Tree-ring Perspective on California Drought

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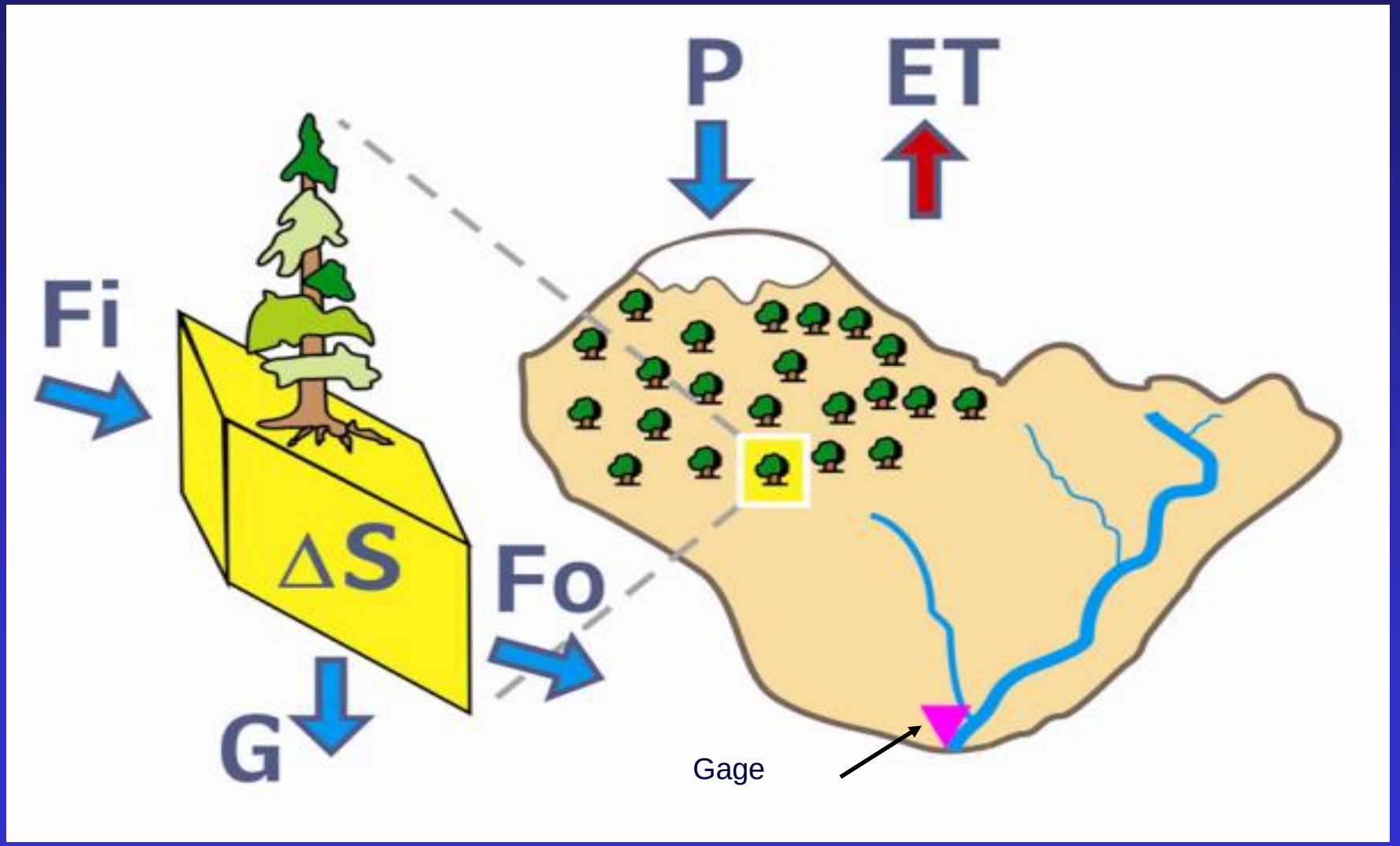
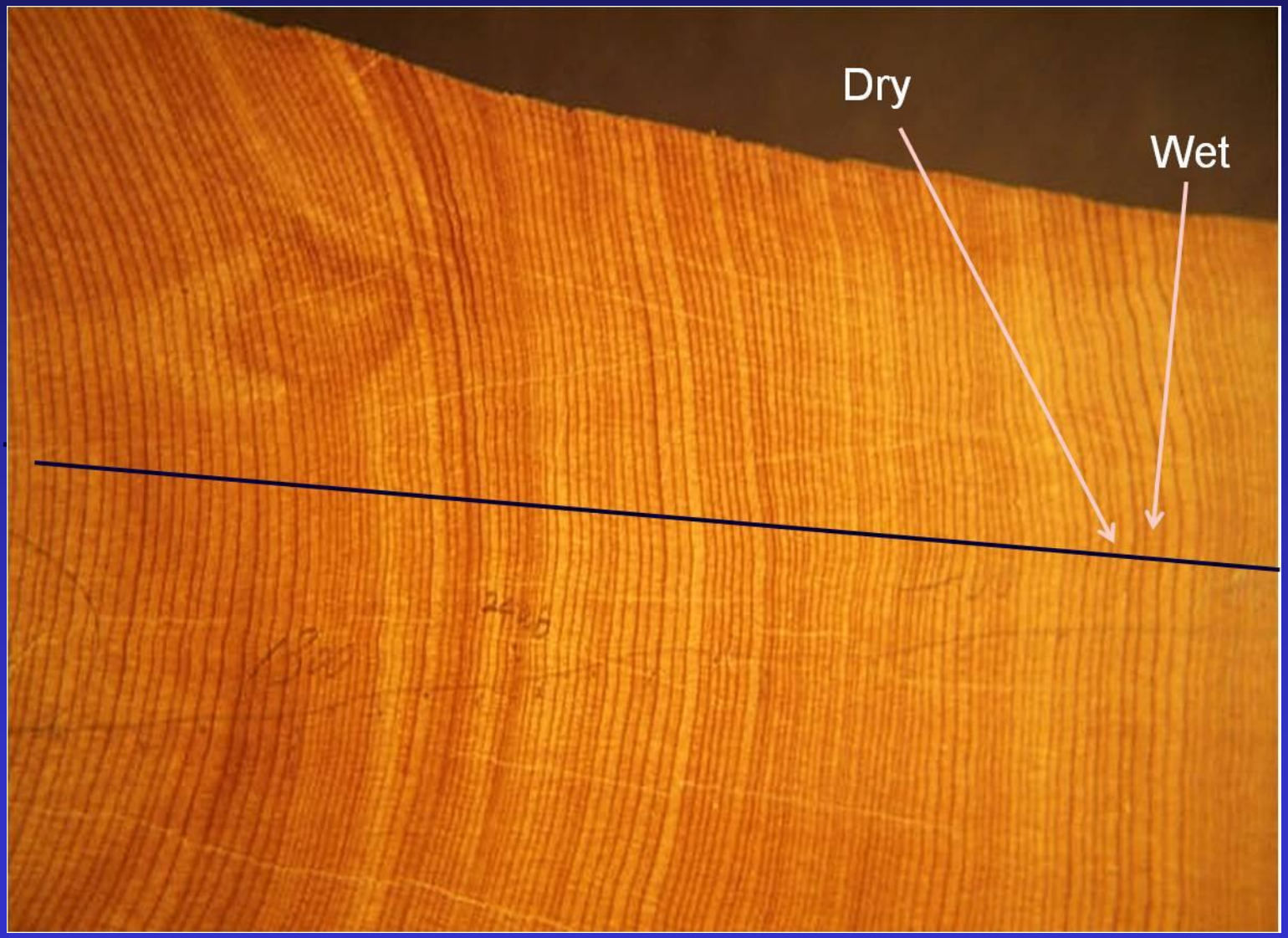
California Drought Forum, Sacramento, May 15, 2014

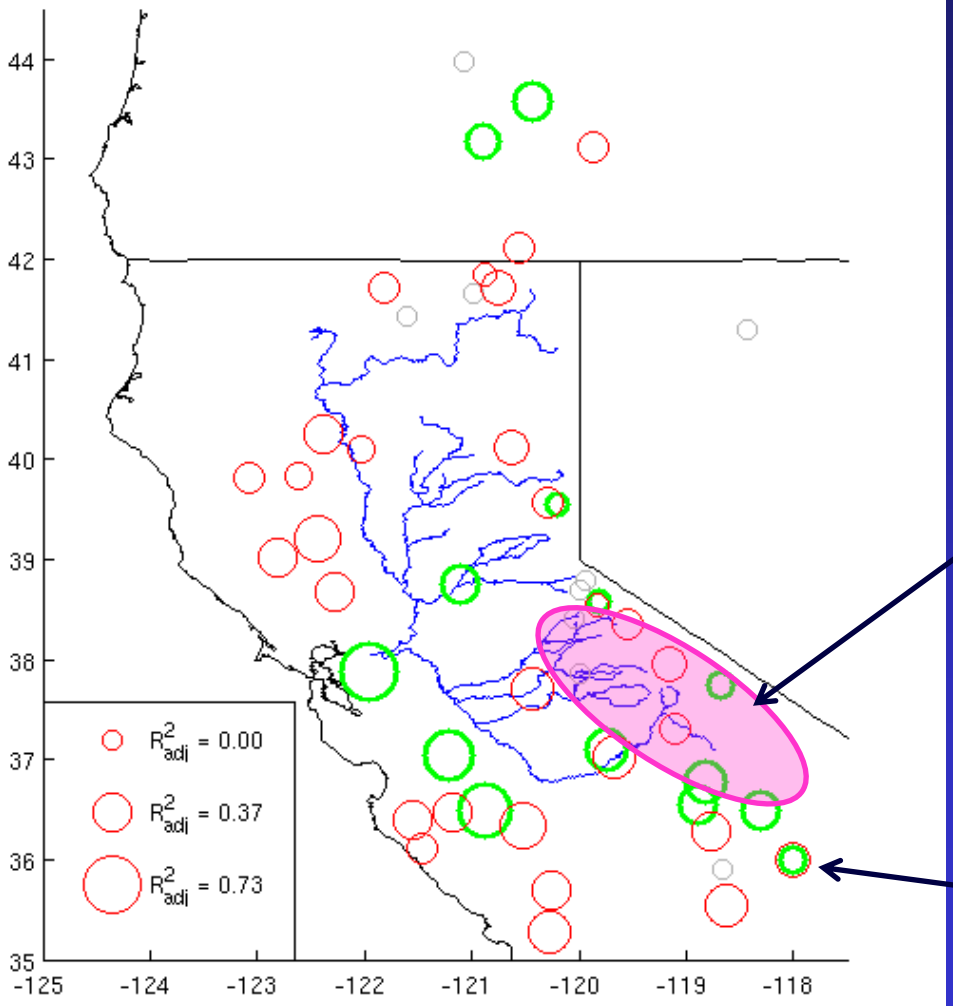
Physical Basis



Basic variable: ring width



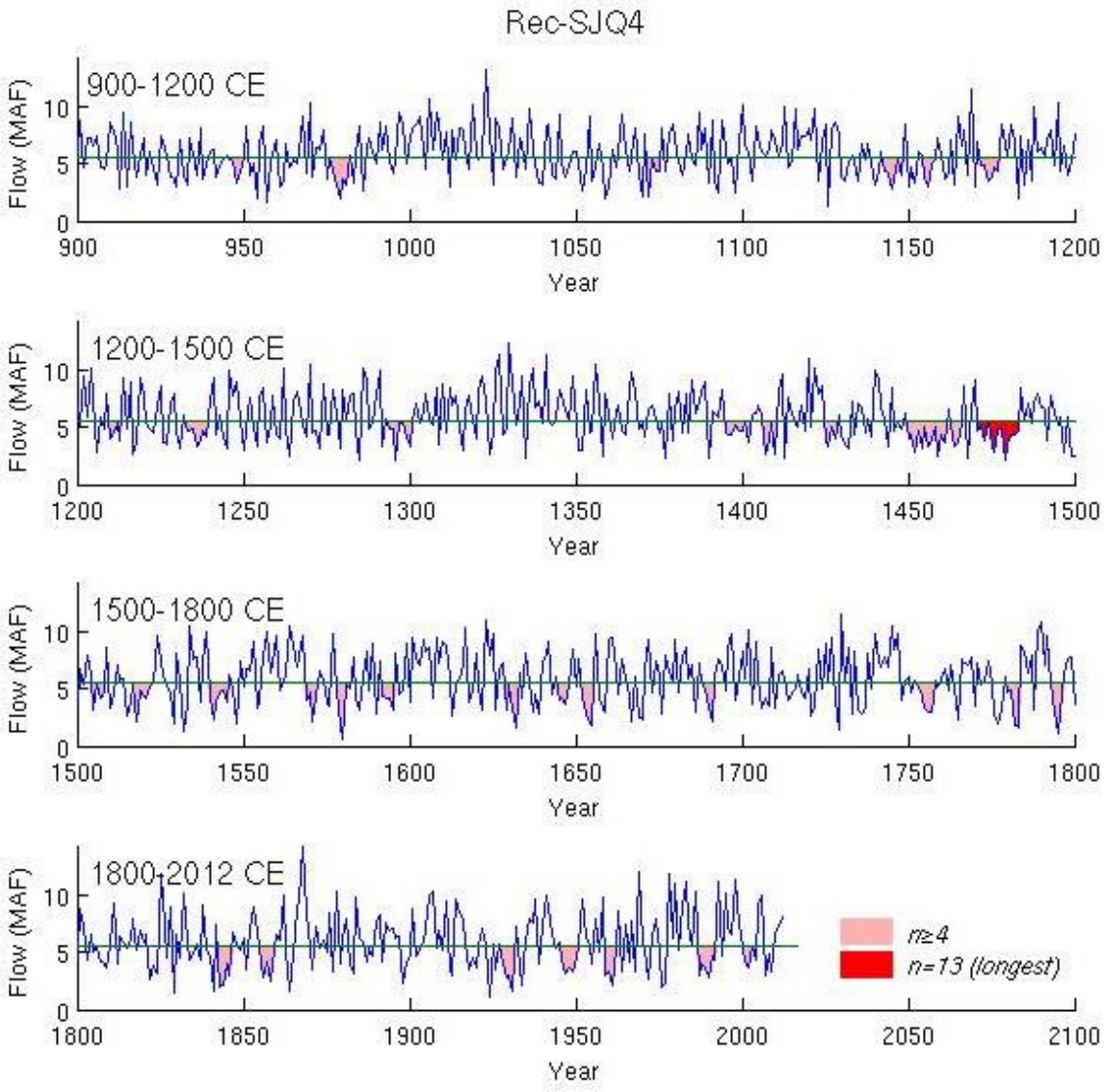
Some recent tree-ring findings



- Study for CADWR, conducted over 2011-2014
- Objective : annual flow reconstructions and interpretation for Sacramento R., San Joaquin R. and tributaries (10 reconstructions)
- A few highlights for the "San Joaquin River Runoff" reconstruction

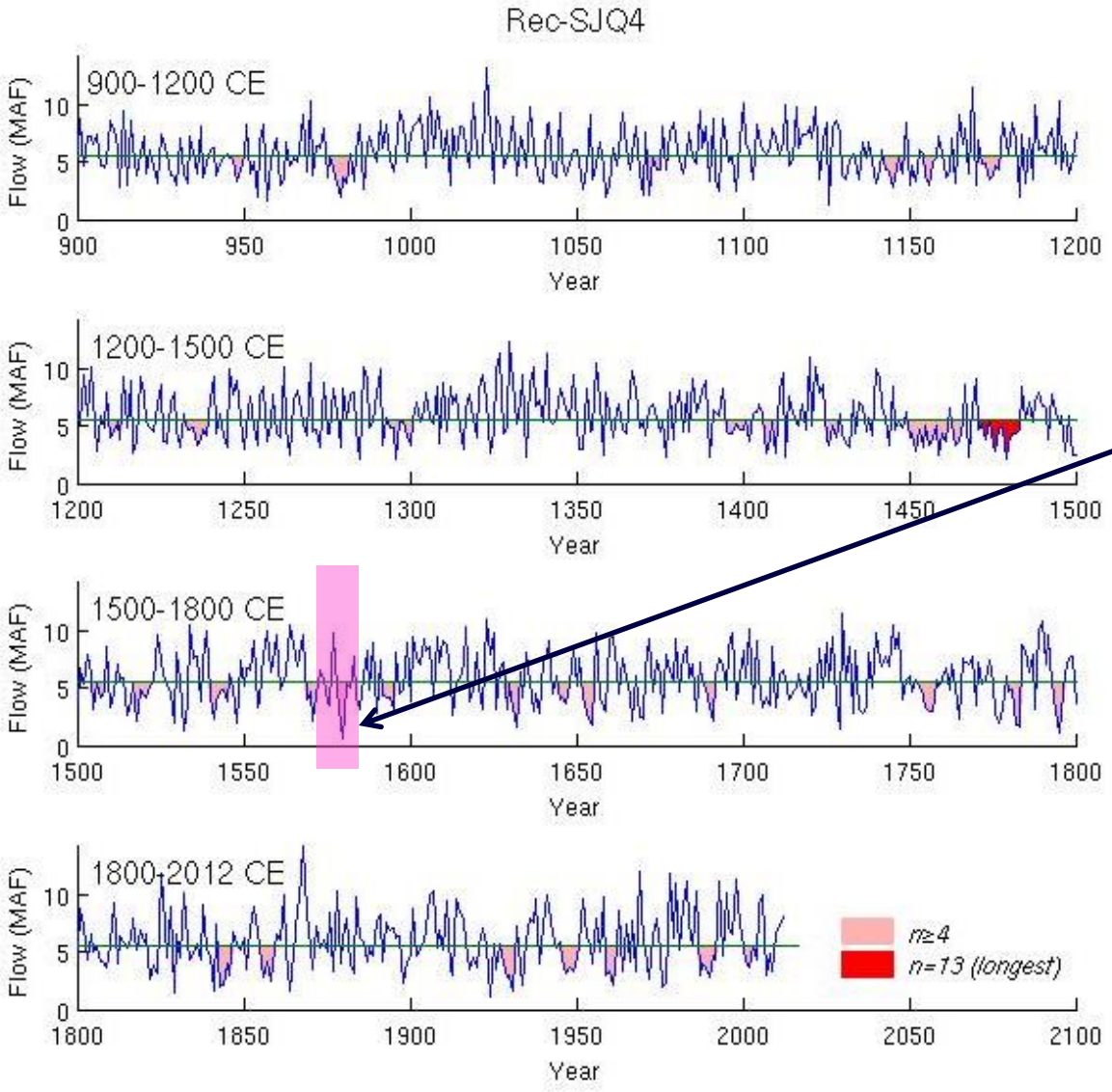
Tree-ring sites (green active for this particular reconstruction)

Annual Runoff, San Joaquin River



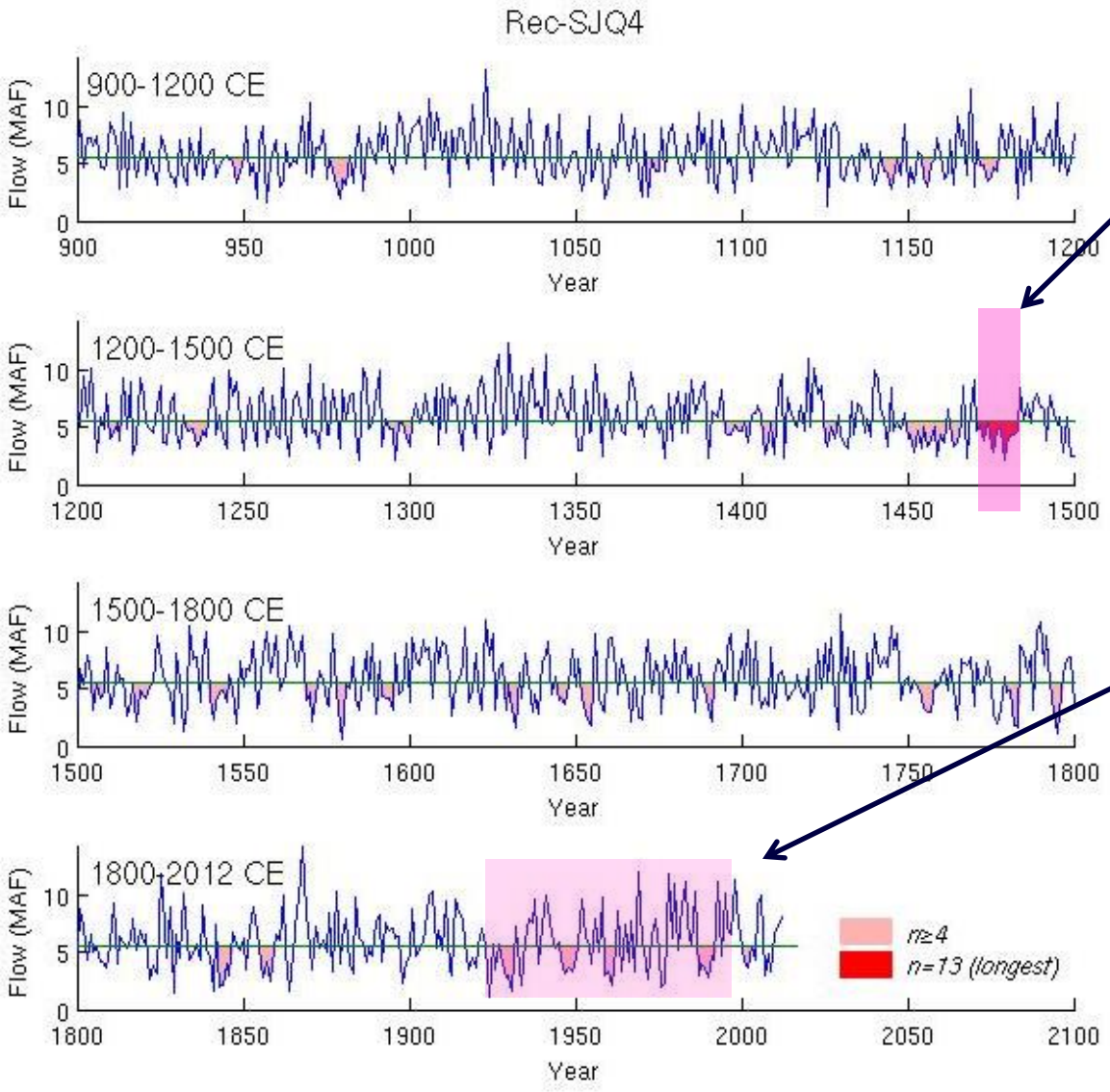
- San Joaquin River annual runoff
- Reconstructed 900-2012 CE
- Line at median, 5.6 maf
- Droughts as runs of consecutive years below median
- Long (n≥4 yr) and longest runs shaded

Annual Runoff, San Joaquin River



1580: driest single year, with estimated flow only about ½ the observed flow recorded in 1977

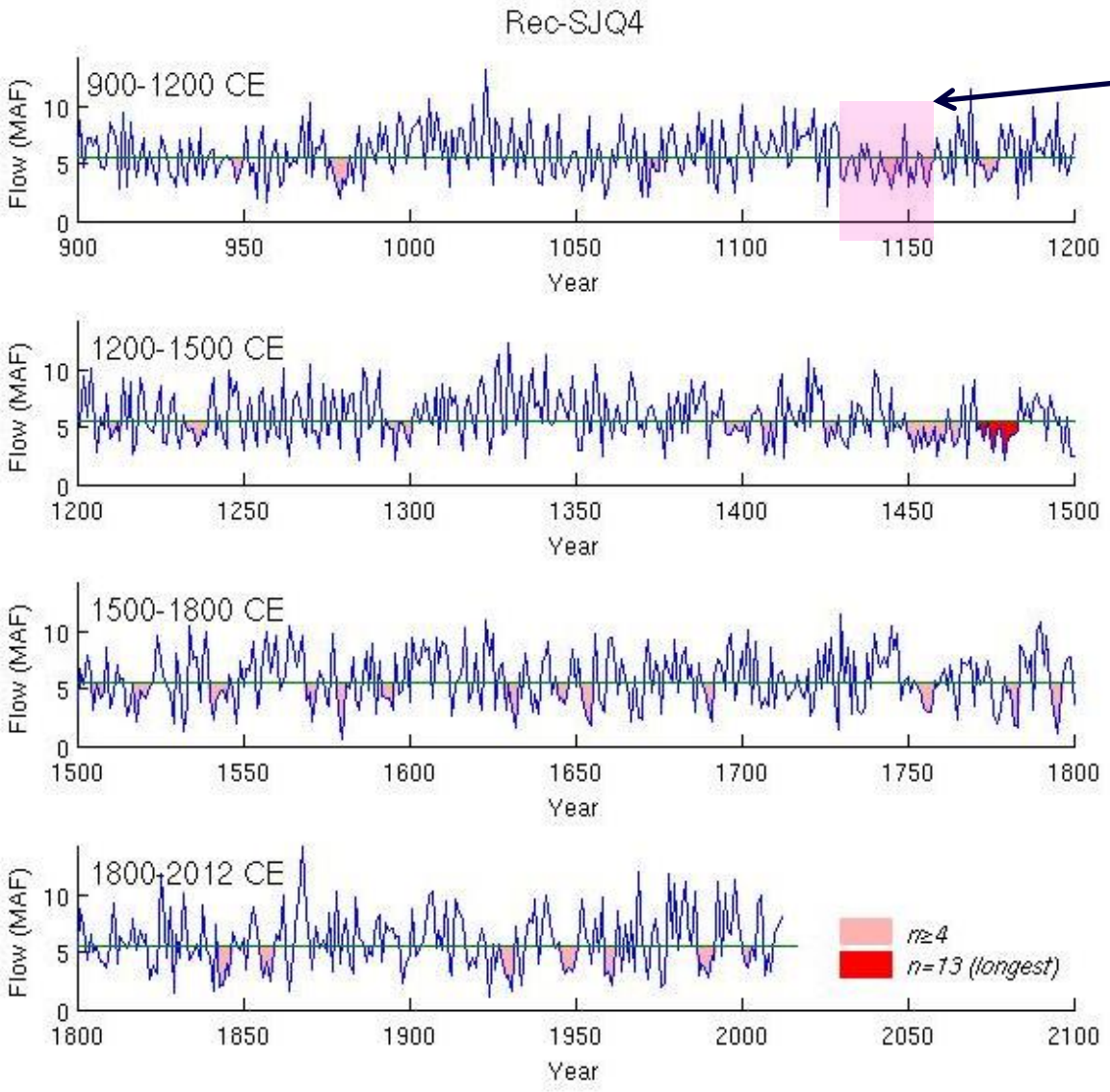
Annual Runoff, San Joaquin River



Persistent drought in mid-1400s, with 13-year run below median

Droughts longer than 4 years well represented in 20th century

Annual Runoff, San Joaquin River



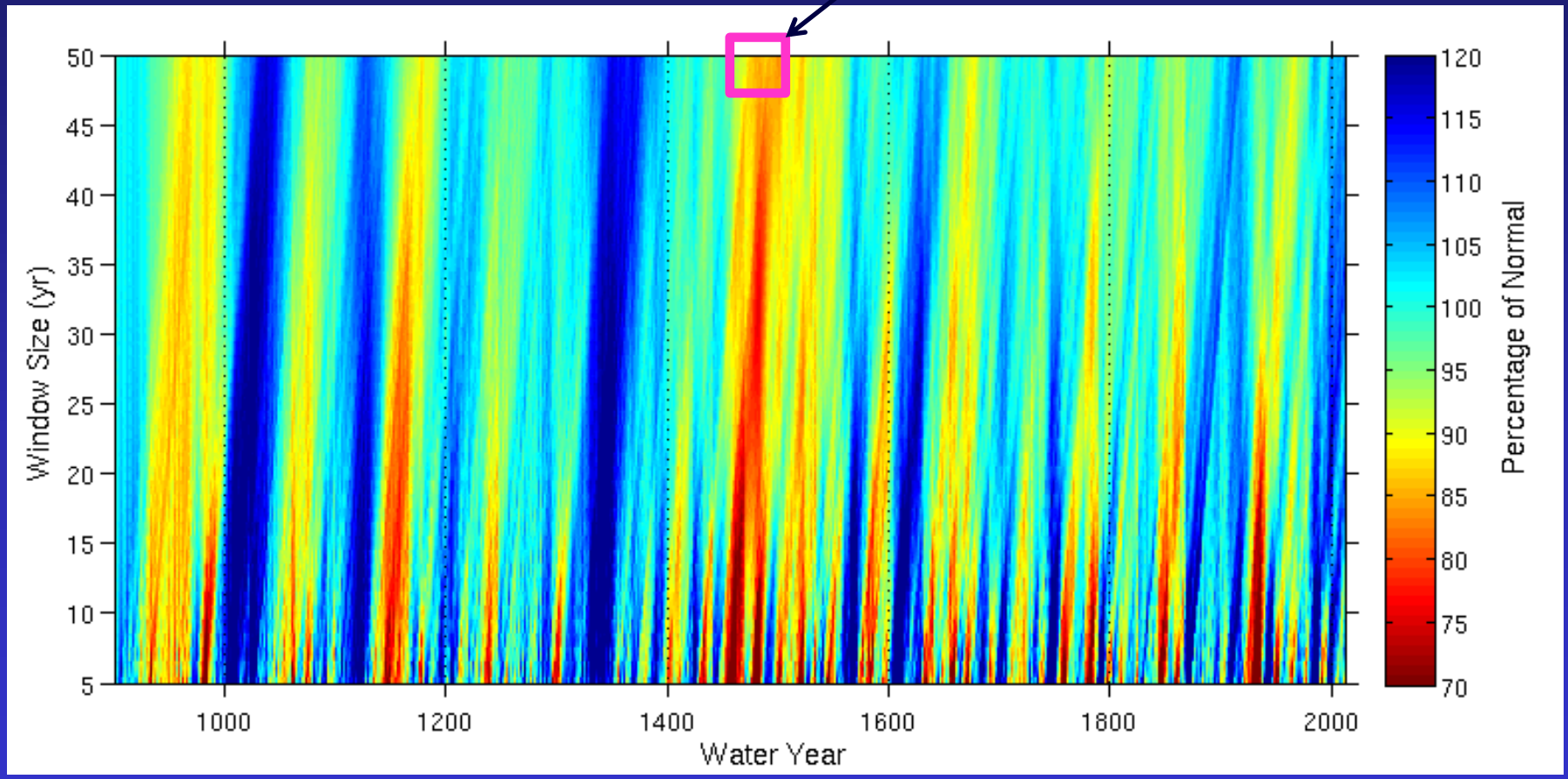
Mid-1100s: unusual ror rarity of wet years; similar feature in reconstructions of Colorado

Running-Means View of Drought

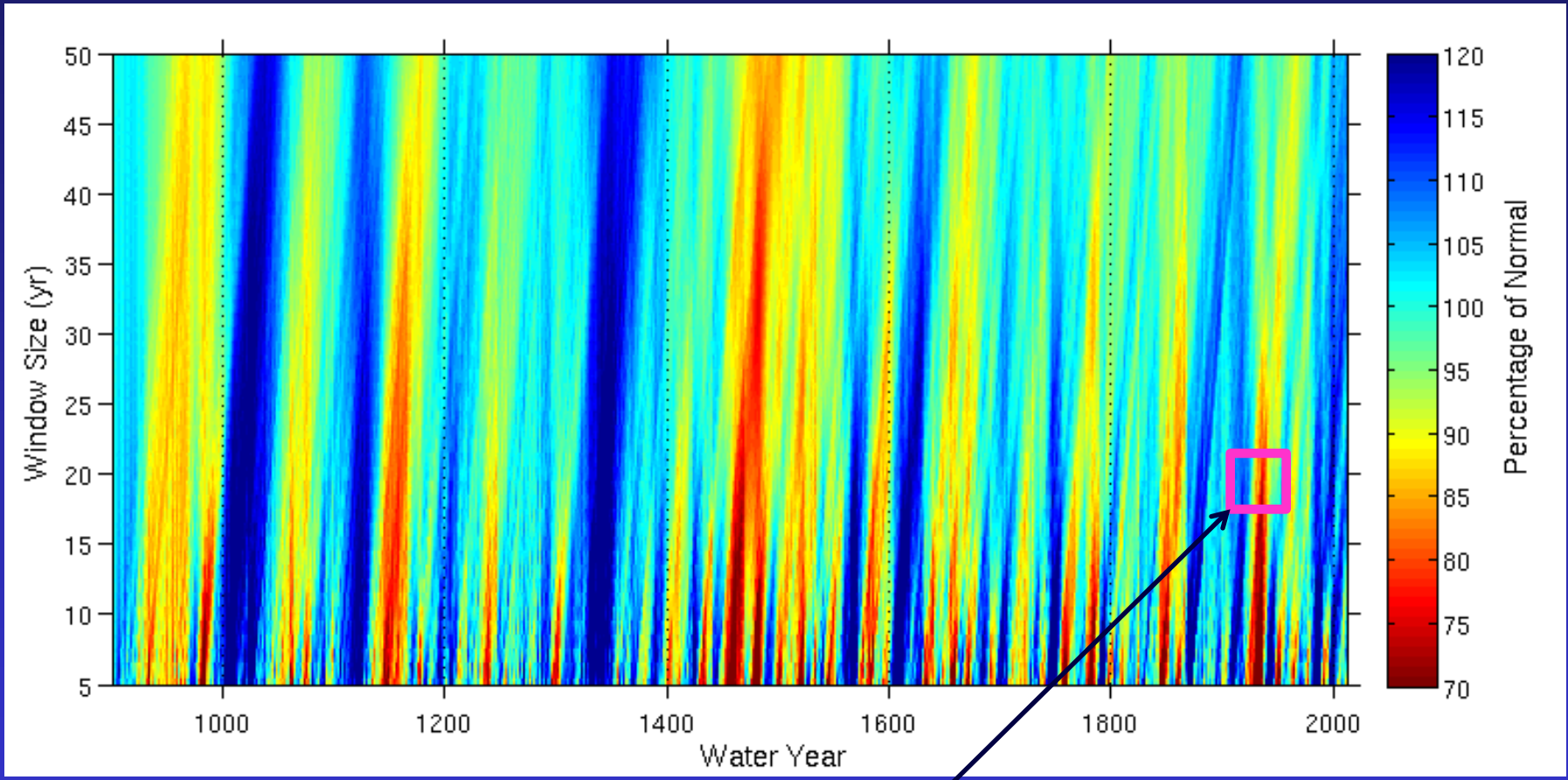
- San Joaquin River runoff annual series, 900-2012 CE
- Compute running means of length 5 to 50 years, for all possible ending years
- Express as percentage of observed 1901-2012 flow
- Color map percentages → Flame Plot

San Joaquin River Runoff

50-year means ending ~1500 are less than 85% of normal flow



San Joaquin River Runoff



20-yr mean ending in 1935 less than 80% of normal flow; unmatched since 1400s