Geophysical Research Abstracts
Vol. 21, EGU2019-6625, 2019
EGU General Assembly 2019

A web-based interactive groundwater platform for modeling and data analysis

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Under variably changing climate and increasing population, how to manage groundwater resources advisably has become a challenge task. Suitable groundwater management relies on accurate assessment of groundwater that based on abundant measurements and efficient analysis tools. In recent decades, numerous web platforms have provide excellent environment for groundwater investigations. They displayed groundwater data and pre-analysis results (i.e. the figures) overlap a map to indicate the location of interests and quantify the influenced regions of groundwater events. However, most of them are mainly focusing on the data visualization; such one-way interaction framework has significantly limited the ability of groundwater relevant applications. To reduce these confines and increase the interactions between platform and users, this study develops an online web-based platform for groundwater data visualization, temporal and spatial data analysis, mesh generation and flow and transport modeling. The study integrates multiple program languages such as JavaScript, 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.