111-7 Case Study: The Role of Pedology In Christina River Basin CZO.

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Monday, November 1, 2010: 11:00 AM
Hyatt Regency Long Beach, Regency Ballroom A, Third Floor

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As a student of soils, we strive to understand the processes occurring in soils. These efforts, however, contribute to better understanding the earth as a system, only when they explicitly address how and how much the processes affect mass and energy exchanges between the soils and the neighboring systems such as the atmosphere, streams, and oceans. Among many soil processes that may significantly affect earth system dynamics, the Cristina River Basin Critical Zone Observatory (CRB-CZO) focuses on accelerated soil erosion due to agricultural and construction activities. A multi-disciplinary team of scientists is testing a hypothesis that anthropogenic soil erosion, by exposing minerals to biologically active land surface and streams and thus facilitating carbon-mineral interactions, creates globally significant carbon sequestration in terrestrial ecosystems. This hypothesis attempts to integrate two growing consensuses: (1) humans have emerged as a major geomorphic agent, and (2) organic matter, when associated with minerals, becomes less accessible to microbial decomposition. The hypothesis explicitly utilizes the past achievements in pedology. For example, the connection between soil mixing and carbon-mineral interactions is considered central to A horizon formation, and carbon accumulation in fluvial sediments is an integral part of soil formation in floodplains. The CRB-CZO thus showcases how pedological understanding at meters to 100 meter scales, when quantitatively integrated with global scale forcings (in this case, anthropogenic soil erosion) and sub-millimeter scale geochemistry (in this case carbon-mineral interactions), can contribute to advancing our understanding of global biogeochemical cycles.

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