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Deciphering the evolution of Deception Island's magmatic system

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Deception Island (South Shetland Islands) is one of the most active volcanoes in Antarctica, with more than 20 explosive eruptive events registered over the past two centuries. Recent eruptions (1967, 1969, and 1970) and the volcanic unrest episodes that happened in 1992, 1999, and 2014–2015 demonstrate that the occurrence of future volcanic activity is a valid and pressing concern for scientists, technical and logistic personnel, and tourists, that are visiting or working on or near the island. We present a unifying evolutionary model of the magmatic system beneath Deception Island by integrating new petrologic and geochemical results with an exhaustive database of previous studies in the region. Our results reveal the existence of a complex plumbing system composed of several shallow magma chambers ($\leq$ 10 km depth) fed by magmas raised directly from the mantle, or from a magma accumulation zone located at the crust-mantle boundary (15–20 km depth). Understanding the current state of the island's magmatic system, and its potential evolution in the future, is fundamental to increase the effectiveness of interpreting monitoring data during volcanic unrest periods and hence, for future eruption forecasting. This research was supported by the MICINN grants RECALDEC (CTM2009-05919-E/ANT) and PEVOLDEC (CTM2011-13578-E/ANT), the POSVOLDEC(CTM2016-79617-P)(AEI/FEDER, UE) project and the grant RYC-2012-11024.