桂林洞穴滴水及现代碳酸钙(CaCO3)沉积的碳同位素记录及其环境意义

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中文摘要:经过前期(1995~2000年)及近2 a对桂林盘龙洞13个滴水点的2 个水文年的滴水和现代碳酸钙沉积的动态监测, 发现现代洞穴碳酸钙(CaCO3)沉积有两种类型: ①常年性滴积碳酸盐, 其δ13C值记录了全年气候变化特征; ②季节性滴水沉积碳酸盐, 其δ13C值记录了季节性气候变化特征。现代碳酸盐沉积监测和碳同位素分析表明, 桂林盘龙洞外部峰体主C3植物(几乎没有C4植物), 现代沉积碳酸盐的δ13C记录显示, 在夏半年, 夏季风强、降水丰沛、生物的活动量大, 现代碳酸盐沉积量大,δ13C值则较偏负, 平均为-13.13‰; 现代碳酸盐13C全年平均值为-12.23‰, 最负值达-14.5‰; 而在冬半年, 由于降水相对较少, 新沉积碳酸盐的δ13C值, 显示稍有增加(或偏正), 其δ13C值为-10‰~-11‰。此外, 当在降大雨或暴雨论是在夏半年或是在冬半年), 滴水在滞后半个月或1个月后沉积形成的碳酸盐, 其δ13C值显示突然偏负, 主要反映的是降雨效应引起的CO2 效应的影响。

中文关键词:现代碳酸盐沉积 碳同位素 环境意义 桂林盘龙洞

Cave Dripping Water and Carbon Isotopic Records of Modern Carbonate (CaCO3) Deposits Stalagmite in Panlong Cave of Guilin and Its Environmental Significance

Abstract:The trend monitoring of cave dripping water and modern carbonate deposits at 13 monitoring points of dripping water in Panlong Cave of Guilin during the pre-pha(1995~2000) and nearly two hydrological years reveal that there exist two types of modern carbonate (CaCO3) deposits: the first is the modern carbonate (CaCO3) deposit o perennial dripping water in the cave whoseδ13C values have recorded climate change characteristics of the whole year, and the second is the modern carbonate (CaCO3) deposit of the seasonal dripping water in the cave with the seasonal change characteristics ofδ13C values. The monitoring and isotope analysis of modern carbonate (CaC deposits show that the exterior mountain peaks of the Panlong cave in Guilin are mainly C3 plants (with almost no C4 plants), and theδ13C records of modern carbonate (CaCO3) indicate that the summer monsoon is strong, the rainwater is relatively rich, the biologic activities are strong, and the modern carbonate deposits are fairly well developed in the half year of summer, and the averageδ13C value is -13.13‰ in the half year of summer. Theδ13C values of the modern carbonate (CaCO3) deposits are somewhat negative, with the annual averageδ13C value being -12.23‰ and the maximum negative value being -14.5‰ for the whole year. Theδ13C values of the modern carbonate (CaCO3) deposits are somewhat positive (-10‰~-11‰) due to less rainwater in the half year of winter. In addition, theδ13C values of modern carbonate (CaCO3) formed by dripping water with a lag of one month or half a month show a sudden negative trend and mainly reflect the influence of the CO2 effect, which results in the effect o