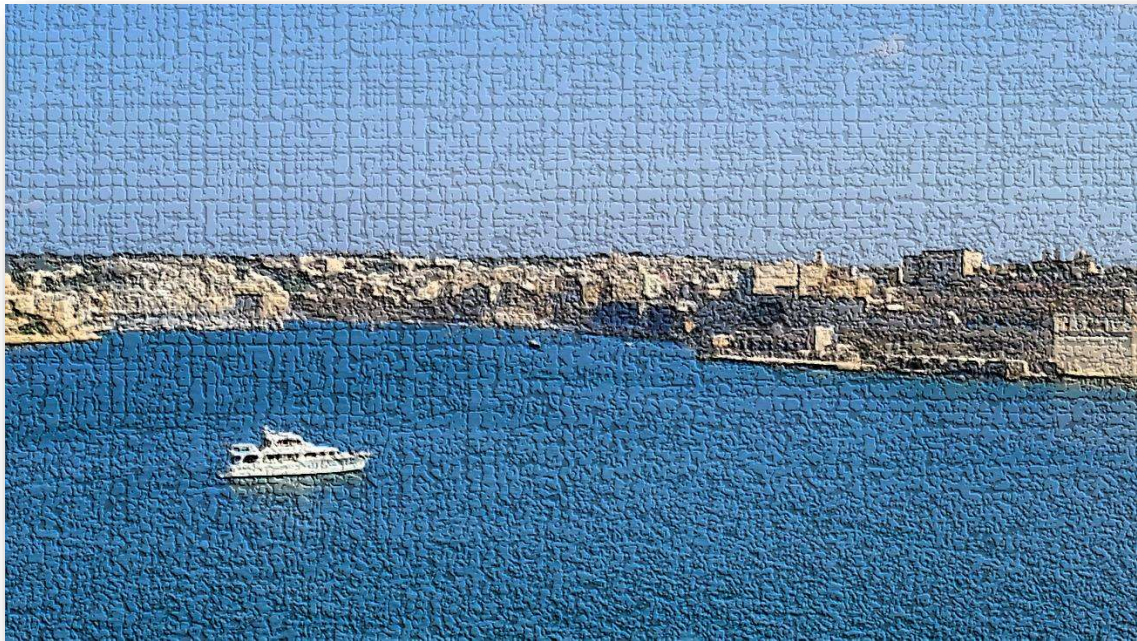




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Identification of Major Sources Controlling Groundwater Quality Under Different Hydrogeological Regimes in Mediterranean Catchments

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Multivariate statistical analysis has been widely used for the hydrochemical interpretation of groundwater data under different hydrological conditions with several techniques. This study deals with the spatial variation of hydrogeochemical characteristics of groundwater in different Mediterranean catchments and determines the natural and anthropogenic influences. The study areas are located in Greece (Anthemountas and Mouriki basins) and Italy (Upper Volturno basin). The general information about the basins was collected and evaluated by including morphological characteristics, land use, and meteorological data. The distribution of hydrochemical data in the study areas and the production of piezometric maps were performed in a GIS environment. Then, the statistical analysis of ion concentrations and calculated ionic ratios were combined to determine the hydrochemical status of the basins. The correlation between the chemical components was obtained using a Pearson's correlation matrix. Additionally, the DPSIR model was applied to highlight and compare the main pressures in the basins. According to the results, chemical fertilizers and manure are the main sources of anthropogenic pollution affecting the study areas. High concentrations of calcium and magnesium were recorded due to the presence of carbonate rocks in the Upper Volturno basin. In addition, a good correlation between calcium and magnesium and bicarbonate ($r^2=0.96$) indicates the dissolution of carbonate rocks. Strong chlorine, sodium and EC concentrations reveal seawater intrusion in the coastal part of the Anthemountas basin and the presence of geothermal fluids in the mainland. The samples in the Mouriki basin showed a positive correlation between calcium, magnesium, sulphate and nitrate due to the presence of chemical fertilizers and the decomposition of organic materials. Furthermore, agricultural activities cover more than 80% of the Greek basins while in the Italian one, it does not exceed 60%. In addition, drought and flood events have been recorded in Anthemountas and Mouriki basins, respectively. These conditions have pronounced impacts on groundwater recharge and quality. Consequently, decision-makers should take immediate action in order to protect the quantity and quality of groundwater in the studied sites.