# Regional isotopic patterns in granitic rocks of southern Tibet and evolution of crustal structure during the Indo-Asian collision

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Southern Tibet hosts one of the largest and youngest examples of a continental-margin composite granitic batholith, the Gangdese Batholith. This batholith is no longer geographically at a continental margin, and there are questions about how it relates to subduction as opposed to intra-crustal melting. Crystallization ages extend from Cretaceous to Miocene; much of the batholith probably formed at 45-55 Ma. We have begun a study of regional patterns in the Nd, Sr, Hf (zircon) and Pb isotopic compositions of the granitoids north of the Indus-Yalu suture (IYS) to investigate the relationship of magmatism to collision, the extent of mantle magma generation, and the age structure of pre-batholithic Tibetan crust. Granitoids in a N-S traverse near Lhasa show a gradient in $\varepsilon_{Nd}$, with mantle-like values adjacent to the IYS (+2 to +6) and much lower values (-5 to -14) at 80 to 120 km north. This type of spatial gradient in $\varepsilon_{Nd}$ is found in other continental margin batholiths—(e.g. Sierra Nevada and Peninsular Ranges in California)—that are associated with subduction but not continental collision. Positive $\varepsilon_{Nd}$ values usually indicate granitoids formed in oceanic crust with sedimentary cover. There is a 60 km-wide zone north of the IYS where this type of crust hosted the batholith even though the magmatism occurred after the beginning of collision. Decreasing $\varepsilon_{Nd}$ northward indicates a decreasing ratio of mantle input/crustal assimilation due to progressively thickened crust. A discontinuity at about 29.8N latitude (just N. of Lhasa) may be the southern edge of pre-collision Tibetan basement. Miocene granites near the IYS have lower $\varepsilon_{Nd}$ than older granites, suggesting crustal thickening and structural rearrangement by Miocene time. Peraluminous (2-mica) granites north of 30.0N latitude have $\varepsilon_{Nd}$ of -7 to -14, corresponding to basement model ages of 1.2 to 1.8 Ga. More detailed regional isotopic characterization of the granites could help document both the initial crustal structure of southern Tibet and its tectonic and magmatic modification during collision.

# Volcanism of the Bureja-Jiamusy superterrane as a reflection of a subduction setting evolution

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The Bureja-Jiamusy superterreane is supposed to be a fragment of the Gondwana land accretted to the Sino-Korea craton in the Late Permian [2] and in the Late Jurrassic, after the closure of the Mongolian-Okhotsk Ocean they formed a single whole with Siberia [3]. But paleomagnetic data [1] indicate that the width of the Mongolian-Okhotsk Ocean has been 3000 m before the Late Jurassic. At present the three coeval Late Mesozoic volkanic complexes of andesite formation of calc-alkali series were identified in the territory of the Northen Flank of the superterreane. I – (120-105 Ma): the rocks are from highly to moderately magnesian; moderately titaniferous; Sr (up to 1029 ppm), Nb (<4-10 ppm), Ta (0.49 ppm), (Eu/Eu*=0.89-1.05), (La/Yb)n=5.4-6.9, La/Ta=30-61, Sr/Y=36-47. II – (116-105 Ma): moderately magnesian and titaniferous, Sr (230-910 ppm), Zr (121-301 ppm), Hf (178-212 ppm), Nb (<5-13 ppm), Ta (0.39-0.72 ppm); (Eu/Eu*=0.74-0.85); (La/Yb)n=5.1-11.22, La/Ta=30-61, Sr/Y=24. III – (116-105 Ma): moderately magnesian, high titaniferous; Rb (43-135 ppm), Sr (190-642 ppm), Zr (129-412 ppm), Hf (3-13 ppm), Nb (7-39 ppm), Ta (1.36-1.90 ppm), Sr/Y=5-12, Eu/Eu*=0.99-0.56, (La/Yb)n=4.40-14.02, La/Ta=18-23. About 120 Ma ago the formation of volcanics with geochemical characteristics typical for products of subduction settings began throughout the whole territory of superterrane's northern flank. 111 Ma a magmatic activity shifted towards the margins of the northerh (II) and eastern (III) flanks (in modern coordinates) of the study superterrane. Volcanism loses the features typical for the subduction rocks: Sr concentration decreases, whereas the concentration of Nb, Ta, Rb, K increase. The rocks of the three complexes formated by peridotite melting. The $K_{REE}$ =2.5-4.3; the ratios of incoherent elements (Ce, Zr, Nb, Th, Yb to La ) are close to the constant values. The rocks of those complexes belong to the common magmatic process and its products are evolved due to a subduction waning within the study region. Basing on geohemical characteristic of the rocks from the Bureja-Jiamusy superterreane we established that a subduction tectonic scenario began to develop there about 120 Ma ago and it completed 105 Ma ago. At that time the superterreane was most likely either a separate structure or, at least, an active continent margin.

[1] Kravchinsky V.A., Cogne J.-P., Harbert W. & Kuzmin M.I. *Geophys. Journal Int*. (2002) **148**, 43-57. [2] Wilde S.A. & Wu F. //*Gondwana Research*. (2001) **4**, 46. P.823-824. [3] Zhao X., Coe R.S., Gilder S.A. & Frost G.M. *Australian Journ. Earth Sci.* (1996) **3**, 643-672.