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Understanding the evolution of a basaltic shield volcano from seismic data: A new model for La Réunion, Indian Ocean

Elodie Lebas (1), Anne Le Friant (2), Christine Deplus (2), and Béatrice de Voogd (3)

(1) Geomar Helmholtz Centre for Ocean Research, Kiel, Germany (elebas@geomar.de), (2) Institut de Physique du Globe de Paris, Sorbonne Paris Cité & CNRS UMR 7154, Paris, France (lefriant@ipgp.fr; deplus@ipgp.fr), (3) Université de Pau et des pays de l'Adour, CNRS FR 2952, Pau, France (beatrice.devoogd@univ-pau.fr)

High-resolution seismic reflection profiles gathered in 2006 on La Réunion submarine flanks and surrounding oceanic plate enabled characterization of the seismostratigraphy architecture of the volcaniclastic apron surrounding it. Two prominent horizons were recognized on the flanks and on the abyssal plain. Intersections with previous data (REUSIS, 1993) allow correlations of the deepest horizon to the horizon V interpreted as the top of the sedimentary units predating the volcanism (edifice base). As a consequence, the shallower horizon S is interpreted as a marker of a major intermediate building phase standing out a change in the complex activity. This horizon displays an undulated morphology reminiscent of buried sediment waves off the southeastern flank. Two other shallower and less prominent horizons, H1 and H2, have been recognized in the southeastern and northeastern regions, respectively. As for V and S, they point out distinct building phases of the volcanic complex. Seismic facies observed within the apron show a prevalence of sedimentary and reworking processes since the onset of the volcanism compared to catastrophic flank collapses. Analysis of the location and of the thickness variations of the units deposited above and between each horizon enabled us to reconstruct and to propose a new model of evolution for La Réunion volcanic complex from an offshore perspective. The data presented highlight the existence of a large proto-Piton des Neiges edifice during the first building phase and argue for a control of La Réunion present-day morphology by a major proto-Piton des Neiges – Piton des Neiges volcanic complex.