Geological and Hydrogeologic Interrelationships Around Seep and Gas Vent Regions on Hydrate Ridge: Seabed Observations

AB: ROPOS, Alvin, and OFOS investigations conducted during TECFLUX 98 and 99 at two localities on N. and S. Hydrate Ridge revealed a wide variety of evidence for paleo and active fluid seepage in regions of high backscatter, as observed in deep-towed sidescan sonar data. Surface manifestations of flow include active gas vents, substantial aqueous-seep-related biologic communities, and locally substantial chemoherm development. Active seepage and venting are confined to localized regions within larger carbonate structures, suggesting temporal evolution of local flow patterns. In South Hydrate Ridge, active seepage is confined to two regions within an approx. 800 x 400m region of high reflectivity near the crest. An impressive, hydrogeologically-active 30–50m high pinnacle-like chemoherm occurs SW of the crest. It is internally stratified subparallel to its surface, apparently growing by external deposition of carbonates. Hydrologically active tensional fissures on its flanks suggest a structural...
control. At the summit, hummocky pock-marked topography is associated with substanital seep communities and underlying shallow hydrates (see Sonne grab results). Vigorous local gas venting was observed to occur here. In N. Hydrate Ridge, venting of gas bubbles also appears to be associated with local topographic highs, suggesting that buoyant updip migration of gas controls vent locations even at local scales. Aqueous seep locations, on the other hand, do not have a strong topographic dependence, suggesting that their locations may be

DE: 1610 Atmosphere (0315, 0325)
DE: 1615 Biogeochemical processes (4805)
DE: 3045 Seafloor morphology and bottom photography
DE: 8045 Role of fluids
SC: OS
MN: 1999 AGU Fall Meeting