

## AGU - Fall Meeting 2013 - session GC025 : Future landuse change and climate

**Title:** Humans and fire shape the land: climate change only exacerbates the trends

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**Abstract:**

We have run the dynamic global vegetation model (DGVM) over the conterminous US at 30arc sec to simulate the impacts of nine climate futures (3GCMs: CSIRO, MIROC and CGCM3; 3 emission scenarios: A2, A1b, B1). We first simulated potential vegetation dynamics from coast to coast assuming no human impacts. Even a moderate effect of increased atmospheric CO<sub>2</sub> on water use efficiency and growth enhances woody encroachment and forest growth. However dry conditions also cause more frequent wildfires that maintain some of the prairie-forest ecotones. Simulating fire suppression starting in 1951 reduces the number and impacts of wildfires by only allowing catastrophic fires to escape. This greatly increases the expansion of forests and woodlands across the western US and ecotones disappear. However when fires do occur their impacts (extent, biomass consumed) are very large. We also ran the DGVM with a simple protocol to evaluate the relative influence of forest and crop harvest, as well as urbanization. As input we use a simplified version of the USGS landuse projections from the LandCarbon national assessment. The future climate scenario that resulted in the most future forest biomass was different with (B1) and without (A1B) landuse. Furthermore, unlike in the potential vegetation case, forest biomass under landuse only increased ~30 years after imposing future climate scenarios, remaining significantly below the non-landuse projections. Clearly more work is needed to more realistically represent regional human activities than in this first effort but nonetheless the striking differences between vegetation distribution maps and the magnitude of carbon sources and sinks confirm other reports on the importance of land use on ecosystem resilience to climate change.