Post-audit of land subsidence modelling of Saga-Shiroishi plain, Japan — lessons and improvements toward useful modelling

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Abstract In Japan, land subsidence caused by excess groundwater withdrawal was a serious problem in the 1960s to 1980s. Groundwater modelling was applied to prevent land subsidence and for groundwater resources management. It is important to investigate the accuracy of the modelling by comparing the prediction results with observation data. This process is referred to as a post-audit. The modelling of land subsidence on the Saga-Shiroishi Plain was examined with regard to its prediction results. A quasi three-dimensional model was adopted to calculate piezometric heads and a one-dimensional consolidation model was used to calculate the land subsidence rate at observation wells. The predicted piezometric heads agreed well with the observation data. However, some prediction results for land subsidence differed considerably from the observation data. The difference between the predicted results for piezometric head and land subsidence is attributed to the difference between the calibration accuracies of the piezometric head and subsidence rate. Post-audits show that accuracies of predictions are not always high. In the case of one-time prediction, accurate prediction cannot always be guaranteed. To improve the accuracy of prediction, it is necessary to revise the model by assimilating observation data and to iterate the prediction for groundwater resources management.

Key words groundwater modelling; land subsidence; post-audit; prediction