Proterozoic cratonic fragments in western and northern Mongolia: importance in the onset of formation of the Central Asian orogenic belt

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Despite extensive work on the Paleozoic Central Asian orogenic belt (CAOB), little is known about the initiation and early stages of tectonism. The Zavkhan and Tuva-Mongolia terranes are Proterozoic cratonic fragments with Neoproterozoic to Paleozoic cover sequences that constitute majority of southwestern and northern Mongolia and record the earliest stages of tectonism in the CAOB. Here we present new geochronologic data to constrain Proterozoic to Paleozoic tectonic evolution of the two regions and propose a tectonic scenario for the initiation of orogenesis in the CAOB. Available geochronologic and lithostratigraphic data of the Neoproterozoic through Terreneuvian strata of the Tuva-Mongolia and Zavkhan terranes are similar. The ~ 2 Ga Gargan basement of the Tuva-Mongolia terranes, its overlying ~ 750 Ma Sarkhoi Group volcanics and Neoproterozoic carbonate dominated strata of the Khuvsgul Group are all comparable. We suggest that the two regions have co-evolved geologically and the areal extent of the Proterozoic cratonic fragments in western and northern Mongolia is much vaster than previously estimated. Particularly, orogenesis began around these terranes with arc accretion followed by slab reversal and accretion around Proterozoic cratonic fragments and ribbon continents, which later oroclinally bent and trapped supracrustal material between larger cratons.

Keywords: Central Asian orogenic belt, Proterozoic to Paleozoic tectonic evolution

Paleotethys born or made? Keys from subduction relics from Iran

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The tectonic processes involved in Pangea birth and death resulted in the creation and destruction of oceanic lithosphere. Remnants of the involved oceans now occur along the margins of the Atlantic, Mediterranean, Black and Caspian seas, as well as in the Alpine-Himalayan and adjacent orogens. Of those oceans, three (Iapetus, Tornsquist and Rheic) were closed during the amalgamation of Pangea and another (Neo-Tethys) is the main witness of its break-up.

However, there is an ocean, the Paleotethys, whose origin is under strong debate. Allegedly it was born during the latest stages of the amalgamation (Devonian-Carboniferous) and closed when Pangea was an “stable” supercontinent (Permian). However, Is the Paleotethys a remnant of Rheic or it opened as a new ocean? If the latter, why the Paleo-Tethys developed in a collisional area? And how? The geodynamic relationship between the ocean and the tectonic and paleogeographic evolution of Pangea are crucial.

To solve those questions is capital to found remnants of this ocean. The Shanderman eclogites, in NW Iran are a potential candidate. They are metamorphosed oceanic rocks (protolith oceanic tholeiitic basalt with MORB composition). Eclogite occurs within a serpentinite matrix, accompanied by mafic rocks resembling a dismembered ophiolite. The eclogitic mafic rocks record different stages of metamorphism during subduction and exhumation. In this talk I will show the new petrological, geochemical and geochronological results from this eclogites to shed light on the Paleotethyan problem.

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Pangea and East Asia: With or Without you

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Pangea, the latest supercontinent, amalgamated during the Paleozoic after the colisions of Gondwana, Laurentia, Baltica and several microplates. Meanwhile an intense tectonic activity accoumpaned a series of cratons and microplates that were located in the interface between the Panthalassa and Tethyan oceans as well as along the acretionary orogens of Altaids and Terra Australis. Most of research has forgotten the role of all these areas into the supercontinent tenure and evolution, however understanding them is crucial to our understanding of the supercontinent cycle and Pangean tectonics.

Keywords: Pangea, East Asian Tectonics, Supercontinents

