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Extended Abstracts

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3.1
Regional groundwater systems

title: **Regional groundwater flow system analysis in Kanto Plain, Japan with thermal and geochemical data**

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INTRODUCTION

Recently much attention has been paid on deep groundwater behavior predictable water resources or as promising stable environment for geological sequestration of carbon dioxide and high level radioactive waste (HLW). A lot of techniques have been developed to evaluate deep groundwater behavior. However, deep groundwater evaluation is capital intensive and limited in situ data could be obtained. Groundwater modeling technique is an effective tool for providing supplementary information. Especially, geological sequestration requires careful evaluation with long term changing environmental conditions. Groundwater modeling technique has much advantage for such evaluations. This paper briefly presents newly developed groundwater modeling approach to evaluate deep groundwater characteristics (Yoshizwa et al., 2008).

STUDY AREA

Kanto plain is selected as the study area on the research because the area contains one of the largest groundwater basin in Japan and the largest number of existing in-situ data could be obtained in the area. Study area is shown in the Figure 1.

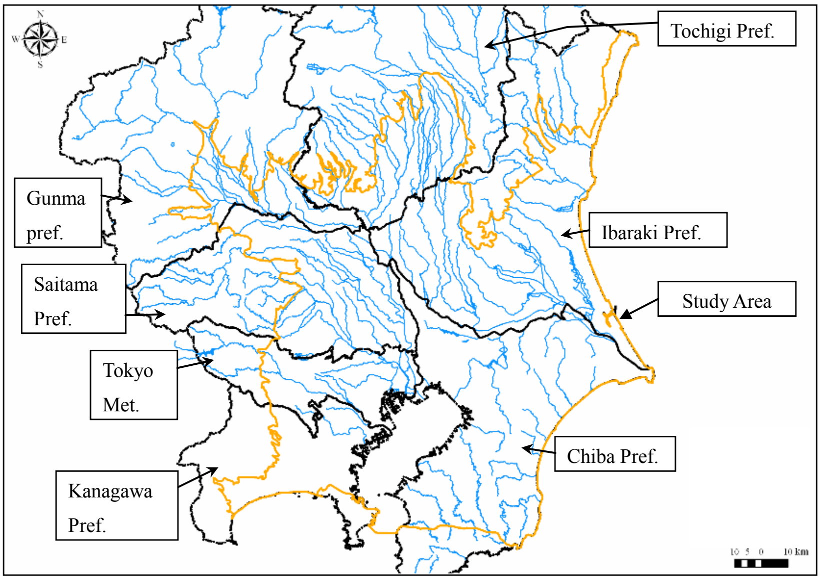

Figure1. Study Area.

DATA COLLECTION AND ANALYSIS

Existing data such as existing drilling data, groundwater level monitoring data, borehole temperature logging data and water quality data are collected in the area. Data collected are complied to establish groundwater model. Groundwater level data could be obtained for only shallow aquifer zone and could not be utilized for the modeling analysis. Therefore, the remaining data, borehole temperature logging data and water quality data is selected to utilize modeling analysis.

Collected borehole temperature data is utilized to extrapolate subsurface temperature distribution. Study area is vertically classified into four major geological formations. Subsurface temperature for the geological formation is obtained from extrapolated data. Figure 2 shows example of subsurface temperature distribution for surface of geological formation.

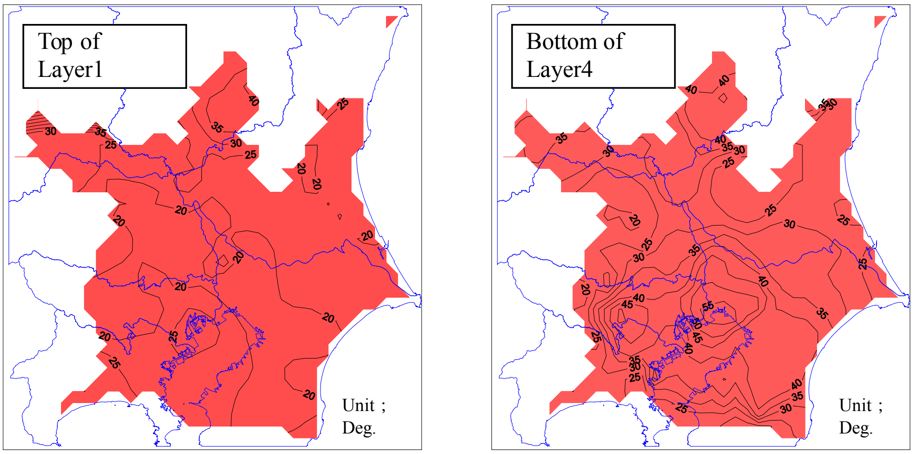

Figure2. Extrapolated temperature distribution.

NUMERICAL MODELING ANALYSIS

3D saturated-unsaturated, variable-density ground-water flow with solute or energy transport model SUTRA is used for the analysis. At the first step, borehole temperature logging data is utilized as the parameter of groundwater flow size from shallow aquifer to deep one. To simulate underground temperature distribution with the SUTRA, hydrogeological settings are used to estimate from the analysis. Figure 3 shows created mesh of numerical model. Extrapolated subsurface temperature distribution is used for calibration target of the simulation.

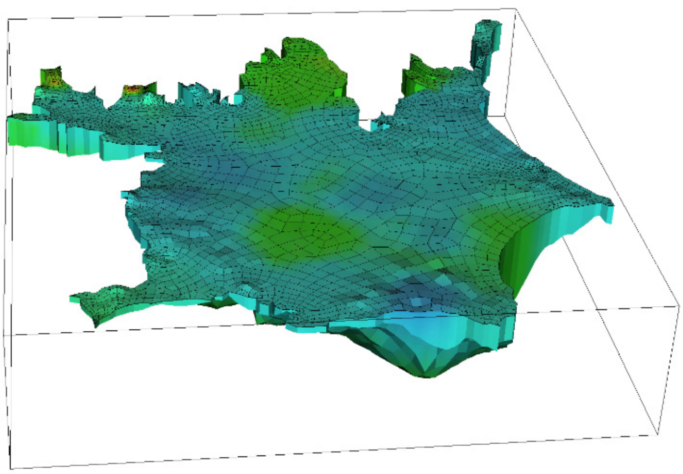

Figure3. Created mesh of numerical model.

In the second step, chloride ion concentration data is utilized for the analysis. To simulate underground chloride concentration distribution with the SUTRA, hydrogeological settings are used to estimate from the analysis.

RESULTS

Hydrogeological settings from shallow to deep aquifer could be estimated and groundwater flow velocity could be evaluated from the analysis. Evaluated groundwater potential distribution provides local scaled to regional scaled groundwater flow system.

REFERENCES

Yoshizwa T., Marui A. and Ito N., 2008: *Large scale groundwater flow analysis introducing segmentalization approach on targeted basin.*, Open-File Report of Geological Survey of Japan, no. 473, pp. 45-46.

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