EGU21-3727
https://doi.org/10.5194/egusphere-egu21-3727
EGU General Assembly 2021

Visualizing uncertainty of one-dimensional land subsidence prediction by preparing various local optimal solutions with a genetic algorithm

Kento Akitaya and Masaatsu Aichi
The University of Tokyo, Graduate school of frontier sciences, Department of environment systems, Kashiwa, Japan

This study tried to visualize the predictive uncertainty while predicting future land subsidence caused by the groundwater pumping. Because land subsidence modeling is highly uncertain, it is impossible to determine the distribution of subsurface physical property values uniquely. Therefore, we prepared various local optimal solutions through the inversion analysis with a genetic algorithm in order to visualize land subsidence prediction uncertainty. The inversion analysis was conducted using the long-term land subsidence monitoring data at Kawajima in the Kanto Plain, Japan. In this study site, the seasonal groundwater level fluctuations have caused plastic compaction in summer and elastic expansion in winter every year. Obtained multiple sets of subsurface properties were within the range of typical values in the existing literature and satisfactorily reproduced the observed subsidence, showing that the inversion analysis worked well. In addition, the groundwater level scenario analysis was conducted using obtained property sets. This revealed that the subsidences predicted for a sudden groundwater level drop and rapid recovery scenario are more volatile than the subsidences predicted for the stable scenario. This means that it is important to have multiple sets of subsurface properties to predict future land subsidence caused by unprecedented groundwater level fluctuations.