Geophysical Research Abstracts,
Vol. 11, EGU2009-10838, 2009
EGU General Assembly 2009

Jurassic granitoid magmatism in the Dinaride Neotethys: geochronological constraints from detrital minerals

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Three independent single-grain geochronometers applied to detrital minerals from Central Dinaride sediments constrain the timing of felsic magmatism that associated the Jurassic evolution of the Neotethys. The Lower Cretaceous clastic wedge of the Bosnian Flysch, sourced from the Dinaride ophiolitic thrust complex, yields magmatic monazite and zircon grains with dominant age components of 164 $\pm$ 3 Ma and 152 $\pm$ 10 Ma, respectively. A unique tephra horizon within the Mesozoic Adriatic Carbonate Platform was dated at 148 $\pm$ 11 Ma by apatite fission track analysis. These consistent results suggest that leucocractic melt generation in the Central Dinaride segment of the Neotethys culminated in Middle to Late Jurassic times, coeval with and slightly post-dating sub-ophiolitic sole metamorphism. Monazite growth and explosive volcanism call for supra-subduction zone processes at the convergent Neotethyan plate margin. This is in accordance with the geochemical diversity of the peraluminous to metaluminous plagiogranite and other granitoid bodies investigated so far suggesting the addition of crustal components (especially Th, LREE, Zr, Hf) to their source magmas (e.g. Bébien et al., 1997; Aigner-Torres and Koller, 1999, Anders et al., 2005). Temporal framework of the supra-subduction zone processes was restricted to a <30 Ma duration by the early Mid-Jurassic onset of subduction and the latest Jurassic completion of ophiolite obduction.
New compilation of geochronological data demonstrates that such Jurassic felsic rocks, either intruding mafic/ultramafic lithologies or interfingering with ophiolite mélange deposits, are widespread in the entire Dinaride-Hellenide orogen. In the Dinarides, supra-subduction zone processes played a more important role than considered in previous tectonic reconstructions.

References

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