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Karst hydrogeology and geomorphology of the East Mountain Plateau, Yunnan China

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The East Mountain Plateau is a fault-bounded karst plateau with an altitude of about 2000m within Mengzi and Kaiyuan Counties of southern Yunnan, 120 km north of China's border with Vietnam. Due to complex and interrelated hydrogeologic, geomorphic, climatic, and socioeconomic factors, Yi and Hani minority nationality residents of the plateau face significant challenges to quality of life, closely tied to water supply. With major support from the U.S. Agency for International Development, a consortium of Chinese and U.S. scientists are working to enhance Chinese academic infrastructure for karst water resource development, with the East Mountain Plateau as a primary demonstration site.

The plateau surface is underlain by the pure carbonate rocks of the middle Triassic Gejiu Group that form variations of peak cluster-depression karst morphology over some 250 km^2 as part of a larger karst groundwater basin with an estimated recharge area of more than 900 km^2. The plateau, as well as the lower elevation graben basins of the western part of the drainage system that are covered with Cenozoic non-carbonate sediments, drains to a large spring at Nan Dong (South Cave) that flows to the Nanpan River within the Xi and ultimately the Pearl River Basin. The system's hydrology and landscape evolution are influenced by south China's monsoon climate—in 2007, for example, more than 85% of Mengzi's precipitation fell in the half-year from April to September.

With a location close to the boundary of the Indian and Eurasian plates, the area's geologic structure and thus geomorphology and hydrogeology have been heavily impacted by complex Himalayan neotectonism. Two major north-south trending faults (the Kaiyuan–Gejiu fault and Dazhuang–Caoba-Mengzi fault) divide the East Mountain Plateau from large graben basins and another limestone plateau just to the west, creating local relief of some 800 m, and several other fault sets exert control on both surface morphology and ground water flow.

A major underground river system with a length exceeding 40 km and an elevation loss of more than 800 m has been identified between Mingjiu Shi Dong (Mingjui Rock Cave), where the Yangliu River completely sinks into the aquifer, and the spring at Nan Dong that has a mean discharge of about 9 m^3/s and which can exceed 40 m^3/s in summer. Numerous smaller caves within this drainage system have also been surveyed by British and joint Chinese/American/British teams, and exploration continues. The caves fall into several classes including 1) inflow caves (as in Mingjiu Shi Dong), 2) perennial (as in Nan Dong), seasonal, and abandoned horizontal outflow caves, and 3) deep vertical shafts on the plateau associated with faulting that can reach 200 m in depth.