Sedimentary provenance of Neogene strata from the SW Portuguese Coast (Sines Cape): detrital zircon U-Pb geochronology

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In this preliminary study of provenance analysis Neogene sandstones and conglomerates of the Alvalade Basin were sampled, from the sea cliffs nearby the Sines Cape (SW Portuguese Coast). Detrital zircons were extracted by conventional methods of particle size separation, magnetic and heavy liquids separation. Detrital zircons were dated by U-Pb method with LA-ICPMS. The U-Pb geochronology results indicate as potential fonts for all samples: i) the Carboniferous greywackes of the Mira Formation (South Portuguese Zone) or the upper Triassic sandstones of the Silves Formation Sandstones (Alentejo Basin) for the zircon ages older than the Permian; and ii) the sienites from the Sines Massif for the upper Cretaceous zircon ages. Note also that one sample includes a significant population of detrital zircon age of Permian age whose potential source is not known in the surrounding of the Alvalade Basin.

Keywords: Plio-Pleistocene, Sandstones and conglomerates, Provenance analysis, Alvalade Basin.

Provenance analysis of the Late Ediacaran basins from SW Iberia (Serie Negra Succession and Beiras Group): evidence for a common Neoproterozoic evolution

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This study makes a comparison of the populations of detrital zircon from Late Ediacaran greywackes of the Ossa-Morena Zone (OMZ) and the southern domains of the Central Iberian Zone (S-CIZ). The results obtained reveal that the main difference between the age spectra of both populations of detrital zircon is the Neoproterozoic, in particularly the Cryogenian grains. Our new data suggest that deposition in both CIZ and OMZ Ediacaran basins was coeval and shows a long lived magmatic event typical of the northern Gondwana margin (Avalonian–Cadomian belt and Pan-African belt). Overall, SW Iberia shows the following sequence of Cryogenian and Ediacaran zircon-forming events: i) ca. 850–700 Ma, Pan-African suture (well represented in the Beiras Group and in the Mares Formation of the Serie Negra Succession); ii) ca. 700-635 Ma, Early Cadomian arc (dominant in
the Beiras Group and in the Mares Formation of the Serie Negra Succession); and iii) ca. 635-545 Ma, Late Cadomian arc (the most important in the Mosteiros and Escoural formations of the Serie Negra Succession). The obtained results reinforce that the Late Ediacaran basins of SW Iberia were evolved together in the active margin of North-Gondwana in the same paleogeographic scenario but sufficiently separated to justify the differences mainly identified in their Neoproterozoic detrital zircon contents. This finding shows that there is no apparent reason to believe that the boundary between the OMZ and the S-CIZ marks a Cadomian suture.

Keywords: Detrital zircon, Source-areas, Central-Iberian Zone, Ossa-Morena Zone, North Gondwana.

Decipher a multi-event in a non-complex set of detrital zircon U/Pb ages

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The determination of U-Pb ages from detrital zircons of sedimentary rocks using LA-ICP-MS has been widely used to develop studies of provenance analysis. A problem that frequently arises is to find a population that appears to be non-complex despite of several perceptible age peaks in their spectrum. These peaks are qualitatively defined through diagrams of relative probability – PDF, but difficult to quantify their statistical significance relative to a zircon forming multi-event. As so, can we decipher and characterize a multi-event in a non-complex set of detrital zircon U/Pb ages?

This work is an attempt to answer the above question by means of a statistical analysis. The objectives are: a) to determine the most appropriate minimum number of zircon age populations (peaks), b) to characterize each peak in terms of age and event duration; c) to compare results obtained for two datasets showing similar zircon ages.

The process starts by a cluster analysis aiming to group zircon ages into a set of consistent clusters. A Gaussian kernel function is then fitted to each cluster and summed up to obtain a theoretical PDF. At the end of the process, the best modeled PDF must coincide with the original PDF in >=95%, and the deciphered peaks can be characterized.

Keywords: Detrital zircon data, population, peaks, comparisions of datasets, Gaussian kernel function.

The Cryogenian and Ediacaran records from Amazon Palaeocontinent

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The Amazon Craton was enrolled in the buildup of the Rodinia and the Gondwana Supercontinents during the Neoproterozoic. Along this Era, the Earth surface was marked by important transformations as global glaciations, atmospheric and ocean oxygenation pulses and the turnover of life forms. Most of these events were record on the margins of Amazon Palaeocontinent exactly during the time between the Rodinia Breakup and the Gondwana Assembly, today located in its southeastern border as part of the Paraguai Thrust and Fold Belt. This abstract shows the age constraints obtained for the respective sedimentary successions based on several tools as geochronology using U-Pb, Pb-Pb and Ar-Ar methods, isotope chemostratigraphy of C and Sr and paleobiology. According the results, the sedimentary successions record the Earth surface conditions from the Early Cryogenian to the Early Cambrian.

Keywords: Cryogenian, Ediacaran, Paraguai Belt, Brazil.