Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.20358

Using statistical and machine learning to explain the threat of arsenic in groundwater in the San Luis Valley, Colorado, USA

ALEXANDER HONEYMAN[1], ALANDRA LOPEZ[1], CAROLINE BLYTHE[1], KATHERINE JAMES[2], RYAN SMITH[3] AND SCOTT FENDORF[1]

[1]Stanford University
[2]University of Colorado Anchutz
[3]Colorado State University

Presenting Author: honeyman@stanford.edu

Droughts and aquifer over-draft can lead to altered aquifer conditions that trigger arsenic release into groundwater and degrade water quality. In the San Luis Valley, Colorado, USA, toxicological studies have linked arsenic in drinking water to adverse health outcomes, but the specific drivers of arsenic release under various aquifer conditions and pumping scenarios are unclear. Through a spatially-balanced, community-engaged sampling campaign of drinking water wells, we assess the current extent of arsenic concentrations and decipher the relative roles of over-pumping in comparison to naturally occurring processes that trigger arsenic release. We deployed statistical and machine learning methods on hundreds of groundwater sample measurements with heterogeneous geochemical compositions to predict the occurrence of arsenic contamination. We explore the effectiveness of these big data strategies, and integrate statistical statements with possible forcing mechanisms of reactive colloidal transport to predict arsenic threat in drinking water. Results inform on possible groundwater management strategies.