FCE LTER Soil Quality Protocols

Soil Nutrients

Three random soil cores are collected from each site. Samples are stored in a freezer until analyzed. The top 10cm of soil are used for analysis. A subsample of $10cm^3$ of soil is weighed and then placed in an oven at 70oC until a constant weight is obtained. The dry weight of the soil is divided by 10 to obtain soil bulk density. Then this soil is burned in a furnace for 3 hours at 500oC to obtain the soil's ash weight. %organic obtained as weight loss on ignition expressed as percentage of dry weight. Another subsample of soil is dried for 72 hours and used for soil nutrient analysis. Between 4 and 7 mg of soil is weighed into tin cups, folded, and placed into the Carlo Erba elemental analyzer to obtain soil TN and TC. Another 17 to 21 mg of soil is weighed into empty 25 mL vials and analyzed for TP following Sharp and Solorzano (1980).

Soil pH and Eh

Both the pH and Eh probes are inserted in the top 5cm of the soil layer within the non-destructive above ground biomass plots. The Eh reading is taken when the Eh probe is attached to the meter and the word "Ready" appears on the meter screen. The pH and temperature reading are taken when the pH probe is attached to the meter and the word "Ready" appears on the meter screen.

Phosphorus and Iron Characterization

Extractable phosphorus by sequential extraction is obtained by the following: PI (MgCl2 extraction--inorganic P only); PII (buffered dithionite extraction--inorganic P only); PIII (1N HCl extraction--inorganic P only); PIV (ashing/acid extraction). Total phosphorus obtained by 1N HCl extraction of ashed soil sample. Extractable iron obtained from ashed soil sample as the result of 18-hour extraction with 1N HCl, followed by ferrozine analysis. Acid volatile sulfide obtained by 1N HCl extraction of soil sample followed by reaction with Cline's reagent. Chromium-reducible sulfur obtained by concentrated HCl/chromous chloride extraction of soil sample followed by reaction with Cline's reagent. Total reduced sulfur calculated as the sum of acid-volatile plus chromium-reducible sulfur.

Sharp, L. , J. H. Solorzano. 1980. Determination of total dissolved phosphorus and particulate phosphorus in natural waters. Limnology and oceanography, 25: 754-758.