# Radiogenic Sr isotopic geochemistry of Late Permian Nb-REE-Ga polymetallic layer from the Xuanwei Formation in Weining, Guizhou Province, southern China

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Nb, REE and Ga are reported been enriched in the lower section of the Xuanwei Formation in the western Yunnan-eastern Guizhou area. This enriched layer has been the focus of studies as a potential resource for critical metals (Nb, REE and Ga). The Xuanwei Formation is terrestrial strata formed by weathering and sedimentation after the eruption of the Emeishan basalts. In order to clarify the relationship between enrichment of these metals and the paleo-weathering-sedimentation process, the radiogenic Sr isotope geochemistry of the Zhangsigou profile of the Xuanwei Formation was conducted using MC-ICPMS. The results show that the $^{87}Sr/^{86}Sr$ ratios trend has three stages, and they correspond to the upper, middle, and lower parts of the Zhangsigou profile. It is found that $^{87}Sr/^{86}Sr$ curve changes is accompanied by contents variations of rare metals (Nb, REE, Ga, Al, Zr, etc.) in profile. A low value zone of the $^{87}Sr/^{86}Sr$ ratios appears in the second part of the profile and corresponds to the enrichment polymetallic layer of Nb-REE-Ga. The variation of the $^{87}Sr/^{86}Sr$ ratios is attributed to the degree of chemical weathering of sediments on the profile. Therefore, the change of sedimentary environment is the main factor controlling the extreme enrichment of Nb, Ga and REE. The low value region of the Sr isotopes is around 0.706753, which is also the lowest ratio closest to the basalt in the profile. In addition, the samples in low value interval also show the uniformity of the $^{87}Sr/^{86}Sr$ values, indicating that the input materials have experienced a stronger degree of weathering process. This is consistent with the thick layer of kaolinitic claystone. It is indicated that the extreme enrichment of rare metals occurs in an ancient lake with slower sediment accumulation rates.