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Assessment of Karst Spring Features in a typical Mediterranean fluvial landscape with an Interdisciplinary Investigation nased on Radon-222 as an Environmental Indicator. The case study of the Bussento River basin (Campania region, Southern Italy).

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Karst aquifers provide 25% of the overall drinking water resources to the world's population and sustain aquatic life in most fluvial systems, providing several ecological services to human beings, although, because of their complex links between surface and groundwater, turn out to be very vulnerable to contamination and pollution. Hydrological assessment of karst systems reveals to be extremely complex and difficult and requires a stepwise multi-tracers approach.

This work describes some of the most relevant findings obtained from the implementation of an interdisciplinary approach based on the use of Environmental Tracers, consisting of Naturally Occurring Radionuclides like Radon-222 (referred to as Radon), for the investigation of Groundwater/Surface water Interaction (GSI) processes in fluvial water bodies. In particular, Radon activity concentration measurement data having been collected from streamflow and instream springs during monthly field campaigns performed in a typical Mediterranean karst river basin: the Bussento river system (Campania region, Southern Italy). The general task has been to investigate the complex interactions and exchanges between streamflow and groundwater in a fluvial water body, at scales that are imperceptible to standard hydrological and hydraulic analyses.

The Bussento River basin has been chosen as a study case for the following features of extreme relevance:

Its location inside the Cilento and Vallo di Diano National Park, its inclusion of a WWF Nature Reserve, it represents a remarkable Drinking Water resource for the territory and last but not least its system includes Submarine Groundwater Discharges (SGD) to the Policastro Gulf. All these issues causes, therefore, that the management of its relevant water resources requires not only groundwater protection for domestic drinking use, but also riverine wildlife preservation and coastal water quality maintenance.

As a support for hydro-geomorphological and hydrological modelling for planning tasks, in application of the European Water Framework Directive (EWFD), a Bussento River Monitoring System (BRMS) as been built, at basin, segment and reach scale. Experimental data about ^{222}Rn activity concentrations, in addition to physical-chemical and streamflow rate, have been acquired and managed from BRMS selected stations, sampling the streamflow and inflow spring waters by means of the Radon-in-Air analyzer, RAD7, together with the Radon-in-water accessories, Radon Water Probe and RAD7H2O (DURRIDGE Co. Inc.), for continuous and batch sampling measurements, respectively. The analysis of the seasonal data trends from karst springs confirms the hydrogeological conceptual model, highlighting the complex behaviour of a multilevel groundwater circuits, the uppermost in caves, the middle in conduits and the lowermost in fracture network, corresponding to the differentiated recharge types in the fluvial-karst hydro-geomorphological system.

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