

## GIS-based spring potential mapping in Beijing using machine learning methods

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The emergence of spring is usually difficult to be monitored due to mountainous terrain. In this study we investigated the performance of two statistical models (frequency ratio (FR), and weight of evidence (WOE) and two machine learning models (random forest and classification regression tree) in generating spring potential map in Beijing. A total of 1378 springs from field survey were used for simulation, with a consideration of impacting factors including elevation, slope angle, slope aspect, topographic wetness index (TWI), stream power index (SPI), distance to rivers, distance to faults, lithology, normalized difference vegetation index (NDVI) and land use. The results demonstrate the well potential of machine learning method on investigating spring distributions, as well as on understanding its evolution under both climatic and anthropogenic impacts.

Keywords: Groundwater spring potential map, weight of evidence, frequency ratio, random forest, classification regression tree, Beijing