

### Titanomagnetite, a new potential geochronometer for in situ U–Pb dating

Yanwen Tang<sup>a</sup>, Na Liu<sup>a,b</sup>, Jianfeng Gao<sup>a</sup>, Junjie Han<sup>a</sup>, Zhongjie Bai<sup>a\*</sup>, Tingguang Lan<sup>a\*</sup>

<sup>a</sup> State Key Laboratory of Ore Deposit Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, 550081, China

<sup>b</sup> University of Chinese Academy of Sciences, Beijing 100049, China

\* Corresponding author: baizhongjie@vip.gyig.ac.cn, lantingguang@mail.gyig.ac.cn

#### Supplementary Information

Table S-1 The modified ID-TIMS U–Pb age results for zircons HGF-01 from the Hongge intrusion<sup>31</sup>.

Sample Number	<sup>207</sup> Pb/ <sup>235</sup> U		<sup>206</sup> Pb/ <sup>238</sup> U		rho
	Ratio	2σ	Ratio	2σ	
1	0.2906	0.0068	0.04102	0.0008	0.751
2	0.2914	0.0055	0.04099	0.0007	0.773
3	0.291	0.0066	0.04107	0.0008	0.746
4	0.2924	0.0069	0.04117	0.0008	0.755
5	0.2876	0.0046	0.04086	0.0012	0.633

Table S-2 Mathematical equation for U–Pb data correction between standards and samples.

$$R_{\text{sam cor}} = R_{\text{sam mea}} * R_{\text{std ref}} * \left\{ \frac{1}{R_{\text{std mea1}}} * \left[ 1 - \frac{(t^{\text{sam}} - t_{\text{std mea1}})}{(t_{\text{std mea2}} - t_{\text{std mea1}})} \right] + \frac{1}{R_{\text{std mea2}}} * \frac{(t^{\text{sam}} - t_{\text{std mea1}})}{(t_{\text{std mea2}} - t_{\text{std mea1}})} \right\}$$

Note:  $R_{\text{sam mea}}$  is the measured isotopic ratio of sample at time of  $t^{\text{sam}}$ ,  $R_{\text{sam cor}}$  is the corrected isotopic ratio of the sample,  $R_{\text{std ref}}$  is the reference isotopic ratio of the primary standard, and  $R_{\text{std mea1}}$  and  $R_{\text{std mea2}}$  are the measured isotopic ratios of primary standard at times of  $t_{\text{std mea1}}$  and  $t_{\text{std mea2}}$ , respectively.

U–Pb isotopic ratios are corrected with standard-sample bracketing method. Cassiterite AY-4 or other RMs was used as external standard, which was analyzed two times every 10 or 15 analyses of titanomagnetite samples, i.e. NIST612 +2 91500+2 AY-4 +2 PL-57 +2~3 YGX +10~15 samples+2 91500+2 AY-4 +2 PL-57 +2~3 YGX + NIST612 or NIST612 +2 91500+2 AY-4 +10~15 samples+2 AY-4 +2 91500 + NIST612. A short integrating time (~28 s) of external standard and samples were selected to correct the Pb/U fractionation and instrumental mass discrimination using ICPMSDataCal software. The U–Pb isotopic ratios of samples were calculated using a linear interpolation (with time) for every ten or fifteen analyses according to the variations of standard. Similar description of mathematical equation and the uncertainty calculation can be found in Tang et al. (2022, 2024)<sup>14,16</sup>.