

Assessing Cumulative Effects of Climate Change Manipulations on Phosphorus Limitation in a Californian Grassland

*Adina Paytan¹

1. University of California Santa Cruz

Grasslands throughout the world are responding in diverse ways to changing climate and environmental conditions. In this study we analyze indicators of phosphorus limitation including phosphorus concentrations, phosphorus to nitrogen, and carbon ratios, oxygen isotope ratios of phosphate in vegetation, and phosphatase enzyme activity in soil to shed light on potential effects of climate change on phosphorus availability to grassland vegetation. The study was conducted at the Jasper Ridge Global Change Experiment (JRGCE), California where manipulations mimicking increases in temperature, water, nitrogen and carbon-dioxide have been maintained for over 15 years. We compare our results to an earlier study conducted 3 years after the start of the experiment, in order to assess any change in the response of phosphorus over time. Our results suggest that a decade later the measured indicators show similar or only slightly stronger responses. Specifically, addition of nitrogen, the principle parameter controlling biomass growth, increased phosphorus demand but thresholds that suggest P limitation were not reached. A study documenting changes in net primary productivity (NPP) over time at the JRGCE also could not identify a progressive effect of the manipulations on NPP. Combined these results indicate that the vegetation in these grassland systems is not very sensitive to the range of climate parameters tested.

Keywords: Phosphorus, Climate Change, Grassland