



New age constraints on the palaeoenvironmental evolution of the late Paleozoic back-arc basin along the western Gondwana margin of southern Peru

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ABSTRACT

The tectonic evolution of the western Gondwana margin during Pangaea amalgamation is recorded in variations in the Permo-Carboniferous back-arc basin sedimentation of Peru. This study provides the first radiometric age constraints on the volcanic and sedimentary sequences of south-central eastern Peru up to the western-most tip of Bolivia, and now permits the correlation of lateral facies variations to the late Paleozoic pre-Andean orogenic cycle. The two phases of Gondwanide magmatism and metamorphism at c. 315 Ma and c. 260 Ma are reflected in two major changes in this sedimentary environment.

Our detrital U-Pb zircon ages demonstrate that the timing of Ambo Formation deposition corroborates the Late Mississippian age estimates. The transition from the Ambo to the Tarma Formation around the Middle Pennsylvanian Early Gondwanide Orogeny (c. 315 Ma) represents a relative deepening of the basin. Throughout the shallow marine deposits of the Tarma Formation evidence for contemporaneous volcanism becomes gradually more pronounced and culminates around 312 - 309 Ma. Continuous basin subsidence resulted in a buildup of platform carbonates of the Copacabana Formation. Our data highlights the presence of a previously unrecognized phase of deposition of mainly fluvial sandstones and localized volcanism (281–270 Ma), which we named Oqoruro Formation. This sedimentary succession was previously miss-assigned to the so-called Mitu Group, which has recently been dated to start deposition in the Middle Triassic (~245–240 Ma). The emersion of this marine basin coincides with the onset of a major plutonic pulse related to the Late Gondwanide Orogeny (c. 260). Exhumation lead to the consequent retreat of the epeiric sea to the present-day sub-Andean region, and the coeval accumulation of the fluvial Oqoruro Formation in south eastern Peru. These late Paleozoic palaeoenvironmental changes in the back-arc basins along the western Gondwana margin of southern reflect changes in tectonic plate reorganization in a long-lived Paleozoic accretionary orogeny.

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1. Introduction

Sedimentation within the Permo-Carboniferous back-arc basin of Peru reflects temporal changes in subduction parameters during

the amalgamation of Pangaea. This study is the first large-scale chronostratigraphic reconstruction of the palaeogeography of south-central eastern Peru during this time period. Two phases of late Paleozoic metamorphism and magmatism at c. 315 Ma and c. 260 Ma have so far been recognised in the central and southern Eastern Cordillera of Peru (Chew et al., 2016). These Gondwanide orogenic cycles can be correlated into the Proto-Andean margin of Argentina and Chile (Chew et al., 2016 and refs therein). Phases of arc advance and retreat in the evolution of this long-lived Paleozoic accretionary orogeny resulted in magmatic pulses and tectonic

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