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Onboard paleomagnetic results of pelagic sediment cores from the South Pacific Ocean, IODP Expedition 329.

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IODP Expedition 329 surveyed and cored the sediment at 6 sites throughout South Pacific Gyre (SPG) and at 1 site its southern margin. The central SPG has been describes as Earth's largest oceanic desert (Claustre and Maritorena, 2003). The dominant lithology of this expedition is zeolitic metalliferous clay at the deeper water sites on older basement (58 to 120 <= Ma) within the gyre (Sites U1365, U1366, U1369 and U1370). Manganese nodules occur at the seafloor and intermittently within the upper sediment column at these sites. The cored sediment at the shallowest site (U1368) is calcareous nanno fossil-bearing clay. The sediment at Site U1367 is transitional between these 2 lithologies. Site U1371 lies out side the low-chlorophyll region, and its cored sediment is dominantly siliceous ooze with abundant diatom debris.

Paleomagnetists of Expedition 329 measured natural remanent magnetization (NRM) of all archive-half sections from Sites U1365 to U1371 using the three-axis cryogenic magnetometer at 2.5-cm intervals before demagnetization. The archive-half sections were demagnetized by alternating fields (AF) of 10 mT and 20 mT. The primary magnetization of pelagic clay generally degrades at a few meters depth below the sediment water interface. The boundary between the primary and stable magnetic records often occurs in the later part of Gauss chron and coincides closely with the late Pliocene onset of northern hemisphere glaciation (Opdyke and Foster, 1970; Kent and Lowrie, 1970; Prince et al., 1980). Magnetic directions of this expedition are not interpretable throughout most of the pelagic clay (Sites U1365, U1366, U1367, U1368, and, U1370) possibly due to magnetic overprint during coring (high positive inclination), viscous remanent magnetization (VRM), or diagenetic changes in the sediment. In addition, appearance of manganese nodules often hampers indigenous magnetic direction in shallow sediment sections. However, fortunately the pelagic clay sediments of Sites U1369 and the top of U1365 (0-6 m) were less these influences.

The lithology at U1367 changed from metalliferous clay (Unit I) at the top to nannofossil ooze (Unit II) at the bottom. The metalliferous clay unit extends from 0-5.5 mbsf in U1367. Consistently, NRM intensities and magnetic susceptibility in Unit I were in the order of 10?-1 to 10?-2 A/m (more than 100?10?-5 vol. SI) and decreased to about 10?-3 to 10?-2 A/m (10 to 50?10?-5 vol. SI) in Unit II (nannofossil ooze).

Keywords: Integrated Ocean Drilling Program, South Pacific Gyre, magnetic stratigraphy, pelagic clay, rock magnetism, viscous remanent magnetization