Structural control on magmatism along divergent and convergent plate boundaries: Overview, model, problems

Valerio Acocella

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Structural control on magmatism along divergent and convergent plate boundaries: overview, model, problems

Valerio Acocella

Dipartimento Scienze Roma Tre, Roma, Italy.

Fax: 0039-06-54888201; e-mail: acocella@uniroma3.it

Abstract

Plate boundaries are the most active, unstable and hazardous areas on Earth. The aim of this study is twofold.

1) Provide an overview of the main structural features along divergent and convergent plate boundaries and their relationships to volcanism. The considered divergent plate boundaries include the continental East African Rift System (EARS), the transitional Afar Rifts and slow (Iceland) and fast (East Pacific Rise) oceanic ridges. The analysis of the convergent plate boundaries refers to the extensional (Taupo Volcanic Zone, New Zealand), strike-slip (Sumatra), contractional (NE Japan) and more complex (Central Andes) volcanic arcs.

2) Propose an original and innovative frame to understand tectono-magmatic processes along plate boundaries, based on two major points. a) Magmatism may effectively control the development of plate boundaries. At immature continental divergent plate boundaries (as the non-magmatic portions of the EARS), regional extension plays a major role in extending the upper crust; however, along mature continental and oceanic rifts magmatism is most effective in spreading plates apart through dikes. At convergent plate boundaries, the possibility to develop extensional, strike-slip, contractional and