Geochronological, geochemical and petrographic constraints on incremental pluton growth: the case of Macao granitic suite, SE China

PEDRO QUELHAS[1,2,*], ÁGATA ALVEIRINHO DIAS[1,2], JOÃO MATA[2], DONALD WAYNE DAVIS[3]

[1] Institute of Science and Environment, University of Saint Joseph, Macao, China, pedro.quelhas@usj.edu.mo *

[2] Instituto Dom Luiz, Faculdade de Ciências, Universidade de Lisboa, Portugal

[3] Jack Satterly Geochronology Laboratory, Department of Earth Sciences, University of Toronto, Toronto, Ont., Canada

Unravelling the magmatic history of large igneous provinces, in general, and the growth history of individual intrusions, in particular, is crucial to understand the complex tectono-magmatic processes underlying the dynamics of crustal growth. The Late Mesozoic magmatic belt cropping out in the southeastern (SE) part of the Cathaysia Block (SE China) has been the focus of much research in the past decades. However, most studies dealt with large batholith areas where sampling cannot represent well the small-scale compositional variation of plutonic bodies. In this study we present high precision U-Pb zircon ID-TIMS and in situ high spatial resolution U-Pb zircon LA-MC-ICPMS ages of Jurassic granites and Jurassic to Cretaceous dacite dykes from Macao. The new ages tightly constrain the Macao granitic magmatism to two periods ranging from 164.5 ± 0.6 to 162.9 ± 0.7 Ma and 156.6 ± 0.2 to 155.5 ± 0.8 Ma, separated by ca. 6 Ma. In addition, younger dacites were dated at 150.6 ± 0.6 Ma and <120 Ma. U-Pb zircon ages and whole-rock REE data of Macao granites indicate that the first pulse is also represented in Hong Kong and SE China, while magmatism with the chemical characteristics of the second pulse seems to not be represented outside Macao. The two granitic magmatic pulses have distinct mineralogical and geochemical features that support their discrete nature rather than a continuum of comagmatic activity and suggest that the Macao granitic suite was incrementally assembled during a period of ca. 9 Ma. The transition from granitic magmatism to the younger dacite dykes likely corresponds to a change in the regional tectonic setting, from an extensional regime related to foundering of the subducting paleo-Pacific plate during the Middle to Upper Jurassic to the reestablishment of a normal subduction system in SE China during the Upper Jurassic to Late Cretaceous period.