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Coast-to-Mountain Environmental Transect in Northern California (COMET) as part of the National Environmental Observing Network (NEON)

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The investigation of the impacts of climate variability on ecosystem processes is a major goal of the National Environmental Observing Network (NEON). The Coast-to-Mountain Transect in Northern California (COMET) spans across a wide geographical transect that includes major ecosystems in California, from the Pacific Ocean (Bodega Marine Lab, BML) to the Lake Tahoe Environmental Research Center (TERC) at the summit of the Sierra Nevada range. COMET is a pioneer project that aims to develop and test the cyberinfrastructure (CI) required to integrate multiple information necessary for an adequate investigation of the complex ecology of the ecosystems across this wide geographical transect. The new research will support advanced data acquisition, data storage, data management, data integration, data mining, data visualization and other computing and information processing services over the Internet. In scientific usage, cyberinfrastructure is a technological solution to the problem of efficiently connecting data, computers, and people with the goal of enabling derivation of novel scientific theories and knowledge. The major goal of the COMET project is to improve understanding of how multiple environmental factors, particularly combinations of different climate conditions, will impact ecosystems.
Here we present a general overview of the COMET project, its relevance, and some preliminary results of the the landscape classification methods we used. We also present the first steps of the effort of integrating different data sets: CO2, CH4 and O3 fluxes from several eddy covariance towers and hyperspectral images from NASA's airborne Airborne Visible Infrared Imaging Spectrometer (AVIRIS) flights across this transect. The hyperspectral images, with their wide spectral range and fine spectral resolution, allow assessing the heterogeneity of the vegetation in the footprint of the eddy covariance towers and across the whole transect. This allows estimates of how representative the point measurements of the towers are for the entire region. In addition to this, several vegetation measures related to canopy processes (including NDVI, WBI, PRI) calculated from hyperspectral images, could assist the investigation of the processes controlling the trace gases emission from different ecosystems. As a result we will better understand the large variability in trace gas fluxes observed in the larger region of California and better predict future emissions.