Poster Presentation

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Techniques to assess human and climate impacts on groundwater - High Plains aquifer perspective

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Abstract

This poster presentation summarizes the research techniques applied by the U.S. Geological Survey to better understand the complicated spatial and temporal variability of human- and climate-induced factors that affect groundwater resources of the High Plains aquifer, United States. Using a novel multiple-scale approach that integrates satellite-based remote sensing, regional measurements of groundwater levels and water quality, and site-specific process-based hydrologic and geochemical investigations, affects on this regional (450,700 km^2) system have been elucidated. Among the techniques applied was the use of remote satellite imagery to develop land-use change maps and estimate contaminant loading to the aquifer. These land-use maps were combined with groundwater quality monitoring to develop groundwater vulnerability models and maps, illustrating the predicted impact of human activity on groundwater quality. Real-time weather monitoring stations, combined with unsaturated-zone monitoring installations, were used to better understand unsaturated zone water and chemical flux in response to climate variability. Using incremental, dry-drilling technology, physical and chemical data were obtained that provide estimates of groundwater recharge rates in response to spatial and temporal variability in land use and climate. The use of such aerially and vertically nested research techniques is offered as one possible approach to understanding sub-regional to regional scale aquifer response to human- and climate-induced impacts.