
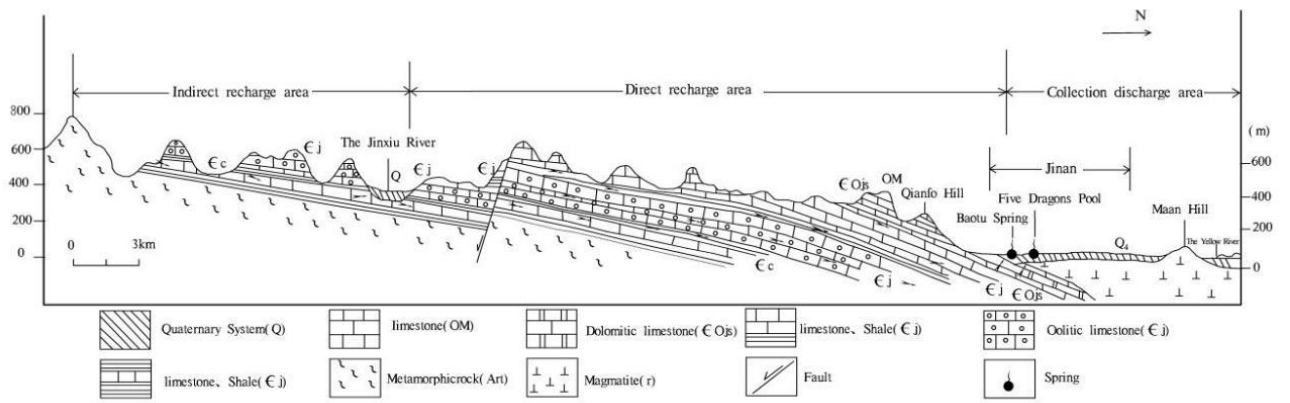




Country	MIKAS springs	Coordinates / Nearby City	Spring discharge (Q in l/s,min/av/max) / tapped or not	Criteria* in order / Main justification */ H-historic, A-aesthetic, S-scientific, E-Economic, Ec-ecologic	Data collected by
China 	1. Baotu spring	N 36°39'39.32" E 117°0'55.45" Z = 30 m asl Jinan city, Shandong Province	440/636/1617 Tapped. Used for tourism, drinking water, bathing and irrigation.	H, A, S, E, Ec <i>Baotu spring has three outlets equidistant from north to south. It can spurt up to half meter into the air when the water is abundant. Flow variability, physico-chemical variability influenced by both natural and artificial factors. This Important source of water ensuring baseflow of downstream river system (river ecology and Daming lake). The catchment is 1700 km², out of which some 450 km² is direct recharge area (autogenic). Baotu spring park has a beautiful natural landscape and historical sites. In ancient times, the emperor of Lu Dynasty and Qi Dynasty met in Baotu spring area in 694 BC. Many geographers and poets described Baotu Spring, like Li Daoyuan of the Northern Wei Dynasty, Yuan Haowen of the Jin Dynasty, Li Gingzhao of the Song Dynasty.</i>	Changsuo Li
	2. Ling Shui	N 23°8'56.56" E 108°16'11.08" Z = 97 m asl Wuming, Nanning city, Guanxi Province, SW China	-/2678/- Tapped for Wuming District of Nanning city	S, E, Ec, A, H <i>Lingshui (LS) spring is both the largest and the most important system among over 148 springs systems in Wuming Basin. The basin covers c. 1400 km². LS provides potable water to about 140,000 residents of the Wuming District. It is a spring group including 9 springs forming a pool with an area of c.30,000 m². Every year, river backflow causes the turbidity of Lingshui to exceed standards, resulting in interruptions to the tap water supply. This has resulted in persistent destruction to the ecological environment at the pool. The spring water maintains the baseflow of the Wuming River and sustains ecosystems. Lingshui has been a famous tourist resort since the Tang and Song dynasties, and many literates have come and written several poems about Lingshui. This is still frequently visited touristic area, Lingshui Spring has beautiful scenery with high water quality.</i>	Fang Guo, Guanghui Jiang
	3. Poxin	N 24°15'13" ~24°35'50" E 106°43'31" ~107°03'50", Z = 690 m asl The Sanmenhai Town, SW China	4500 / - / 9000 Partly tapped and used for potable water supply	S, E, A, Ec <i>The Poxin underground river is a part of Youjiang Basin. Very thick clastic rocks had deposited in the deep trough after the early Triassic Era. Since the allogenic water from the clastic area is very erosive, and the big poljes formed in the contact zone between the carbonate rocks and the clastic rocks, and fengcong</i>	Junbing Pu

				<p>landform formed, with big ground rivers and large cave chambers. During the Neogene uplifting movement, fengcong became higher and higher, and cave roof collapsed, karst windows and tiankeng developed. Sanmenhai karst is composed of four exposing to the surface and one inside cave, the windows are huge with beautiful lake down the entrance, and it is the most pretty and splendid karst window group in the world. Poxin underground river provides potable water to about 14,000 residents of the Sanmenhai town. This is a frequently visited touristic area, there are three continuous big karst windows near the outlet. Two distinct species and endemic fishes, Translucen goldenly-line barbell <i>Sinocyclocheilus hyalinus</i> and Uni-opththal fish, are living in the Poxin underground river. This is a part of Leye-Fengshan UNESCO Global Geopark.</p>	
	<p>4. Daxiaojing underground river system</p>	<p>N 25°33'55.6" E106°52'10.07" Z = 430 m asl</p> <p>Dajing Village, Moyang Town, Guizhou province</p>	<p>2,369/-/140,641 (!)</p> <p>Groundwater flows from two underground river outlets (Dajing and Xiaojing) and mixes to form a a river at the surface. Underground river is used for potable water supply, agricultural irrigation, tourism and recreation.</p>	<p>S, E, A, Ec</p> <p><i>The Daxiaojing is the largest underground river system in Guizhou Province, formed by the convergence of two separate and the relatively independent underground rivers. The catchment is highly karstified and characterized by many dolines (sinkholes), ponors (swallow holes), gorges, swallet stream, karst depressions and caves. The outlet of Daxiaojing underground river system is a headwater of Bawang River, which provides potable water to about 80,000 citizens of Luodian county. Spring is located some 23 km from the county. The springs are also pumped for agricultural irrigation flowing along the river on both sides and downstream.</i></p> <p><i>The Five-hundred-meter Aperture Spherical radio Telescope (FAST), located in a karst depression in the middle of catchment of Daxiaojing underground river, is the world's largest single-dish radio telescope, with a receiving area equivalent to 30 football fields. It is expected that FAST will maintain its world-class status for the next 20 to 30 years, and together with numerous karst features become 5A tourist attraction in China and attract thousands of visitors. The outlet of Daxiaojing underground river system maintain the baseflow of Bawang River and ecological flow sustains ecosystems of national aquatic germplasm reserve for endemic fishes, such as <i>Mystus guttatus</i>, <i>Onychostomagerlachi</i> <i>Acrossocheilus clivosius</i>. However, explosive increase in tourism could pose a potential risk to the underground river system</i></p>	<p>Shouyang He, Junbing Pu</p>

MIKAS – Baotu spring

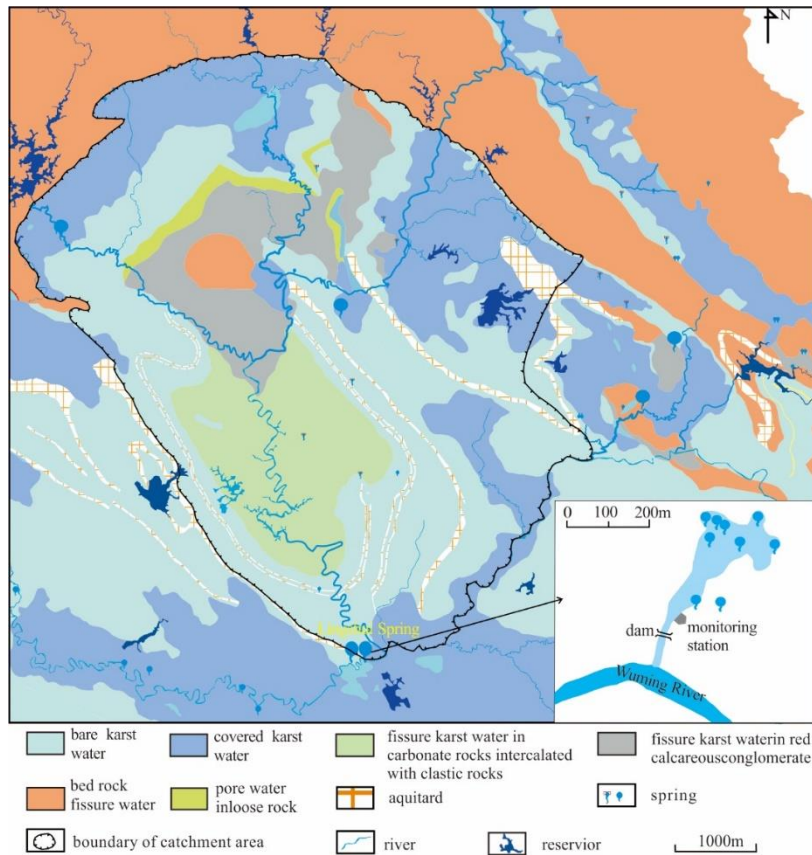


Hydrogeological cross-section of Baotu Spring catchment (Gong et al., 1959)



Photo of the spring (source: http://www.jinan.gov.cn/art/2022/3/9/art_135_4942367.html)

MIKAS – Ling Shui

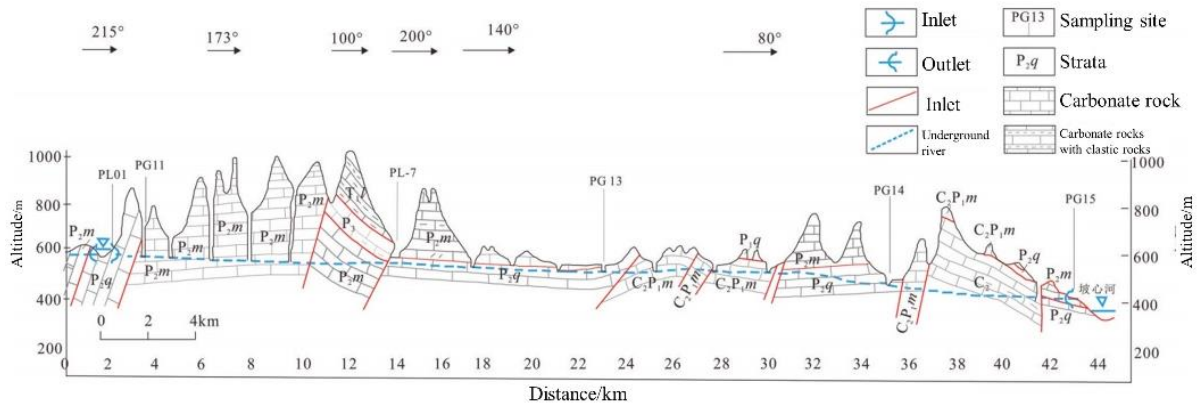


Hydrogeological map of catchment area of LS



Lingshui spring in SW China. Detailed view, depicting the positions of the nine spring outlets and the Wuming River.

MIKAS – Poxin



Hydrogeological profile of Poxin underground river



Jiangzou Natural Bridge (75.5 m in height, 144 m in span)

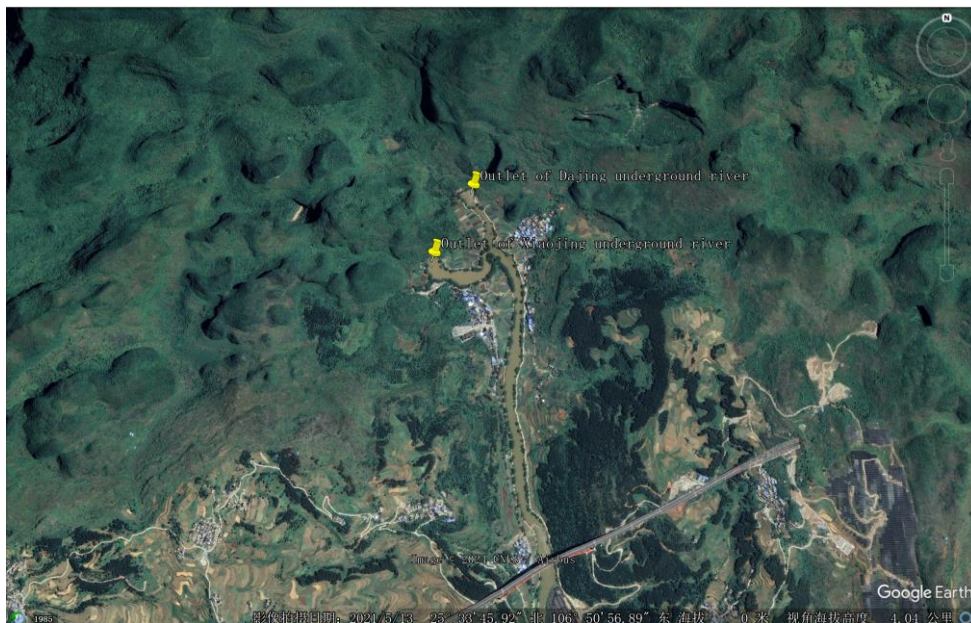


Poxin outlet and large spring's pond

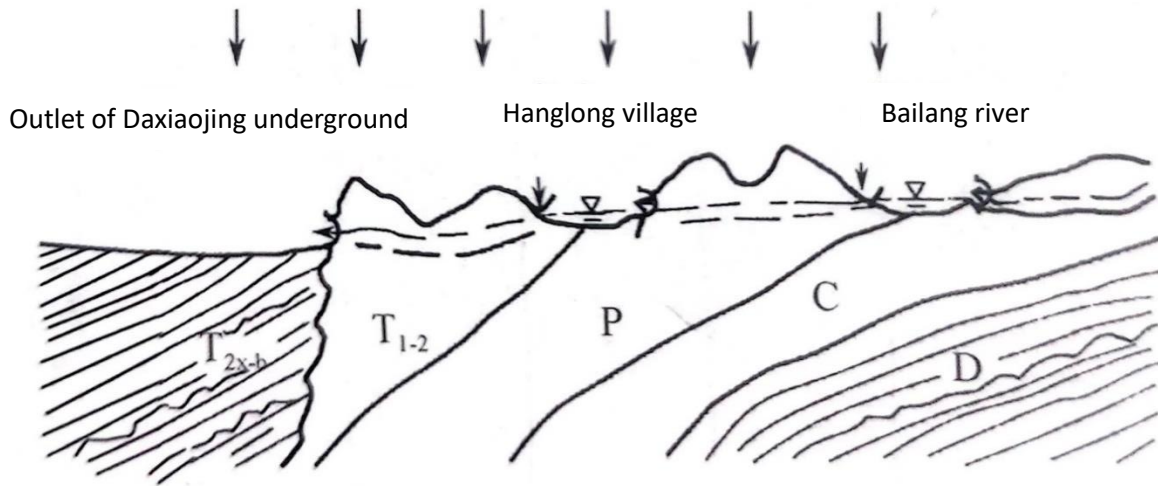


Karst window near the Poxin underground river outlet

MIKAS – Daxiaojing underground river system



Google Earth map with pinned outlet of underground river



Schematic cross-section Daxiaojing underground river. Legend: T2x-b: Middle Triassic limestones, T1-2: Middle and lower Triassic limestones, dolomitic limestone, P: Permian System, C: Carboniferous System and D: Devonian Period (modified from Xingrui Han, 2015).



Outlet of Xiaojing underground river

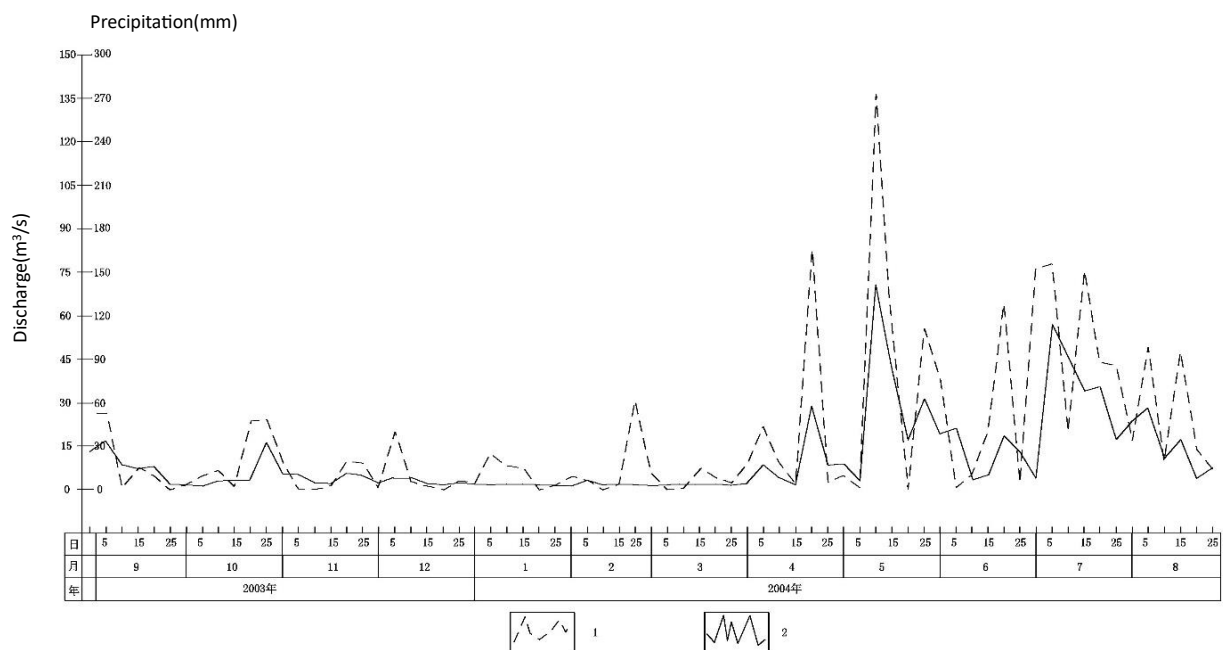


Outlet of Dajing underground river

Outlet of Daxiaojing underground river (Photo Shouyang HE)



Underground river for tourism and recreation (Photo Shouyang HE)



A Curve of dynamics of total outlet flow of the Daxiaojing underground river in a hydrological year 2003/2004 (Wang et al., 2014). Legend:1. Discharge (m^3/s), 2. Precipitation (mm)