

Title: Monitoring and hydrogeological and hydrogeochemical modelling of groundwater of the Somma-Vesuvius volcanic aquifer, Italy.

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Proposal

Groundwater from volcanic systems are vital sources in many regions of the world and widely used for human consumption, agricultural and industrial activities. In active volcanic areas groundwater can be a valuable tool for monitoring and forecasting volcanic activity. For Somma-Vesuvius, despite being among the most active and dangerous volcanoes in the world, hydrogeological and hydrogeochemical knowledge is still fragmentary and incomplete, due to the lack of permanent monitoring.

The project proposal will aim to carry out a hydrogeological and hydrogeochemical study of the groundwater of the Somma-Vesuvius volcanic system, based on characterization, multi-parameter monitoring and groundwater modeling to increase the knowledge of hydrogeological processes and hydrothermal and identify new proxies for the prevention of risks and hydrogeological and volcanic surveillance.

Research Program

The research proposal will include investigations, field and laboratory analyses, as well as characterization, modeling and multi-parameter monitoring, by a permanent and remote network monitoring of hydrogeological and hydrogeochemical sensors of groundwater.

The research program will be divided into the following phases and activities:

- hydrogeological, hydrogeochemical and stratigraphic field data collection (wells, springs, boreholes).
- 2D, 3D and 4D cartographic and numerical modeling of the volcanic aquifer and groundwater flow, from basin to local scale.
- implementation of a continuous and remote multi-parameter monitoring network of groundwater and control of piezometric levels, chemical-physical and isotopic parameters of the groundwater and geothermal fluids.
- analysis of hydrogeological and hydrogeochemical processes and of the interaction between the groundwater and deep fluids of hydrothermal origin.
- realization of a hydrogeological and hydrochemical database of groundwater in a WebGIS system, as a real-time analysis of the volcano and decision support tool for stakeholders, and regional and national institutions.

The research proposal will be supported by economic resources of a three-year research agreement signed by DiSTAR and G.O.R.I. S.p.A. (Optimal Management of Water Resources) to study the groundwater recharge and contamination processes of aquifers located within ATO 3 Sarnese-Vesuviano District. The research proposal is part of a scientific agreement signed by the DiSTAR (Department of Earth, Environmental and Resources Sciences), INGV-OV (Vesuvius Observatory) and G.O.R.I. S.p.A.