Development of a spatially comprehensive, daily hydrometeorological data set for Mexico, the conterminous U.S., and southern Canada: 1950-2013.

http://www.ig.utexas.edu/jsg/css_jsg/research/index.html

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CIRES

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

Overview

- Motivation – downscaling *Localized Constructed Analogs,* LOCA (*Scripps*); Water balance studies;
- Consistent methodology relative to international boundaries—1/16° (~6km) daily, P, T_{max}, T_{min}, 1950-2013
- Spatial extension of a previous data set[1,2].
- QC and comparison with NLDAS-2

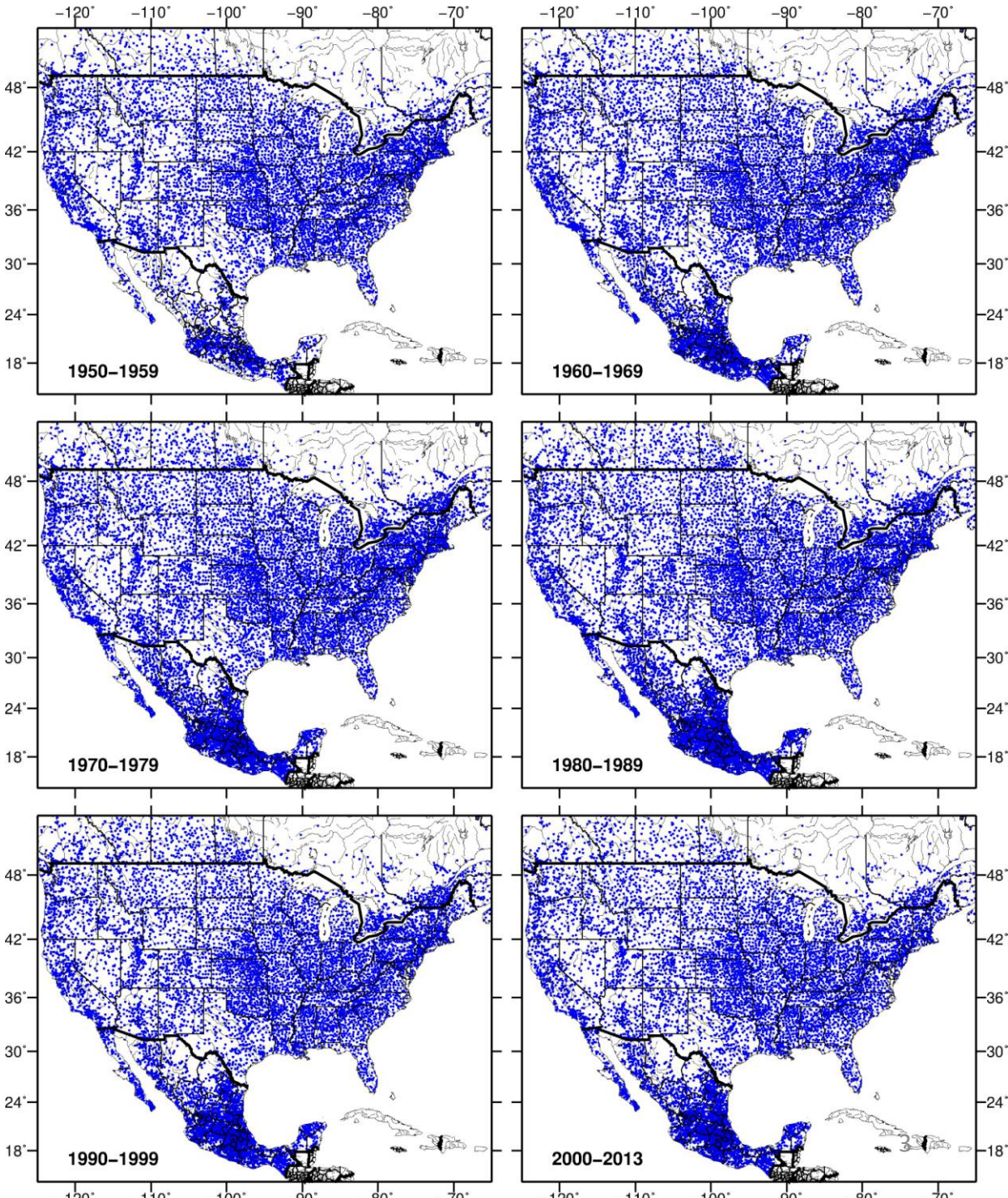
[1]Livneh B., E.A. Rosenberg, C. Lin, B. Nijssen, V. Mishra, K.M. Andreadis, E.P. Maurer, and D.P. Lettenmaier, 2013: **A Long-Term Hydrologically Based Dataset of Land Surface Fluxes and States for the Conterminous United States: Update and Extensions**, *Journal of Climate*, doi:10.1175/JCLI-D-12-00508.1.

[2]Maurer, E. P., Wood, A. W., Adam, J. C., Lettenmaier, D. P., & Nijssen, B. (2002). **A long-term hydrologically based dataset of land surface fluxes and states for the conterminous United States***. *Journal of Climate*, 15(22), 3237-3251.

Station Density by Decade

- 20-year record length required (CONUS, Canada)
- 60-day length requirement for Mexico *to ensure adequate station density**

***Numerous local agencies contacted for Mexican station data**



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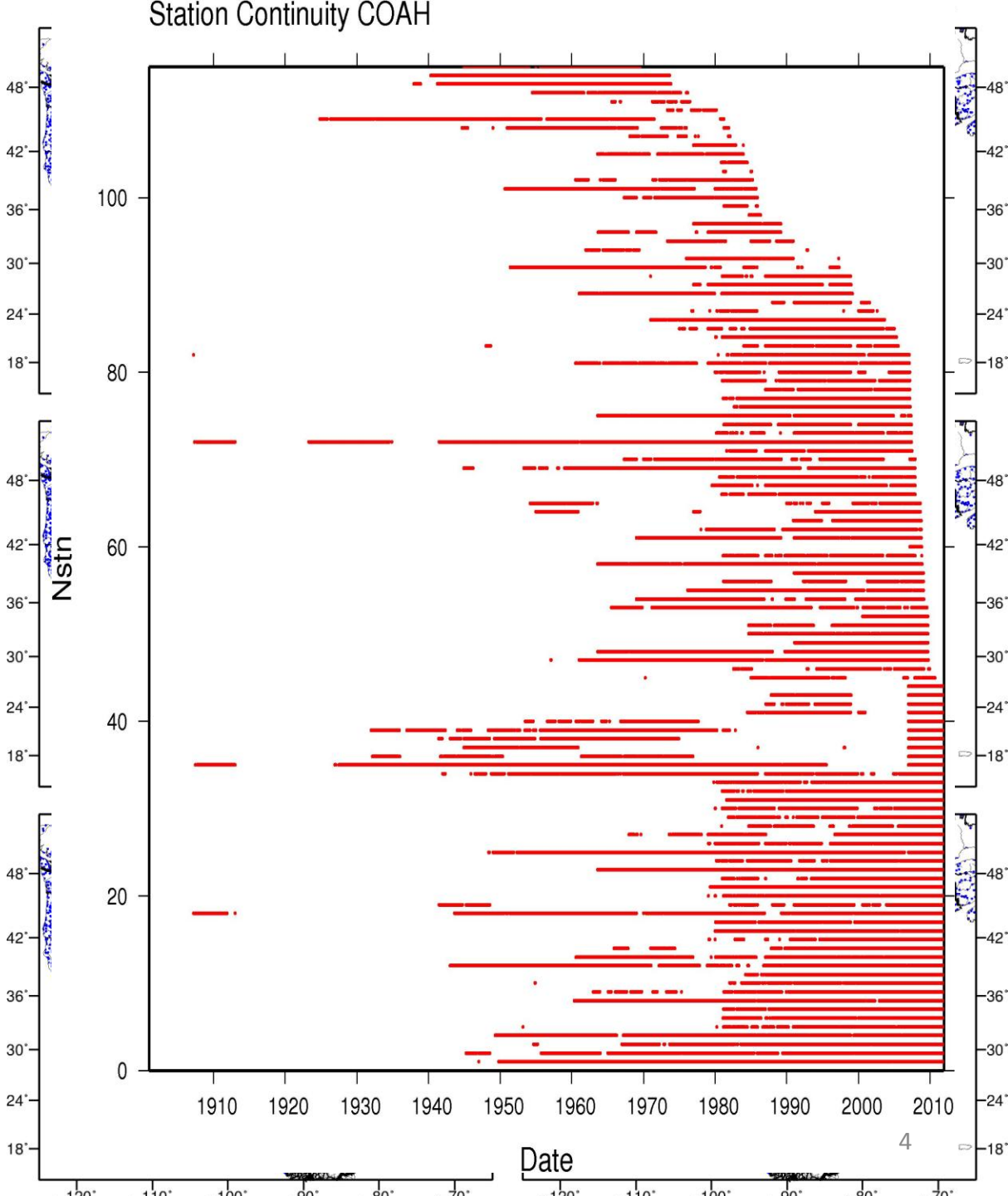
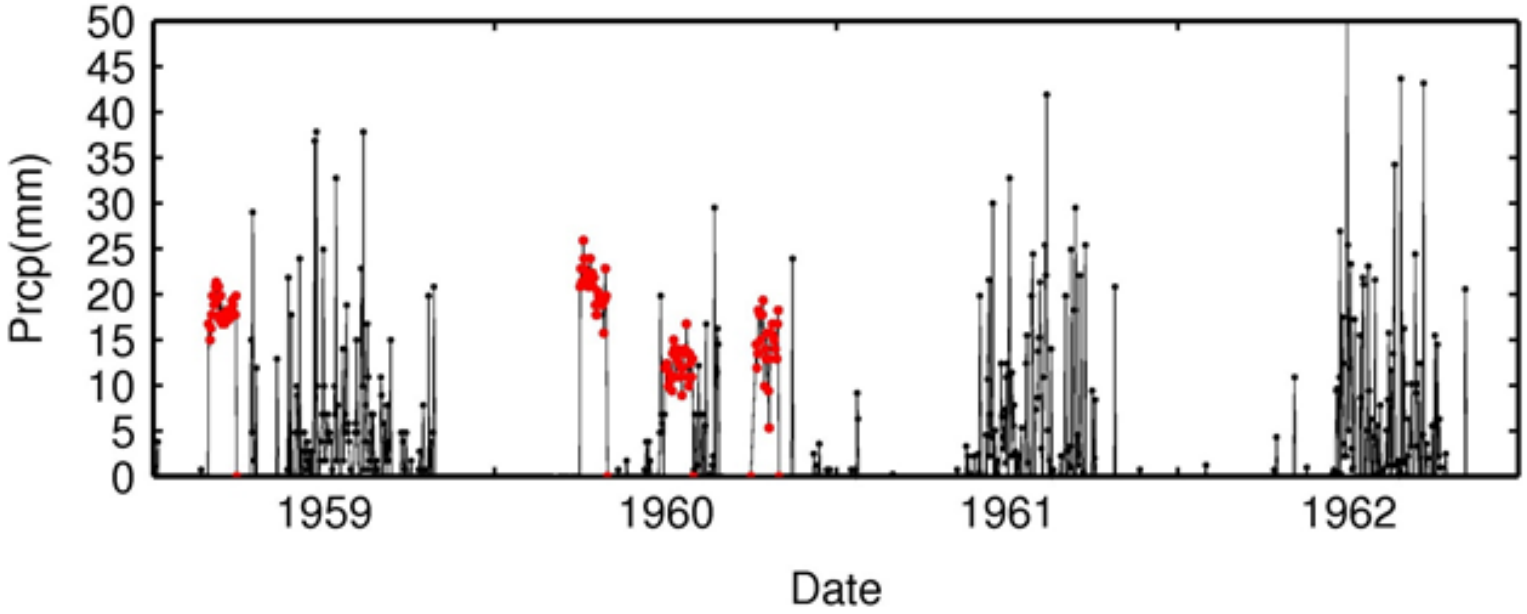


Quality control for Mexican Station Data

Spurious, near-constant non-zero precipitation were identified and flagged on a monthly basis for each station by computing the monthly coefficient of variation, Cv_i and its climatological average value, CV_m

Months with $CV_i < 0.18\ CV_m$, were removed, threshold was determined empirically.



Example: spurious precipitation data (red circles) for Station ID: 14111, Poncitlan, Jalisco, MX.

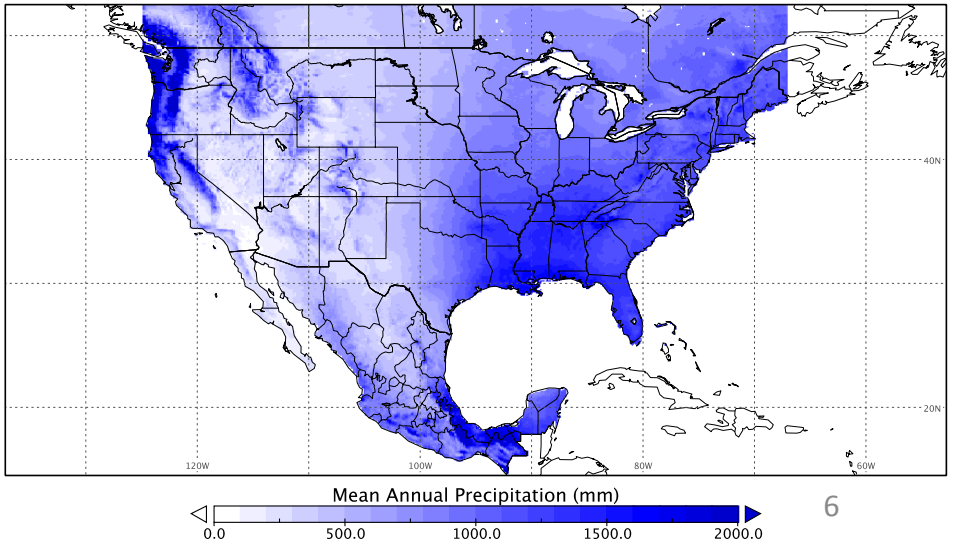
Precipitation: *Orographic Adjustment*

- To account for orographic effects, daily precipitation was scaled using the ratio of long-term (30-year) gridded average precipitation to climate normal (1/20° ~5km resolution) on a monthly basis

For a daily value in Month, *M*:

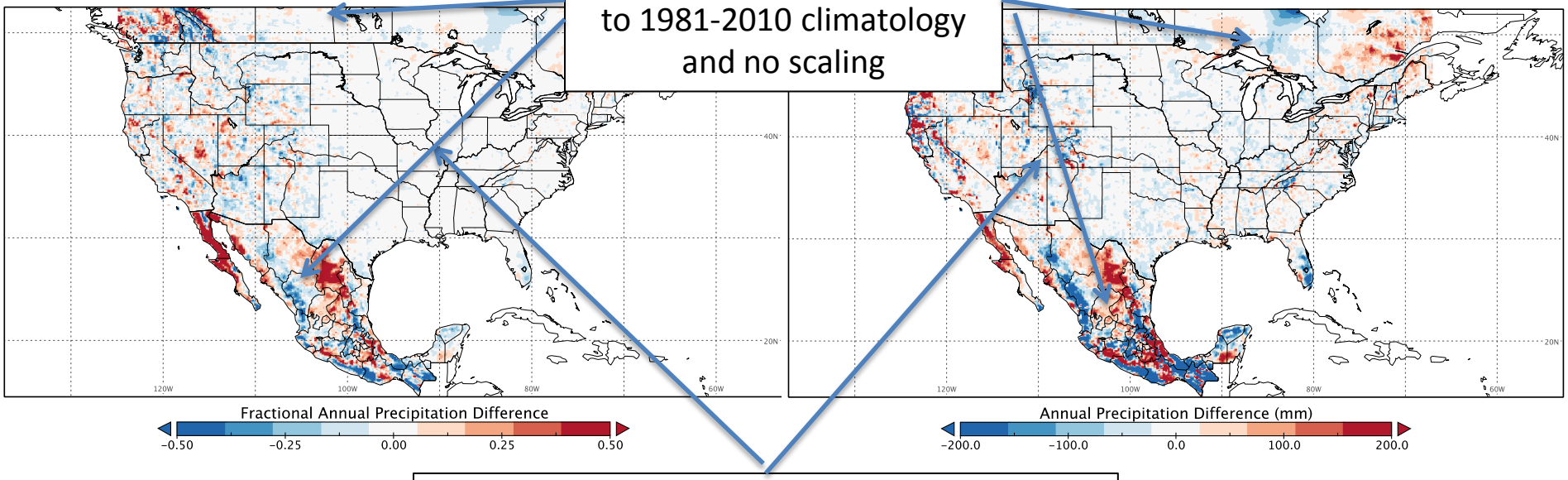
$$P_{scaled}=P_{raw}*(1981\text{-}2010\ normal_{M}\ /\ 1981\text{-}2010 mean\ gridded\ value_{M})$$

- Outside CONUS—Vose et al. (2014) 1981-2010 normal used*
- Within CONUS, PRISM 1981-2010 normal used



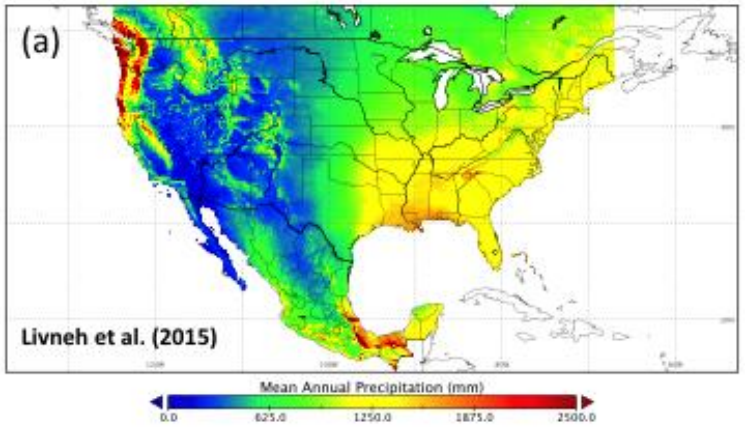
Selection of ‘normal’ period important

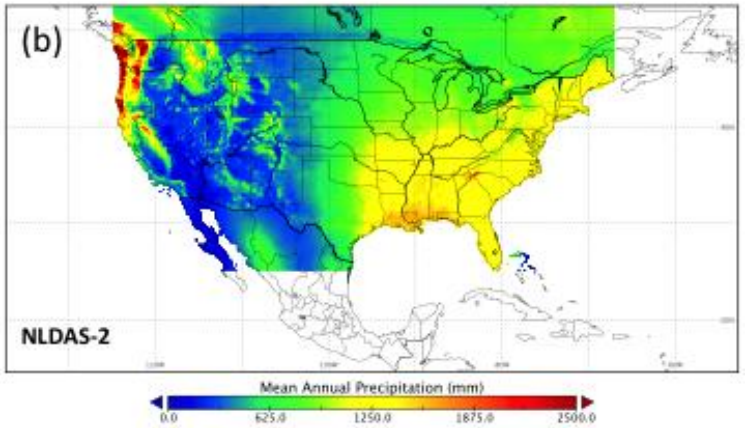
- Livneh et al. (2013) data set used the 1961-1990 period, whereas current data set uses 1981-2010.
- Long-term averages differ when scaling to these sets.

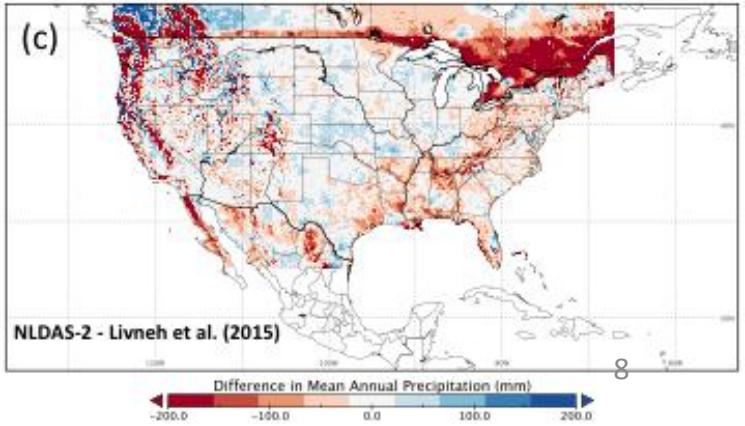


Data do not suffer transboundary discontinuity issues

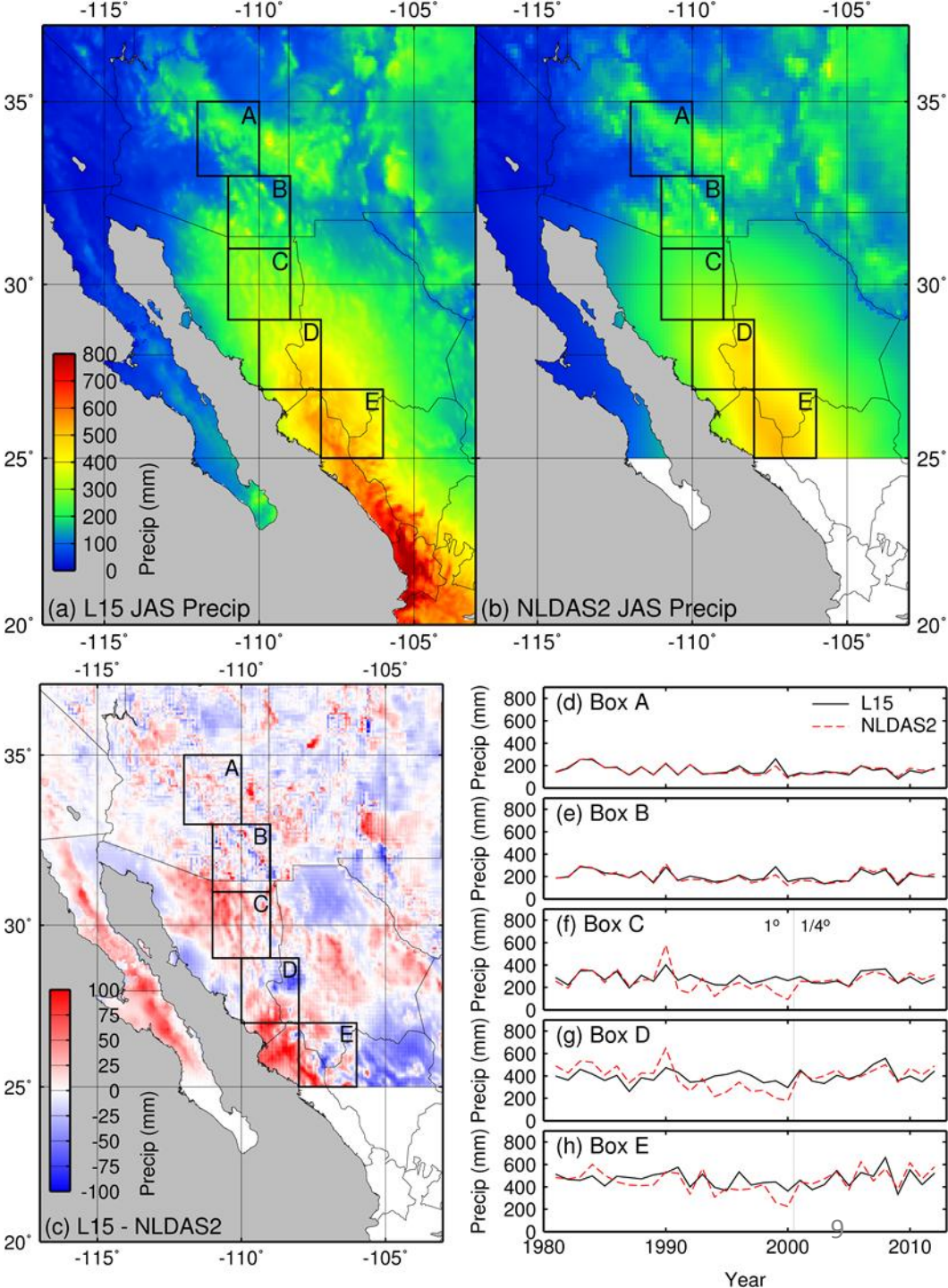
- Comparison with NLDAS-2 mean annual precipitation, 1979-2013
- Noticeable discontinuities in NLDAS-2 at 50° N, also at U.S. Mexico Border







Importance for N.A. Monsoon, Drought



Summary

- New data set spatially extends previous data set, relatively free from transboundary discontinuities.
- Interesting question raised during orographic scaling (choice of data set).
- Updating a priority, station access (Mexico) an issue
- Publicly available ftp://gdo-dcp.ucllnl.org/pub/dcp/archive/OBS/livneh2014.1_16deg/
- Contact: ben.livneh@colorado.edu

Livneh B., T.J. Bohn, D.S. Pierce, F. Munoz-Ariola, B. Nijssen, R. Vose, D. Cayan, and L.D. Brekke, 2015: A spatially comprehensive, hydrometeorological data set for Mexico, the U.S., and southern Canada 1950-2013, *Nature Scientific Data* (in review).

Thank you