

Type of presentation: Poster

Abstract Title: ApsûGIS : a GIS-tool for groundwater vulnerability assessment using physical criteria

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Key words: groundwater vulnerability, GIS, physically-based, Belgium

The Apsû method has been developed since 2004 to produce groundwater intrinsic and specific vulnerability maps based on a quantitative description of contaminant transport processes in the subsurface. It is based on the source-pathway-receptor approach, driven by two concepts: land surface dangerosity that accounts for lateral flow on land surface and infiltration and subsurface attenuation capacity. Vulnerability classes are based on physically-based criteria reflecting the sensitivity of groundwater to pollution events, namely contaminant travel time across the unsaturated zone, pollution duration, or contaminant concentration or mass recovery factors at the groundwater table.

To facilitate the application of the Apsû method to case studies, GIS-based applications and interfaces have been developed to integrate geodatabases and user interfaces in the same environment software. The main geodatabase contains all the data required for the calculation of the vulnerability coefficient, such as spatial data (topography, land cover, hydrological network, meteorology, soil types...) and specific databases on contaminant properties (i.e. Koc values, degradation constants...), on hydrogeological properties of geological layers constituting the unsaturated zone flow path. Specific user interfaces have been developed to prepare and export spatial data required by the Apsû calculations. Once the groundwater vulnerability factors are calculated, another user interface is available to automatically create and customize different thematic layers related to groundwater vulnerability mapping. This integrated system makes it possible to automate numerous data formatting geoprocessing operations, and to ensure data integrity by minimizing user interactions with the data (spatial frame, data projection, link between spatial data and databases, etc.) and to focus work on the specificities of the areas studied and the interpretation of the vulnerability maps created.

The objective of the communication is to describe the general organisation and operation of the GIS-based interface, illustrated with groundwater vulnerability case studies for aquifers of the Walloon Region of Belgium.