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Extended Abstracts

Editors:
Andrzej Zuber
Jarosław Kania
Ewa Kmiecik

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title: **Ljubljana polje aquifer heterogeneity, modelled with transition probability geostatistics**

author(s): **Mitja Janža**
Geological Survey of Slovenia (GeoZS), Slovenia, mitja.janza@geo-zs.si

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Heterogeneity of the aquifers is one of the key factors that control transport processes in groundwater. It is defined by the spatial distribution of hydofacies-sediments formed in characteristic depositional environments and have typical hydrogeological properties. Due to the (in time and space) changing sedimetological conditions, is the distribution of hydrofacies in nature often complex and difficult to define. The difficulty of this procedure most often limits reliability and consequently applicability of numerical transport models.

Ljubljana polje aquifer is highly productive intergranular aquifer which is the main water resource for supply of city Ljubljana with drinking water. In consists of up to 100 m alluvial sediments, deposited in Pleistocene. As a basis for improvement of reliability of hydrological model of the aquifer, hydrogeological model was constructed. It is based on the borehole logs, supplemented with geological conceptual information and geostatistical methods, combined with Markov chain models (Carle, Fogg, 1996, 1997; Carle, 1999). A set of 258 borehole logs (Fig. 1, 2) with 6,422 m of log description was used.
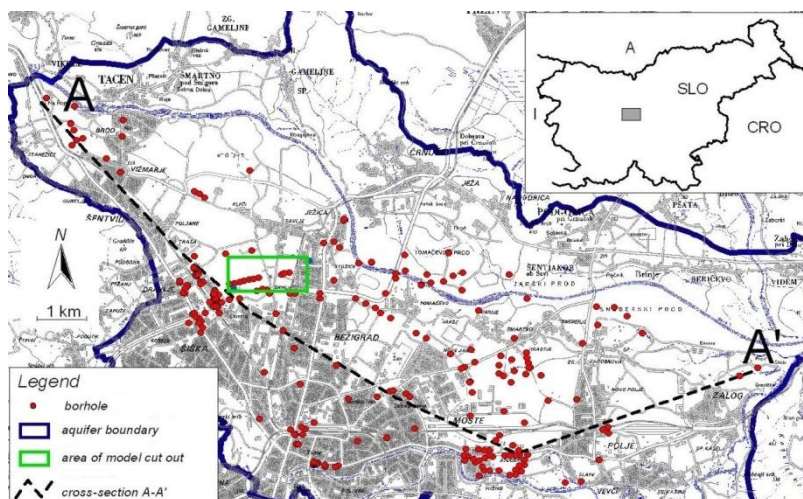

Figure 1. Study area with locations of the boreholes, area of presented model (Fig. 3) and cross-section (Fig. 2) (Janža, 2009).

Lithological descriptions were classified into four units — hydrofacies with different volumetric portions (Gravel 45%, Silt and clay with gravel 36%, Silt and clay 5% and Conglomerate 14%). Transition probability and Markov models were determined from the logs which were discretized into 1 m increments. With the procedure based on software TPROGS (Carle, 1999) a set of equally probable realisations of spatial distribution of hydrofacies that are conditioned to the borehole data and represent geologically plausible image of the heterogeneity of the aquifer were developed (Fig. 3).
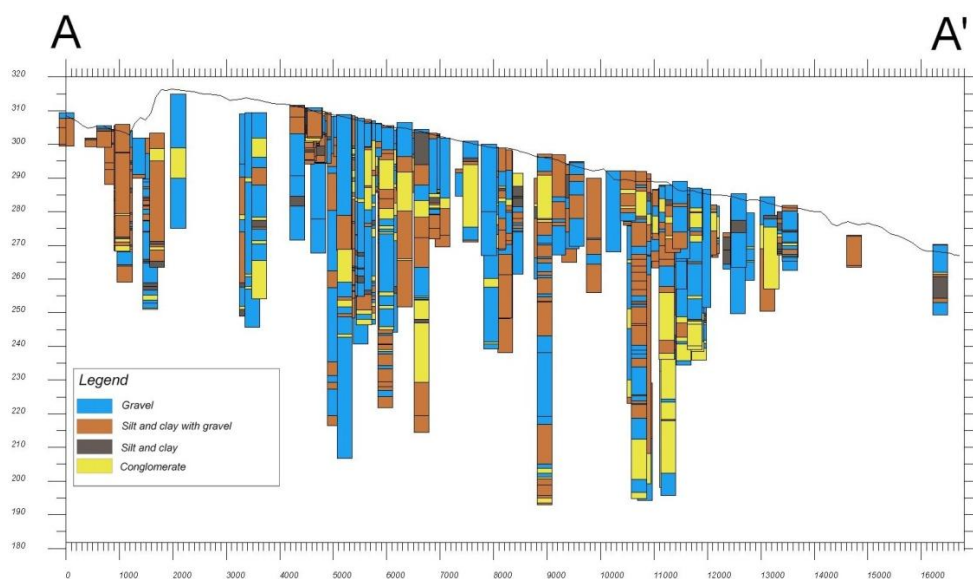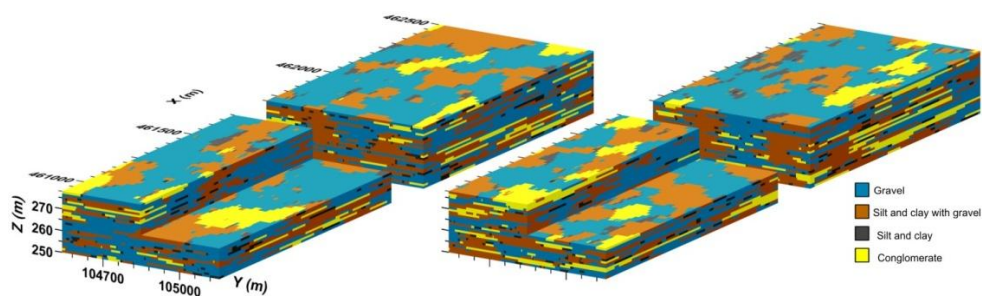
Figure 2. Boreholes in cross-section.

Figure 3. Parts (Fig. 1) of two realisations of geostatistical hydrogeological model of Ljubljana polje.

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