Magmatic changes in Central Panama as an indicator of subduction dynamics and breakup of Farallon plate

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The breakup of Farallon plate into the Cocos plate and Nazca plate is considered to have occurred ca. 23 Ma and was possibly followed or predated by oblique subduction of the Nazca/Cocos or Farallon plate beneath Caribbean Oceanic Plateau in Panama. However, relationships between the Farallon plate breakup, previous subduction dynamics and possible changes in supra-subduction magmatism in Panama remain poorly constrained. To test this relationships, we have conducted a geological and sampling transect along the Isthmus of Panama in the Canal area, which provide a new insight into a ca. 60 m.y. long history of the arc.

Several volcanic and magmatic phases have been recognised in the studied area which outline several phases of evolution of the Panama volcanic arc between subduction initiation in the Late Cretaceous (ca. 72 Ma) to possible shutdown of the volcanic arc in Central Panama in the Miocene (ca. 16 ma). A change from predominantly incompatible element depleted magmatism to predominantly trace element enriched magmatism occurred ca. 25 Ma. This magmatic evolution is interpreted to reflect a decrease in hydrous melting associated with a change from relatively orthogonal to oblique subduction along the Panama arc which might play an important role in the breakup of the Farallon plate ca. 23 Ma. Modelling and analysis of radiogenic isotopes are in progress, which suggest that different degrees of partial melting, probably reflecting different slab input contributed to the observed geochemical spatio-temporal changes.