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Isotopic anatomy of an intraoceanic arc crust: Example from the Jijal-Patan-Dasu area (Kohistan arc, Indus Valley, N Pakistan)

B. Dhuime (1), D. Bosch (1), J.L. Bodinier (1), O. Bruguier (2), C. J. Garrido (3), S. Hussain (4) and H. Dawood (4)

(1) Lab. Tectonophysique, UMR/CNRS 5568, U.M.II, 34095 Montpellier cedex 05, France, (2) Service ICP-MS, ISTEEM, U.M.II, 34095 Montpellier cedex 05, France, (3) Dep. de Mineralogía y Petrología, Univ. de Granada, Granada, Spain, (4) Pakistan Museum of Nat. History, Garden Av., Shakarparian, 44000 Islamabad, Pakistan (dhuime@dstu.univ-montp2.fr)

Lower to mid-crustal level rocks of the Jijal and Patan-Dasu complexes are remnants of a major plutonic phase that took place during the ∼110-90 Ma building stage of the Kohistan arc within the neo-Thetyan ocean. Now obducted along the Indus suture in northern Pakistan, the Kohistan Arc complex (KAC) is subdivided into a lower crustal ultramafic-mafic section (Jijal complex) and a middle crustal gabbro-dioritic section (Patan-Dasu metaplutonic complex). Sr, Nd and Pb isotopic analyses were performed on representative samples from each sequence of the KAC in view to (1) characterize the magma sources involved in the arc accretion and (2) define the genetic relationships between the various rocks throughout the arc section. The Jijal complex consists of an ultramafic section yielding scattered initial isotopic ratios and a granulitic-facies gabbroic section with limited isotopic variations (Dhuime et al., this session). The Patan-Dasu metaplutonic complex is subdivided into a basal unit of strongly deformed metagabbros and metadiorites, (Patan sheared gabbros and diorites, including the Sarangar gabbros), a middle unit of interlayered amphibolites, metagabbros and metadiorite sills (Kiru sequence) and an upper unit of meta-amphibolites, metapelites, metavolcanics and carbonates (Kamila sequence). Granitic intrusions are observed from the Kiru sequence to the top of the arc section where they become more abundant. The Sarangar gabbros yield isotopic ratios similar to the underlying Jijal gabbroic rocks. This strongly points to a common, homogeneous arc-like isotopic signature for both Sarangar and Jijal gabbros. Reported on the Sr-Nd and Pb-Pb iso-

topic diagrams, rocks from the Kiru sequence plot along the mantle correlation line with an increase of the radiogenic character from bottom to top. Samples of the overlying Kamila sequence define a wide domain overlapping the Kiru gabbroic section. The Kiru and Kamila crustal sections display isotopic characteristics more heterogeneous than the Jijal crustal section. The two former sequences are characterized by a greater influence of a DMM component. Two groups (Type 1 and 2) of granites intrusive into the Kiru and Kamila sequences yield Sr and Pb isotopic compositions distinct from the underlying Jijal granulite-gabbro section but within the range of the Kiru and Kamila sequences. Overall the isotopic characteristics of the different KAC sequences make it possible to assess the global isotopic and chemical composition of a complete oceanic arc section, which has implications for model of continental crustal growth by arc accretion.