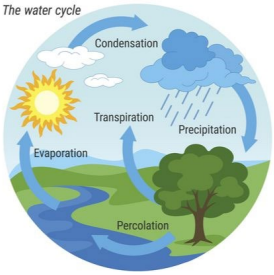
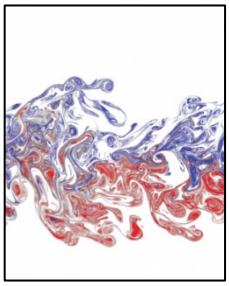
Boase Seminar Series in Hydrology and Water Resources Engineering

Department of Civil, Environmental and Architectural Engineering





Groundwater Dynamics in Headwater Regions under a Changing Climate

Professor Shemin Ge

Department of Geological Sciences

University of Colorado, Boulder, CO

Wednesday, April 26, 2023 | 11:15 AM | ECCE 1B41 &
Zoom: https://cuboulder.zoom.us/j/98861379124

Abstract:

It has been observed that stream flow in some headwater regions during fall-winter has increased over the past several decades. These headwater regions are hydrologically sensitive to surface temperature changes due to the presence of frozen grounds that include seasonally frozen grounds and permafrost. Freezing and thawing processes lead to changes in subsurface hydrologic properties and dynamically impede or invigorate groundwater flow in the shallow subsurface. How do seasonal and long-term surface temperature variations impact recharge to groundwater and its discharge to surface water? Coupled heat transfer and groundwater flow processes in headwater catchments are modeled to address this question. The results illustrate that groundwater flow in summer and early fall is most energetic as thawed ground promotes infiltration and groundwater flow in the shallow subsurface, invigorating groundwater discharge to surface water. Under increasing temperature scenarios, groundwater discharge to surface may experience a several fold increase over the decadal scale. While warming leads to increased groundwater discharge to surface waters in the short run, insufficient recharge to groundwater upstream due to shrinking glaciers or snowpack will make it challenge to sustain the groundwater discharge to streams in the long run.

Speaker Bio: Shemin Ge is a professor in the Department of Geological Sciences at the University of Colorado Boulder. Her current research is in the areas of fluid induced earthquakes and groundwater under a change climate. Dr. Ge received her Ph.D. in hydrogeology from Johns Hopkins University in 1990. She holds an M.S. from the University of British Columbia and a B.S. from the Wuhan University of Technology.