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RELATING FACIES CONNECTIVITY TO FLOW AND TRANSPORT PROPERTIES FOR A POINT BAR-CHANNEL AQUIFER ANALOGUE

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Summary. Facies connectivity is one of the most influent parameters on groundwater flow paths and therefore on solute transport at any scale. In alluvial aquifers, the degree of connection among facies bodies contributes to determine flow path and velocity, transport and diffusion of contaminants. For this reason the quantification of connectivity at different scales could provide constraints for simulation of aquifer heterogeneity and for elaboration of flow and transport models. To explore this opportunity we studied a well-exposed and well-known aquifer analogue, at the scale of the point-bar/channel depositional element of a meandering river, starting from knowledge of the sedimentary architecture of the unit. The analogue, exposed in a gravel pit, belongs to the historical sediments of the terraced meandering valley of the Lambro River (Po plain, Northern Italy). The whole volume under study (about 30000 m^3) was simulated on two different grids with three methods (SISIM, T-Progs and MPS), using conditioning data from five quarry faces. A test volume (about 370 m^3) was simulated with SISIM and MPS at the hydrofacies scale. The aim of this communication is to present the results of the connectivity analysis for the test volume, so that some preliminary comments on the link between connectivity indicators and transport properties can be drawn. In particular an ensemble of equiprobable realizations for each simulation method permits, in a Monte Carlo fashion, to compute the probability density functions of indicators of facies connectivity and of the equivalent conductivity tensor and therefore of flow connectivity indicators. Moreover, virtual field data on transport processes were generated by simulating the evolution of contaminant plumes through these portions of a virtual alluvial aquifer: one experiment of convective transport of a non-reactive solute was performed for each realization and each method, so that transport connectivity indicators were computed. The analysis of the results, in particular the correlation between different connectivity indicators, permits further insight in the comprehension of the hydrodispersive parameters of point bar-channel aquifers.