Assessing the Natural Background of Cr(VI) impacted aquifers in Central Greece

K.PYRGAKI , A. ARGYRAKI , E. KELEPERTZIS , F.BOTSOU , I. MEGREMI , S.KARAVOLTSOS, E.DASSENAKIS, D.DERMATAS

[1]National and Kapodistrian University of Athens, Athens 15784, Greece, kpyrgak@geol.uoa.gr

[2] National and Technical Unversity of Athens, Athens 15780, Greece

According to Water Framework Directive 2006/118/EC the members states of the European Union have to take into account the natural background levels in order to set treshold values for the assessment of groundwater chemical status. In the present comparative study, a total of 134 groundwater samples were collected during the wet and dry seasons of 2017 and 2018 from four Cr(VI) impacted porous groundwater bodies of Central Greece where Cr(VI) is mainly of geogenic origin [1]. The scope is to assess the chemical status deviation from the natural groundwater quality due to the human induced pressures. In the study areas, such pressures are caused by the use of agrochemicals, domestic wastewater effluent release and borehole overpumping. Water chemical analysis data were coupled by mineralogical analysis by SEM-EDS of suspended material collected on water filters. Subsequent sample categorization according to hydrogeochemical, hydrogeological, mineralogical and land use criteria allowed the discrinination of a set of samples with chemical characteristics closer to the natural background. Specifically, samples with high salinity due to sea intrusion, agricultural return flows and sewage effluents were identified. Samples impacted by sea water intrusion exhibited a ratio of Na/Na+Cl (<0.5) and high TDS (>500 mg L^{-1}) and they were located close to the coastal zone. Samples impacted from agriculture return flows were distinguised by their very high SO_4/Cl ratio (>>0.05) while samples with NO_3>50mg L^{-1} were considered indicative of nitrification processes. Out of 134 samples, only 41 samples were categorized as representative of the natural background. The two sample populations were analysed using one-way ANOVA.

It was found that the anthropogenic impacted samples had significantly higher mean and median values of Cr(VI) than those of the samples being closer to natural background (p< 0.05).

[1] Kaprara *et al* (2015) *J. Hazardous Materials*, **281**, 2-11.