Multi-scale carbon cycle observations and ecosystem process modeling at Niwot Ridge, Colorado

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This project is a multi-scale investigation of carbon cycling at Niwot Ridge, Colorado, and application of the data to improve components of the Community Land Model (CLM). The study involves a paired-site design, including measurements at an alpine tundra location and a nearby subalpine forest (the Niwot Ridge AmeriFlux tower). New observations will extend ongoing continuous long-term CO_2 concentration and CO_2 isotope records to 11years. We will add new carbon isotope process capability to CLM, and use these datasets to constrain and test the model in site-specific mode. These data will guide improvements to the representation of vegetation and belowground carbon cycling in CLM and provide important tests of modeled terrestrial ecosystem responses to disturbance and climate change.

Results during year 1 include a) successful hiring and training of a postdoctoral physical chemist with expertise in laser spectroscopy (began in Sept. 2013), b) successful hiring of a postdoctoral scientist with expertise in land surface carbon cycle modeling (start date in summer 2014), c) a publication in press in about the isotopic difference between gross primary productivity and respiration fluxes (the 13C land disequilibrium), d) initiation of tests of infrared spectroscopic CO_2 isotope instrumentation from all the major commercial manufacturers, e) upgrade of analytical equipment and procedures associated with CO_2 and isotope calibration, and f) continued measurements.