

10 years of ACORK: Continuous pressure from the decollement zone at Nankai Trough off Muroto

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During the KR22-12 cruise, three dives were completed using ROV KAIKO onboard R/V KAIREI during Dec. 20-25, 2011, to retrieve pressure data and interstitial fluid samples from ACORKs at ODP Holes 808I and 1173B situated landward and seaward of the deformation front in the Nankai Trough off Muroto. With 3-year-long and a 4-year-long new data records from 808I and 1173B, respectively, we now have over 10-year-long continuous pressure records since June 2001 at both sites. Most of pressure data from multiple depths show systematic variations in pressure with depth, and in tidal signal amplitudes. Transient changes were observed at the time of several nearby earthquakes, including ones during the recent 3 to 4 years at the time of Mar. 11 Tohoku earthquake, followed by a long-lasting pressure change starting on Mar. 23, 2011.

Gas-tight fluid sampling operations were successfully carried out from the hydraulic port attached to the swellable packer inserted within the ACORK head. The swellable packer was set in order to isolate the decollement zone that lies roughly 20 m below the bottom of casing at 922 m below the seafloor. We observed shimmering water venting through the port, and the flow rate was measured using a ball-type flowmeter. Fluid samples looked muddy-colored, probably due to the stain from the casing steel. Geochemical as well as microbial analyses are planned as a post-cruise activity, and a full analysis of the relationship between the Tohoku earthquake and the pressure transients is underway.

Keywords: ACORK, Nankai Trough, pore pressure, decollement