

## Hydrochemical and Stable Isotope ( $\delta^{18}\text{O}$ and $\delta^2\text{H}$ ) Characteristics of Khorasan Razavi Rivers

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### Abstract

Iran located in arid and semi-arid region faces dramatic water shortage crisis mainly in large and populated provinces. Surface water resources plays dominant role to provide irrigation and potable water usages in Khorasan Razavi province. In this study, 1112 hydro chemical analyses from 25 river stations in Khorasan Razavi Province north-eastern Iran have been studied to determine the main parameters controlling river water quality. The results demonstrated that rock weathering with simultaneous dissolution of evaporative, carbonate and silicate minerals is dominant factor controlling river water quality. Stable isotopes  $\delta^{18}\text{O}$  and  $\delta^2\text{H}$  in some of the rivers and two main dam reservoirs Kardeh and Torogh demonstrated that river water samples mainly plot below Mashhad Meteoric Water Line between Eastern Mediterranean Meteoric Water Line and Global Meteoric Water Line and show negligible deviation due to low evaporation. However, dam reservoir samples show notable deviation from meteoric water lines due to huge evaporation from their surfaces.

**Keywords:** Cluster analyses, Hydro chemistry, Iran, Khorasan Razavi, Rivers, Stable isotopes

### Research Highlights

- Surface water resources play dominant role in Khorasan razavi water resources supply
- The quality of water resources have been studied in 25 main rivers by hydrochemical and isotope tools
- 25 main rivers have been clustered to 6 main groups based on their hydrochemical characteristics

### 1. Introduction

In the recent decades, the world faces crucial challenges to provide water supply as important factor influencing economic and social development. As available water resources quality and quantity has been rapidly reducing globally due to pressures caused by huge water consumption and anthropogenic (irrigational, municipal and industrial) pollutants, very precise monitoring should be done to control water shortage crisis and prevent large catastrophe. Among various water resources, rivers represent key role in water cycle, returning about 35% of continental precipitation to oceans [1]. The same as other water resources types, river systems are also very vulnerable to climate change and needs continues and accurate monitoring and support. Rivers water system are controlled by both natural parameters atmospheric precipitation and rocks weathering and anthropogenic sources. River water quality