RE-OS AGES AND SOURCES OF HIGH-TI CONTINENTAL FLOOD BASALTS OF THE PARANÁ BASIN, BRAZIL

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Resumo: The Re-Os isotopic systematics of high-Ti flood basalts of the Paraná Basin of Brazil were investigated. These basalts represent some of the least contaminated in the region and therefore offer the best opportunity for examining the potential sources for these magmas. Whole rock as well as mineral fractions from HI-34 (Urubici), KNJ-161 (Pitanga) and PU-1098 (Paranapanema) high-Ti basalt samples were found to have distinctive and restricted Re concentrations but highly variable and overlapping Os concentrations and isotopic ratios. Together, samples HI-34 and KNJ-161 form an isochron yielding an age of 130,0 ± 2,0 Ma, consistent with other isotopic systems, and coincident with the age of maximum eruption rates within the Paraná Basin. An initial $^{187}Os/^{188}Os$ ratio of 0,134 ± 0,004 does not give a unique solution for the source reservoir, but suggests either direct derivation from an enriched mantle plume source or contamination of a subcontinental lithospheric mantle (SCLM)- or depleted MORB mantle (DMM)-derived magma by crustal assimilation limited to 1-2%. Analyses of Paranapanema sample PU-1098, however, yield an isochron with an anomalously old age (146,4 ± 1,3 Ma) and a subchondritic initial Os isotopic composition of 0,115 ± 0,003. While this age is difficult to explain with regard to oldest accepted Ar-Ar ages of Paraná flood basalts (~138 Ma), it is interesting to note that the initial Os isotopic composition is coincident with the expected Os isotopic composition of the SCLM formed at a Transamazonian age.

Palavras-chave: Re-Os; Paraná Basin; Flood Basalts.

SERRA GERAL GROUP IN THE PARANÁ BASIN – AN OPTIMIZED VOLCANIC STRATIGRAPHY.

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Resumo: Regional geological mapping and geochemistry reveal that the internal structure of Serra Geral flows is composed of a composite sequence of different magma types. The sequential development caused the interfingering of lavas with distinct magma compositions. The vertical sequence shows the recurrence of similar magmas in several stratigraphic heigths and their uneven distribution in the large area covered by volcanism in southern Brazil and neighbouring coutries. This is critical to the understanding of how magmatic feeder systems and processes varied during the evolution of the province.

The following formations have been recognized in the Serra Geral Group, based mostly on field mapping and geochemistry. One main stratigraphic section has been described from north to south across the center of the basin. The listing of formations does not follow a vertical sequence of occurrence.

Serra Geral Group – Low Ti: Várzea do Cedro Formation, Palmas Formations; high Ti-Zr: Ourinhos Formation, Chapecó Formation; low Ti/Y: Esmeralda Formation, Campos Novos Formation; low Ti/Y: Paranapanema Formation, Campo Erê Formation, Cordilheira Alta Formation, Capanema Formation, Alegrete Formation, Gramado Formation; high Ti/Y: Nova Laranjeiras Formation, Pitanga Formation; high Ti/Y: Urubici Formation, Ribeira Formation; picritic: Morungava Formation.

The concept of Formation follows standard procedures of stratigraphic classification and nomenclature (e.g., National Commission on Stratigraphic Nomenclature). The Serra Geral Formation is now designated Serra Geral Group because it contains several formations, mapped and characterized.

Volcanism started with high Ti/Y compositions in the north in a thick crust and low volume of magma extraction, evolving into a highly fractionated and contaminated, low Ti/Y magmatism in the south. The different types of magma were thus not generated by fractionation from a single mantle source, but from different sources of magma. Moreover, it is suggested that magmas were generated in a wider area than the present distribution of the lavas, and the chemical types are thought to have erupted in different places dischronously.

Several observations are significant: a- the magmatic activities started in the northern part of the basin, with high-Ti/Y dominant; b- fractionation and contamination became more effective to the south; c- melting and mixing with the crust started the acid volcanic activity; d- the magma modification was not sharp from north to south, interfingering distinct magma types in the geological sequence; e- the same magma type can occur in distinct stratigraphic levels, and this must be included in the stratigraphic designation; f- the chemical composition is a major component for the understanding of magmatic processes, but the positioning of each flow in the stratigraphic unit requires field, petrographic and geophysical characterization.

Palavras-chave: paraná basin; serra geral group.

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