

## 非飽和層地質材料對降雨與地下水位關係的影響

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報告日期：2025/03/14

### 摘要

降水首先因重力作用進入非飽和層，然後沿著孔隙向下滲漏抵達淺層非受壓飽和層，使其地下水位上升。在此過程中，水的移動受非飽和層材料透水性影響。在桃園地區的非飽和層普遍存在紅土礫石層，主要由未膠結的礫石組成，並夾雜砂質或粉砂質的凸鏡體。其質地致密且透水性差，形成雨水入滲的阻礙，影響降雨入滲的地下水補注過程。然而，我們在桃園市龍潭區研究發現，降雨對當地地下水位提升有立即的反應，與其它區的反應明顯不同。目前推測補注差異與紅土層覆蓋與否和覆蓋厚度相關。因此，本研究旨在使用 THMC 軟體，建立多個不同材料組成的二維垂直模型，並且設定不同降雨強度，分析有無紅土礫石層的情況下，降雨補注與地下水位變化的差異，並探討紅土礫石層在阻礙入滲過程中的作用。

**關鍵字：**降雨、地下水位、材料、水力傳導係數、孔隙率、儲水係數。

# **The impacts of unsaturated zone geological materials on the relationship between rainfall and groundwater level**

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Date: 2025/03/14

## **Abstract**

Precipitation first enters the unsaturated zone due to the force of gravity and then infiltrates downwards through the pores to reach the shallow unconfined saturated zone, causing the groundwater level to rise. During this process, the movement of water is influenced by the permeability of the unsaturated zone materials. In Taoyuan, the unsaturated zone often contains a lateritic gravel layer, primarily composed of unconsolidated gravel mixed with sand or silt-sized convex bodies. The layer has a dense texture and poor permeability, forming a barrier to rainfall infiltration and affecting the groundwater recharge process. However, our research in Longtan District of Taoyuan City found that rainfall has an immediate effect on the local groundwater level, which is significantly different from the response observed in other areas. It is currently speculated that the difference in recharge is related to the presence or thickness of the lateritic gravel layer. Therefore, this study aims to use THMC software to establish multiple 2D vertical models with different material compositions and varying rainfall intensities, analyzing the differences in rainfall recharge and groundwater level changes under the presence or absence of lateritic gravel, and exploring the role of lateritic gravel in hindering the infiltration process.

**Keywords:** Rainfall, Groundwater level, Material, Hydraulic conductivity, Porosity, Storativity.