

Evolution of hydrological and biogeochemical process understanding at a Water, Energy, and Biogeochemical Budgets Program site: Panola Mountain Research Watershed, Georgia

Dr. Jake Peters
Tuesday, November 3, 2009
10:00 am
USGS Minnesota Water Science Center
Training Room
2280 Woodale Dr., Mounds View, MN

Presentation Abstract: The Panola Mountain Research Watershed, Georgia (PMRW), is a relatively undisturbed 41-ha forested watershed, 25-km southeast of Atlanta. Research began in 1984 to evaluate methods for measuring dry atmospheric deposition and to determine the watershed processes controlling acid neutralization, which provided some process understanding and quantification. Since 1991 when PMRW became a Water, Energy, and Biogeochemical Budgets Program site, the research has expanded scope of basic hydrological and biogeochemical processes to include the effects of climatic variables, and human influences on watershed processes. Process conceptualization of PMRW has evolved from: (1) rainfall on and runoff from bedrock outcrop areas moving rapidly through the watershed to episodic subsurface flow on and leakage through bedrock outcrops and major leakage through bedrock underlying soil-mantled hillslopes; (2) uniform flow through soils to preferential flow producing high sulfate concentrations in ground and stream water; (3) vertical recharge and discharge of riparian zone aquifers to threshold (non linear) linking stream-riparian zone interactions with hillslope connectivity linking groundwater levels, soil moisture content, precipitation and stormflows; (4) simple mixing model assessments of hydrologic pathway contributions to stream solute fluxes to multi-end member mixing analysis, which provide quantification of end member contributions; and (5) uniform distributions of soil moisture content to temporal and spatial varying hillslope soil moisture content affected by trees through evapotranspiration. In addition, research also has evolved our understanding of factors affecting atmospheric deposition and canopy interactions, calcium depletion, carbon sequestration and respiration, mercury cycling, weathering, and groundwater residence times and included modeling. The evolution in process understanding also involved changes in approach/scale for hypothesis testing and serendipity.

Brief Biography:

Jake Peters (USGS) is a research hydrologist at the U.S. Geological Survey, Atlanta, Georgia. He received his BS (honors) in chemistry from State University of New York at Albany, and MS & PhD in geology (geochemistry) from the University of Massachusetts at Amherst.

Jake is the past President of the International Commission on Water Quality of the International Association of Hydrological Sciences and is currently the International Union of Geodesy and Geophysics liaison with the International Council of Science's Scientific Committee on Problems of the Environment. Jake has organized, convened, and edited proceedings volumes of several international symposia and workshops and published many papers on water quality and relations among hydrological processes and water quality. He also is an associate editor of *Hydrological Processes*.

Jake's main research interests include understanding the linkages between hydrology and biogeochemistry (vegetation, soil, and atmosphere interactions) in watersheds (from natural to highly

altered - urban), including process understanding (streamflow generation and water-quality genesis) from hillslope to catchment and larger spatial scales and at varying temporal scales. He also is interested in the effects of human activities including climate change and urbanization on hydrology and water quality. Jake has conducted hydrology and hydrochemical process research in several small watersheds worldwide including Australia, Czech Republic, Norway, United Kingdom, China, Sweden and Canada. Since 1985, Jake has been conducting research at the Panola Mountain Research Watershed, Georgia, one of five sites of the USGS Water, Energy, and Biogeochemical Budgets Project.

Sign up

There will be a sign-up sheet at the lecture for those who are interested in applying for one hour Professional Development credit by the Minnesota Board of Architecture, Engineering, Land Surveying, Landscape Architecture, Geosciences, and Interior Design (AELSLAGID). We need an estimate before the meeting about who plans to attend. **Please contact Lindsay Forbes by email (lforbes@usgs.gov) or by phone/voicemail (763-783-3100) with your name and affiliation. Please let us know if you plan to attend by Thursday, October 29th. An informal pizza lunch will be served following the lecture at a cost of \$5 to provide the opportunity to visit with Jake.**

**Regards,
Jim Stark
Center Director**

**Sketch map showing USGS Minnesota Water Science Center location
north of the I-694 and I-35W interchange:**

