Institut für GEOWISSENSCHAFTEN und GEOGRAPHIE
Martin-Luther-Universität Halle-Wittenberg

MARTIN-LUTHER-UNIVERSITÄT
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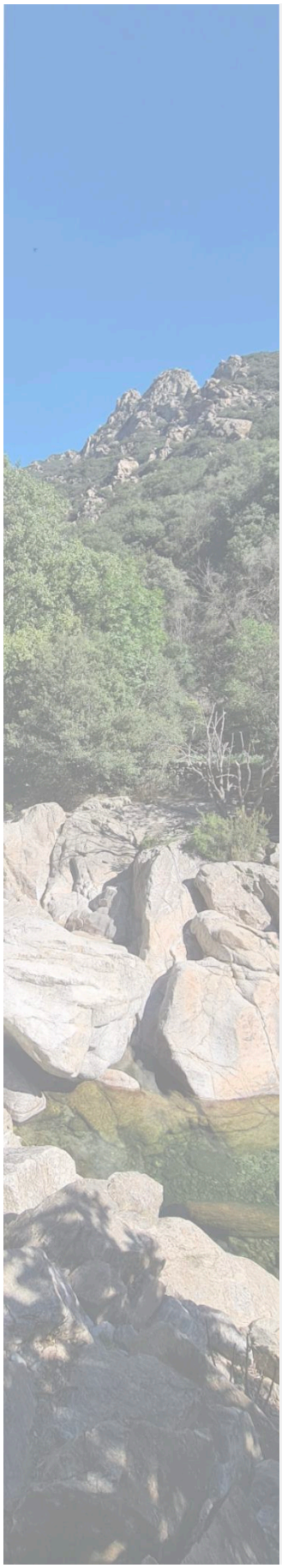
Geowissenschaftliche Kolloquien WiSe 2025/2026



Di 25.11.205
16.15 Uhr

Herr Prof. Dr. Grant Ferguson

Department of Civil, Geological and Environmental Engineering at the University of Saskatchewan

Darcy Lecture 2: Living Fossils - Ancient Groundwaters in the Anthropocene

Prof. Dr. Grant Ferguson

The bulk of groundwater on Earth is fossil, having been recharged more than 12,000 years ago. Past definitions classified these waters as nonrenewable because the aquifer systems containing them are not replenished on human timescales. Scrutiny of this definition suggests that it is overly simplistic and may result in preventing access to groundwater to improve water security in some cases or while failing to prevent excessive depletion in others. In many aquifers, groundwater residence times are long because of their large storage volumes; there is no reason to believe that using groundwater from large aquifers is less sustainable than using groundwater from smaller aquifers if recharge rates have not varied appreciably over time. In cases where past climates were much wetter, there has been concern that groundwater will not be replenished under current conditions. Examination of groundwater age distributions suggests that this situation is relatively uncommon. Substantial groundwater storage anomalies are unlikely to persist in areas containing fossil groundwater due to the differences between the rates of transport and hydraulic diffusion, except in very large regional aquifers. This difference in behaviour between storage and transport has been confirmed by recent studies using stable isotopes of noble gases to reconstruct past water table depths.

Changes in storage associated with past climates appear to be smaller than those associated with anthropogenic depletion of groundwater, including cases where modern and fossil groundwaters have been extracted. The long response times of many groundwater systems allow them to mediate water and solute fluxes within the Earth system over long time periods. Their lack of sensitivity to current climate changes will make them a strategic resource, if used at appropriate rates.