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CE 394K

GIS in Water Resources Term Project Proposal

The response of different soil types to precipitation events over contrasting soil moisture conditions (dry vs wet).

Motivation:

The land area on the Earth most influential to human activity is literally right under our feet. The critical zone, or vadose zone, is considered an area of unsaturated (with respect to water) media sandwiched between the atmosphere above and groundwater or bedrock below. This zone typically includes some form of soil mixture that influences the flow and properties of a fluid passing through it. A key concept to understand is the movement of fluid through this area and how the saturation state and properties of the media affect flow. Within this study I plan to examine the properties of at least 3 different soil types and how these soils respond to precipitation events based on their level of saturation.

Methods:

A hydrologic budget will be constructed to determine the reaction of the soils to the incoming precipitation. First, soil moisture data sets will be examined from 2-3 separate Long Term Ecological Research (LTER) sites (Coweeta LTER, Harvard Forest LTER, and possibly Sevilleta LTER), each representing a different arrangement of soil types. These weekly to hourly sampled soil moisture profiles will be observed before and after precipitation events to compare how each respond to precipitation intensity and timing. A parallel effort to quantify how much moisture the soils are absorbing (or not absorbing) will be to analyze local steam gauge height following precipitation events.

Possible Data Sources:

Soil moisture data sources:

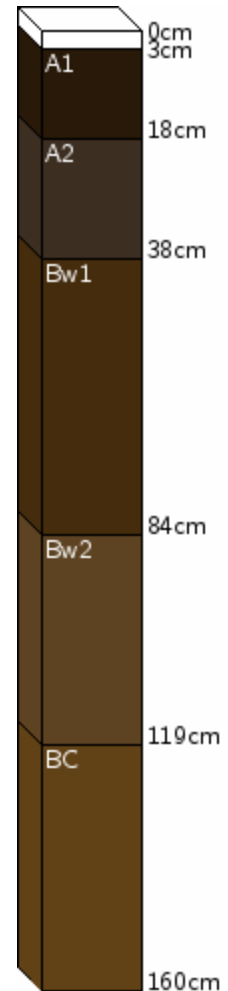
HVD LTER: <http://harvardforest.fas.harvard.edu:8080/exist/xquery/data.xq?id=hf069>

CWT LTER: http://coweeta.uga.edu/dbpublic/dataset_details.asp?accession=1013

SEV LTER: http://sev.lternet.edu/project_details.php?id=SEV078

Soil survey data: <http://casoilresource.lawr.ucdavis.edu/drupal/node/902>

Watershed data: <http://nhd.usgs.gov/>



Precipitation data: <http://www.weather.gov/>

- Other customized datasets from within each LTER Data bank

Stream Flow data: <http://water.weather.gov/ahps/>

- Other customized datasets from within each LTER Data bank