

## **Drilling for Gas Hydrates: ODP Leg 164**

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ODP Leg 164 was devoted to investigating gas hydrates stored in Marine sediments. Three sites were drilled on the Blake Ridge, a clay rich sediment drift. The holes extend to 700-750 mbsf, penetrating through the depth (~450 mbsf) of the bottom simulating reflector (BSR) into sediments below.

Finely disseminated gas hydrates occupy more than 1% of the sedimentary section between 200 and 450 mbsf at all three sites, regardless of the whether a BSR was present or not. Some solid gas hydrate nodules were recovered, the largest of which was a >30 cm thick horizon of massive gas hydrate. Pore water profiles show progressive freshening to depths of ~200 mbsf. From 200 - 450 mbsf chloride concentrations are highly variable, characterized by local, anomalously-fresh values. These anomalies indicate variations of up to 8% in the amount of gas hydrate contained in adjacent samples throughout this zone. Well-logs show distinct zones of higher electrical resistivity and sonic velocity that are coincident with the chloride anomaly zones and thus the presence of gas hydrate. Vertical seismic profiles indicate that the velocities of the sediments above the BSR are not significantly elevated above normal sediment velocities. However, velocities as low as 1400 m/sec were measured beneath the BSR. Methane gas volumes from a pressure core sampler are in excess of in situ methane saturation, thus demonstrating that free gas exists intermittently throughout the sedimentary section below the base of gas hydrate stability. Results of ODP Leg 164 confirm that sedimentary gas hydrates, plus associated dissolved and gaseous phases, represent a major methane reservoir.