HYDROLOGIC MEASUREMENT FACILITY
PROOF OF CONCEPT GEOPHYSICS SUPPORT

Title: HMF Geophysics Investigation at the USDA Reynolds Creek Experimental Watershed, Idaho

Date(s): July 12-21, 2006

Participants:

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HMF Support:
HMF support was provided by David Robinson, based at Stanford University under the CUAHSI HMF geophysics program run by Rosemary Knight.

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Environmental Geophysics at Stanford
http://pangea.stanford.edu/research/enviro/

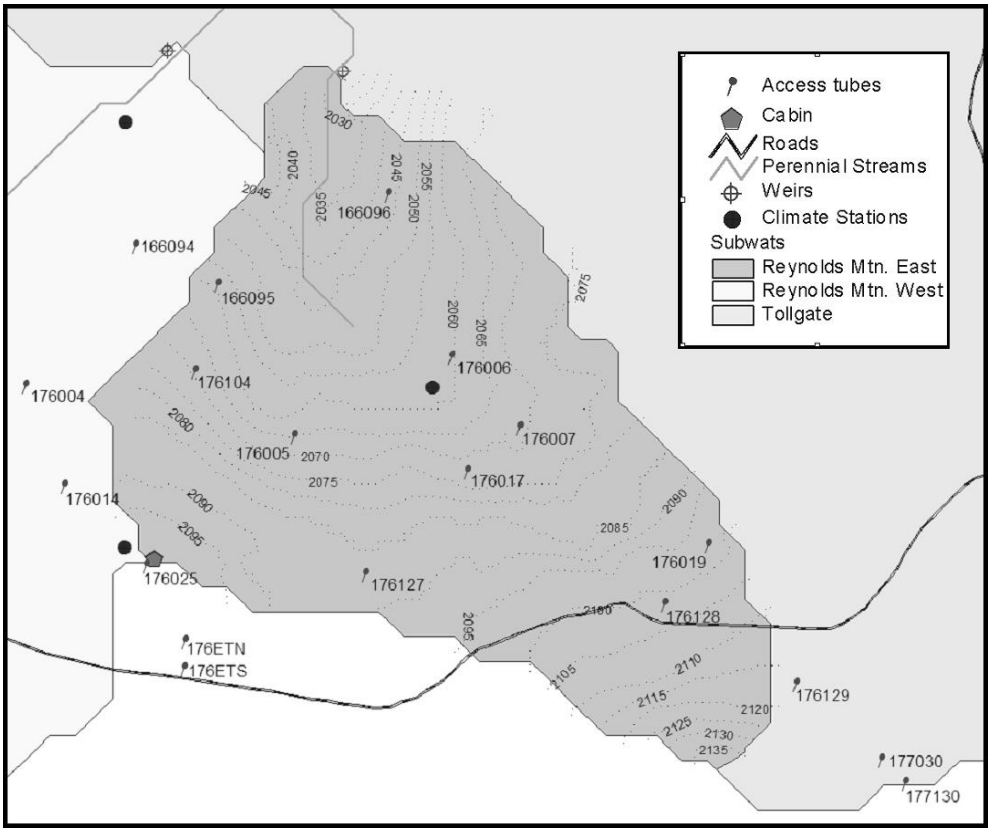
Using electromagnetic induction to determine soil properties in a small watershed

Background:

The concept of the work is to integrate the use of geophysical tools to assist in mapping soils. Traditional soil mapping uses photographic interpretation and pedon description and is limited in its use for understanding the role of soils in hydrology at the small watershed scale, due to low resolution. Our goal is to test the use of electromagnetic methods, including geophysical tools such as electromagnetic induction, to determine if it can be used to map soils and determine soil properties. Properties of interest are the clay%, water content and soil hydraulic properties.

Approach:

A geophysical electromagnetic induction survey was conducted at Reynolds Mountain East between July 12 -21. This work compliments ongoing research supported by the Inland North West Research Alliance and the Environmental Soil Physics Group at Utah State University to develop methods of characterizing soils using geophysical methods. The survey covered the entire 37 ha Reynolds Mountain East watershed. Subsequent work will examine the best ways to calibrate this data to predict properties such as water content, clay percentage and saturated hydraulic conductivity.

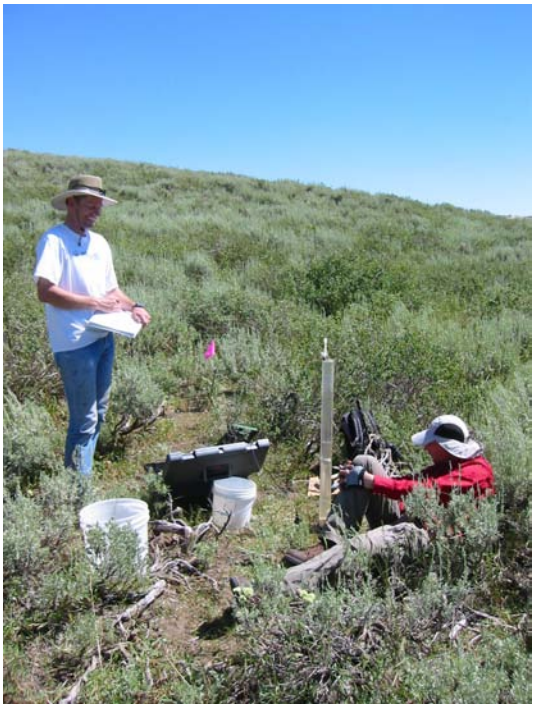


The Reynolds Mountain East Experimental Watershed showing the location of instrumentation. This watershed is used extensively for testing instrumentation.

A view looking North over the watershed from the summit of Reynolds Mountain. Much of the watershed is covered by sagebrush making it inaccessible to many ground based geophysical methods such as ground penetrating radar.

PhD student Hiruy Abdu (USU) using an electromagnetic induction sensor with David Robinson (Stanford) guiding the survey path. The sensor is integrated through a field computer with a GPS to collect geo-referenced measurements.

Making GPS-referenced EM measurements in an Aspen grove is challenging. Advanced GPS technology provides 3m resolution below the canopy.



Scott Jones and David Robinson making Infiltration measurements near survey sampling points in sagebrush.