High-precision zircon U-Pb dates obtained using new 10^{13} Ohm resistor current amplifiers by TIMS

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We tested the accuracy and precision of measuring small U and Pb ion beams on newly available 10^{13} Ohm resistors by Thermal Ionisation Mass Spectrometry (TIMS). The TritonPlus-RPQ at the IGP institute (ETH Zurich) is equipped with five new 10^{13} Ohm resistor current amplifiers to measure the $^{202\text{-}205\text{-}206\text{-}207\text{-}208}$Pb masses and one MasCom multiplier to measure the ^{204}Pb in static multiple collection mode. After Pb analysis, and further heating of the same load, the $^{265\text{-}267\text{-}270}UO_2$ masses were also measured in static multiple collection mode, using three 10^{13} Ohm resistor current amplifiers. During analyses the vacuum of the TritonPlus-RPQ show values of 2.3 x 10^{-8} (source), 1.9 x 10^{-9} (analyser) and 5 x 10^{-4} (fore vacuum). The gain calibration of the 10^{13} Ohm resistor current amplifiers was performed using the procedure after [1], with ^{144}Nd-^{146}Nd being connected to 10^{11} Ohm resistor current amplifiers and $^{142\text{-}143\text{-}145\text{-}148\text{-}150}$Nd being connected to 10^{13} Ohm resistor current amplifiers [1] [2]. Standard deviations of the noise in all five new 10^{13} Ohm resistor current amplifiers were between 3.1 and 3.4 x 10^{-6} volts over a 10h period, with no shift occurring over this time.

To test the new equipment, we selected the GJ1 zircon (600 Ma), two new standard zircons (38 Ma, 2.3 Ma) [3] and one synthetic solution (100 Ma, see www.earth-time.org) for our first application. All zircon samples were chemically abraded following the procedure of [4] and spiked with the ET2535 tracer solution and the obtained Pb and U measurements (static mode) were compared with the commonly used single jumping mode on the MasCom multiplier. This study illustrates the benefits of using high gain amplifiers to measure small ion beams over the more conventional peak-hopping techniques.

[1] Trinquier, A. 2014 Application Note 30281. [2] Koornneef *et al.* (2014) *Analytica Chimica Acta* **819**: 49-55. [3] Kennedy *et al.* (2014) *The Canadian Mineralogist* **52**: 409-421. [4] Mattison (2005) *Chemical Geology* **220**: 47-66.