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## Strontium isotope as tracers of groundwater contamination

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### Abstract

Groundwater flowing under a municipal solid waste landfill has been studied to identify potential contamination phenomenon and to test strontium isotopic composition as a natural tracer of contamination. The study was carried on in June 2014 in central Italy. Five selected boreholes were selected and analysed according to their location related to the site. Samples taken from boreholes placed upward to the site were considered as uncontaminated groundwater. One borehole located downward from the site and with major contaminant values has been considered as potentially contaminated end-member. Sr isotope results show that samples located upward from the site present lower Sr concentration and highest Sr isotopic values, which reflects weathered bedrock, while borehole located downward from the site show lowest Sr values and  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio, probably due to pollution by landfill leachate. The mixing calculation highlights the possible mixing phenomenon for the other samples located downward from the site.

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### 1. Introduction

Municipal solid waste landfills are the common method for organized waste disposal in many places around the world. Leachate from these landfills contains a large variety of organic and inorganic pollutants that can migrate into the groundwater.

The use of isotope analyses, as  $^3\text{H}$ ,  $\delta^{11}\text{B}$  and  $\delta^{13}\text{C}$ , are often applied to identify sources of contamination<sup>1-3</sup>. Strontium isotope can be used as geochemical and environmental tracers. Several authors<sup>4</sup> showed that strontium isotopic analysis could be used to investigate surface and groundwater or leachate contaminated groundwater. The distinctive chemical composition of landfill leachate is a result of the chemical interaction between water, chemical by-products of degrading organic matter in solid wastes, such as organic and inorganic acids, minerals and other

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