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The effects of methane-influenced pore-waters on benthic foraminiferal assemblages from the Hikurangi Margin of eastern New Zealand.

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Cold methane seeps are common features of continental margins both passive and active, and when coupled with gas hydrates, are reservoirs for vast quantities of carbon. In addition, they support unique, chemosynthetically-fueled ecosystems. The Hikurangi Margin off eastern New Zealand hosts a large number of active seeps, characterized by distinctive carbonates and seep-specific metazoan communities including chemosymbiotic bivalves and vestimentiferans. Samples used in this study originated in seeps from the Rock Garden and LM3 seeps in the north and the North Tower seep in the southern, Wairarapa region, of the Hikurangi Margin. Sixty-eight species of foraminifera, dominated by Uvigerina peregrina, Bolivina advena, and Lenticulina spp., were identified. All foraminiferal species found in these seeps are also found in non-seep localities. Stained (living?) specimens were, however, rare in these samples, thus the assemblages were treated as total assemblages. Foraminiferal densities were highest in the top 1.5 cm of each core, ranging from 566 to 985 individuals/cm3. Little difference in densities was observed in the different cores. Isotope analyses reveal considerable variability and depletion in d13C values of foraminiferal tests in all of the stations examined. Greatest variability and depletion were observed in U. peregrina from the North Tower site at Wairarapa. d13C values for this species at this site ranged from -5.68 permil PDB to -0.15 permil PDB. G. pacifica and B. advena also

displayed considerable variability in d13C values, though not the degree of depletion shown in U. peregrina. While these values are not indicative of the source of methane in these seeps, their variability reflects the extent of inconsistency in the microhabitats of these organisms. This, in turn, is due to the tortuosity of fluid pathways and the mixing of methane-influenced pore waters and ambient sea water. Mg/Ca analyses of foraminiferal tests indicate a degree of diagenetic alteration has occurred in samples from the Wairarapa station. Again, U. peregrina is the most affected. The isotope values are thus the result of both primary and secondary mineralization.