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Subduction and backarc spreading structures along the Kermadec trench from wide-angle seismic data

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Two marine geophysical transects reveal lithospheric structures of the Kermadec subduction zone north of North Island, New Zealand. Our southern transect is about 300 km long and shows the northern end of the subducting Hikurangi Plateau, an accretionary forearc, and the backarc structures of the Australian plate. Here lies one of the deepest backarc basins in the world, Raukumara basin. Refracted phases indicate sediment velocities down to depth of about 10 km below seafloor. The width of the basin, situated between the Kermadec and Colville ridges is about 100 km. Our second transect, 1000 km to the north, is close to the active volcano of Raoul Island, the regional seismicity is higher and we observe an erosive subduction margin. The transect is about 500 km long, covering incoming normal Pacific oceanic plate as well as forearc and backarc basins of the Australian plate. Here, the incoming crust is about 5 km thick, and the upper mantle velocity is remarkably slow (down to 7.4 km/s), perhaps due to sampling the slow orientation of the inherent seismic anisotropy in addition to strong alteration of the bending plate with possible serpentinisation of the mantle peridotites. The backarc basin is considerably thinner in the north, only up to about 1.5 km thick, however a well developed forearc basin exists, about 100 km wide and up to 4 km deep. The uppermost arc mantle has a P-wave velocity of 7.7 km/s. This study is part of the MANGO project (Marine Geoscientific Investigations on the Input and Output of the Kermadec Subduction Zone) which aims at understanding the transition throughout the different subduction regimes in the working area, the variation of the structures to explain the accompanying seismicity by analysing the lithospheric

structures and also material transfers through subduction zone processes.