Geophysical Research Abstracts
Vol. 18, EGU2016-10709-1, 2016
EGU General Assembly 2016

Automated mapping of burned areas in Landsat imagery; tracking spatial and temporal patterns of burned areas and greenhouse gas emissions in the Southern Rocky Mountains, USA.

Todd Hawbaker (1), Melanie Vanderhoof (1), Nancy French (2), Michael Billmire (2), Yen-Ju (Grace) Beal (1), Josh Takacs (1), Robbert Bosshart (1), and Megan Caldwell (1)

(1) U.S. Geological Survey, Geosciences and Environmental Change Science Center, Denver, United States (tjhawbaker@usgs.gov), (2) Michigan Tech Research Institute (MTRI), Michigan Technological University, Ann Arbor, MI, US

Accurate estimates of greenhouse gas emissions depend on precise mapping of burned area extent and timing. Consequently, fire disturbance has been identified by the Global Climate Observing System (GCOS) program as one of the 14 Terrestrial Essential Climate Variables (ECVs). Landsat's temporal resolution and sensor characteristics make it more suitable for mapping burned area than existing burned area products from coarse resolution sensors. We have developed an automated algorithm to identify burned areas in temporally rich stacks of Landsat surface reflectance data using boosted regression trees and spatial filters. For this analysis, we quantified trends in burned area and fire emissions using the USGS Burned Area ECV data and the Monitoring Trends in Burn Severity data, the latter of which is known to be incomplete. Both datasets were combined with the LANDFIRE Fuel Characteristic Classification System to assign pre-fire biomass loads, and the CONSUME model was used to estimate biomass consumption and greenhouse gas emissions. Both data sets show a dramatic increase in burned area between 1984-1999 and 2000-2015, but the Burned Area ECV included more small fires and fires in non-forest ecosystems. Emission estimates were similar between the two burned area datasets, but were generally greater for the Burned Area ECV. Our results suggest that national and regional scale emission estimates could be improved by incorporating the more complete Burned Area ECV dataset.