The primary dolomite of microbial origin in the Late Neoproterozoic algal dolomite, Tarim Basin, China

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Microbial mediation is an important mechanism for precipitation of primary dolomite, as evidenced by laboratory experiments, and more and more discoveries of primary dolomites from modern sediments and Triassic sequences. However, the primary dolomite in old sequences, especially in the Precambrian, rarely has been reported. This study represents a discovery in the Late Neoproterozoic algal dolomite in the Tarim Basin, NW China.

The microbial dolomite consists of low-relief stromatolites and lamellar algal dolomite. The low-relief stromatolites are suggestive of the inter-supratidal facies. Matrix dolomite (microbial dolomite), bladed cement dolomite and rhombic cement dolomite are recognized under microscopic and SEM investigations. The crystals in the matrix dolomites are fine grained (2~5 μm), euhedral, and lack evidence of precursor minerals; thus, they are formed via precipitation, whereas not replacement process.

SEM observations of the matrix dolomites reveal the presence of spherical structures, which are interpreted to be formed via the microbial mediation (Figure 1A); some sheet-like structures are also identified, which are mineralized extracellular polymeric substances (Figure 1B). The EDS results indicate that the spherical and sheet-like structures are all dolomites in composition (Figure 1). These observations suggest that microbe played an important role during the precipitation of the matrix dolomite. Thus, the dolomites are primary and of microbial origin.

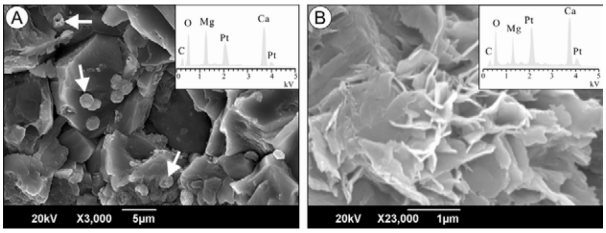

Figure 1: SEM images and EDS results of A) dolomite spheroids (white arrow) and B) mineralized extracellular polymeric substances (EPS).

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Study on Qinglong Antimony deposit, Guizhou Province, China: Buried history, ore-forming temperature and mineralizing period

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Qinglong antimony deposit is hosted by upper Permian volcanic breccia and tuff in the bottom of Emeishan basalt formation. Intrusive rocks are not found in the deposit field. The deposit is believed to be a volcanic sedimentation-reformation deposit, and the basin fluid play a important role in ore-forming.

Using rock's porosity-depth formula of Sichuan basin, a continuous and equable buried history from late Permian to Triassic is built by back-stripping method. In latest Triassic, the buried depth of the bottom layer of basalt is deepest at 5717 meters.

The 11 apatite samples are all collected in mid-upper Triassic. Apatite fission-track ages vary from 96.7Ma to 38.6 Ma. which is much younger than the age of mid-upper Triassic. It means that apatite fission anneals obviously when the strata was raised and ablated quickly from late cretaceous to early tertiary.

The coal-bearing strata overlays on Emeishan basalt formation and has high abundance of organic matter whose total organic carbon content (TOC) is about 3.48%. The kerogens belongs to II-type and III-type and the vitrinite contents vary from 20% to 30%. The 20 samples have similar vitrinite reflectance (Ro) and their average is about 2.96%. On the base of Waples simplified model, $T_{max} = (\ln Ro + 2.11)/0.0167 + 11.7 \ln Hr$, and Middleton simplified model , $T_{max} = (\ln Ro + 1.82)/0.0118 + 11.7 \ln Hr$, highest temperature of coal-bearing strata being heated in buried history is accounted to be 212°C. In late Triassic, the ground temperature in Southern Guizhou is calculated to be 44°C by $\delta^{18}O$.Geothermal gradient can be calculated to be 2.94°C/100m by ground temperature, deepest buried depth and highest temperature above mentioned. Ore-forming temperature vary from 150°C to 171°C by quartz and fluorite inclusion.According the curve of buried history, the ore-forming depth is between 3606m to 4320m, and ore-forming time is in the middle of late Triassic. This is earlier than 142 Ma. and 148 Ma. by Sm-Nd isotope method

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