

# Groundwater Flow Path and Evolution in the Nagqu Basin, Northeast Tibet Plateau

Xiaoyan Gong<sup>1</sup>, Baisha Weng<sup>2</sup>, Denghua Yan<sup>2</sup>, Yuheng Yang<sup>2</sup>, Yongzhen Niu<sup>2</sup>, and Hao Wang<sup>1</sup>

<sup>1</sup>Jilin University

<sup>2</sup>China Institute of Water Resources and Hydropower Research

November 11, 2020

## Abstract

Permafrost groundwater is characterized by a unique circulation, which is due to global warming and permafrost degradation. Understanding the groundwater flow path and evolution is essential for the sustainable management of water resources in alpine regions. In this study, the flow and evolution of groundwater in the Nagqu River Basin in the Qinghai–Tibet Plateau were studied using hydrochemistry, 18O, 2H and 3H analyses. The results reveal that water–rock interaction, including the dissolution of the sulfate minerals calcite and dolomite, is the main factor affecting the hydrochemical evolution. In mountainous areas, it is also affected by the dissolution of halite. However, in the valley plain, it is affected by the dissolution of sodium, evaporation concentration, and cation exchange reaction. Superpermafrost water is a mixture of modern and ancient water. From the high-altitude recharge area to the plain, the renewal rate decreases from 10.48% to 0.61% and the mean transit time increases from less than 6 to 20–35 y. In mountainous areas, groundwater is mainly recharged by the infiltration of glacier meltwater, snow meltwater, and highland precipitation, whereas deep fissure water replenishment occurs in fault areas. The main drainage modes are evaporation and overflow into springs. This study discusses fundamental mechanisms controlling the groundwater system in alpine areas and provides a theoretical basis for studying the groundwater circulation in similar systems.

## Hosted file

Text-Groundwater Flow Path and Evolution in the Nagqu Basin, Northeast Tibet Plateau.pdf available at <https://authorea.com/users/374901/articles/492291-groundwater-flow-path-and-evolution-in-the-nagqu-basin-northeast-tibet-plateau>







