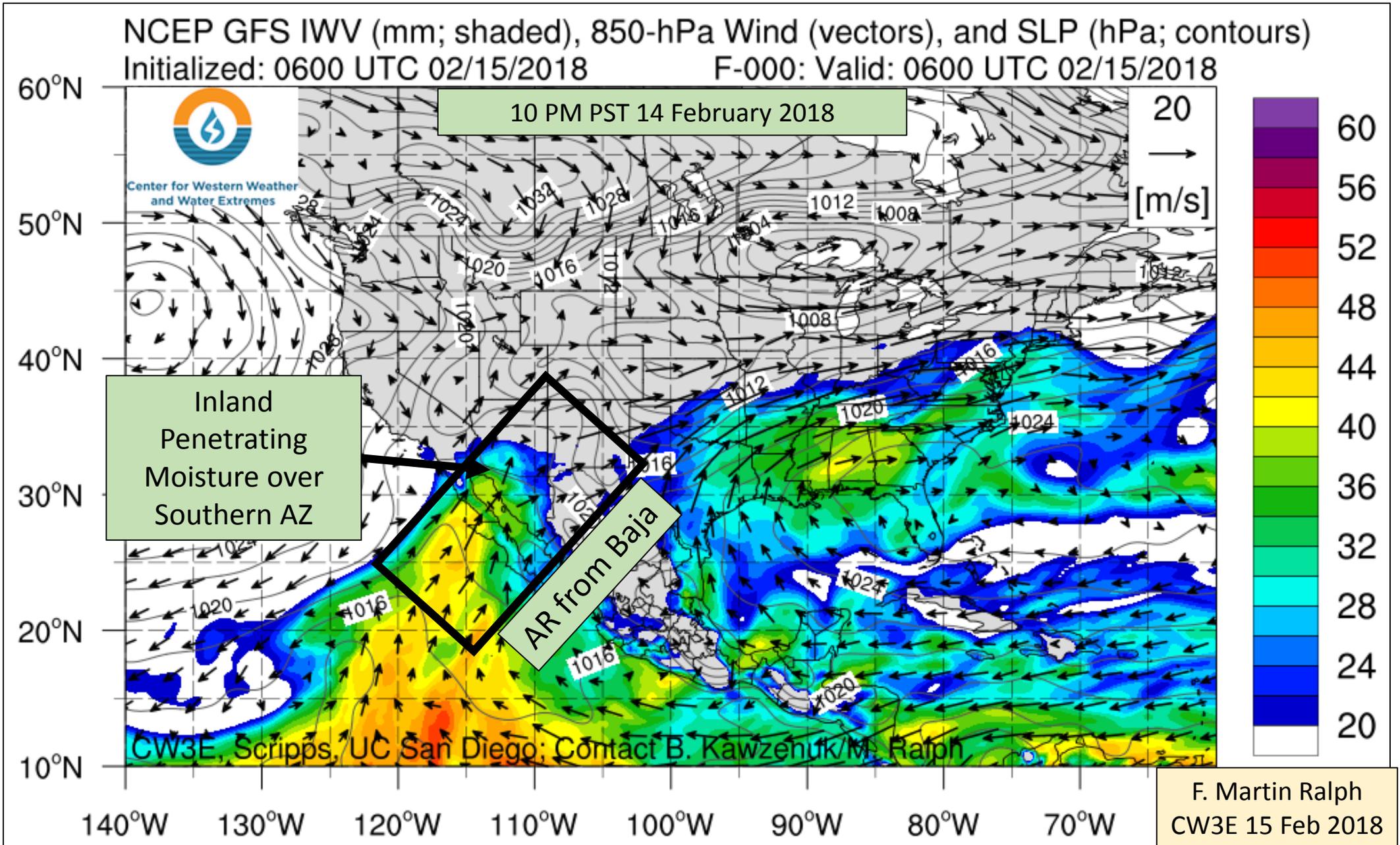
NCEP GFS IVT ($\text{kg m}^{-1} \text{s}^{-1}$; shaded), IVT Vector, and SLP (hPa; contours)
Initialized: 0600 UTC 02/12/2018 F-000: Valid: 0600 UTC 02/12/2018

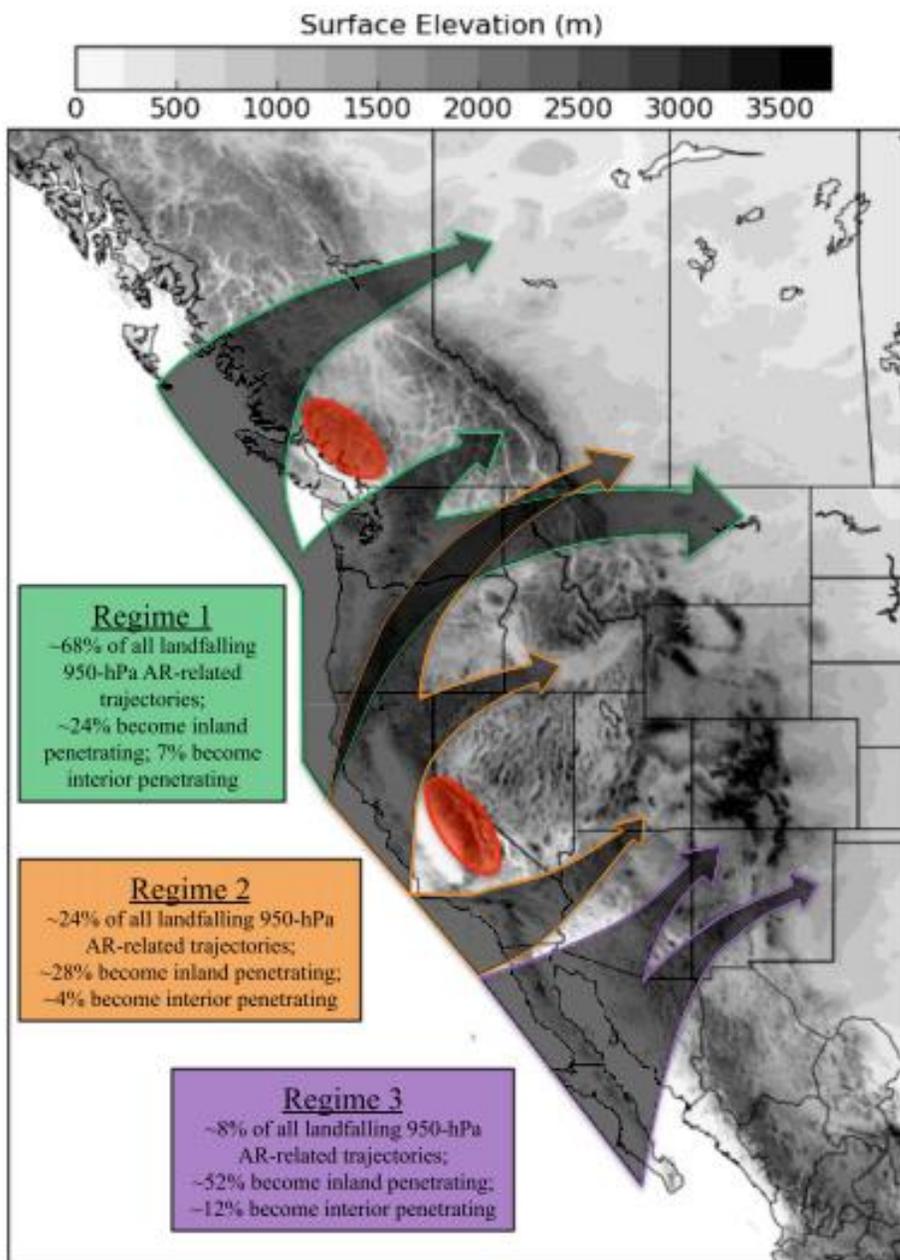


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The Inland Penetration of Atmospheric Rivers over Western North America: A Lagrangian Analysis

J.J. Rutz, J. W. Steenburgh and F.M. Ralph
Mon. Wea. Rev., 2015

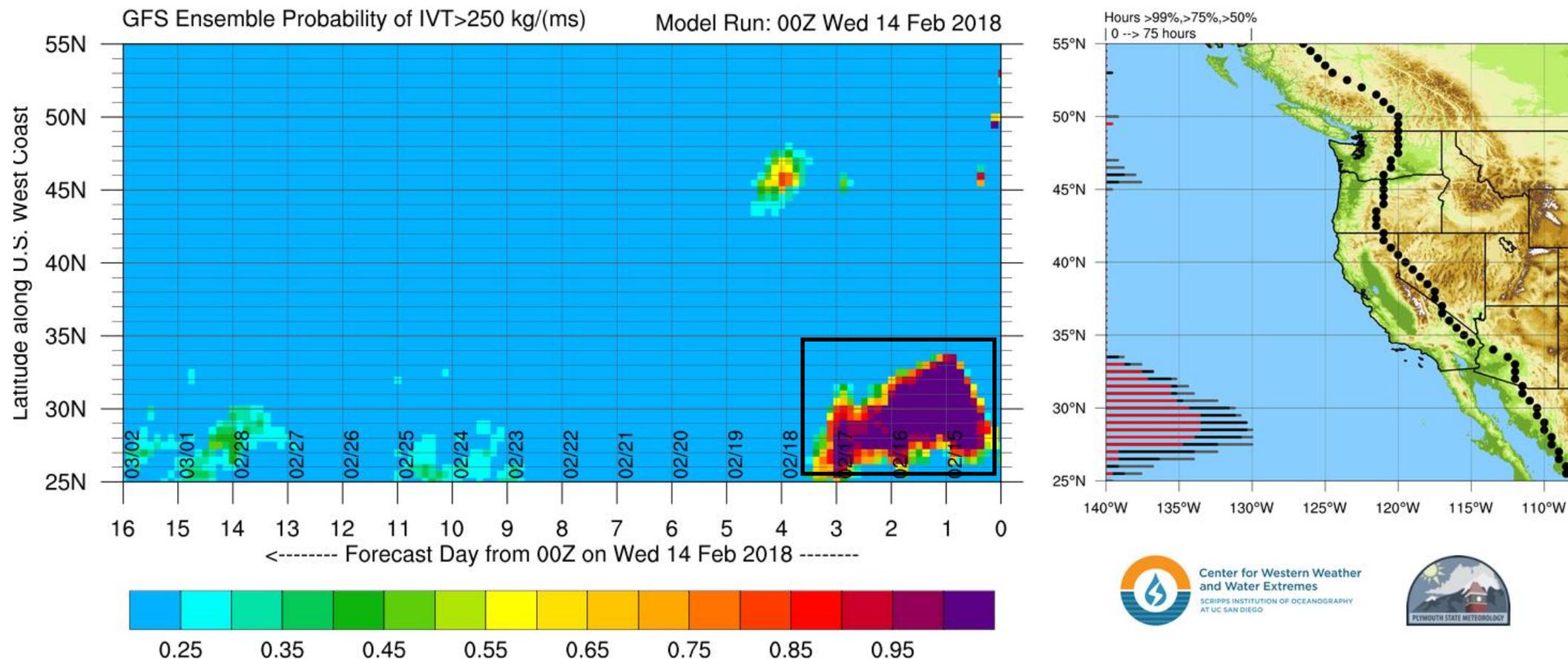
- Work by Rutz et al. 2015 identified that southwesterly oriented ARs that make landfall over the Mexican Baja are able to penetrate inland through gaps of lower terrain and bring AR conditions and impacts to Arizona
- While landfalling ARs are rare over the Mexican Baja compared to northern West Coast ARs, they tend to be more efficient at penetrating inland and impacting the Desert Southwestern States
- ~52% and ~12% of ARs that make landfall over the Mexican Baja become inland and interior penetrating respectively, a proportion much higher (~2 times more) than ARs that make landfall at higher latitudes along the North American coast (Regime 1; Green and Regime 2; Orange)

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Odds of at least a **WEAK** AR making landfall



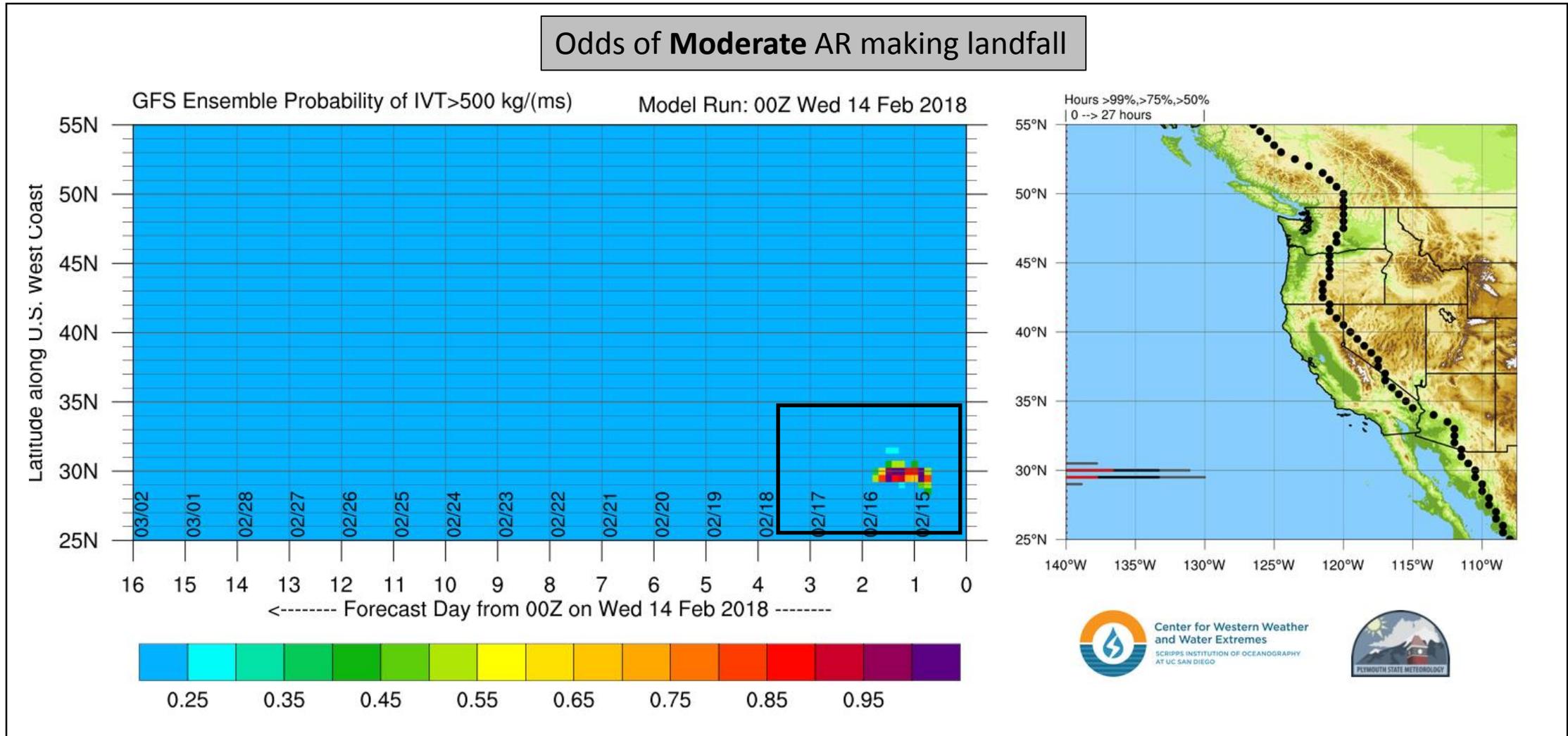
- The 00 UTC 14 February 2018 GFS forecast indicated a high probability of at least weak AR conditions (IVT > 250 kg/m/s) over inland portions of Southwestern AZ and Mexico

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Odds of Moderate AR making landfall

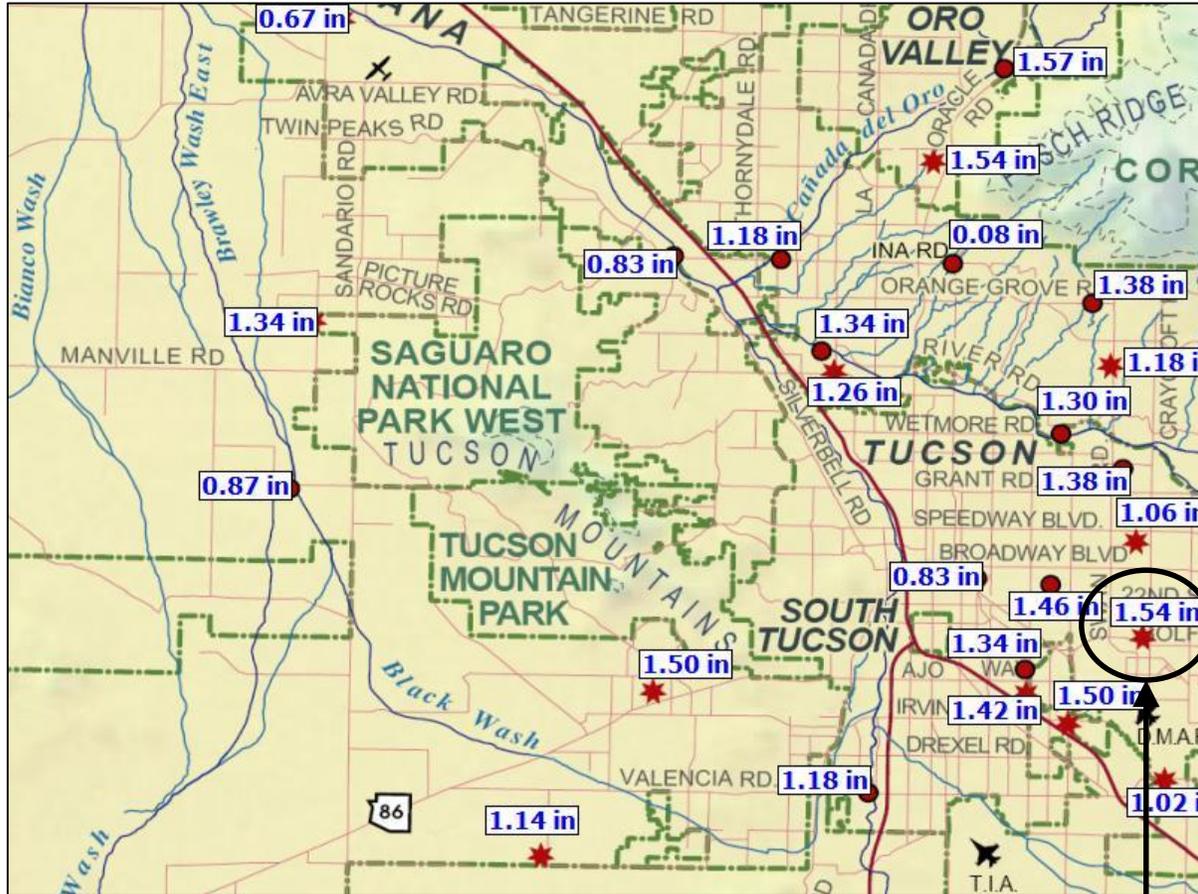


- The 00 UTC 14 Feb. GEFS also predicted high probability (>75%) of moderate AR conditions (IVT > 500 kg/m/s) over Southern AZ

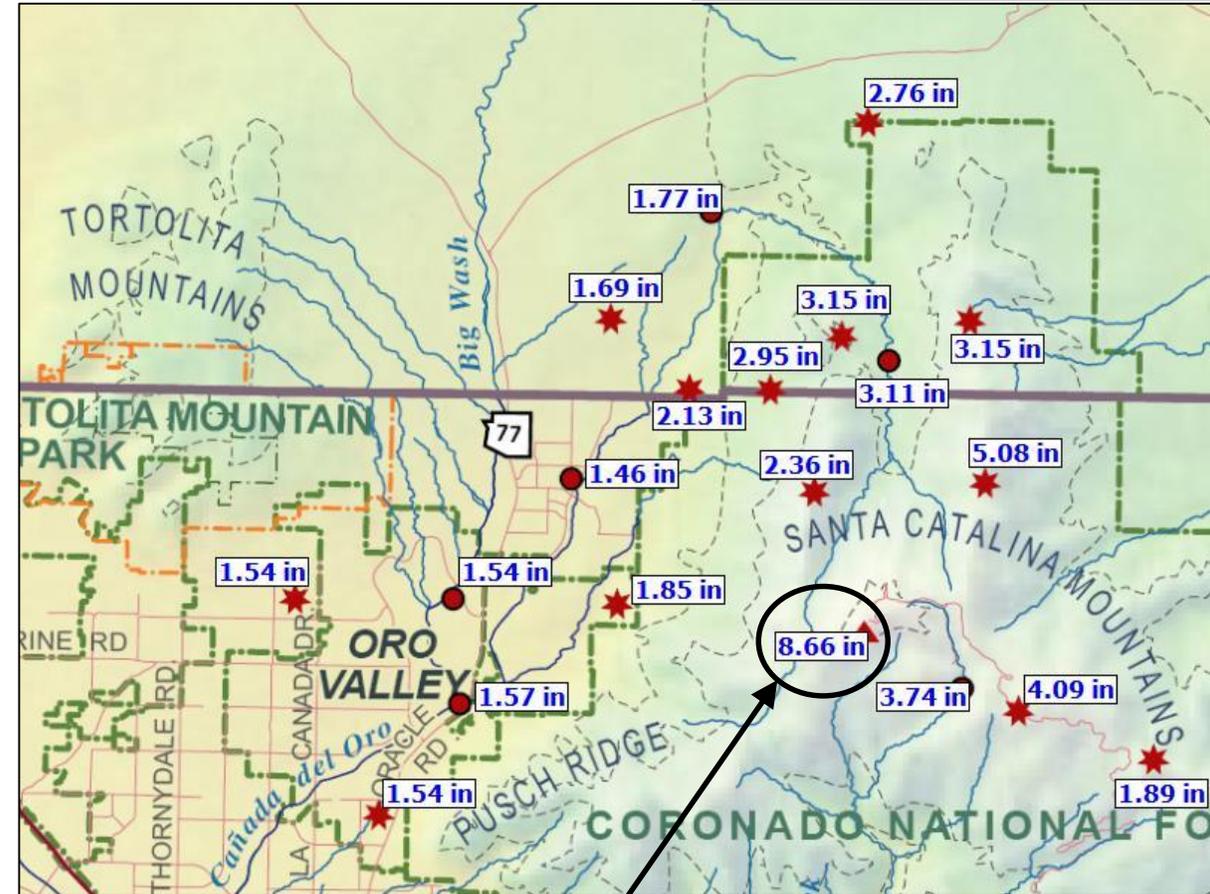
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48-HR Precipitation ending 10:15 AM MST 16 February 2018

Source: alert.rfcd.pima.gov/perl/Pima.pl



- Numerous rain gauges around Tucson, AZ received >1 in. of precip. with 1.54 inches falling near Davis-Monthan AFB
- 1.3 inches of precipitation at Tucson International Airport is ~10% of the average annual precipitation



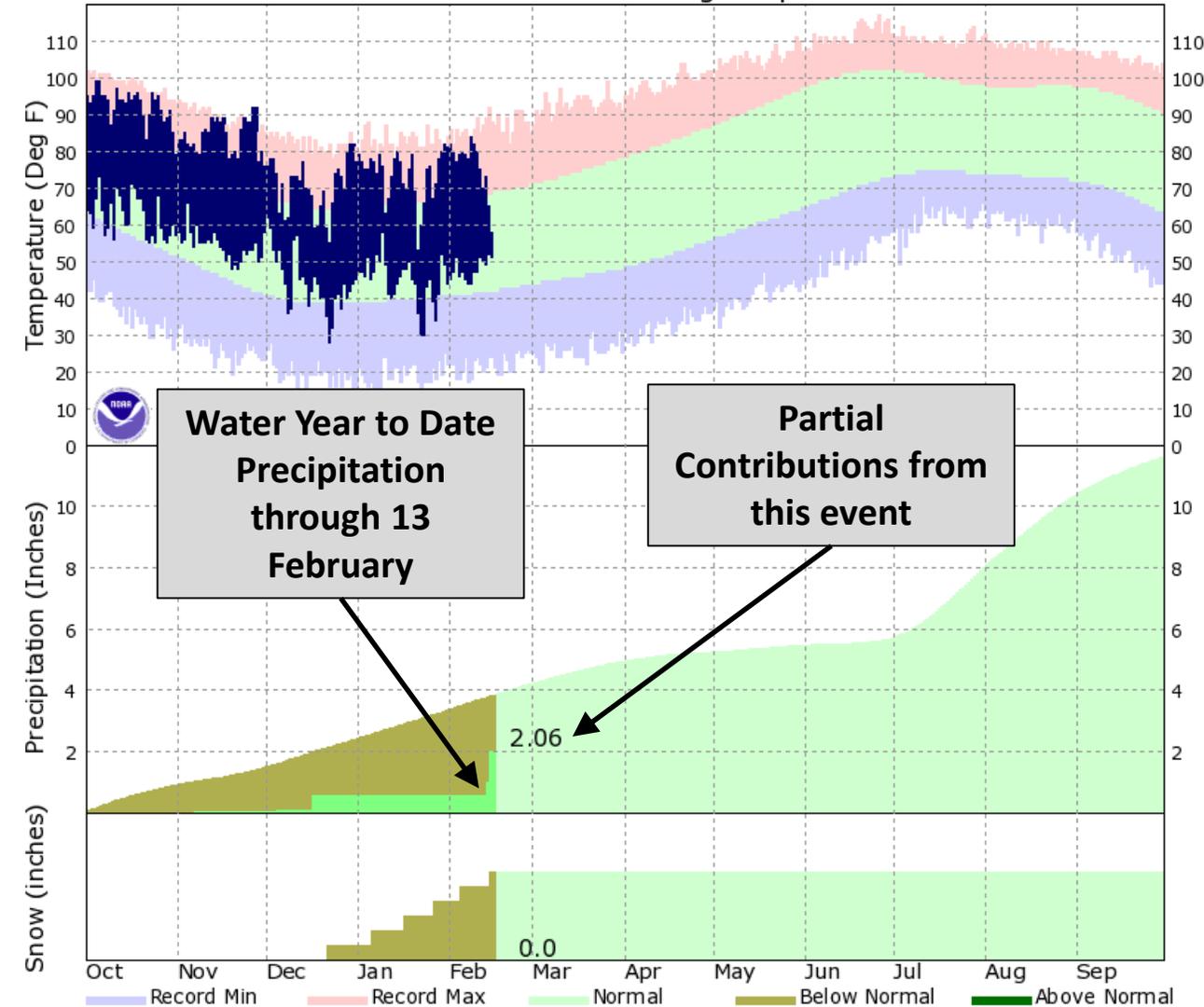
- The higher elevations to the northeast of Tucson received higher amounts of precipitation ranging from ~1.5 in. over the foothills to 8.66 in. over Mount Lemmon (elevation 9,159 feet)

AR Event Summary: 16 February 2018



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KTUS - Oct 2017 Through Sep 2018



- From the start of the water year (October 2017) to 14 February 2018, Tucson International Airport had received 1 inch of precipitation, ~2.8 inches below the average water year to date precipitation
- During this event, Tucson International Airport received ~1.3 inches of precipitation in 24 hours, more than doubling the water year to date precipitation accumulation

Source:
<http://www.wrh.noaa.gov/climate/yeardisp.php?wfo=twc&year=2017&span=Water%20Year&stn=KTUS>