

雲林地區地下水之水化學特徵及鹽化

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摘 要 本研究探討雲林地區地下水之主要化學組成，以了解各含水層地下水之化學特徵及反應機制，進而推測雲林地區地下水可能之鹽化成因。結果顯示：整體而言，雲林地區地下水是以(Ca+Mg)-HCO₃型之水化學相為基本架構，Na-HCO₃及(Ca, Mg, Na)-HCO₃水化學相之地下水則分佈在扇尾或深層地下水中；Na-Cl型出現在沿海地區，(Ca, Mg)-SO₄型地下水之分佈較與個別之地點有關。由各含水層地下水中相關離子之濃度關係與相關水化學反應途徑比較顯示，本研究區之地下水是以碳酸鹽溶解作用為主；相較於深層地下水，扇頂及淺層地下水則有較為明顯之硫酸鹽溶解現象，而陽離子交換作用則顯著發生在深層或扇尾之地下水中。地表來源之溶解態離子滲入和扇尾地區鹽土淋洗之作用，可能是造成雲林地區地下水鹽化程度增高的二主要原因。地表來源之溶解態離子滲入造成含水層1表現出較高TDS和EC的濃度，離子種類以Ca²⁺+Mg²⁺、HCO₃⁻及SO₄²⁻為主；扇尾區地下水受近期入滲淡水淋洗鹽土的作用影響，因此顯示出較高之Na⁺與Cl⁻濃度。以本研究之數據而言，扇尾地區直接源自海水污染而造成地下水鹽化之情況並不明顯。

關鍵詞：地下水、水化學相、鹽化、雲林。

Hydrochemical Characteristics and Salinization of Groundwater in the Yunlin Area

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ABSTRACT This study integrated and made explicit the major chemical compositions of groundwater for the purposes of not only understanding the hydrochemical characteristics and reaction mechanism of the groundwater in the Yunlin area, but also inferring the reasons for groundwater salinization. The results show that the basic hydrochemical facies of Yunlin's groundwater is the (Ca+Mg)-HCO₃ type; Na-HCO₃ and (Ca, Mg, Na)-HCO₃ are observed in the distal fan or in the deep aquifer. Na-Cl distributes in coastal areas and (Ca, Mg)-SO₄ also exists in some specified sites. A comparison of the relations between the selected ions with related hydrochemical reaction paths in the groundwater of each aquifer indicates that dissolution of carbonates is the primary reaction path of aquifers in the Yunlin area. Sulfate dissolution is significant in the groundwater of the proximal fan and shallow aquifer,

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rather than that in groundwater of the distal fan or the deep aquifers where are mainly controlled by cation exchange. Dissolved ions infiltrating the shallow aquifer from the land surface and salt ions leached from saline soil in the distal aquifer could be the two main factors causing groundwater salinization in the Yunlin area. Land surface infiltration of $\text{Ca}^{2+}+\text{Mg}^{2+}$ and SO_4^{2-} ions caused groundwater of aquifer 1 to exhibit high concentrations of total dissolved solid (TDS) and electronic conductivity (EC). It is suggested that the relatively high concentrations of Na^+ and Cl^- in the distal groundwater was due to recent leaching from the saline soils by freshwater. Groundwater salinization induced from seawater intrusion is therefore not clearly based on the hydrochemical characteristics of this study.

Key Words: groundwater, hydrochemical facies, salinization, Yunlin area.