Open source GIS based tools to improve hydrochemical water resources management in EU H2020 FREEWAT platform

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Due to the general increase of water scarcity (Steduto et al., 2012), water quantity and quality must be well known to ensure a proper access to water resources in compliance with local and regional directives. This circumstance can be supported by tools which facilitate process of data management and its analysis. Such analyses have to provide research/professionals, policy makers and users with the ability to improve the management of the water resources with standard regulatory guidelines. Compliance with the established standard regulatory guidelines (with a special focus on requirement deriving from the GWD) should have an effective monitoring, evaluation, and interpretation of a large number of physical and chemical parameters. These amounts of datasets have to be assessed and interpreted: (i) integrating data from different sources and gathered with different data access techniques and formats; (ii) managing data with varying temporal and spatial extent; (iii) integrating groundwater quality information with other relevant information such as further hydrogeological data (Velasco et al., 2014) and pre-processing these data generally for the realization of groundwater models.

In this context, the Hydrochemical Analysis Tools, akvaGIS Tools, has been implemented within the H2020 FREEWAT project; which aims to manage water resources by modeling water resource management in an open source GIS platform (QGIS desktop). The main goal of AkvaGIS Tools is to improve water quality analysis through different capabilities to improve the case study conceptual model managing all data related into its geospatial database (implemented in Spatialite) and a set of tools for improving the harmonization, integration, standardization, visualization and interpretation of the hydrochemical data. To achieve that, different commands cover a wide range of methodologies for querying, interpreting, and comparing groundwater quality data and facilitate the pre-processing analysis for being used in the realization of groundwater modelling. They include, ionic balance calculations, chemical time-series analysis, correlation of chemical parameters, and calculation of various common hydrochemical diagrams (Salinity, Schöeller-Berkaloff, Piper, and Stiff), among others. Furthermore, it allows the generation of maps of the spatial distributions of parameters and diagrams and thematic maps for the parameters measured and classified in the queried area.

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