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THE FAMATINIAN OROGENY OF WESTERN SIERRA DE SAN LUIS, ARGENTINA: ISOTOPIC FEATURES

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In Eastern Sierras Pampeanas the most important metamorphic, tectonic and magmatic features of Sierra de San Luis basement were delineated by the Famatinian orogeny developed during the Early Paleozoic. The main phase occurred in Ordovician times and it is generally accepted that this phase was related to a collision affecting the continental margin of Gondwana and involving previously formed metamorphic and igneous rocks. The Famatinian rocks are characterized by low to high-grade regional metamorphism, a penetrative NNE deformation and the emplacement of magmatic arc which was already active at least since Late Cambrian. Late- to post-orogenic stage can be traced up to Early Carboniferous times, with localized shear zone deformation, dislocation metamorphism and emplacement of late- to post-orogenic granitoids. In this abstract we summarize the results of isotopic studies carried out through the last six years about characterization of the Famatinian orogeny in the western part of Sierra de San Luis. They are the results of joint projects developed by the universities of La Plata and São Paulo.

The western Sierra de San Luis is dominated by the high-grade Nogolí Metamorphic Complex consisting of micaschists, metaquarzites, paragneisses, migmatites and granitic orthogneisses, with less abundant orthoamphibolites, metakomatiites, marbles and calcsilicate rocks. Lower grade rocks are the San Luis Formation and Micaschist Group, of greenschist to lower amphibolite facies. All these rocks are intruded by granitoids of the Famatinian magmatic arc that are then deformed together with the country rocks. Circular intrusions of post-orogenic character cut the penetrative structures and large scale ductile shear zones with mylonites juxtapose the metamorphic rock strips.

The Ordovician magmatic arc was dated by conventional U-Pb zircon method at 477 ± 3 and 472 ± 1 Ma (Pantanos Negros and Gasparillo tonalites).

The high grade metamorphism was constrained by U-Pb ages at 475 ± 3 and 473 ± 3 Ma (monazites of orthogneisses), 461 ± 5 Ma (zircon in metakomatiite) and 458 ± 2 Ma (monazite in paragneiss), while the EPMA monazite dating of the same paragneiss yielded 470 ± 15 Ma. Ar-Ar amphibole ages of amphibolites are 470 ± 3 to 457 ± 3 Ma, while a Sm-Nd mineral isochron of another amphibolite gave 445 ± 21 Ma.

For the post-orogenic El Molle monzonite pluton, the U-Pb zircon crystallization age is 417 ± 6 (± 7) Ma, resulting in one of the earliest post-orogenic intrusions. The metamorphism associated with shear zone deformation that affects this pluton was constrained by Rb-Sr mineral errorchron of 378 ± 48 Ma, Sm-Nd mineral isochron of 348 ± 35 Ma and K-Ar biotite age of 380 ± 7 Ma. Other K-Ar biotite ages were obtained from the southern extension of one of the shear zones (364 ± 7 Ma) and other northern extensions (414 ± 10 Ma and 379 ± 9 Ma).

All these data suggest that during the Early to Middle Ordovician times took place the regional high-grade metamorphism in western Sierra de San Luis which lasted about 30 Ma. Two plutons belonging to the pre-collision magmatic arc were intruded in the Early Ordovician. The post-orogenic stage is represented by Late Silurian granitoids, whereas the ductile shear zones operated through Late Silurian to the Earliest Carboniferous.