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RESEARCH DISCOVERIES AND EFFICIENCIES REALIZED VIA IMPLEMENTATION OF A REGIONAL HYDROLOGIC INFORMATION SYSTEM (HIS)

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ABSTRACT: In 1999, construction began on a series of evapotranspiration (ET), eddy covariance towers running along the Rio Grande from Albuquerque to San Acacia, New Mexico. These towers were accompanied by five wells at each location to measure the subsurface hydrologic impacts of ET produced by various types of land cover. Rapid instrument measurement intervals resulted in huge quantities of temporal hydrologic data. Each tower location produces 100 measurements every thirty minutes resulting in tens of millions of measurements since the program began. Data sets this size can provide a rich insight to complex hydrologic and ecological systems. The trouble lies in querying and presenting the data in ways that are useful for exploring and validating research hypotheses. Common tools, such as Excel or Matlab, may be helpful if you know the exact sequence of data you want to analyze. Frequently, this is not the case. Looking at long term trends, adding and removing additional variables, or comparing local results to external national datasets are difficult or impossible with these tools. To overcome the limitations of current data management methods, we deployed a Hydrologic Information System (HIS) using the Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) HIS server system in collaboration with Earth Data Analysis Center (EDAC) and the Experimental Program to Stimulate Competitive Research (EPSCoR). The HIS is running on a virtual server in EDAC';s data center with a high speed connection to the internet allowing international access to the local datasets. Data products on the server are stored using WaterML, an XML based language specifically designed to facilitate distribution of hydrologic data and metadata. Integrated metadata management ensures future researchers will have access to the provenance of the data. Using the HIS to store, query, distribute, and archive this large evapotranspiration dataset allows incredible flexibility in data analysis. Trends in the data that previously went unseen can be discovered by easily expanding the time range or adding additional variables to graphs on the fly. We are taking a fresh look at this rich dataset to provide further evidence supporting current research and discover new hypotheses.

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