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Sr-Nd同位素初始比值和Nd模式年龄的误差估算 [点此下载全文](#)

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摘要:

Sr-Nd同位素参数广泛应用于岩石物质来源及其成因研究,但绝大多数研究者在应用这些参数时并未说明科学。作者首次利用误差传播定律推导出了有关参数的误差估算公式,这些参数包括Sr同位素的初始比值( $(^{87}\text{Sr}/^{86}\text{Sr})_t$ )、Nd同位素的初始比值( $(^{143}\text{Nd}/^{144}\text{Nd})_t$ )、 $\epsilon_{\text{Sr}}(t)$ 、 $\epsilon_{\text{Nd}}(t)$ 、Nd含量的高低及其测定误差决定着( $(^{87}\text{Rb}/^{86}\text{Sr})_t$ )的误差,Sm、Nd含量的高低及其测定误差决定着( $(^{147}\text{Sm}/^{144}\text{Nd})_t$ )的误差,( $(^{87}\text{Sr}/^{86}\text{Sr})_t$ )的大小及其误差、( $(^{87}\text{Sr}/^{86}\text{Sr})_t$ )的误差共同影响着( $(^{87}\text{Sr}/^{86}\text{Sr})_t$ )的误差。同样, ( $(^{147}\text{Sm}/^{144}\text{Nd})_t$ )的误差、年龄值大小及其误差共同影响着( $(^{143}\text{Nd}/^{144}\text{Nd})_t$ )的误差。CHUR和单阶段亏损地幔模式年龄( $T_{\text{DM}}^{\text{DM}}$ )的误差影响因素主要包括( $(^{147}\text{Sm}/^{144}\text{Nd})_t$ )的大小及这两个比值的误差,而Nd同位素两阶段亏损地幔模式年龄因素之外,还包括年龄值大小及其误差。通过对广西姑婆山4个花岗岩样品Sr-Nd同位素参数及其误差的计算,分析,认为采用同位素稀释质谱法测试数据和高精度的年龄数据是获得理想示踪参数的保证,Rb、Sr、Sm、Nd含量测试结果的做法是不可取的,对高Rb样品更应该谨慎从事。建议研究者在使用Sr-Nd同位素参数时能够估算这些参数。

关键词: [Sr-Nd同位素](#) [示踪参数](#) [误差传播定律](#) [精度](#) [计算公式](#)

Error Estimation of Initial Ratios of Sr-Nd Isotopic and Nd Model Age [Download Full Text](#)

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Abstract:

Only a few researchers mentioned the accuracy (error) of Sr-Nd isotopic parameters although widely used both in the study of petrogenesis and rock-forming material source. Obviously it's not parameters without mentioning accuracy explanation. Authors firstly derived the related calculation errors using the propagation law of errors. These parameters include initial ratios of Sr isotope ( $(^{87}\text{Sr}/^{86}\text{Sr})_t$ ) and Nd isotopes ( $(^{143}\text{Nd}/^{144}\text{Nd})_t$ ),  $\epsilon_{\text{Sr}}(t)$ ,  $\epsilon_{\text{Nd}}(t)$ . The error of ( $(^{87}\text{Rb}/^{86}\text{Sr})_t$ ) depends on the contents of Rb, Sr and their measurement factors of ( $(^{147}\text{Sm}/^{144}\text{Nd})_t$ ) determined by the contents of Sm, Nd and their measurement factors of ( $(^{87}\text{Sr}/^{86}\text{Sr})_t$ ) are the values of ( $(^{87}\text{Rb}/^{86}\text{Sr})_t$ ) determine deviations of ( $(^{87}\text{Rb}/^{86}\text{Sr})_t$ ), ( $(^{87}\text{Sr}/^{86}\text{Sr})_t$ ) parameter ( $(^{143}\text{Nd}/^{144}\text{Nd})_t$ ) have similar influencing factors. The errors of  $T_{\text{DM}}^{\text{DM}}$  depend on the values of ( $(^{147}\text{Sm}/^{144}\text{Nd})_t$ ), ( $(^{143}\text{Nd}/^{144}\text{Nd})_t$ ) and the values of ( $(^{147}\text{Sm}/^{144}\text{Nd})_t$ ), ( $(^{143}\text{Nd}/^{144}\text{Nd})_t$ ) and their geological age and its error also influences factors of  $T_{\text{DM}}^{\text{DM}}$ . This study conducted Sr-Nd error calculation for four granite samples from Guposhan pluton in Guangxi Province. Influence factors using isotope dilution mass spectrometry (IDMS) and high accuracy isotopic age in order to ensure parameters. It is not advisable to use the test results of trace element because of unreliable results of samples with high concentration of Rb. The author suggests that researchers can provide corresponding error when they use Sr-Nd isotopic parameters.

Keywords: [Sr-Nd isotope](#) [tracing parameter](#) [low of propagated error](#) [accuracy](#) [calculation formula](#)