Geophysical Research Abstracts
Vol. 15, EGU2013-3327-1, 2013
EGU General Assembly 2013

Paleozoic archipelagic tectonic evolution of Western Junggar, NW China: implications for continental growth of southern Altaids

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The Western Junggar, NW China, a dominant site for continental growth in Southern Altaids, bridges the Circum-Balkhash and Junggar belts and exposes ophiolite, igneous rocks and strata from Cambrian to Carboniferous. Recent updated data on structure, geochronology, geochemisty and paleomagnetism, integrated with previous data, present a newly Paleozoic spatial and temporal framework of Western Junggar. In Cambrian, the Western Junggar begins to birth at the Tangbale area to south, where occurs Ordovician blueschist and top-to-south vergence structures, indicating north-dipping subduction. This event triggers intra-arc extension to generate Ordovician island arc in the Hongguleleng-Xiemisitai area to north and seamount in the Mayile area, middle of Western Junggar. Until Silurian, a southeastward subduction begins in the extended back-arc basin to west of Mayile, occurring blueschist at the Barleik trench and the Nalunsuo magmatic arc, at the rear of which generates Devonian back-arc basin around the Durbut area. Meanwhile, a Silurian Xiemisitai magmatic arc has been developed at the northern part of Western Junggar, along which a northward subduction has emplaced the Tarbahatai ophiolite and generates the Carboniferous Sawur magmatic arc. At the middle part of Western Junggar, the coeval adakite and sanukitic dykes, charnockite, multiple properties of ophiolite and plutons, SSZ-like andesite, dacite and rhyolite and regional structures suggest that there develop double-subduction systems with ridge-trench interaction in Carboniferous. These features suggest that the Western Junggar experiences rollback, intra-oceanic extension and subduction polarity reversal/flip in back-arc basin settings. Furthermore, positive εNd(t) values and no huge movements of blocks suggest that the Western Junggar is amalgamated by juvenile elements with different orientations. Therefore, we conclude that the Western Junggar enlarges from an island arc to Paleozoic tectonic regime with island arcs and subduction-accretion complexes via continuous accretion presented as episodic events and it significantly contributes to continental growth in southern Altaids.