

The Cañari Formation (Early Silurian): U-Pb isotopes on detrital zircon and Palinomorphs data for a regional correlation of a significant unit in the Central Andes

S. Lopez Velásquez¹, M. di Pasquo², U. Zimmermann³

¹ Universidad Mayor de San Andrés UMSA

²Laboratorio de Palinoestratigrafía y Paleobotánica, CICYTTP-CONICET

³Department of Petroleum Engineering, University of Stavanger

The thick marine sequence of the Early Paleozoic in Bolivia is usually divided in two tectosedimentary cycles. In the first one, a highly subsident retro arc basin formed in a distensive setting; in the second cycle, a change in the tectonic regime from distensive to compressive, gave origin to a foreland basin characterized by frequent instabilities. In the limit of these cycles the Cancañiri Fm deposited with some special lithologic features that permit its correlation at a regional scale. However, both the age and the deposition environment of this unit were controversial. In order to contribute to clarify these issues, the outcrop of La Cumbre, sited NE of La Paz (Bolivia), was revised and sampled to obtain U-Pb isotope ages on detrital zircon and palinomorphic data.

Outcrops of Cancañiri Formation are located along the Eastern Cordillera, Subandean zone, and Altiplano. Usually it was described as massive unit of dark gray diamictites, with interbedded lenses of mudstones and coarse sandstones. The thickness is so variable, ranging from some 1400 m in the depocenter to 30 m in the eastern border of the basin. Previous studies gave ages varying from Ashgillian to Wenlockian. It was suggested that this unit deposited in a transgressive regime due to deglaciation. For these features, the Cancañiri Fm could be correlated to some units in Argentina, Perú, and Brazil.

At the outcrop of La Cumbre, the Cancañiri Fm is composed by three facies: cross stratified, coarse to medium grain, quartz sandstones interbedded with lithic and siltitic sandstones in the base; above, a thick sequence of interbedded mudstones and sandstones of turbiditic origin, and at the top a predominance of massive diamictites with frequent boulders of quartzite and granitoids. The presence of authigenic pyrite was interpreted as an evidence of anoxic environment. However, a massive unit of grey diamictites does not crop out but c. 5 km to the west.

Detrital zircons from the outcrop of La Cumbre provide U-Pb ages that can be classified in two groups: The younger one is of Ediacaran to Early Cambrian age; the older is of Paleoproterozoic age (1.9 to 2.1 Ga). These results are in accord to other obtained in outcrops of the northern Eastern Cordillera. The absence of Ordovician ages is remarkable.

The micropaleontologic study has shown the predominance of Acritarca, and two less important groups of cryptospores and chitinozoa. Acritarca furnish a wide range of ages (Hirnantian-Rudanian to Ludlovian). On the other hand, three species of chitinozoa: Cyathochitina sp B.C. campanulaeformis, Conochitina cf armillata and Sphaerochitina sp. C gave a narrow range of ages.

U-Pb isotope data on detrital zircons cannot date the sedimentation age of the rocks and points to a Lower Cambrian age, which is not the case. Paleontological findings date the succession as young as Ludlow, too young to be related to deglaciation processes of the Hirnantian ice age and by far younger than the isotope ages. The latter may be related to the tectonic setting lacking significant syndepositional magmatism. The interpretation of the exposed 'diamictitic' facies may also be interpreted as mass flows; however, awaits further detailed sedimentological studies