Cave Porosity and Permeability: A Technique for the Comparison of Differing Karst Areas

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The understanding of karst groundwater flow and karst hydrogeological concepts and the relationship of both porosity and permeability in karst are often poorly understood. The high variability of karst areas make comparison between areas difficult. Confusing and contradictory terminology has not helped.

Worthington (1991) developed morphometric techniques relating to porosity and permeability measurement in carbonate aquifers which enhance understanding of conduit development in the aquifers. Consequently these techniques are useful tools for the comparison of the karstification of different areas.

Concepts such as conduit density and porosity can assist in determining the karstification of an area. Cave porosity is the percentage volume of the karstic rock occupied by mapped cave. It represents only part of secondary porosity, which also includes smaller fissures. Conduit density is defined as the total length of conduits within a unit volume of rock (karst aquifer). These values are always underestimates as they will always be increased by further exploration and mapping and they are a rather coarse measure of karstification. However, they enable comparison between areas in a way that has been previously difficult.

Australia has been described as having limited caves and karst (Jennings, 1967; Jennings, 1975). However more systematic exploration has significantly extended the karst estate. The problem remains in developing methods for valid comparison of karst areas with vastly different characteristics. Comparison of several Australian karst areas and some international well-known karst areas will illustrate this technique as a useful comparative tool.