## Meteorological Characteristics of the Santa Ana River Watershed

#### Synoptic and Mesoscale Forcing of Southern California Extreme Precipitation

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### The Santa Ana River Watershed



#### Meteorological Analysis for Forecast Informed Reservoir Operations (FIRO) at Prado Dam

Use an "ingredients-based" approach to evaluate precipitation processes in Southern California

- Orographic Forcing
- Synoptic Forcing
- Convection

- 1. Using two case studies events from the remarkable 2016/17 water year
- 2. Evaluating precipitation mechanisms in these events relative to the watershed's climatology.

Cannon F., et al. Synoptic and Mesoscale Forcing of Southern California Extreme Precipitation. *Journal of Geophysical Research -Atmospheres* 





- Investigate two AR events with major impacts on the Santa Ana River Watershed in 2017.
- 1. How do their synoptic conditions compare to the climatology?
- 2. What are the primary precipitation mechanisms for each event?



Location of surface low pressure center and orientation of IVT for the 107 precipitation events whose 3-day totals accounted for 50% of PRISM precipitation within the watershed (1981-2017)





Cannon F., et al. Synoptic and Mesoscale Forcing of Southern California Extreme Precipitation. *Journal of Geophysical Research -Atmospheres*  Orographic forcing is the dominant precipitation mechanism, **but** orographic enhancement is not uniform across events



On average, 50% of event precipitation falls below 500m in the basin... but this value ranges more than 25%







Precipitation Accumulation (mm)

The precipitation distributions during the events were also very different.

What drove each of these events, and what drives extreme precipitation, climatologically.

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# What Produces Extreme Precipitation in S. CA?

- Atmospheric Rivers, but not like in N. CA!
- Generally, shorter duration w/ higher intensity
- Moist upslope flux is only one mechanism
- Synoptic dynamics and forced convection are also important
- Going forward, what is the forecast skill for each mechanism?
- What about continued modeling and field campaigns?

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#### The Wildcard



Least Bell's Vireo

