Quantitative analysis of late Cenozoic tectonic deformation across the Northern foreland of the Chinese Tian Shan

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The East-West trending Tian Shan range has been reactivated and uplifted in the late Cenozoic in response to the northward propagation of deformation related to the India-Eurasia continental collision [1, 2]. Three paralleled rows of anticlinal belts have developed sequentially from south to north. Precise timing of and magnitude of the Tian Shan uplift are required to understand possible mechanisms of continental lithosphere deformation and interactions between climate, tectonism and erosion. Here, we provide structural analysis of seismic section and magnetostratigraphic and biostratigraphic age control on the stratigraphy of the northern Chinese Tian Shan foreland [3, 4]. In the southernmost row of the anticlinal belts, the magnitude of shortening is ~2.9km (15.1%), and the shortening rate is 0.41mm/yr based on the time of tectonic activity of ~6.0Ma. In the middle row, the magnitude of shortening is ~5.9km (23.7%), and the shortening rate is 2.9mm/yr based on the time of tectonic activity of ~2.0Ma. And the northernmost row, the magnitude of shortening is ~4.3km (15.7%), with a shortening rate of 4.3mm/yr. The results indicate that the intensity of the tectonic activity along the northern margin of the Tian Shan has been increasing since the late Cenozoic.

[1] Molnar *et al*. (1993) *Reviews of Geophysics* **31**, 357–396. [2] Tapponnier *et al* .(1979) *Journal of Geophysical Research* **84**, 3425–3459. [3] Li *et al*. (2010) *Basin Research* doi: 10.1111/j.1365-2117.2010.00475. x. [4] Li *et al*. (in press) *Journal of Asian Earth Sciences*, doi: 10.1016/j. jseaes. 2010.08.009.

Transient oxic conditions amid ferruginous deep waters after the Cryogenian Sturtian glaciation evidenced from Fe-C-S proxies

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The Neoproterozoic ocean was characterized by profound perturbations which helped to trigger biological revolutions. While several lines of geochemical evidence indicate that the Ediacaran deep ocean was dominated by anoxic ferruginous conditions, much less is known about Cryogenian seawater. An iron-rich and sulfate-poor environment has been hypothesised for the post-'Sturtian' or late Cryogenian non-glacial interval, in accordance with the growth of a large organic carbon pool, as implied by decoupling between carbonate and organic carbon-isotopes [1].

Here we report iron speciation data from the basal Datangpo Formation which lies between the glacial deposits of the Tiesi'ao (Sturtian) and Nantuo (Marinoan) formations on the Yangtze Platform, South China. Our aim is to examine deep-water redox conditions after the Sturtian glaciation. Samples were collected from two underground rhodochrosite mines named Yuxin and Changxingpo, respectively.

Iron concentrations in different highly reactive species (Fe_{HR}), including $Fe_{carbonate}$, Fe_{oxide}, $Fe_{magnetite}$, were analyzed using the sequential leaching method outlined in reference [2] and performed at Newcastle University, UK.

Siltstone samples from the latest Tiesi'ao Fm. in the Yuxin section yielded Fe_{HR}/Fe_T above 0.38 and Fe_{py}/Fe_{HR} below 0.8, indicating ferruginous conditions. However, three samples from the uppermost Tiesi'ao Fm. at Changxingpo section have Fe_{HR}/Fe_T below 0.38, indicating oxic bottom waters during the melting of the Sturtian ice cover at c. 665 Ma. Organic- and manganese-rich carbonaceous siltstone samples from the lowermost Datangpo Fm. in both sections have Fe_{HR}/Fe_T above 0.38 and Fe_{py}/Fe_{HR} below 0.8, suggesting ferruginous deeper-waters during early interglacial time. This is consistent with a previous study of carbonate and organic matter C-isotope and pyrite S-isotope data from Yuxin section, which showed that the chemocline was initially close to the sediment-water interface and moved up into the water column during the early interglacial interval, as manganese was oxidized in the water column and then converted to manganese carbonates [3].

This study was co-funded by NSFC 40872025 and the DFG FOR736 program.

[1] Swanson-Hysell *et al*. (2010) *Science* **328**, 608–611. [2] Poulton & Canfield (2005) *Chem. Geol*. **214**, 209–221. [3] Chen, Li *et al*. (2008) *Prog. Nat. Sci*. **18**, 421–429.