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Spatial Variation in Vertical Methane Migration and Contribution to Shallow Sediment Carbon Cycling: Hikurangi Margin, Mahia Peninsula, New Zealand

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Gas source variation and vertical migration patterns are compared to shallow sediment organic and inorganic carbon pools in sediments on the Hikurangi Margin, east of the North Island, New Zealand off the Mahia Peninsula. Seismic and Topas data collected on board during the expedition were used to organize a coring plan. Selection of piston core locations was based on spatial variation in vertical gas migration and strong bottom simulating reflections (BSRs) through three different study regions. Two regions showed strong BSRs and blanking at specific points in the seismic data. Through these study sites, methane concentrations varied by more than an order of magnitude at stations within a few hundred meters. The sediment gas composition in all cores showed no higher molecular weight gases, indicating a biogenic gas source. Methane concentrations did show a strong correlation with seismic and Topas data that suggested high vertical migration and large shallow gas pockets. While these data focused on locations where a BSR was observed, high methane concentration, was also observed in three cores from a nearby site where a BSR was not observed. This presentation will compare spatial variation in the vertical gas migration and stable isotopic composition of sediment organic and inorganic carbon, methane and porewater dissolved inorganic carbon among the core locations to better understand vertical methane migration and shallow sediment methane cycling. Analysis on the contribution of methane to shallow sediment carbon cycling in the presence and absence of geophysical data suggesting the presence of deep system gas hydrates expands our understanding of the potential for methane contribution to shallow sediment carbon cycling.