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Hydrogeology of Ljubljana polje perched aquifers

D. Šram (1) and M. Brenčič (1,2)

(1) Geological Survey of Slovenia, Ljubljana, Slovenia (dejansram@gmail.com), (2) Faculty of Natural Sciences and Engineering, Department of Geology, Ljubljana, Slovenia (mihael.brencic@geo.ntf.uni-lj.si)

Ljubljana polje aquifer lies in central part of Slovenia and is one of the biggest and most important aquifers in Slovenia. Aquifer was formed in quaternary basin which was filled with sediments from local rivers. River Sava is the biggest and the most important among them. Thickness of the aquifer varies from 20 m to 100 m. In general it is an unconfined aquifer, but locally, between gravel and sand sediments which have good hydraulic conductivity, layers with low hydraulic conductivity, such as silt and clay, appear. Those layers or lenses can form perched aquifers.

Perched aquifers are important for prevention of pollution of the main aquifer and also for the water recharge in the time periods with high precipitation. The perched aquifers were located by boreholes, while their spatial distribution has not been studied yet.

Within the project INCOME all the existing lithological borehole logs were collected and analysed with Jewel Suite 2011 software. A geostatistical method sequential indicator simulation was used to create spatial distribution of five hydrofacies at the Ljubljana polje aquifer. The layers/lenses that are bigger than 0.07 km^2 and have hydraulic conductivity lower than K = 10^{-7} m/s were defined as lenses that can potentially form perched aquifers.

In the modelling area, two areas with higher concentration of lenses with low hydraulic conductivity were defined. At those areas, according to the borehole data, perched aquifers appear few meters below surface to the depth around 30 m. At the other parts of the model area lenses with low hydraulic conductivity are less abundant.

With spatial information (lateral and vertical extension) of perched aquifers in Ljubljana polje improvement of existing hydrogeological models can be made which can help to improve the qualitative and quantitative status of the Ljubljana polje main aquifer.