

Dryland ecosystems represent 41% of the global land surface and provide critical ecosystem services to 38% of the human population (Reynolds et al. 2007). Anthropogenic development and climate fluctuations threaten the ecological stability of dryland ecosystems; drylands already operate on the margins of available precipitation (Adeel et al. 2005). These systems are affected by the changing climate, land use, and invasive species. The development of methods to efficiently quantify vegetation in dryland ecosystems allows us to monitoring ecosystem productivity and resilience.

The goal of this study is to compare optical sensors on unmanned aerial system (UAS) to derive metrics for vegetation cover and above ground biomass in sagebrush ecosystems. Cover and biomass can be used to measure and track the productivity of plants. We surveyed three types of sagebrush communities: Wyoming big sage (*Artemisia tridentata wyomingensis*), dwarf sage (*Artemisia arbuscula*), and mountain big sage (*Artemisia tridentata vaseyana*). These three communities represent a gradient of semi-arid vegetation ranging from low to high precipitation, respectively. In summer 2019, the sites were surveyed with a four types of optical sensors of increasing complexity and cost. By comparing the data collected by these sensors, we aim to provide recommendations to ranchers, land managers, and researchers about the extent and quality of data that each sensor can provide. Our comparison of sensor allows groups to make a sensor selection based on their goals and budget.

Semi-arid rangelands are a large, dominant landscape in the North American West; due the extent and heterogeneity of these ecosystems, we need to be efficient in our monitoring methods. As such, an evaluation of fine scale optical imagery will contribute to improved documentation and management of drylands.