A seamless GIS groundwater flow model and its example applications in England

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Groundwater modelling is a well developed scientific technique but requires both an understanding of the processes and complex IT. To lower the barriers of entry the first seamless groundwater flow model, named GISGroundwater has been developed, by coupling a groundwater flow model with a Geographical Information System. The system allows non-modellers, for example scientists or students to construct groundwater flow models efficiently and easily. It can be freely downloaded from internet and used for any purpose.

GISGroundwater has been validated through comparison with an existing stand-alone groundwater modelling code, and against analytical solutions to groundwater head profiles for a range of aquifer configurations. It is useful in quickly developing preliminary groundwater flow models or evaluating conceptual hydrogeological understandings at both regional (large scale) and catchment scales. The example applications in the Eden Catchment and Thames Basin, England demonstrated that groundwater models can be easily and efficiently developed using GISGroundwater. Only 1.4 hours were needed in building up the Thames Basin groundwater model using GISGroundwater, whilst another groundwater model needs up to 62 hours for the same modelling target.