Abstract

Improving national shrub and grass fuel maps using remotely sensed data and biogeochemical modeling to support fire risk assessments

Jim Vogelmann , USGS Earth Resources and Observation Science (EROS) Center, Sioux Falls, SD, vogel@usgs.gov, 605 594 6062

Todd Hawbaker, USGS Geosciences and Environmental Change Science Center, Denver, CO

Zhengpeng Li, Teleobservation Research LLC, Laurel, MD

Hua Shi, Inuteq, USGS EROS, Sioux Falls, SD

Matt Reeves, US Forest Service, Missoula, MT

This paper is intended for the NASA Wildfires Special Session

Shrub and grassland ecosystems in the western United States are especially prone to fire events, yet available data for assessing fire risk in these areas are inadequate. During the early parts of this project, we assessed relationships between intra- and inter-annual variability in biomass, modeled using remotely sensed data, and fire behavior in the shrub and grasslands of the Owyhee Basin, which is located in southern Idaho, northern Nevada, and eastern Oregon. We demonstrated the following: (1) Intra- and inter-annual spectral variability in these ecosystems is high; (2) Spectral variability is highly correlated with climate variables, especially precipitation; (3) Fire activity is more likely in areas where the differential between spring and summer normalized difference vegetation index (NDVI) values is high; (4) Live and dead biomass can be modeled through the combination of MODIS NDVI and Net Primary Productivity (NPP) data, existing LANDFIRE land cover information, and field data, (5) Fire activity tends to be most prevalent where live and dead biomass is the highest, which relates to 1-hour fuel loads; (6) Programs such as STARFM and their derivatives can be effectively used to use combine the temporally rich attributes of MODIS data (which has relatively low spatial resolution for LANDFIRE applications) with spatially detailed Landsat data (which has relatively low temporal resolution for intra-annual fire applications); and (7) Employing the newly-derived fuel loads in fire behavior models greatly alters the values of standard fire behavior indices used by practitioners (e.g. flame length), as compared with default (i.e. existing LANDFIRE) fuel loads. We are now expanding our work to include a larger geographic region. We will initially focus on the Great Basin, which includes many of the same types of ecosystems as are within the Owyhee Basin. Ultimately, we will expand to include the entire western US. During this next phase of the study, we expect to collect field information that will be used to better establish the biophysical relationships between remotely-sensed observations and biomass, which is important for assessing fire behavior. We will also be expanding our collaboration with external partners, including the Multi-Resolution Land Characteristics (MRLC) consortium, the Bureau of Land Management (BLM), and especially LANDFIRE. Ultimately, these activities will be transitioned to LANDFIRE, which has demonstrated a high level of commitment to the effort.