

Rock magnetic signature of gas hydrate-bearing sediments: insights from the Kumano Basin, Nankai Trough, offshore Japan

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Interest in gas hydrate occurrences have been increasing in the last decades because of their potential value as an energy resource. Signatures in the rock magnetic record has successfully been used to identify present gas hydrate-bearing horizons in marine sediments, and can potentially indicate former gas hydrate accumulation zones. Recent studies carried out at Integrated Ocean Drilling Program (IODP) Site C0008, in the frontal thrust of the Nankai Trough, have shown that authigenic ferrimagnetic iron sulfide-rich layers characterize present day gas hydrate horizons. Here we present a detailed rock magnetic study of gas hydrate-bearing sediments from the Kumano forearc basin in the Nankai Trough drilled during IODP Expedition 338. We aim to characterize the present distribution of gas hydrate-bearing horizons in the basin. Our data are from Site C0002 from 200 to 500 meters below sea floor (mbsf), which is cut by prominent, regional bottom simulating reflector (BSR) observed at ~400 mbsf in seismic data. Downhole evolutions of concentration, grain size and composition of the magnetic minerals are investigated by a series of rock magnetic measurements. The preliminary results support a characteristic rock magnetic signature related to gas hydrate and suggests the presence of gas hydrate beneath the BSR, i.e. below the base of gas hydrate stability. This deeper signature of hydrate occurrence correlates with the depth of a discontinuous, but widespread double-BSR in 3D seismic data.

Keywords: Nankai Trough, Gas hydrate, Rock magnetism