Geol. 611. Field Soils

The main objectives of this course are (1) to give you the opportunity to see soils and ecosystems in a wide variety of climates; (2) develop and refine a conceptual model that relates soil properties to climate, organisms, parent material, time and topography; (3) Learn how soil characteristics influence, and are influenced by key ecosystem properties and processes, (4) Learn the strengths and weaknesses of the U.S. soil classification system as a guide to interpreting the primary forces that shape soils and the biological communities they are integrated with.

This is an ecosystems course that focuses on soils. The major premise is that within a given climate zone, the properties of soils are determined by parent material, topography and time. The plant communities that live in/on a given soil have characteristics that are determined by climate and the nature and properties of the soil. In turn, there are feedbacks by which the plants and associated organisms influence soil properties.

At the landscape scale, patterns and processes in soils and their related biotic communities are decipherable and the controls on those patterns and processes are not difficult to determine. I hope to demonstrate this.

The flow of the course is pretty much as follows:

Intro and review of course content, soil taxonomy, theoretical and practical; Soil Surveys

Review how parent material, topography, climate, organisms and time determine soil properties (as needed)

Feb Special topics: Each of you will lead a lecture/discussion on one or two soil orders or on some aspect of soils or paleosols of your choice.

Topics:

(1) Soils we will not see: Gelisols, Aridisols, Andisols, their properties and the ecosystems they are part of
(2) Paleosols: Review of the state of the art (could be shared by 2 people)—focus on the interpretations made on the basis of measured paleosol properties
(3) Translating between the U.S. classification and other soil classification systems

March Puerto Rico: Moist forest, wet forest, rain forest, dry forest, on acid igneous rocks, limestone and ultramafic rocks. Oxisols, Ultisols, Inceptisols, Entisols, Mollisols and Vertisols.

NJ Pinelands: Warm temperate forests on sand (Spodosols, Entisols and Histosols)

NJ Inner Coastal Plain: Warm temperate forests on finer textured parent material: Ultisols

Piedmont: Warm temperate forests on limestone and on schist. Alfisols, Ultisols, Entisols and Inceptisols.

Pocono Plateau: Cool temperate forests on glacial till (Inceptisols, Ultisols/Spodosols?)

April/May CT, MA: Cool temperate forests on a variety of parent materials (Inceptisols). Boreal forest soils as represented by the montane boreal forests of the northern Appalachians. (Spodosols, Histosols, Inceptisols)

Requirements for this course are as follows:

Give a well-prepared lecture/discussion.
Keep a field notebook.
Contribute to the discussions.