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Geogenic carbon transport through karst hydrosystems of Greece

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The Earth C-cycle is complex, where endogenic and exogenic sources are interconnected, operating in a multiple spatial and temporal scale (Lee et al., 2019). Non-volcanic CO_2 degassing from active tectonic structures is one of the less defined components of this cycle (Frondini et al, 2019).

Carbon mass-balance (Chiodini et al., 2000) is a useful tool to quantify the geogenic carbon output from regional karst hydrosystems. This approach has been demonstrated for central Italy and may be valid also for Greece, due to the similar geodynamic settings. Deep degassing in Greece has been ascertained mainly at hydrothermal and volcanic areas, but the impact of geogenic CO_2 released by active tectonic areas has not yet been quantified.

The main aim of this research is to investigate the possible deep degassing through the big karst aquifers of Greece. Since 2016, 156 karst springs were sampled along most of the Greek territory. To discriminate the sources of carbon, the analysis of the isotopic composition of carbon was carried out. $\delta^{13}C_{TDIC}$ values vary from -16.61 to -0.91 ‰ and can be subdivided into two groups characterized by (a) low $\delta^{13}C_{TDIC}$, and (b) intermediate to high $\delta^{13}C_{TDIC}$ with a threshold value of -6.55 ‰. The composition of the first group can be related to the mixing of organic-derived CO_2 and the dissolution of marine carbonates. Springs of the second group, mostly located close to Quaternary volcanic areas, are linked to possible carbon input from deep sources.

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