Geophysical Research Abstracts
Vol. 21, EGU2019-3740, 2019
EGU General Assembly 2019

Karst Fracture-cave Structure and Development Characteristics Based on 3D Outcrop Characterization in Tabei area, Xinjiang

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There are abundant karst caves and fractures on the Ordovician stratum which underwent the Caledonian movement, Hercynian movement, Indosinian-Yanshanian movement in Tabei area, Xinjiang Province. This collections of karst caves and fractures form into three-dimensional karst fractures-cave spaces with complex structures and different shapes. Compared to the limitations of traditional field geological investigation, Unmanned aerial vehicle(UAV) oblique photography have great advantages of high efficiency, good safety factor and high accuracy of data collected. In view of the present situation, we used UAV oblique photography to assist field investigation and extract outcrop data information such as the length and width of karst caves and fractures. By the three-dimensional outcrop characterization technology of UAV oblique photography, a three-dimensional digital model is established to cognize the location and scale of karst caves and fractures, and the spatial combination structure of karst fracture-cave system. Through observation of outcrop, the fabric characteristics of karst caves-fracture system are recognized. It is proposed that the vertical vadose zone is made up of water tunnel and scepage wells; karst run off zone is composed of hall caves, trunk stream caves, tributary caves and tip caves. The filling characteristics of karst fracture-cave, and the formation evolution of fracture-cave units are clarified through the filling geochemical test and analysis of karst fracture-cave. The research results indicate that karst fracture-cave system is formed by carbonate rocks dissolved by the running water, which is controlled by phreatic fluctuation and the fault activity in the karst stage. In this study UAV oblique photography, field geological investigation and the filling geochemical analysis are comprehensively applied in the research of structure and development evolution of karst fracture-cave, which provides important basis and reference for accurate exploration and development of oil and gas in Tahe oilfield and other fractured-cave reservoirs.