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# Traditional ($\delta$D, $\delta$O-18 ) and non-traditional (Sr-87/Sr-86) isotopes approach to vertical lake profile study

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Isotopic studies ($\delta$D, $\delta$O-18, and Sr-87/Sr-86) may contribute to hydrodynamic characterization of lakes, considered as complex systems. Most frequently, researches on lake waters using stable isotopes focus on hydrodynamic studies for the development of hydrological balance. Moreover compared to other types of natural or artificial tracers, isotopes have the advantage of being conservative.
Stable isotopes are defined ideal tracers for the characterization of some hydrodynamic parameters of lakes. A comparison of Sr-87/Sr-86 ratio between the aqueous phase (lakewater and groundwater) and the Sr-87/Sr-86 ratio of exchangeable Sr from aquifer material can give detailed information on the hydrochemical processes that contribute solutes to the water. Furthermore, the combination of Sr-87/Sr-86 ratios with information on flow patterns deduced from other isotopes ($\delta$D, $\delta$O-18 ) and from geochemical modeling of the cycling of major ions in lakewater and groundwater provides an effective multitracer approach. This can significantly add to our understanding of complex hydrologic systems
In addition to determining chemical components and chemical-physical properties (T, pH, electrical conductivity, dissolved oxygen) the study provided the isotopic characterization ($\delta$D, $\delta$O-18 e Sr-87/Sr-86) of Lake Albano waters.
The vertical profile of dissolved oxygen indicates the existence of the following: ossic epilimnion from surface to the depth of 30 m, a quite large thermocline (metalimnic zone) from 30 to 50 m depth, and anoxic extended hypolimnum from 50 to 100 m depth.
The pattern of the value of $\delta$O-18 and $\delta$D with depth leads to the hypothesis that the lake basin is divided into an upper zone (up to 60 m), with a good flow of water, and a lower zone (60 m to 100 m) with a system of stagnant and stratified water, producing different values of $\delta$18O between the layers.

$\delta$O-18 data associated with $\delta$D value shows the effect of evaporation on closed basin.
The values of Sr-87/Sr-86 isotopic ratio of the lake suggests that there is an interaction of lake water with volcanic products and a contribution of water sedimentary substrate.
Sr-87/Sr-86 ratio in combination with, such as $\delta$O-18 and $\delta$D, provide invaluable information about geochemical processes, such as dissolution of aquifer minerals and cation-exchange reactions, flow and mixing patterns in dynamic hydrologic flow systems, and sources of dissolved solutes in groundwater controlling the chemical evolution of groundwater in a volcanic complex.