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Evaluating Uncertainty in Estimating Groundwater Residence Time through a River Bend –An Integrated Hydrogeologic Modelling Study

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A hydrogeologic modelling study of the Steinlach River bend, in Southwest Germany, was conducted to assess the predictive uncertainty of hyporheic exchange. The Steinlach River bend is an experimental site established in 2010 to monitor hyporheic exchange fluxes through a river bend (Osenbrück et al., 2013). One aspect of hydrogeologic models most readily identified as contributing significantly to predictive uncertainty is the representation of hydraulic conductivity. This research aims to evaluate which aspect of the subsurface representation – the representation of geological structure, the model for local scale heterogeneity, or the associated parameter values – most influences the predictive uncertainty of intra-meander hyporheic exchange. HydroGeoSphere (HGS) was used to model the Steinlach River bend. HGS is a state-of-the-art control finite volume fully integrated surface water-groundwater model (Therrien et al., 2012). This model is set up and treated as 'virtual reality', which is in turn modelled as several simpler models using different subsurface parameterization schemes. The accuracy and precision of modelled groundwater residence times through the intra-meander are evaluated, with an analysis of the predictive uncertainties associated with the different aspects of the subsurface representation.