

Degassing of CO₂ and H₂S into a volcanic freshwater aquifer system at Mount Vulture, Basilicata – southern Italy

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The study of geochemical processes and integrated water flow can help identify water-rock interaction processes and improve hydrogeological conceptual model of the Mount Vulture hydro-structure. The Mount Vulture is a Pleistocene strato-volcano which consists of about 700 m thick lava and pyroclastic successions placed along the external edge of the Apennine Chain, close to the western portion of the *Bradanic Foredeep*. The volcanic activity started at about 0.75 Ma and continued, interrupted by long-lasting quiescence periods, up to 0.14 Ma. The investigated area represents one of the most important hydro-structures of Basilicata Region (south Italy), having an area of about 180 Km². Understanding groundwater flow paths in the study area is important within such complex volcanic and/or sedimentary environments, where the exploitation mode plays also a crucial role for the preservation of the overall aquifer quality. A total of 48 water samples taken at different altitudes ranging from 350 to 1200 meter a.s.l. among drilled wells and springs were collected during three sampling campaigns, from Jun 2007 to Jun 2008. The sampling points are located in the NW and NE sectors of the study area within the volcanic products and in the SE sectors inside the fluvio-lacustrine sediments pre-sin and post volcanic. The isotopic composition ($\delta^{18}\text{O}$, δD), major (Ca^{2+} , Mg^{2+} , Na^+ , K^+ , Cl^- , SO_4^{2-} , NO_3^-), minor and trace elements (V, Al, As, B, Br, Cu, Fe, Mn, Ni, Pb, Rb, Se, Sn, Sr and Zn) were analyzed. Also isotopic data of $^{13/12}\text{C}$ and $^3/4\text{He}$ available. Phreeqc-2 is used to identify hydrogeochemical reactions and to describe water-rock interaction.