Research of three-dimensional engineering geology strata modeling in urban underground space

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The utility of urban underground space is a certain development trend in future. To efficient use the underground space, and to avoid of engineering accident and unnecessary resource waste, the rock and mass characteristics in strata and the distribution must be ascertained. Establishment of Three-dimensional engineering geology strata model could provide a reliable evidence for the city planning and engineering contracture.

Based on the investigation data, analysis and adjust the data according to accrual strata distribution, construct Changchun city engineering geology borehole data, then use the solids module in GMS (Groundwater Modeling System) to construct the three-dimensional engineering geology strata model of underground space in Changchun city. Analysis the cross section and vertical section of the visual three-dimensional strata, and qualitatively evaluated the engineering geology distribution characteristics of rock and mass in Changchun city.

In addition, compared to other software, GMS is convenient to draw and visualized well. The three-dimensional engineering geology strata model constructed with GMS could truly show the actual situation.

Records of sulfur isotopic composition and their significance from the Permian strata at Shangsi section of Guangyuan, Sichuan

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By analyzing the data of TOC total sulfur and sulfur isotopic composition of carbonate-associated sulfate (CAS) and pyrites from the Permian strata at the Shangsi section of Guangyuan, Sichuan province, and based on the C-S charts and associated sulfur isotopic theory, the relationship between the variation of $\delta^{34}S_{seawater}$ and the related paleoenvironments and paleoclimate was deciphered, together with discussion of the marine sulfur cycle; The organic matter burial efficiency in different periods was analyzed by dividing the $\triangle^{34}S_{CAS\text{-}Py}$ values into different grades and mineralization of the sedimentary organic carbon by BSR was also quantified. Some information about the sedimentary environments and the diagensis of the burial organic matter in this area has been obtained.

Carbon-sulfur charts show that the concentration of sulfate in the seawater was very low during the whole Permian in this area, and is just 0.6-0.8 of the modern marine in late Permian although with a little increase and the occurrence of sulfidization in bottom waters in this period. Characteristics of high S/C ratio and $\delta^{34}S_{Py}$ in the bottom of Chihsia formation indicates late intrusion of hot sulfuric fluid , therefore, the information about the sedimentary environments and early diagenesis is uncertain.

Another negative shifts in $\delta^{34}S_{seawater}$ values occurred in middle Dalong ages, however, with a lager extent of 16.5‰. There have been many hypotheses about its mechanism, among of which the reoxidization of massive H_2S from the bottom water was the direct cause. Recent research suggests that BSR is controlled by anoxic environments, supply of organic matter and SO_4^{2-} ion as well as favorable temperature. Highest activity of BSR occurs under the condition of 20-35℃. Therefore, persistent supply of heat to the bottom water released by The “short-lived” mantle plume event (lasting 10-20Ma, Siberian volcanism envent) during this period is the necessary factor of the fierce activity of BSR. In the meanwhile, the rising of the bottom water’s temperature would accelerate the upward diffusion of H_2S and mixing of the ocean, which finally caused a large amount of H_2S accumulating and reoxidized in the surface waters.