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Drilling Gas Hydrates on Hydrate Ridge, Oregon Continental Margin

During Leg 204, we cored and logged 9 sites on the Oregon margin to determine the distribution and concentration of gas hydrates in an accretionary ridge and adjacent slope basin, investigate mechanisms that transport methane and other gases into the hydrate stability zone (GHSZ), and obtain constraints on physical properties of hydrates in situ. A 3-D seismic survey provided images of potential fluid conduits and indicated the base of the GHSZ throughout the region. Logging-While-Drilling (LWD) yielded an initial estimate of hydrate concentration through the proxy of electrical resistivity. Infrared thermal imaging of cores on the catwalk was used to estimate the distribution and texture of hydrate within cores. Geochemical analyses of interstitial waters and of headspace and void gases constrain the distribution, concentration, origin and rate of formation of hydrate. Bio- and lithostratigraphic description of cores, measurement of physical properties, and in situ pressure core sampling and thermal measurements complete this multidisciplinary dataset. Among the most interesting preliminary results are that: 1) gas hydrates are distributed through a broad depth range within the GHSZ and that different physical and chemical proxies for hydrate distribution and concentration give generally consistent results; 2) lithology controls the migration of fluids beneath southern Hydrate Ridge (SHR); 3) SHR hydrates contain significant concentrations of higher order hydrocarbons, and fractionation and mixing signals will provide important constraints on gas hydrate dynamics; and 4) very high chlorinity values extend for at least 10 mbsf near the summit, indicating very rapid hydrate formation.