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Re: Konopelko thesis review

I am happy to have had the opportunity to read Dr. Dmitry Leonidovich Konopelko's doctoral thesis, titled "Paleozoic granitoid magmatism of Western Tien Shan". Although I had previously read some of the underlying papers, I learned a great deal from this comprehensive study of the evolution of this orogen. As my expertise lies in the direction of tectonics and geochronology rather than geochemistry, I will focus my attention on these topics, knowing that the commission includes experts with other specialties. Below I will summarize some of the main points of the thesis.

Dr. Konopelko has combined 27 years of fieldwork in the Tien Shan, more than 26 publications and a broad and deep understanding of the scientific literature of this immense study area in order to understand the magmatic evolution and tectonic history. The thesis is primarily focused on Permian, postcollisional felsic magmatism in the South Tien Shan. However, the Paleozoic history of the Middle Tien Shan is also significant subject, particularly in chapter 4. The thesis is comprised of an introduction, 4 main chapters, a short concluding chapter, references, and the analytical data tables and photographs in the appendices. The goals of this dissertation are summarized in the 4 thesis statements on p. 7-8. The body of the thesis provides a rigorous scientific examination of these ideas; in the concluding chapter 5, the main points of the thesis are summarized, placing the main points of the work into these 4 theses.

Chapter 1 provides an overview of the current state of knowledge. The main geochronologic and geochemical approaches used in the study are introduced; references for methodologic details are provided. High-resolution U-Pb dating of zircons are combined with isotopic studies which constrain the nature of individual intrusions and hence the tectonic environment in which the melts were formed as well as the nature of the protolith material. Chapters 2, 3 and 4 all present substantial new datasets using these methodologies. Each of these chapters devotes a large amount of space to carefully explaining the nature of the samples and interpreting the results.

Chapter 2 discusses the Permian, postcollisional intrusions in the Kokshaal Segment in SE Kyrgyzstan. The source of the relatively unform magmas in this segment reflect the underlying Tarim craton. The source of the heat for these post-collisional intrusions is quite an interesting question. The intrusions roughly follow the trend of the late Carboniferous Southern Tien Shan Suture (STSS), which was reactivated as a series of sinistral strike-slip

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faults during the Permian. Therefore, a genetic link is proposed (illustrated on p. 72), following the model of Teyssier and Tikoff (1998). This model is also invoked in chapter 4. The idea that trans-crustal shear zones can provide conduits for fluids and magma is quite reasonable. However, the San Andreas fault, studied by Teyssier and Tikoff (1998), is a very steep, active plate boundary while the STSS would be expected to dip northward (in present coordinates). The question of how such a new, steep structure would be created deserves additional attention. A larger question, perhaps unrelated to the thesis, is the nature of the geodynamic regime which caused this particular plate-scale shearing.

Chapter 3 examines the postcollisional intrusions in the Alai Segment. The magmatism in this segment is far more heterogenous than that in the Kokshaal, reflecting the more variable nature of the underlying basement. This is a strong argument that the Tarim craton did not continue into the Alai during the Phanerozoic. Fig. 3.11 extends the tectonic model presented in Chapter 2. The Alai microcontinent is bounded by 2 sutures; this scenario is postulated to have allowed the lithospheric mantle to delaminate, aiding the production of the more heterogenous magmatism.

Chapter 4 is the most significant section in the thesis. It concerns the largest and most complex dataset in the thesis, covering a large, poorly documented portion of the Uzbek Tien Shan. Geochemical study of the magmatism shows that the underlying protoliths are more juvenile in the far western part of the study area. The Kyzylkum Segment is similar to the Alai segment in that they both exhibit heterogenous intrusions. The study also examines the Paleozoic evolution of the Uzbek Middle Tien Shan, ranging from ocean formation to extensive supra-subduction magmatism. The chapter also has a subsection which focusses specifically on a detailed study of magmatism associated with gold deposits in the Koshrabad massif. The chapter concludes with a geodynamic model for the entire thesis. This is based on a series of 4 schematic tectonic cross-sections. It would have been interesting to see a corresponding series of map-view reconstructions, although these would of course have been quite speculative. It would also have been interesting to read a comparison of the Tien Shan post-collisional magmatism with similar magmatism in other orogens.

Chapter 5 presents a synopsis of the work presented in the thesis. In particular, the 4 thesis statements introduced in Chapter 1 are supported by summarizing the relevant points from Chapters 2-4. This provides a usual closure to the work and allows the reader to more easily place the broad work into context. For instance, the profound influence of variations in the nature of the underlying crust on the character of post-collisional magmatism becomes clear. This is a significant point, as much of the basement of the Tien Shan is poorly known or completely covered.

The thesis is a combination of material that was originally published in English (and which I assume was translated into Russian for the Russian version of the thesis) and material which was apparently translated into English from the original Russian. The work behind creating a bilingual thesis is immense and cannot be underestimated. Having said that, the translated sections would have benefitted from additional proof-reading.

Overall, this thesis presents a commendable and remarkable compilation of new data and interpretations focusing on the evolution of (primarily) post-collisional magmatism in the South Tien Shan. This is of interest not only for an academic understanding of these processes but also for economic reasons, as numerous significant economic deposits, particularly gold, are hosted by these intrusive systems. Therefore, I find that this thesis is quite acceptable. Dr.

Konopelko should be granted the degree of doctor of geological and mineralogical sciences at Saint Petersburg State University.

Sincerely,

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