



Unprecedented U–Pb–Th SHRIMP and Lu–Hf isotopic data in zircon from Tandilia basement rocks, Argentina: new insights into Palaeoproterozoic and Neoproterozoic crustal reworking of the Río de la Plata craton

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ABSTRACT

We present new geochronological zircon data from the Siempre Amigos Hill (SAH), a small but representative portion of Tandilia Terrane within the Río de la Plata Craton (RPC). U–Pb–Th SHRIMP data indicate a heterogeneous Palaeoproterozoic (Rhyacian) crust. A garnet-bearing granite (2165 ± 16 Ma) hosts felsic (2108 ± 13.6 Ma) to intermediate gneiss protolith (2104 ± 8 Ma), andesite with a sanukitoid signature (2094 ± 47 Ma) and granulites or charnockites. Additionally, calc-alkaline granitoids (2092 ± 13 Ma) intruded, as a result of differentiation from an igneous mafic sanukitoid source. Localised low-temperature shear zones affected the sequence. Lu–Hf isotopic data for the post-orogenic stage (< 2.1 Ga) complement previous results, showing progressive negative $\epsilon_{Hf(t)}$ values. These isotopes suggest post-orogenic transtension. New Neoproterozoic ages (652 ± 37 Ma, 618.4 ± 11.2 Ma and 686 ± 60 Ma) from granites, with low-to-very low zircon Th/U ratios, are presented as evidence of U–Th–Pb systems overprinting by Neoproterozoic (Cryogenian) thermal-hydrothermal events. Those Neoproterozoic ages are, within analytical uncertainty, equivalent to the 656 ± 19 Ma metamorphic age obtained for the Palaeoproterozoic granulite. These new Neoproterozoic ages, suggests a thermal perturbation linked either to the collision of the Nico Pérez Terrane against the passive margin of RPC, or the Neoproterozoic evolution of the Ventania System basement during the Brasiliano/ Pan-African orogeny.

1. Introduction

The Río de la Plata Craton (RPC), defined by Almeida et al. (1973), has outcrops in both Argentina and Uruguay, and is considered one of the main Precambrian shield areas of the South American continent. It has been studied for mapping, geochronology, and geochemistry over the past decades (Almeida et al. 1973; Pankhurst et al. 2003; Rapela et al. 2011; Oyhantçabal et al. 2011, 2018; Cingolani, 2011 and all references therein).

The Tandilia belt (Fig. 1) is considered the southernmost outcrops of the RPC in Argentina, comprising mainly an igneous-metamorphic basement, known as the Buenos Aires Complex (BAC, Marchese and Di Paola, 1975), covered by Neoproterozoic to Lower Paleozoic sedimentary rocks. Herein we present new geochronological U–Pb–Th and Lu–Hf

zircon data from the Siempre Amigos Hill (SAH), a small portion of Azul hills, Tandilia belt, which complement the latest U–Pb ages and Lu–Hf data obtained in zircons extracted from SAH rocks (Angeletti et al., 2021). Although no larger than 2 km^2 , SAH has become particularly interesting, since it exposes many of the Buenos Aires Complex lithologies, including granite, granulites, amphibolites and gneisses.

The aim of the Lu–Hf system studies in zircons focus on the sources of magmas using their isotopic fingerprint. Our new data from SAH rocks reinforce the idea of a Palaeoproterozoic event of crustal growth and possibly recycling in this sector of the RPC, and also open a discussion on Neoproterozoic tectonic events affecting the southern margin of the RPC.

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