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Subsurface temperature distribution in a tropical alluvial fan

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As a groundwater intensive use country, Taiwan's 1/3 water supplies are derived from groundwater. The major aquifers consist of sand and gravel formed in alluvial fans which border the fronts of central mountains. Thanks to high density of monitoring wells which provide a window to see the details of the subsurface temperature distribution and the thermal regime in an alluvial fan system. Our study area, the Choshui Alluvial Fan, is the largest groundwater basin in Taiwan and, located within an area of 2,000 km2, has a population of over 1.5 million. For this work, we investigated temperature-depth profiles using 70 groundwater monitoring wells during 2000 to 2015. Our results show that the distribution of subsurface temperature is influenced by various factors such as groundwater recharge, groundwater flow field, air temperature and land use. The groundwater recharge zone, hills to the upper fan, contains disturbed and smaller geothermal gradients. The lack of clay layers within the upper fan aquifers and fractures that developed in the hills should cause the convection and mixing of cooler recharge water to groundwater, resulting in smaller geothermal gradients. The groundwater temperatures at a depth to 300 m within the upper fan and hill were approximately only 23-24 °C while the current mean ground surface temperature is approximately 26 °C.