IDENTIFYING HYDROLOGIC CHANGES AND TRENDS USING AUTOMATED STATISTICAL ANALYSES

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Climate change, sea-level rise, and human activities can result in changes in surface-water salinity, flow and stage, as well as groundwater levels and salinity. These changes can adversely affect ecosystem health and the sustainability of water resources for human use. Water managers need the big picture that can be provided by combining results of temporal, spatial, and statistical analyses of groundwater, surface water, and salinity data into one website that shows trends and current hydrologic conditions. Several existing USGS websites provide water managers with data and analyses; however, these existing websites are limited in data types, data sources, spatial extent, or statistical capabilities. Therefore, to aid coastal water managers, the U.S. Geological Survey is developing a prototype website, the Coastal Data and Analysis Tool for Water Resources Management (CDAT-WRM) by expanding on two existing U.S. Geological Survey websites, the Water Level and Salinity Analysis Mapper (WLSAM) and the Coastal Salinity Index (CSI). This new prototype builds on the framework of the WLSAM and CSI to: (1) incorporate additional types of data, (2) add data from non-USGS sources, (3) update and add new statistical analyses, and (4) include sites from a broader geographic area. R scripts are run daily to generate the tables, plots, and map symbols that will be displayed on the CDAT-WRM. The scripts automatically compute basic statistical summaries and rolling means, perform frequency and trend analyses, and generate graphical and tabular output for hundreds of hydrologic and water-quality monitoring sites. The CDAT-WRM website focuses on water level, flow, salinity, chloride, and specific conductance data from coastal monitoring sites. However, the R scripts and underlying automated statistical analyses from this prototype can be applied to a wide variety of data types in any geographic region as a tool for evaluating temporal trends, including those caused by climate change.

PRESENTER BIO: Dr. Root is a hydrologist with the U.S. Geological Survey Caribbean-Florida Water Science Center. She has extensive experience working on groundwater chemistry and groundwater-surface water interaction projects. She has 15-years of prior experience in academia where she taught hydrogeology and water resources courses and supervised graduate student research.