

## Spatial distribution and temporal variation of hydrogeochemistry in coastal lagoons and groundwater on the eastern area of Korea

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### Abstract

Coastal lagoons play a crucial role in water exchange, water quality, and biodiversity. It is essential to monitor and understand the dynamics of hydrogeochemistry in lagoon water and its groundwater to preserve and sustainably manage the groundwater-dependent ecosystems like coastal lagoons.

This study investigated the spatial and temporal hydrogeochemical characteristics of coastal lagoon (Songjiho) and groundwater on the east coast of Korea. The concentrations of major ions, water isotopes, and nutrients (nitrogen and dissolved organic carbon) in lagoon water and groundwater were periodically monitored for one year. The study revealed that major ions and total dissolved solids (TDS) concentration were higher at deeper depths of aquifers and closer to the coastal area. The hydrogeochemical characteristics of coastal lagoon and groundwater chemistry were classified into two types, Ca-Mg-HCO<sub>3</sub> and Na-Cl, based on their spatial location from inland to coastal area. Moreover, the hydrogeochemical characteristics of coastal lagoons and groundwater varied significantly depending on the season. During the wet season, the increased precipitation and evaporation lead to changes in water chemistry. As a result, the total organic carbon (TOC) of coastal lagoons increases during this season, likely due to increased runoff by rainfall whereas the variation of chemical compositions in the lagoon and groundwater were not significant because there is reduced precipitation, resulting in stable water levels and during the dry season.

The study emphasizes the impact of spatial distribution and seasonal changes in precipitation, evaporation, and river discharge on the hydrogeochemical characteristics of the coastal aquifer and lagoon system. Understanding these impacts is crucial for managing and protecting coastal lagoons and groundwater resources.

**Keywords:** Groundwater-surfacewater interaction, Hydrogeochemistry, Coastal lagoon.

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