View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by OceanRep

Geophysical Research Abstracts
Vol. 14, EGU2012-11873-1, 2012
EGU General Assembly 2012
© Author(s) 2012

Louisville Ridge subduction at the Tonga-Kermadec trench: preliminary velocity models from wide-angle seismics

W. Stratford (1), C. Peirce (1), T. Knight (1), A. Watts (2), I. Grevemeyer (3), M. Paulatto (2), D. Bassett (2), J. Hunter (2), and L. Kalnins (2)

(1) Durham University, Department of Earth Sciences, Durham, United Kingdom (w.r.stratford@durham.ac.uk), (2) Oxford University, Oxford, United Kingdom, (3) GEOMAR, Helmholtz Centre of Ocean Research, Kiel

Subduction of the Louisville Ridge at the Tonga-Kermadec trench perturbs the structure of the forearc and changes the seismogenesis of the subduction zone. The oblique collision and high convergence rates between these two > 4000 km long features results in rapid along-trench variation from a post-collision zone north of the Louisville Ridge to a pre-collision zone to the south. Due to the obliqueness of collision there is a southward migration of the collision zone at ∼200 km/Ma. At the collision zone, seafloor topography shows a zone of extensive faulting. Tectonic erosion of the overriding plate, collapse of the overriding plate into the trench and a seismic gap are inferred to be due to subduction of the Louisville Ridge. In addition, the consequences of subduction for the seamount are paramount to elucidating the seismogenic nature of the collision zone, with the mode of deformation of the down-going edifice inferred to have a significant effect on the earthquake potential of the system. Truncation of the seamount at shallow depths may result is no seismicity, while truncation at greater depth and pressure within the subduction system may be seismogenic. The pre-, post- and present-day collision zones are investigated with ∼1800 km line length of new geophysical data collected along four profiles during April-June, 2011. This NERC-funded, multidisciplinary, multi-institutional project acquired wide-angle and multichannel seismic, gravity, magnetic and swath bathymetry data in a region centred at the point of Louisville Ridge subduction. Three of the new geophysical profiles strike perpendicular to the trench, one along-axis of the seamount chain, and one to the north and south. The profiles were designed to cross the main tectonic features of the subduction zone, explicitly to elucidate differences in crustal structure in the overriding plate. New results on the crustal velocity structure from wide-angle data are presented for the three deformation zones. Results are discussed in context of changes in structure of the overriding plate associated with changes in down-going plate topography and with possible seamount truncations.