Rocky Mountains Cooperative Ecosystem Studies Unit
Project Summary

**Project Title:** Soil Characteristics, Carbon Storage, and Tundra Persistence in Rocky Mountain National Park

**Task Agreement #:** P18AC00622
**Discipline:** Natural
**Type of Project:** Technical Assistance/Research
**Funding Agency:** National Park Service
**Other Partners/Cooperators:** Metro State University of Denver
**Student Participation:** Yes
**Effective Dates:** 5/1/2018 – 12/31/2019
**Funding Amount:** $18,231.90

**Investigators and Agency Representative:**
NPS Contact: Name: Scott Esser, Ecologist, Rocky Mountain National Park,1000 US HWY 36, Estes Park, CO 80517 Phone 970-586-1394 Email Scott_Esser@nps.gov

Investigator: Dr Sarah Schliemann, Professor, 890 Auraria Parkway C, Denver, CO 80204 Phone 303-615-0804 Email sschliem@msudenver.edu

**Project Abstract:** Alpine tundra is a rare ecosystem that occupies less 0.2% of the total land area in the continental United States. Rocky Mountain National Park is covered by about a third of this ecosystem, providing an ideal site to study and monitor change. Soil and vegetation have an important interdependent relationship. Vegetation contributes organic matter to soils through leaf and shoot litter, root turnover, and root exudates (Kuzyakov and Domanski 2000). This soil organic matter impacts many important aspects of soil quality including soil structure, soil water-holding capacity, and nutrient availability (Chatterjee and Lal 2009). In turn, these factors can influence the type of vegetation found in an area.

This project will build on work initiated by the PIs 8 years ago as part of a project to map permafrost locations along Trail Ridge Road. This project will collect soil respiration, soil carbon, and soil nutrient data in three locations within in the park: a conifer stand at the upper limit of the tree line, a fellfield area, and a wet meadow tundra area. In addition, we will collect soil temperature and soil moisture readings at these 3 locations every 2 hours throughout the year using HOBO data loggers and sensors. Soil respiration will be measured weekly during the snow-free period using a Li-Cor LI-8100A automated CO2 flux system. To measures soil carbon and soil nutrients, we will collect soil samples monthly using a 1-inch diameter soil corer and used a Shimadzu solid carbon analyzer to determine the total carbon and a Hach colorimeter to measure nutrient concentrations. Although seasonal patterns are evident in our current data, inter-annual variability makes it difficult to see developing trends. By monitoring soil characteristics over a longer time period, we anticipate that overall trends will become apparent.

**Keywords:** Alpine tundra, Soil, Carbon storage, biogeochemistry, Metro State University, Rocky Mountain National Park, National Park Service