

Web-based interactive platform for analysis of regional-scale groundwater resources

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With the increasing variability of climate conditions, the sustainable management of groundwater resources has become a challenging task. Accurate assessment of groundwater resources relies on sufficient measurements and efficient analysis tools. The integrated technologies and multidisciplinary knowledge for groundwater have enhance the understanding of dynamics in groundwater systems. Taking advantages of widely developments in computer sciences and web service, the web platform provides an excellent open environment for groundwater investigations. However, most groundwater relevant web platforms are mainly focusing on the data visualization. The data (points, polylines, and polygons) and pre-analysis results (i.e., the figures) overlap a street map to indicate the location of interests and quantify the influenced regions of groundwater hazards. Such one-way interaction framework has significantly limited the implementations of measurement data and groundwater relevant applications. The study aims to develop an online web-based platform for groundwater data visualization, temporal and spatial data analysis, mesh generation and flow modeling. The study integrates multiple program languages such as Java, C, Python, and FORTRAN to bridge the data flow and online visualization. The interactive real-time web environment enables users to screen temporal and spatial measurements on the web map, conduct online data analyses, and develop numerical groundwater models. With well-designed database and numerous modules for data analyses and modeling, the platform allows users to share data and develop collaborative activities. The built-in analysis tools can also improve the efficiency of groundwater management and decision-making processes.

Keywords: groundwater resources, Web-based platform, data visualization, groundwater model