The Chemistry of Springs in the Saguache Creek Watershed, Colorado

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Improving the understanding and representation of water resources in the Upper Rio Grande is critical for the sustainability of agricultural practices, municipal supplies, and economic growth in the Rio Grande Valley. As such, there is an increased need to understand those processes which are responsible for recharge and streamflow generation in the San Juan Mountains. Important questions remain concerning the partitioning of snowmelt runoff and summer precipitation into streamflow and recharge, the kinetics of water chemistry and their clues about residence times, and the distribution of flowpath lengths in watersheds of the Upper Rio Grande. These factors are intricately linked to the lithology of the watershed and should provide much needed information about the hydrological processes operating in the watershed. The Saguache Creek watershed appears to be dominated by fracture flow; thus, residence time distributions should reflect the integration of water travelling along very different flowpaths at any given point in the watershed. Each flowpath may exhibit vastly different degrees of tortuosity, fracture connectivity, and aperture size. These characteristics exert primary control on fracture velocities and consequently, residence time distributions. Likewise, increased contact within the fracture network has a definitive influence on the kinetics of water chemistry (i.e. weathering, dissolution, and precipitation of minerals). Importantly, fracture velocities and residence times can be scrutinized based upon the kinetics of weathering reactions needed to obtain the observed trends in watershed scale aqueous chemistry. Initial findings and future work will be presented.

Biographical Sketch

Marty was born and raised in Vale, North Carolina. After high school, he obtained an AAS (Associate in Applied Science) in Electronics Engineering Technology and went to work as an electronics technician. Later, he switched jobs and began working as a research & development technician in the communications engineering industry. While he was working for this company, he completed his BS in Electrical Engineering plus a minor in Biology from UNC Charlotte. Then, he began studies toward a Masters degree in Electrical Engineering but the thoughts of returning to cubicle life were too painful plus he had a growing interest in hillslope and watershed hydrology. Consequently, he completed his Masters degree in Earth Science in December 2004 at UNC Charlotte. He is currently working toward a Ph.D. in Hydrology under the supervision of Fred M. Phillips. His research objectives are to investigate the kinetics of stream and groundwater chemistry in the Saguache Creek watershed; to use stream, spring, and groundwater chemistry to understand runoff processes, residence times, and flowpath length distributions; and to use stable isotopes to investigate the source of groundwater recharge in the watershed.