

(48-220415-B) Western USA Ecosystem Response to Prolonged Drought and Susceptibility to Fire

I. Baker¹, A. Kaushik^{2,3}, L. Bruhwiler³, B. Gillespie⁴, and K. Haynes¹

¹Colorado State University, Fort Collins, CO 80523; 970-491-4948, E-mail: ian.baker@colostate.edu

²Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO 80309

³NOAA Global Monitoring Laboratory (GML), Boulder, CO 80305

⁴San Diego State University, Global Change Research Group, San Diego, CA 92182

The western USA has been experiencing prolonged drought for the last 20 years. This, combined with warming temperatures due to climate change, has imposed ecosystem stress that has resulted in unprecedented forest fires. In this poster, we quantify the ecosystem response to drought and warming over the last 40 years, not only in terms of meteorological forcing, but also with regard to ecosystem function and status.

We find that internal variability is large, yet superimposed on a downward trend in precipitation in the last 40 years, and upward trends in Growing Degree Days (GDD), potential ET, and precipitation deficit (defined as potential ET – precipitation). We also find increases in specific stressors on canopy function related to both temperature and relative humidity or Vapor Pressure Deficit. These patterns are consistent in sign across pine forests in the western USA. We find that absolute stress increase is largest in the southwest USA, with temperature being the dominant imposition of stress.

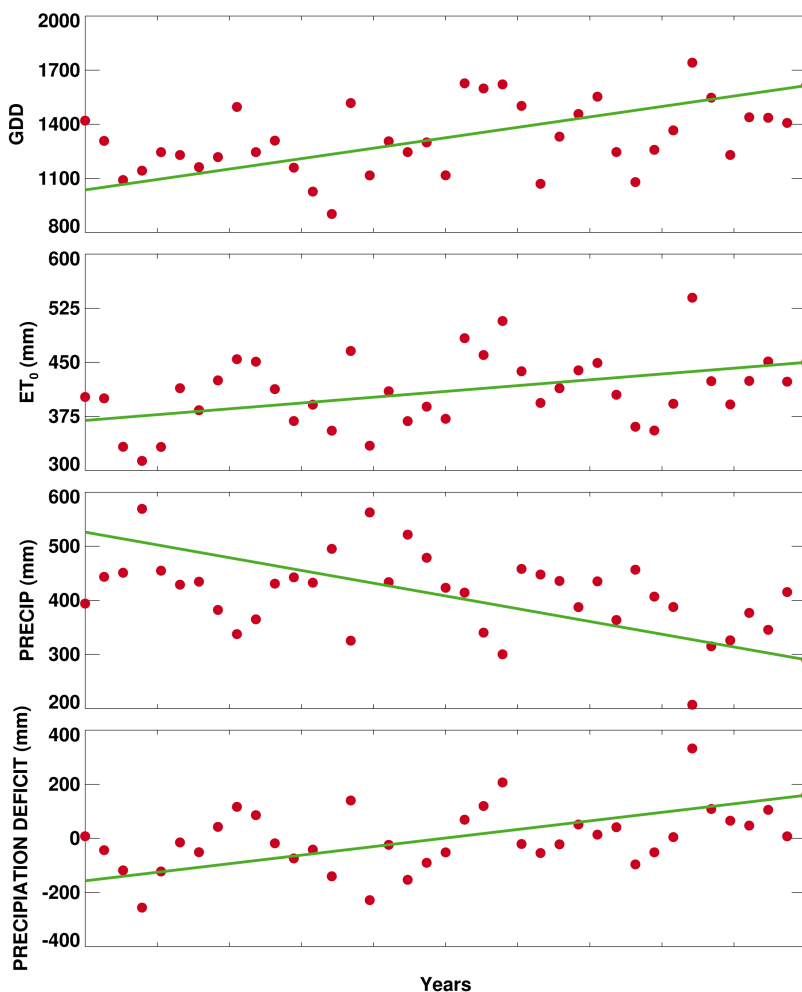


Figure 1. Time series of Growing Degree Days, potential EvapoTranspiration, Precipitation, and precipitation deficit for the period 1980-2020. The gridcell shown contains the region in Colorado that burned in the 2020 Cameron Peak fire.