The high-Ti dykes of Florianópolis Swarm (Paraná Magmatic Province): mantle sources and crustal contamination

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The Florianópolis Dyke Swarm is located in the Santa Catarina Island (Southern Brazil), encompassing also the nearby coast. This swarm belongs to the Paraná Magmatic Province, whose emplacement preceded the South Atlantic opening. The dykes are tholeiitic (very few transitional are found) and most of them trend NE-SW, with subordinate NW-SE orientation. The rocks have SiO_2 varying from 50 to 55 wt% and TiO_2 >3 wt%. The dykes with Sr>550 µg/g are dominant and some of them experienced up to 10% of crustal contamination, as evidenced by their relatively low P_2O_5/K_2O (<0.3), high $(Rb/Ba)_{PM}$ (up to 2.2), and radiogenic Sr and Pb isotope compositions ($^{87}Sr/^{86}Sr_i$ up to 0.70787; $^{206}Pb/^{204}Pb_m$ up to 19.093). Almost all tholeiitic dykes with Sr<550 µg/g as well as the transitional ones were substantially affected by at least 15% of crustal contamination, as shown by their high values of $(Rb/Ba)_{PM}$ (up to 2.6), $^{87}Sr/^{86}Sr_i$ (0.70737-0.71750) and $^{206}Pb/^{204}Pb_m$ (18.446-19.441), and low P_2O_5/K_2O (<0.3). Xenoliths with border reactions and some intrusions presenting diffuse contacts indicate that the contamination was probably caused by assimilation of re-melted granitic host rocks. Considering only the dykes that were not affected by crustal contamination, the Sr, Nd and Pb isotope mixing modelling indicates the participation of a heterogeneous metasomatized (refertilized) SCLM, composed by partial melting of a depleted sublithospheric mantle (DMM), which was hybridized by addition of pyroxenite (<5%) and carbonatite (<2%) melts. The isotope mixing also points to a significant participation (up to 50%) of Archean SCLM.

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