

Title: Wildfire Impacts on Watershed Transport of Carbon to Coasts

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Summary: The proposer seeks to better understand coastal ecosystem responses to changing carbon flux from watersheds due to wildfires, addressing a critical knowledge gap on how carbon moves from land to the ocean. While much attention is on the feedback between wildfire and atmospheric carbon cycles, little is known about the cumulative effects of wildfire disturbances on the land-to-ocean transport of carbon. Wildfires impact watershed carbon and sediment transport to the coast, changing light availability for primary producers and

vital foundation species, like kelp forests.

This project aims to quantify how wildfires alter particulate organic carbon (POC) and sediment fluxes to the California coast and also how these fluxes impact coastal kelp forest distributions and productivity along the California Current system for the 2000-2020 study period. The proposal describes adaptation of the Soil and Water Assessment Tool (SWAT) modeling framework for four California coastal watersheds to be identified during the project along a latitudinal gradient spanning a range of climatic conditions and terrestrial biomes for the present and in hindcast mode and will employ satellite remote sensing data, including MODIS, Landsat, and Sentinel 2, and in situ data from the CalCOFI ocean time series for model validation. The research includes running the SWAT model with climate change forcing scenarios to predict future changes in carbon and sediment fluxes. The impact of wildfire disturbance on kelp forests will be quantified through changes in light availability and linked directly to changes in kelp forest spatial distribution and productivity using existing satellite remote sensing maps provided by co-Is Bell and Kavanaugh. Underrepresented individuals in STEM fields at undergraduate and postdoctoral levels at UC Merced, federally designated HSI and AANAPISI, will participate in the proposed work. The proposal describes how undergraduate students will be engaged in the modeling and remote sensing research activities, and there is a mentoring plan based on literature related to shared values and that takes into account traditional power structures. The project will also sponsor UC Merced undergraduate summer internship opportunities at JPL with co-I Lee for mentoring, training, and conducting research using satellite data to detect and characterize watershed discharge plumes along the California coast.