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In situ light hydrocarbon concentrations and stable carbon isotope values in hydrate-bearing sediments of Cascadia Margin, Vancouver Island

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In situ light hydrocarbon concentrations and stable carbon isotope values were measured in pore-water samples collected from a ROV-deployed seafloor probe in hydrate-rich surface sediments off the Cascadia Margin in the summer of 2004. The probe was deployed at a site featuring an exposed thermogenic gas hydrate outcrop in the Barkley Canyon (850m water depth) off Vancouver Island from the ROV *ROPOS*. Pore-water samples were collected along vertical and horizontal gradients in the upper 7-25 cm of the sediments at three distinct locations from the outcrop: $\sim$2.5 meters away, $\sim$1.5 meters away and in the shallow sediments draping the top of the outcrop. Alongside each probe deployment, sediment push cores were also collected to compare dissolved methane concentrations and stable carbon isotope compositions in decompressed core samples with un-decompressed *in situ* probe samples. When sufficient sample was available, ethane and propane concentrations and stable carbon isotopes were also measured. Preliminary data show maximum concentrations of dissolved methane to be as high as 31mM in the probe samples. Methane concentrations were often higher in core samples than the probe samples; direct observations of hydrate flake dissociation in the cores suggest these higher values are an artifact of core sampling. Probe methane carbon isotopic values averaged -43.15 $\pm$ 2.5‰ (n=33) and were indistinguishable from solid phase hydrate values (-42.9 $\pm$ 0.4‰), indicating a thermogenic methane gas origin. Core methane carbon isotope values were more depleted in C-13 (-50.67 $\pm$ 8.9‰, n=41) and showed greater variability that may be explained by a combination of methane source, microbial oxidation in the surficial sediments, and hydrate flake dissociation. This novel data set provides information critical to under-

standing the *in situ* processes and environmental conditions controlling gas hydrate occurrences in Cascadia Margin sediments.