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Uncertainty management of a hydrogeological data set in a lignite basin, using BME

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The quality of water is defined in terms of its physical, chemical, biological and bacteriological parameters and may vary with the type of use such as drinking, bathing and domestic use, irrigation, recreation and industrial use. Quality criteria of underground and surface waters constitute the acceptable level of contaminant concentrations. The occurrence of chemical parameters is an issue of considerable interest. In the case of Ptolemais lignite opencast mining area, ammonium, nitrites, nitrates, iron total and total manganese concentrations have been monitored since the early 2000's through an extensive sampling network. The continuous, though, alteration of the surface topography due to the intensive mining works, affects the life span of the water boreholes and results to a non homogeneous time scale of the data. Thus, the number of the available data for each borehole varies from one to eight quarterly measurements. Regarding the problem of spatial mapping of water contamination, the data in most locations are neither enough to allow for estimation of a possible seasonal behavior, nor too stationary to ensure certainty. In line to the above problem, the focus of the present work is methodological. In particular, we propose the treatment of the whole dataset as uncertain; instead of using solely the average value of nitrate content in each location in the conventional way, we consider a uniform distribution between the minimum and the maximum values. The Bayesian Maximum Entropy theory is an important component of this framework, which possesses solid theoretical foundations and offers powerful tools to merge the uncertainty sources with the rest of conventional measurements.