Geophysical Research Abstracts
Vol. 15, EGU2013-3601, 2013
EGU General Assembly 2013

Simulating post-wildfire forest trajectories under alternative climate and management scenarios

Alicia Azpeleta (1), Peter Fule (1), Kristen Shive (1), Carolyn Sieg (2), Andrew Sanchez-Meador (1), and Barbara Strom (1)

(1) Northern Arizona University, School of Forestry, Flagstaff, United States (pete.fule@nau.edu), (2) USDA Forest Service, Rocky Mountain Research Station, Flagstaff AZ

To assess post-fire vegetation recovery under the influence of climate change, we applied the Climate-Forest Vegetation Simulator (Climate-FVS), a new version of a widely used forest management model, to compare alternative climate and management scenarios in a severely burned multi-species forest of Arizona, U.S.A. The incorporation of seven combinations of General Circulation Models (GCM) and emissions scenarios altered long-term (100 years) projections of future forest condition compared to a No Climate Change (NCC) scenario, which forecast a gradual increase to high levels of forest density and carbon storage. In contrast, emissions scenarios that included continued high greenhouse gas releases led to near-complete deforestation by 2111. GCM-emissions scenario combinations that were less severe reduced forest structure and carbon storage relative to NCC. Fuel reduction treatments that had been applied prior to the severe wildfire did have persistent effects, especially under NCC, but were overwhelmed by increasingly severe climate change. We tested six management strategies aimed at sustaining future forests: prescribed burning at 5, 10, or 20-year intervals, thinning 40% or 60% of stand basal area, and no-treatment. Severe climate change led to deforestation under all management regimes, but important differences emerged under the moderate scenarios: treatments that included regular prescribed burning fostered low density, wildfire-resistant forests composed of the naturally dominant species, ponderosa pine. Non-fire treatments under moderate climate change were forecast to become dense and susceptible to severe wildfire, with a shift to dominance by sprouting species. Current U.S.A. management requires modeling of future scenarios but does not mandate consideration of climate change effects. However, this study showed substantial differences in model outputs depending on climate and management actions. Managers should incorporate climate change into the process of analyzing the environmental effects of alternative actions.