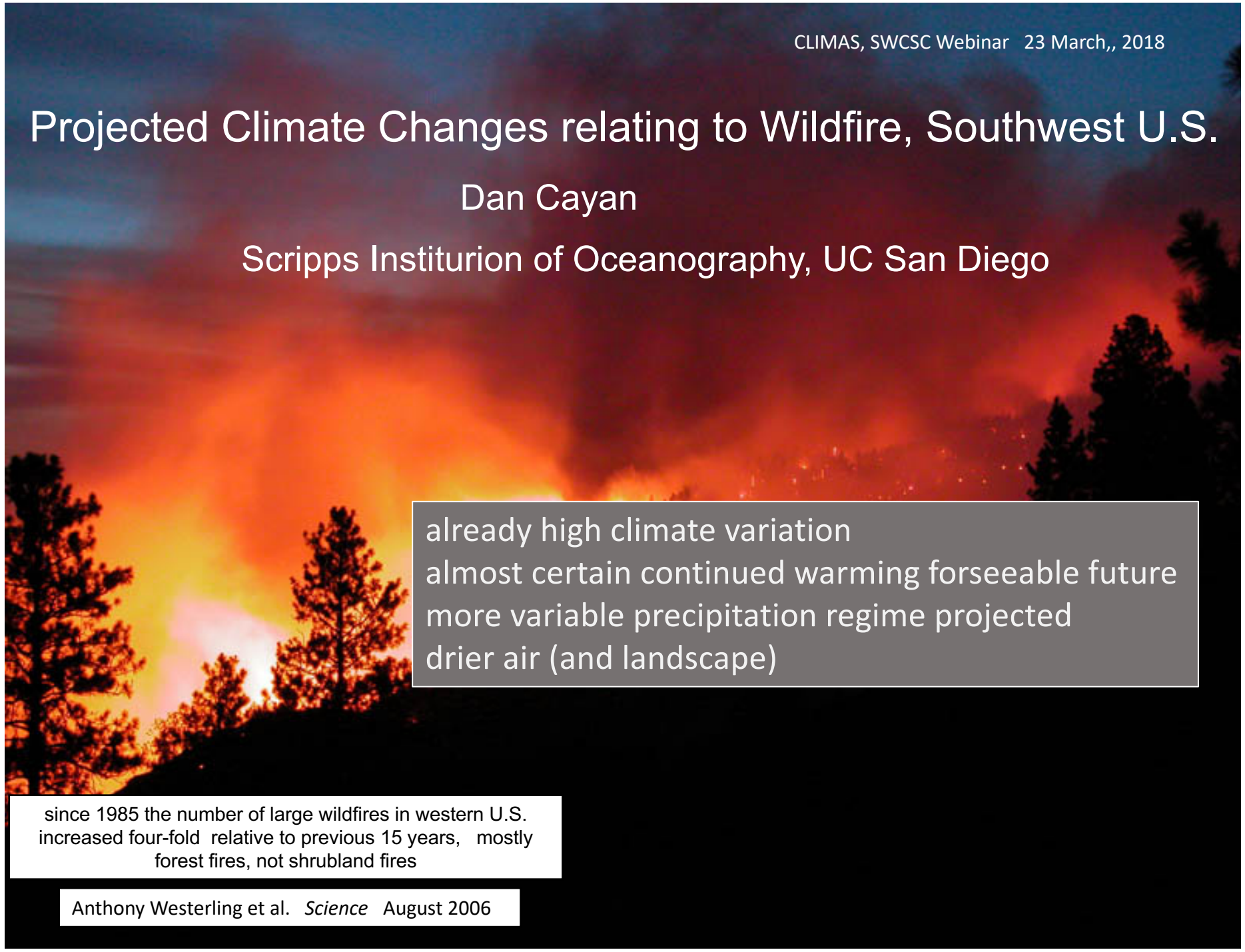
Projected Climate Changes relating to Wildfire, Southwest U.S.

Dan Cayan

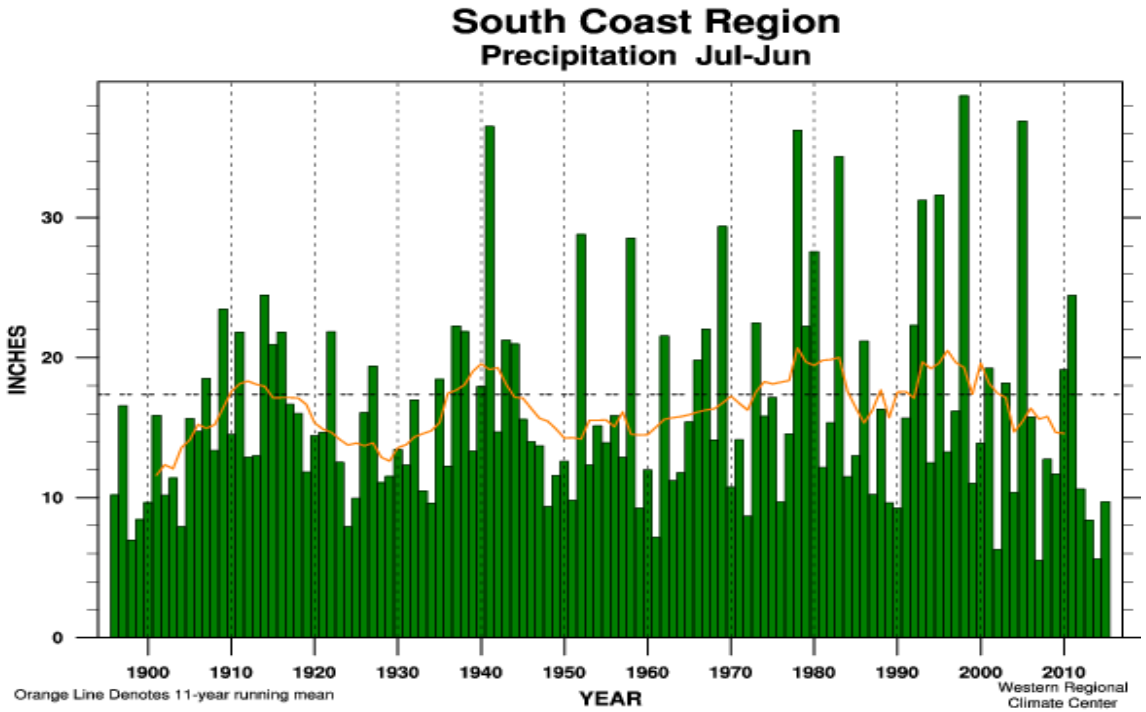
Scripps Instiurion of Oceanography, UC San Diego

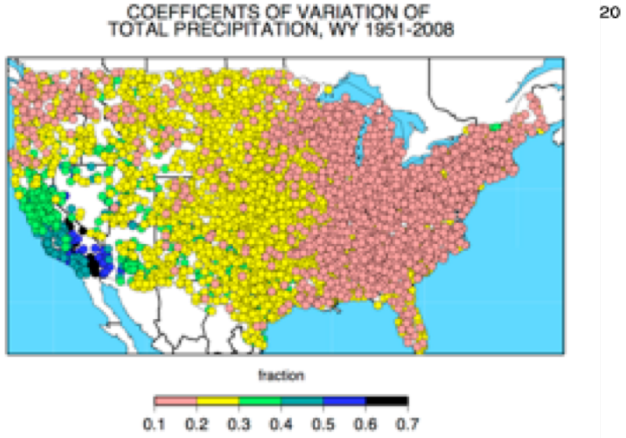


already high climate variation
almost certain continued warming forseeable future
more variable precipitation regime projected
drier air (and landscape)

since 1985 the number of large wildfires in western U.S. increased four-fold relative to previous 15 years, mostly forest fires, not shrubland fires

Anthony Westerling et al. *Science* August 2006





Very High Variability of annual precipitation in the Southwest results in very dry years and dry decades

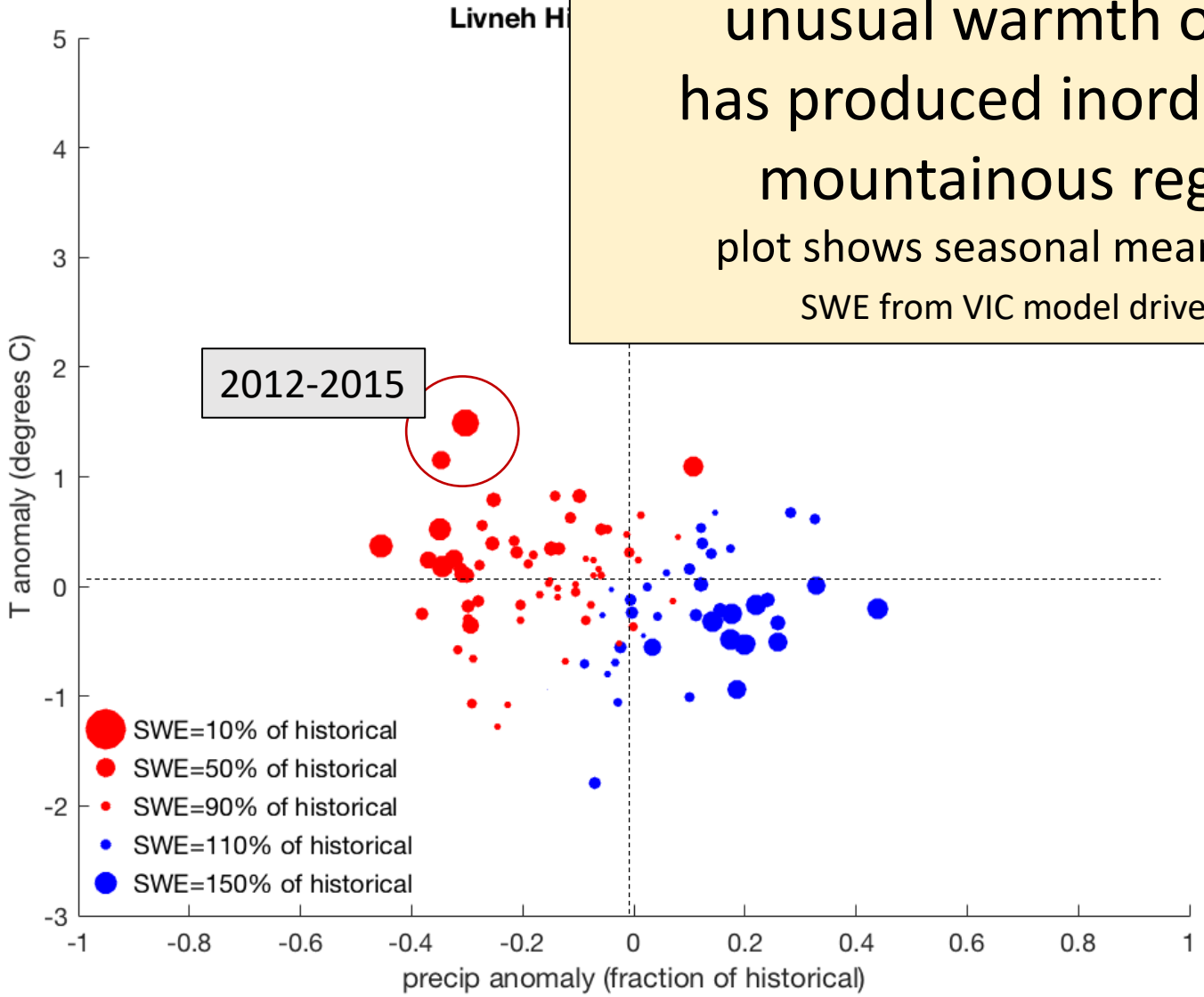
Southern California has highest variability in the U.S. (compared to its annual average)

during 2007-2016--- only three wet years

unusual warmth of recent dry years
has produced inordinately low snowpack
mountainous region of California

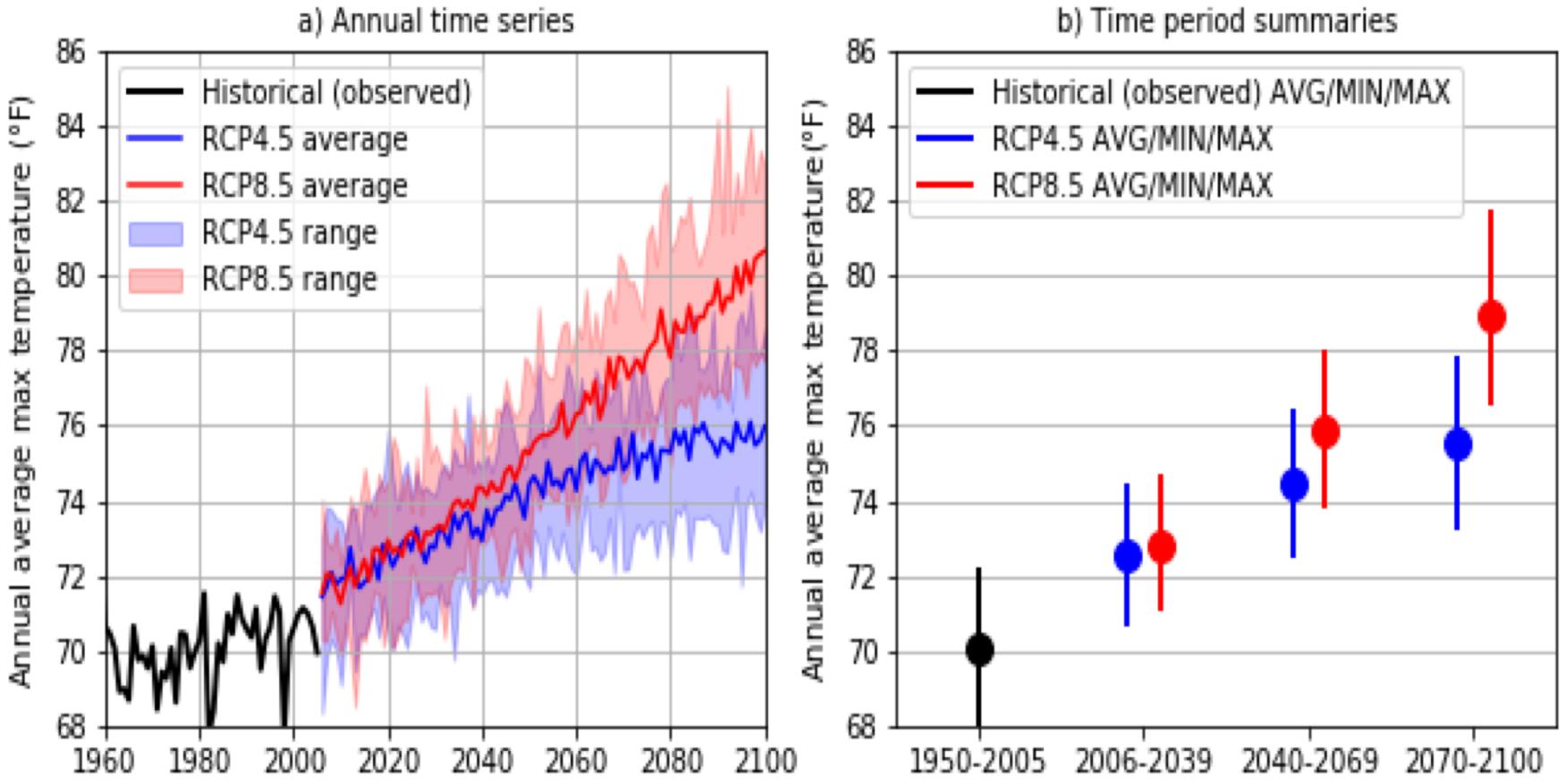
plot shows seasonal mean T, P and SWE 1915-2015

SWE from VIC model driven by Livneh observed T and P



Southwest U.S. is facing a substantially warmer climate in coming decades

projected California annual temperature from 10 CMIP5 GCMs under RCP 4.5 and RCP 8.5



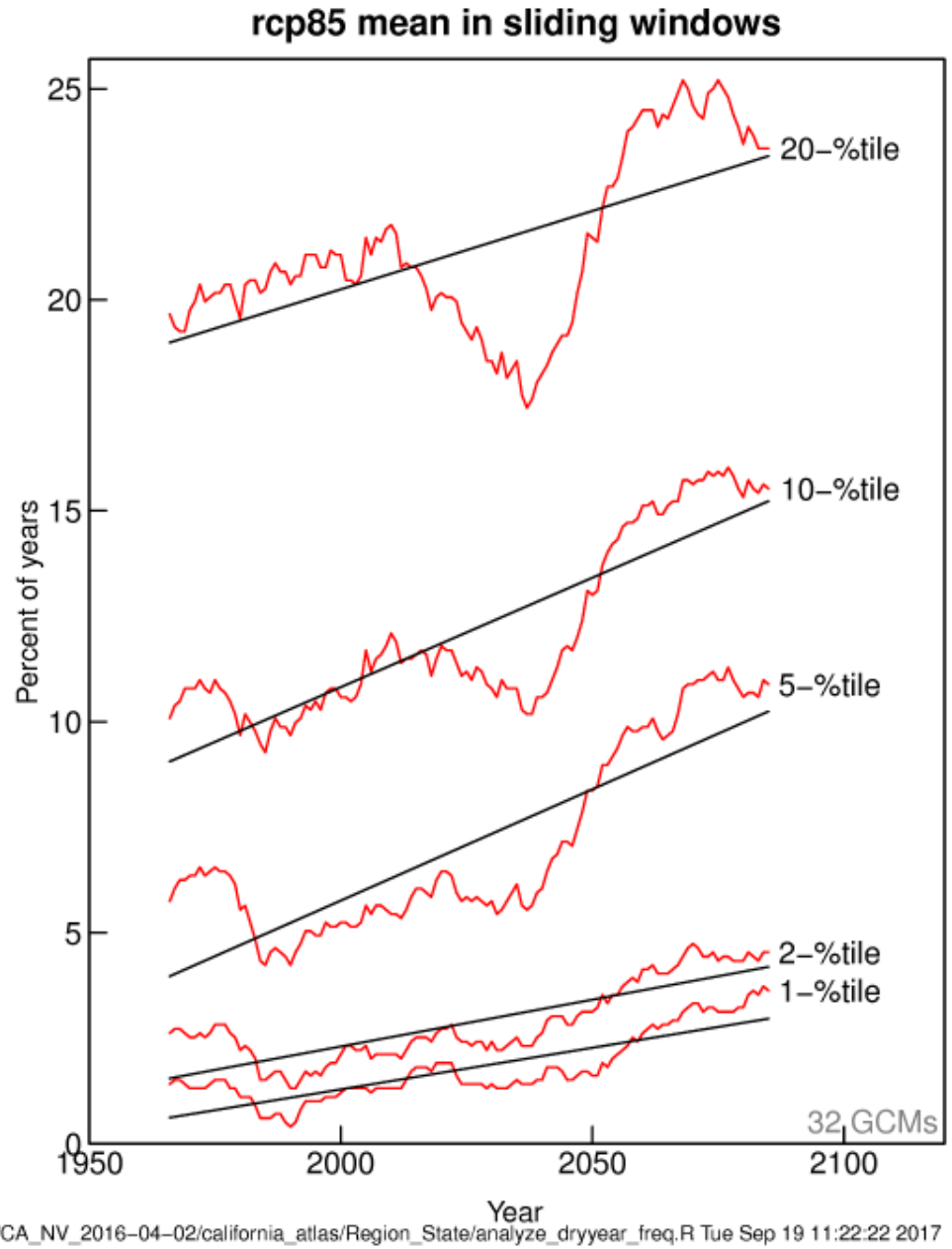
Frequency of Dry Years, California

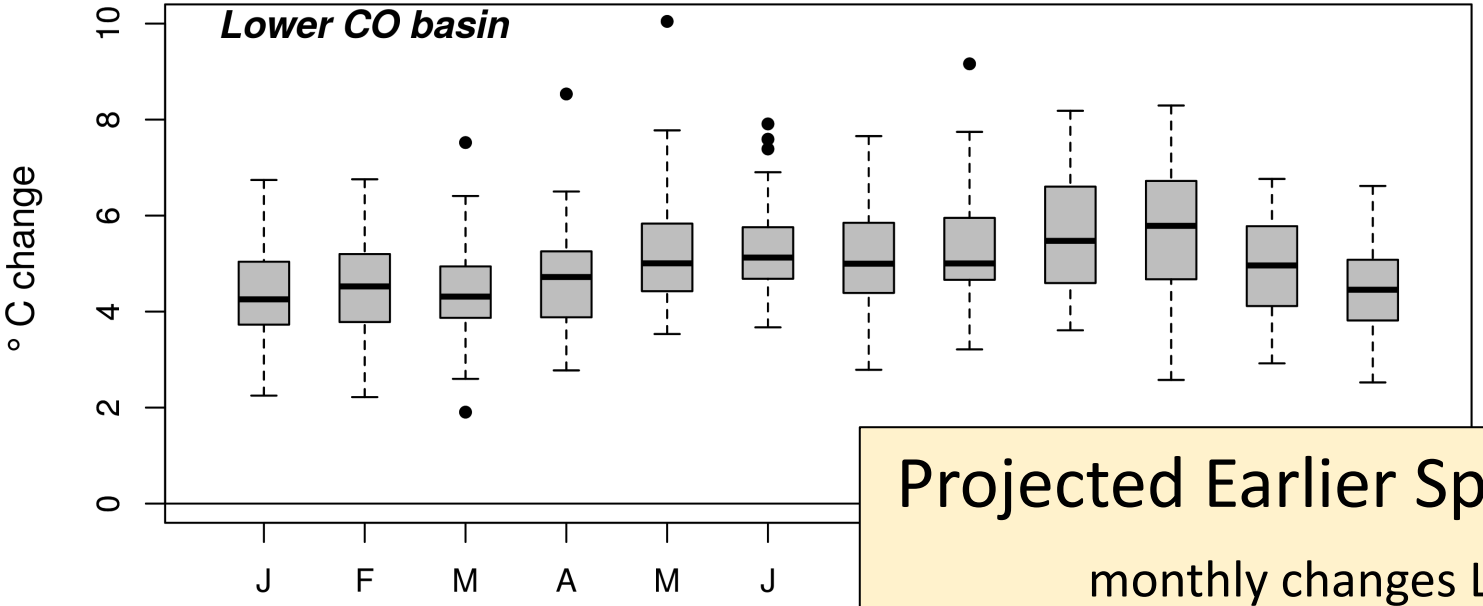
With climate change, models indicate increasing occurrence of dry years

32 RCP 8.5 GCMs statewide avg precipitation

increased dry years is offset by occasional very wet years

from Fourth California Climate Change Assessment

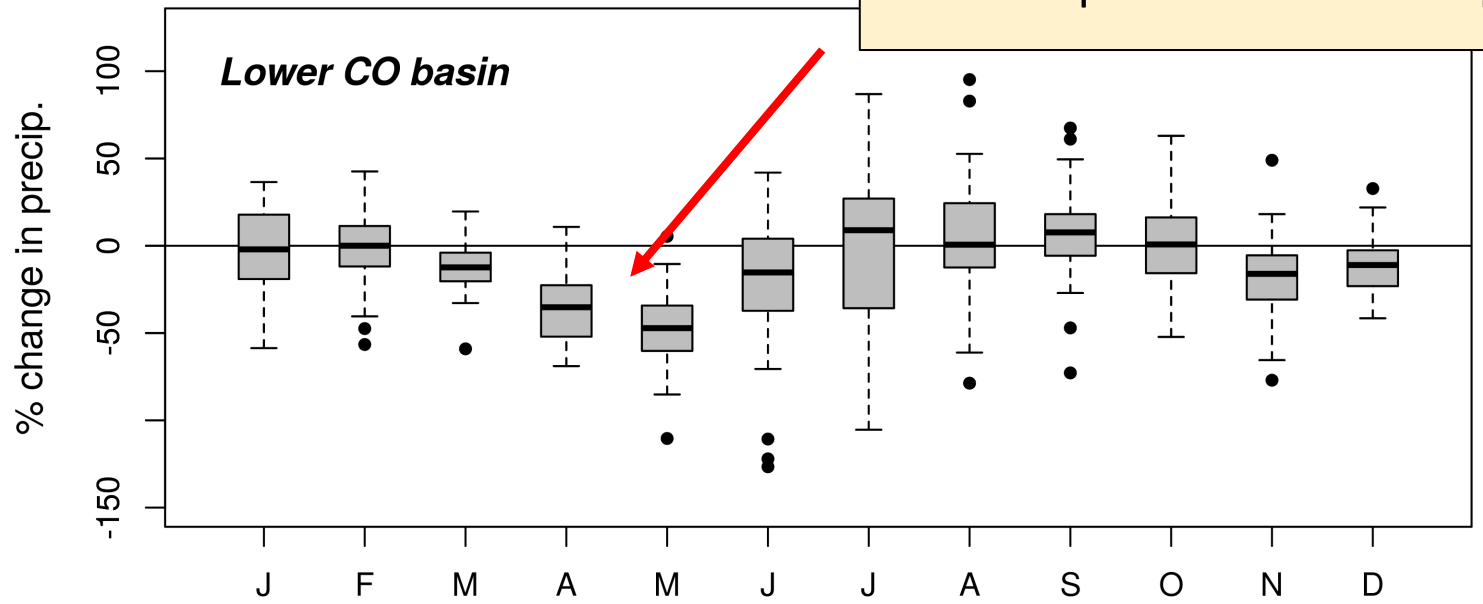


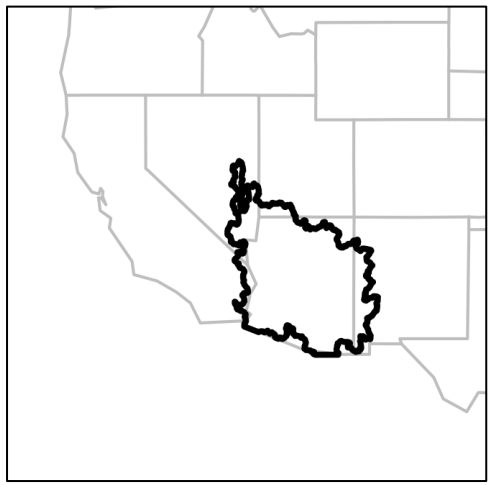


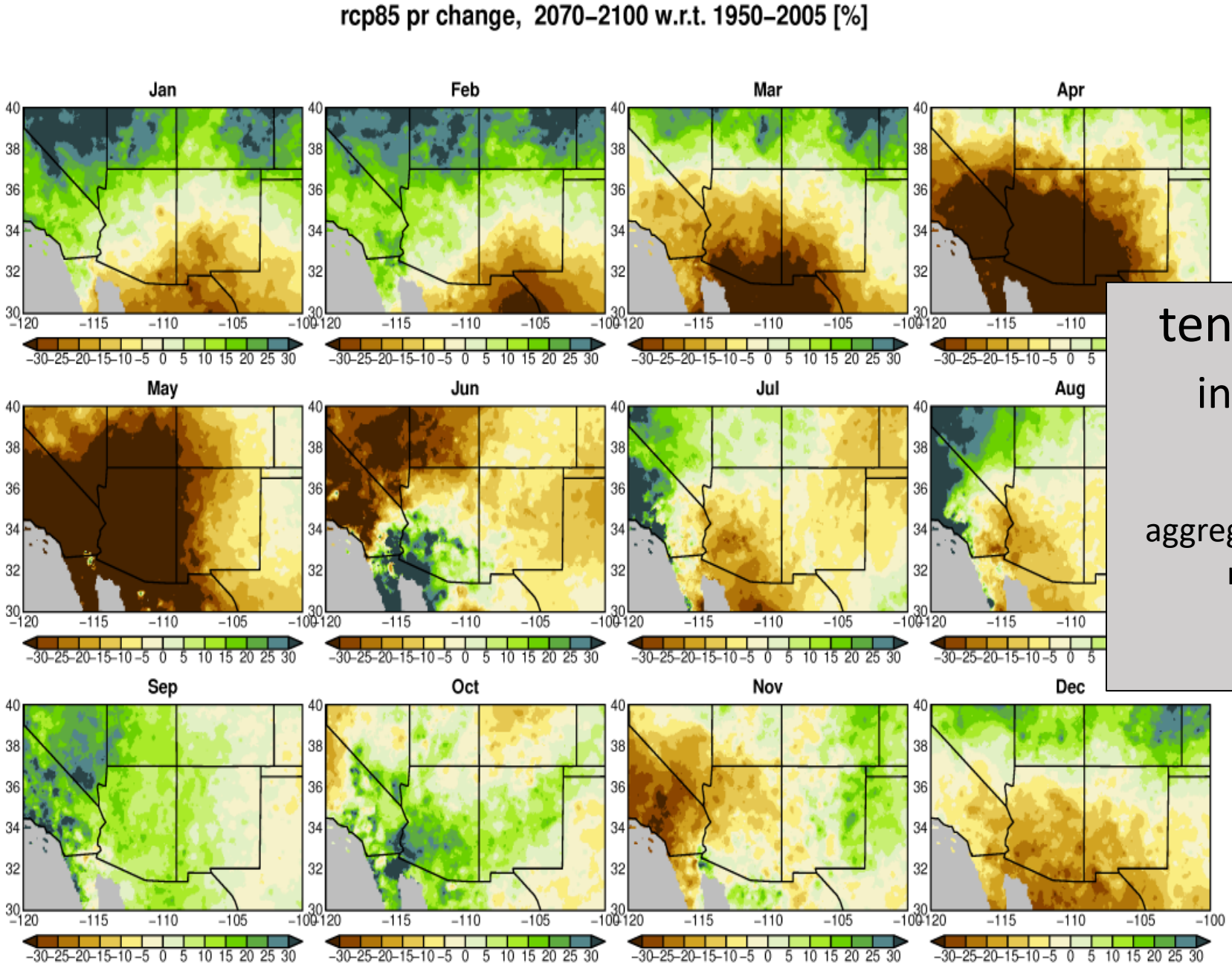
Projected Earlier Spring Drying in the Southwest

monthly changes Lower Colorado Basin

Temperature and Precipitation 2070-2100 32 RCP 8.5 GCMs







tendency toward drier springs

in Southwest over 21st Century

aggregate of 32 Global Climate Models RCP8.5
monthly precipitation difference
2070-2100 – 1950-2005

Relative humidity min (day) change by 2070–2100 w.r.t. 1950–2005, RCP 8.5