
VOLATILES EXPELLED THROUGH MAGMA-SEDIMENT INTERACTIONS IN THE PARANA- ETENDEKA MAGMATIC PROVINCE

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ABSTRACT

The link between Continental Flood Basalts, extinctions and environmental changes is mainly attributed to the effects of volcanic emissions, where the expelled volatile species have an important effect on the atmospheric composition. It is highly probable that magmatic degassing is an insufficient killer mechanism, and an important additional volatile flux should be provided by alternative sources, for example, outgassing associated with contact metamorphism. Brazil hosts one of the world's most expressive CFB associated with the breakup of the Gondwana Supercontinent and the opening of the Atlantic Ocean, the Parana- Etendeka Magmatic Province. Some uncertainties prevent the concrete identification of volcanic activity as a trigger of environmental changes. In this context, this work contributes by investigating the composition of volatiles released via interaction of magmas and sedimentary bedrocks of different compositions (e.g. sandstones, carbonate-bearing rocks, and organic matter-rich shales) via fluid inclusion studies in view to compare the nature of the identified volatiles with those available for extinction-related provinces. Different from what occurs with magmatic assimilation, thermal devolatilization due to contact metamorphism engenders a massive release of fluids. The two field stages allowed the collection of 25 samples from sedimentary sequences affected by magmatism (vein samples and sedimentary hornfels) and vein samples that cut the magmatic samples for selection of high-temperature fluid inclusions. The microthermometry measurements (298 inclusions were measured) showed that fluid inclusions are aquosaline with high and low salinity variability (present at all samples measured)(0.2 to 25 w.t%). Carbonic inclusions were found at the quartz grains of siltite hornfels, suggesting that there was CO_2 remobilization. Moreover, the variability of melting temperature of CO_2 (-39 to -58°C), although small, indicates the possibility of mixing volatiles different from CO_2 (e.g. CH_4 , N_2). Eutectic temperatures suggest a system composed of NaCl - MgCl_2 / CaCl_2 - H_2O . The observation of decrepitation behavior and the increasing homogenization temperatures against constant ice melting of fluid inclusions indicate a thermal reequilibration. The high temperatures reached (120 to >500°C) and the evidence of reequilibration suggests that fluid inclusions have undergone modifications due to some later event probably to the heating by the Parana volcanic event.

Keywords: Continental Flood Basalts; Parana-Etendeka Magmatic Province; Volatile species; Fluid inclusion studies.

