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Discrimination of Paraná Flood Volcanics by Thermal Inertia

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Spatially-related geochemical and isotopic variations of samples from the Paraná continental flood-basalts (CFB) and ultrapotassic magmas indicate two contrasting regions: the southern Low-Ti and the northern High-Ti provinces. Thermal Inertias (TI), given by $(dck)^{1/2}$[respectively density, specific heat, and conductivity] in units of $Wm^{-2}K^{-1}s^{1/2}$, and determined by a transient heating method, have been investigated as a rapid and reliable field method to provide the spatial distribution of the CFB. A general tendency is seen in the inserted figure in which TI correlates negatively with the SiO_2 content of the tholeiites, tholeiitic andesites, and rhyodacites-rhyolites. However, a remarkable positive correlation is noted for the basalties. In this case, a possible increase in density, notwithstanding the observed SiO_2 increment, is accountable for the TI enhancement. TI values fall in clusters that are very distinct between the basics from the north (open symbols) and the south (full symbols) but much less definite between the acids from the north and the south. Broadly similar behaviors are discerned in plots of TI versus $SiO_2/(SiO_2 + CaO + MgO + FeO)$ [polymerization index]. Coherent associations are also perceived in negative correlations between TI and TiO_2, CaO/Al_2O_3, and FeO for the basaltic samples, probably related to the d component, and K_2O, FeO, and Fe_2O_3 for the acid volcanics, possibly associated with the k component.