



An overview of the Mesozoic-Cenozoic magmatism and tectonics in Eastern Paraguay and central Andes (Western Gondwana): Implications for the composition of mantle sources



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The paper is dedicated to Ricardo Héctor Omarini, full professor at the Salta University and president of the "Centro de Estudios Geológicos Andinos". He planned this publication in January 2015 together with Piero Comin-Chiaramonti. Unfortunately, Ricardo passed away on June 28, 2015, but always remains in our hearts.

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ABSTRACT

The amalgamation of the Western Gondwana (including the Greater Gondwana supercraton) occurred at 600 Ma during the Brazilian – Pan African orogeny. A plate junction related to this event is marked by the Transbrasilian lineament which separates the South American continent into two sectors: the Eastern Paraguay-Brazilian and Central Andean domains. An overview of the geodynamic data from these two sectors indicates that the two domains were subjected to distinct evolutions from the Proterozoic to the present. The Andean domain is characterized by long-lived subduction processes linked to the convergence and consequent collision of microplates since the Middle Proterozoic (western Amazonian Craton) with a peak at about 600–580 Ma. The Paraguay-Brazilian domain remained relatively stable but was affected by extension episodes that reactivated ancient (Early and Middle Proterozoic) suture zones. These different geodynamic evolutions seem to reflect broadly distinct mantle compositions. In the subduction zones of the Andean domain the mantle was deeply modified by metasomatic processes following the subduction of oceanic plates. Consequently, the Andean type magma sources show a clear HIMU imprint inherited from the MORB, whereas the Paraguay-Brazilian sector shows a prevalent EMI and subordinate EMII character. The petrological data mainly from Mesozoic and Cenozoic magmatic events in the two sectors are reviewed to investigate the current mantle plume and mantle dome models for the uprising of the asthenospheric (or sub-lithospheric) material.

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1. Introduction

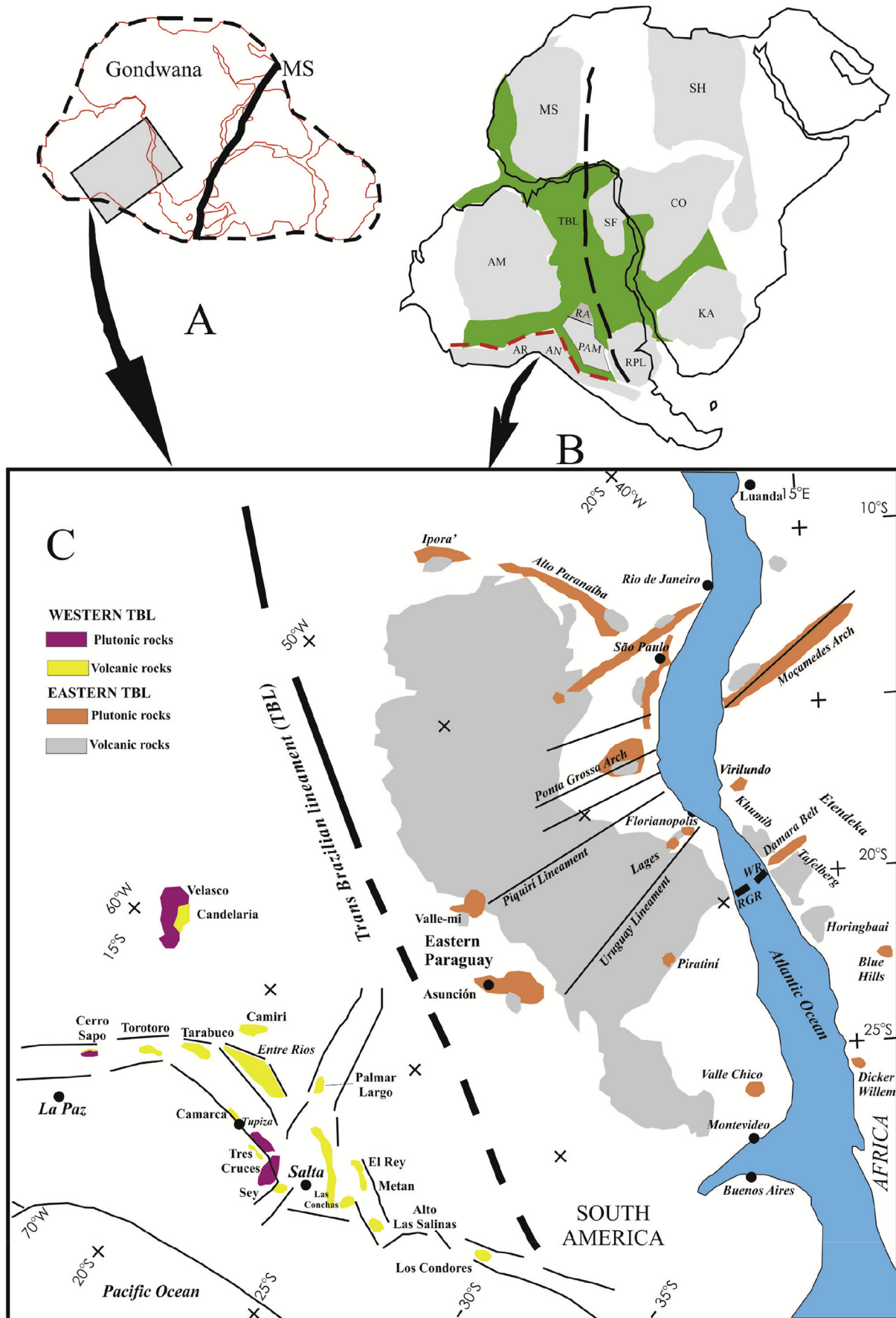
This paper presents a revision of petrological, geological, geochemical and geophysical studies of continental magmatism in the central sector of Eastern Paraguay and the central Andes (South American Platform) during the Mesozoic-Cenozoic time, to elucidate the parental mantle sources (Cristiani et al., 2005; Comin-Chiaramonti et al., 2009). The area considered in this paper is characterized by potassic, sodic and alkaline-peralkaline continental magmatic rocks associated to the continental tholeiitic basalts of two LIPs (large igneous provinces), namely the Central Atlantic Magmatic and the Parana Etendeka provinces exposed

over different geographic domains from eastern to western sides of the Transbrasilian lineament (TBL of Cordani et al., 2013 and references therein; see also Fig. 1).

The largest volume of tholeiitic and alkaline rocks are located on the eastern sector of the TBL, parallel to the continental margin of the South American (Atlantic) domain. Magmatic activity in the western sector of the TBL is minor in volume and developed within or close to a series of rift basins parallel to the western border of the South America Continent (proto-Andean domain). Notably, the magmatism, developed within the late Proterozoic to Early Paleozoic basement, contains also marine and continental sediments of Jurassic/Cretaceous ages. The opening of the Atlantic Ocean, in the context of the breakup of the Gondwana continent, has controlled the magmatic activity in these sectors. In terms of chemical and petrological relationships, these areas have been rarely considered together with the exception of a study on lavas carrying mantle

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