ABSTRACT

TITLE:	Dissolved Organic Carbon Concentrations in Alpine Water Samples Collected Near Silverton, Colorado: Implication for Natural Terrestrial Sequestration of Carbon
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ABSTRACT: With atmospheric CO2 concentration projected to double within the next 50 to 100 years, attention has been directed towards remediation practices to decrease CO2 concentrations, in addition to reducing greenhouse gas emissions. One remediation possibility involves natural terrestrial sequestration (NTS) of carbon by soils. Soils with high NTS potential are able to function as carbon sinks, and assist in decreasing atmospheric CO2. The NTS potential of soils is directly related to the soil's total organic carbon (TOC) concentration and dissolved organic carbon (DOC) concentration in water. Soils in the study area are derived from the weathering of propylitically-altered, mid-Tertiary, intermediate volcanic rocks. Minerals associated with the propylitic alteration assemblage, such as chlorite and epidote, weather to form Mg-Fe-Ca clays, which have large specific surface areas, and high adsorption potentials. These clays are able to naturally sequester and store atmospheric CO2, which is demonstrated by the regionally high TOC concentration in soils, and comparatively low DOC concentration in water samples. To further test this hypothesis, 60 water samples (from groundwater, springs and surface flow) were collected and analyzed for DOC concentration. The average DOC concentration through peak and base flow conditions was 1.2 parts per million (ppm) compared to the national average of 1.5 to 40 ppm. The DOC data collected near Silverton supports the hypothesis of Yager and others (2007), indicating the ability of regional soils to naturally sequester and store atmospheric CO2. High TOC concentration in soils is indicative of the ability of Mg-Fe-CA clays to interact with and sequester CO2. The comparatively low DOC concentration found in water samples signifies the soil's ability to bond and store carbon, as it is not readily flushed though the system during precipitation events and snowmelt. These data provide important insight into the NTS potential of soils, and how it can possibly assist in the remediation of atmospheric CO2 concentration.