Multidisciplinary study of a recent oceanic pluton: The syenitic complex of Rallier du Baty, Kerguelen(TAAF)

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Kerguelen plume's activity is known from 120 Ma to present days. Through this period, the interaction between the plume and the South East Indian Ridge leads to an important tholeitic-transitional magmatism that formed the Kerguelen plateau and the Broken Ridge. The rocks of the Kerguelen archipelago, dominated by basalts, have recorded the chemical evolution from the "transitionnal" magmatism to a Kerguelen plume-related alkaline magmatism. This alkaline magmatism is characterised by a wide range of volcanic and plutonic rocks from basic to highly differentiated rocks. The study of the differentiated rocks led to models of crustal growth related to the occurrence of a mantle plume in a within-oceanic plate context. These rocks occur at different locations in the archipelago but are especially abundant in the Rallier du Baty Peninsula located in the southwest of Kerguelen island. Through a multiple-analytical approach, the aim of this study is to constrain the origin, evolution and emplacement history of the Rallier du Baty plutonic complex. Field observations and fabric study evidence that the plutonic complex has a laccolithic shape and was formed by successive intrusions of numerous magmatic pulses, those intrusions being now slightly tilted to the south. The rocks occurring in the plutonic complex range in composition from gabbro to quartz rich-syenite and define a typical alkaline oversaturated magmatic serie. Whole-rock geochemical data reveal that the evolution of parental magma of that plutonic series is mostly controlled by fractional crystallisation processes. A short timing of 6 Ma for the emplacement of the entire pluton has been deduced from U-Pb dating using separated zircons. All these features lead us to propose a short timing emplacement of a plutonic intrusive body formed by successive magmatic pulses in a oceanic within-plate setting.