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MELTING OF ACCRETIONARY WEDGE AND BUILDING MATURE CONTINENTAL CRUST: INSIGHTS FROM THE MAGMATIC EVOLUTION OF THE CHINESE ALTAI OROGEN, CENTRAL ASIA

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Tectonic-magmatic reworking of accretionary wedges is a key process responsible for differentiation and stabilization of continental crustal in accretionary orogens. This generic problem can be exemplified by magmatic evolution of the Chinese Altai which represents a high-grade core of the world's largest accretionary system, namely the Central Asian Orogenic Belt (CAOB). In the Chinese Altai, voluminous Silurian-Devonian granitoids intruding a greywacke-dominated Ordovician flysch sequence. These intrusions are classically interpreted to originate from predominant (70–90 %) juvenile (depleted mantle-derived) magma. However, their close temporal and spatial relationship with the regional anatexis of flysch rocks, allows us to examine the possibility that they were mainly derived from flysch rocks.

Geochemical data are firstly used to assess the potential importance of accreted short-lived materials in the source of the "arc-like" granitoid magmatism. Melt resulted from the anatexis of the flysch, was modeled in pseudosection. Then the petrology and densities of both molten and un-molten flysch metasediments were thermodynamically modeled and discussed in the frame of a gravity model of Altai mountains. Finally, the geological architecture of Altai orogen is compared with Pyrenees-type European Variscan regions where

the continental basement was underplated by juvenile gabbroic magma. The results indicate that the fertile flysch can produce a large amount of melt that are geochemically identical to the granitoids. Melting of the flysch could leave a high-density garnet- and/or garnet–pyroxene granulitic residue in the deep crust, and this can explain the major gravity high over the Chinese Altai. We show that enigma of granitoid genesis cannot be explained by conventional models, but, the data allow us to conclude that granitoids predominantly originated from partial melting of the flysch. Results from this effort show that melting and crustal differentiation of accretionary wedges can transform oceanic material into stabilized continents and contribute to peripheral continental growth.

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