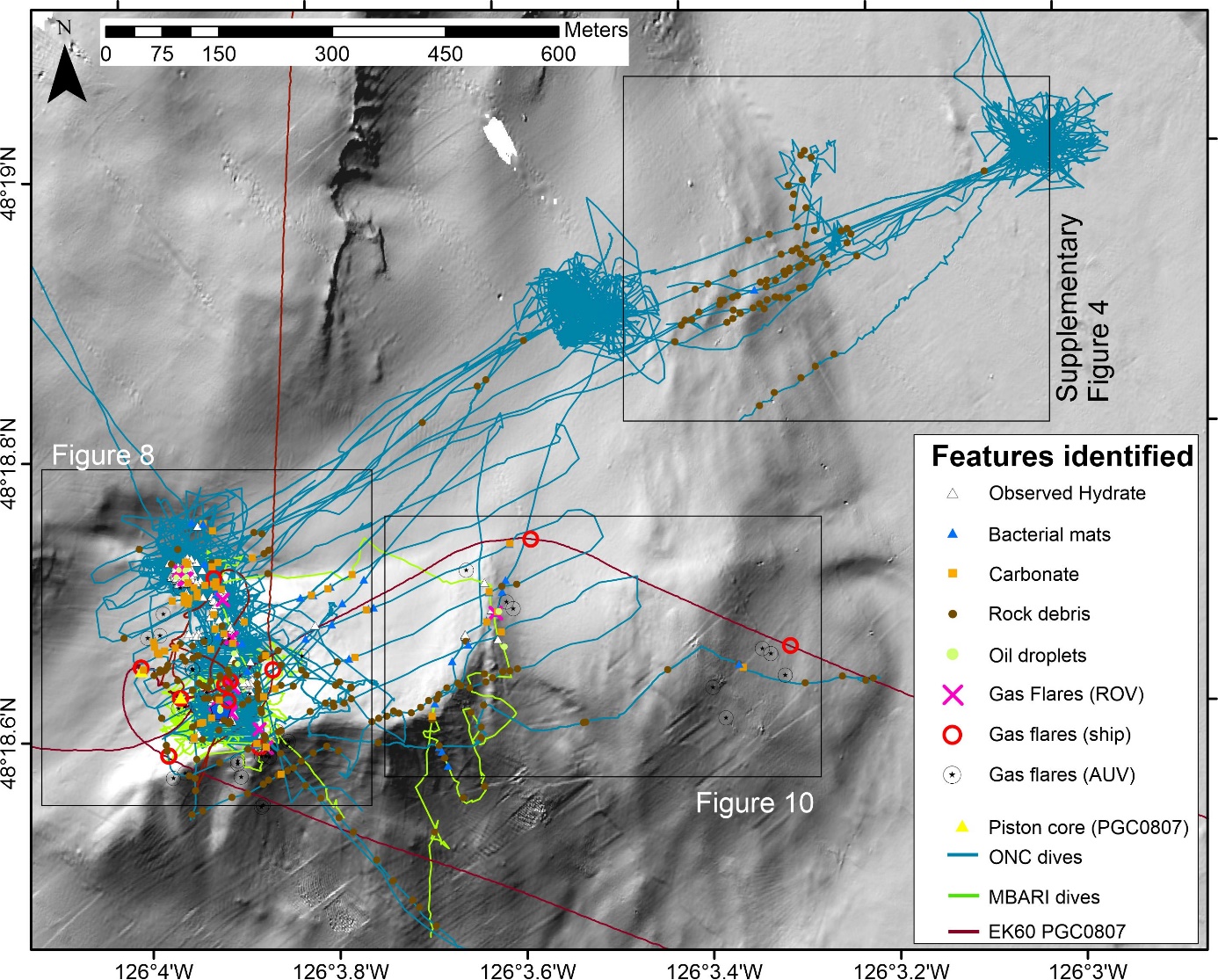
**Supplementary Figures**



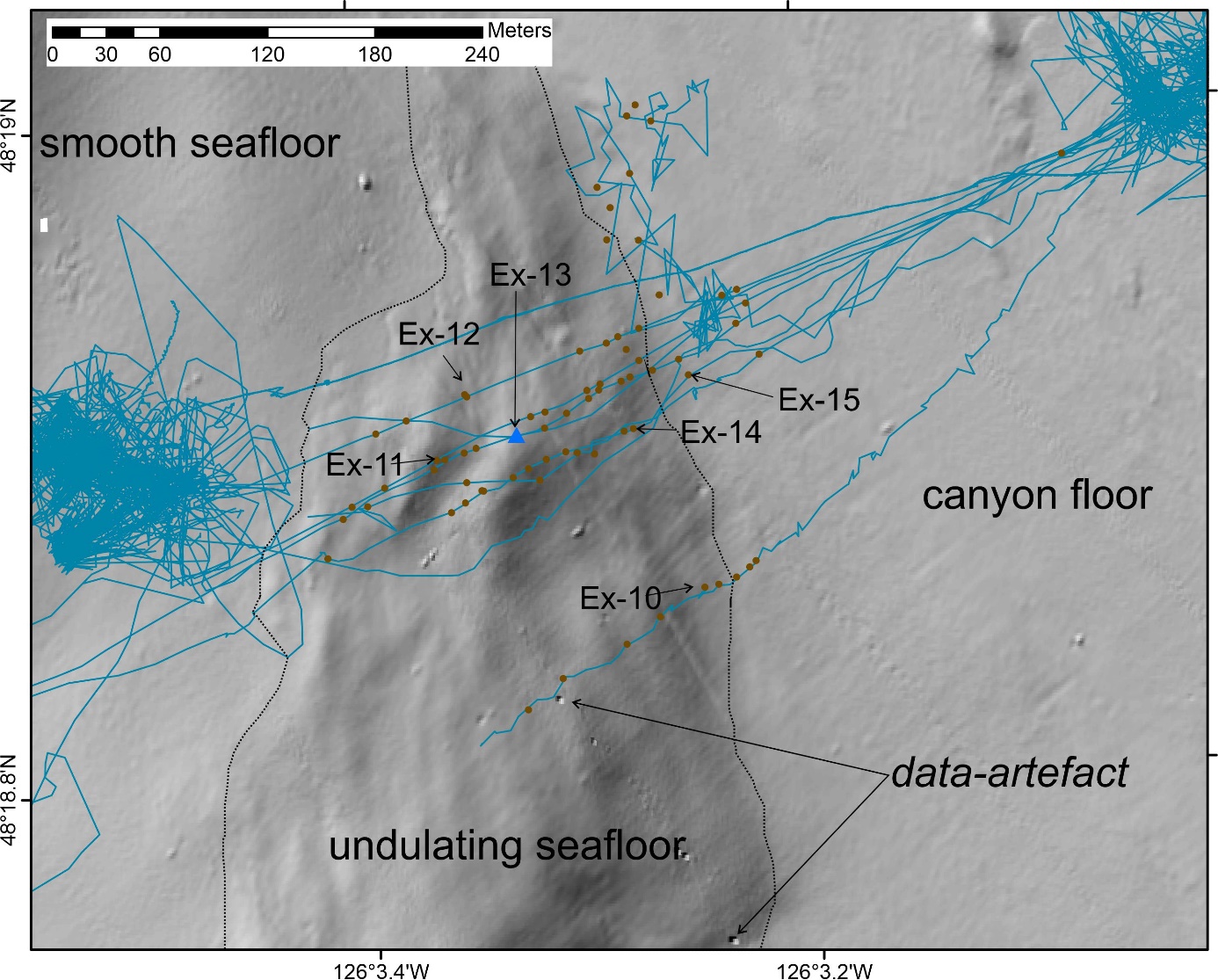
**Supplementary Figure S1.** Overview of all features identified from all dives conducted in the region with bottom-video information. Shown are the track lines of individual dives and the ship-route from PGC0807 for the EK60 data utilized. Figures 8 and 10 show features at an expanded scale. Examples for the rock debris on the undulating seafloor are given in Supplementary Figures 4 and 5.



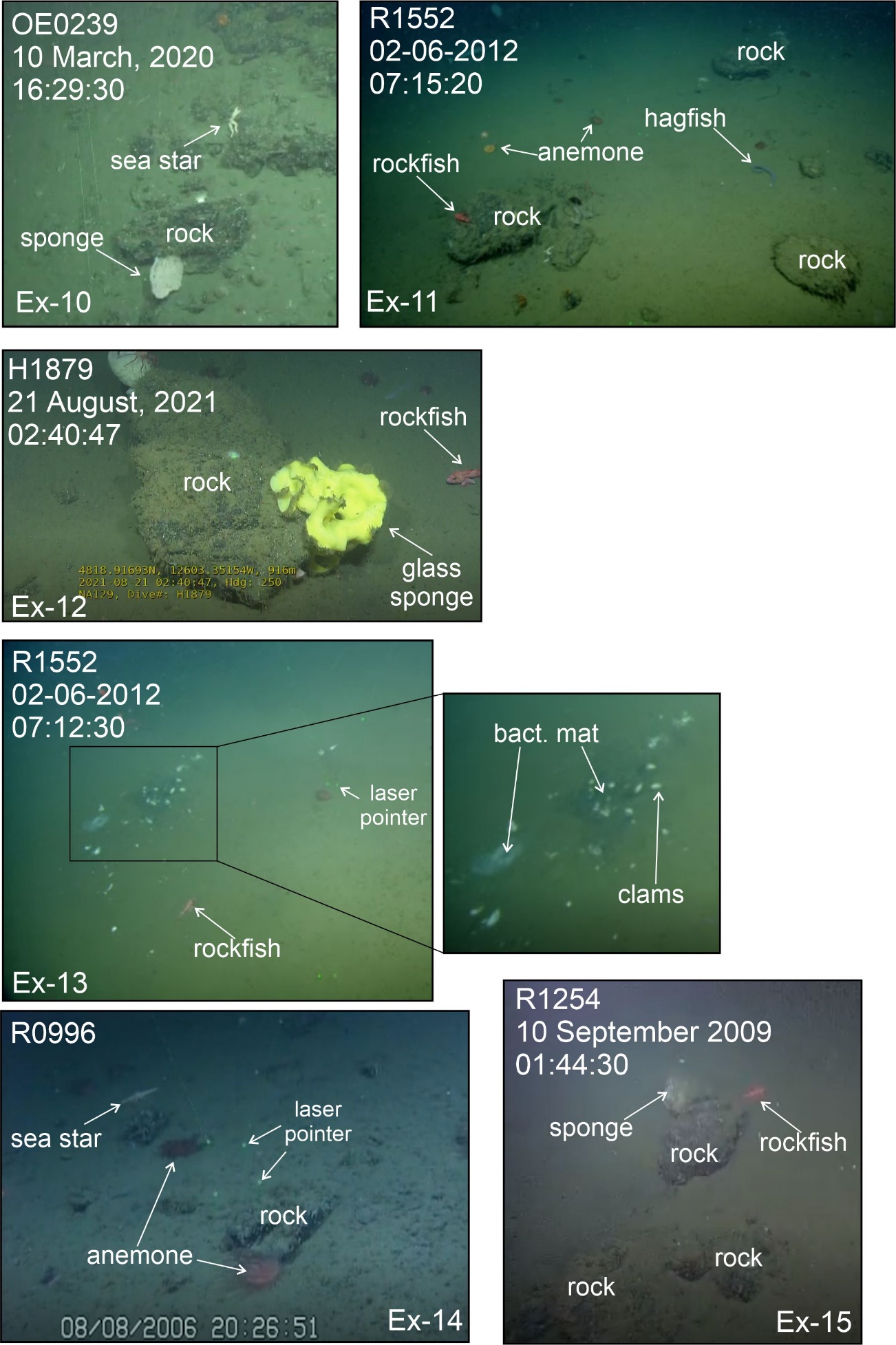
**Supplementary Figure S2**. Images of oil-sample collection during MBARI expedition DR Dive 273.



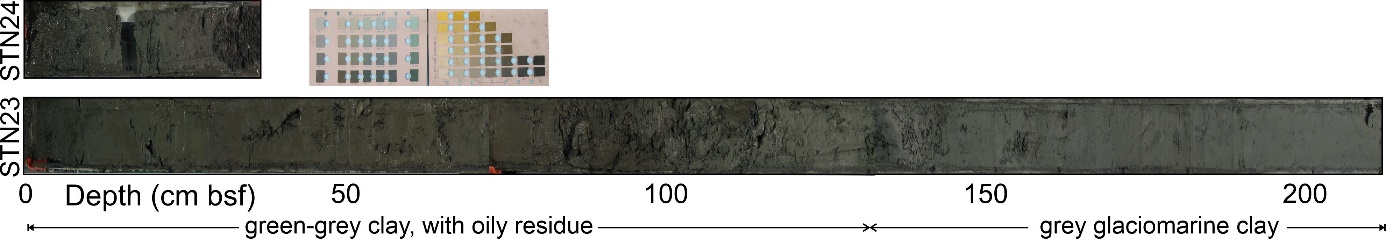
**Supplementary Figure S3** Images of oil-sample collection during MBARI expedition DR Dive 279.



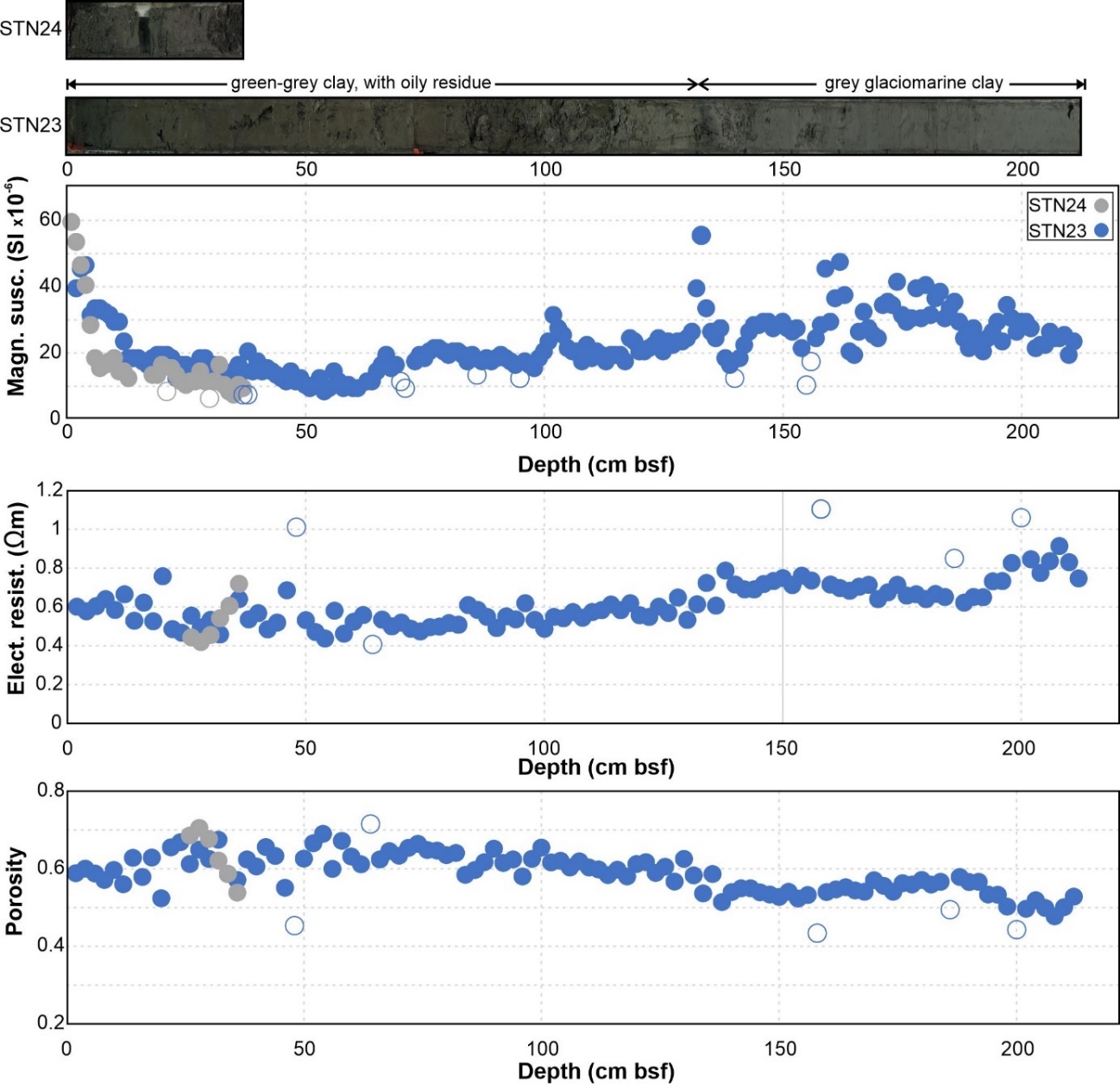
**Supplementary Figure S4.** Map of region with undulating seafloor and observations of rock-debris. One small seepage site was seen during Dive R1552 in 2012 (Ex-13), but no other dive-tracks showed similar occurrences of bacterial mats and clams in this region. Individual rocks are seen either as drop-stones (glacial erratic) lying irregularly on the seafloor (Ex-11, -12, and -14), or appear more as exposed outcrop (Ex-10). Nearly all of the rocks host some form of biology (corals, sponges, anemones). Images are given in Supplementary Figure 5.



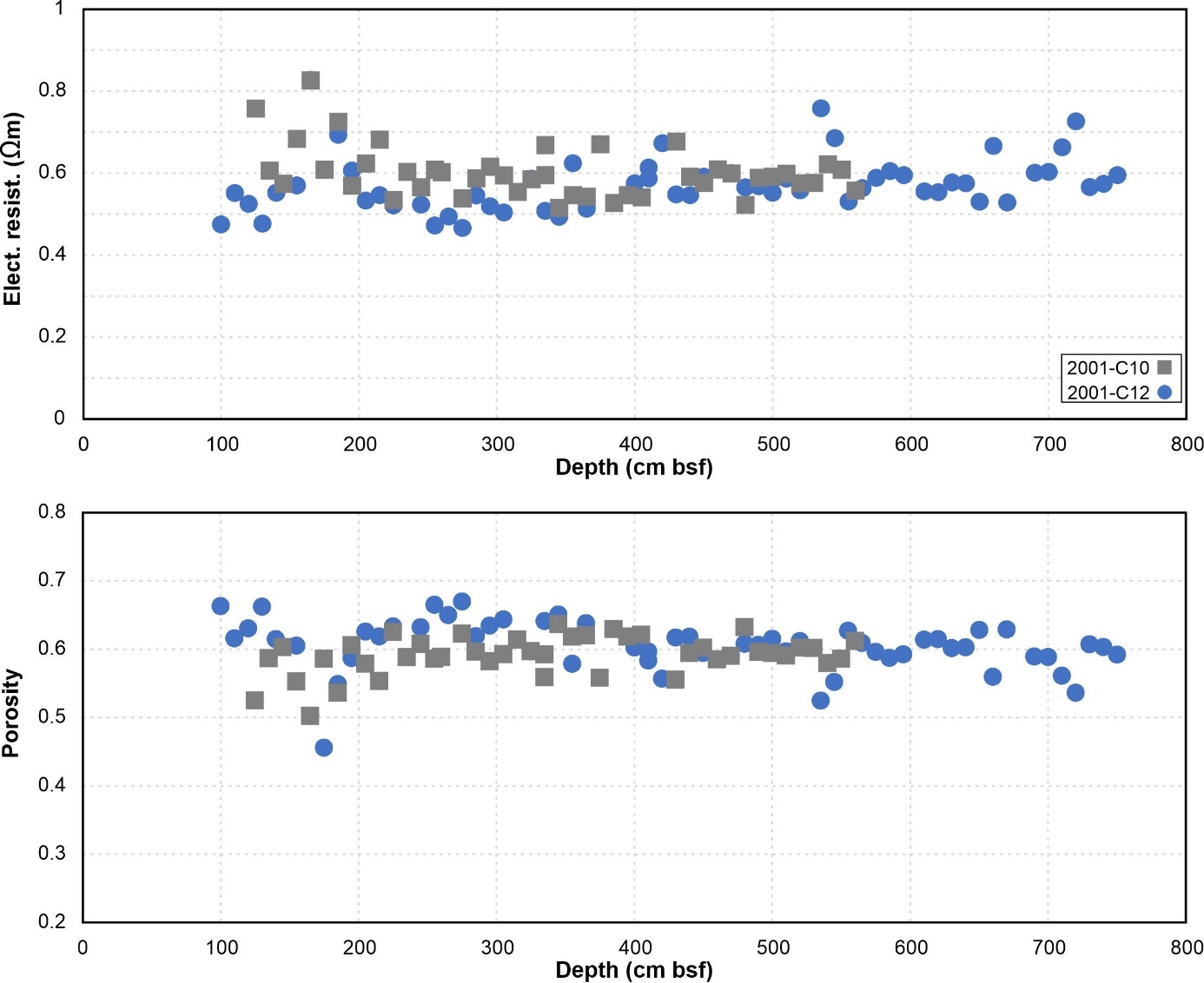
**Supplementary Figure S5.** Examples of rocks and associated biology in the region of undulating seafloor. One small seep-site with bacterial mats and clams was seen (Ex-13).



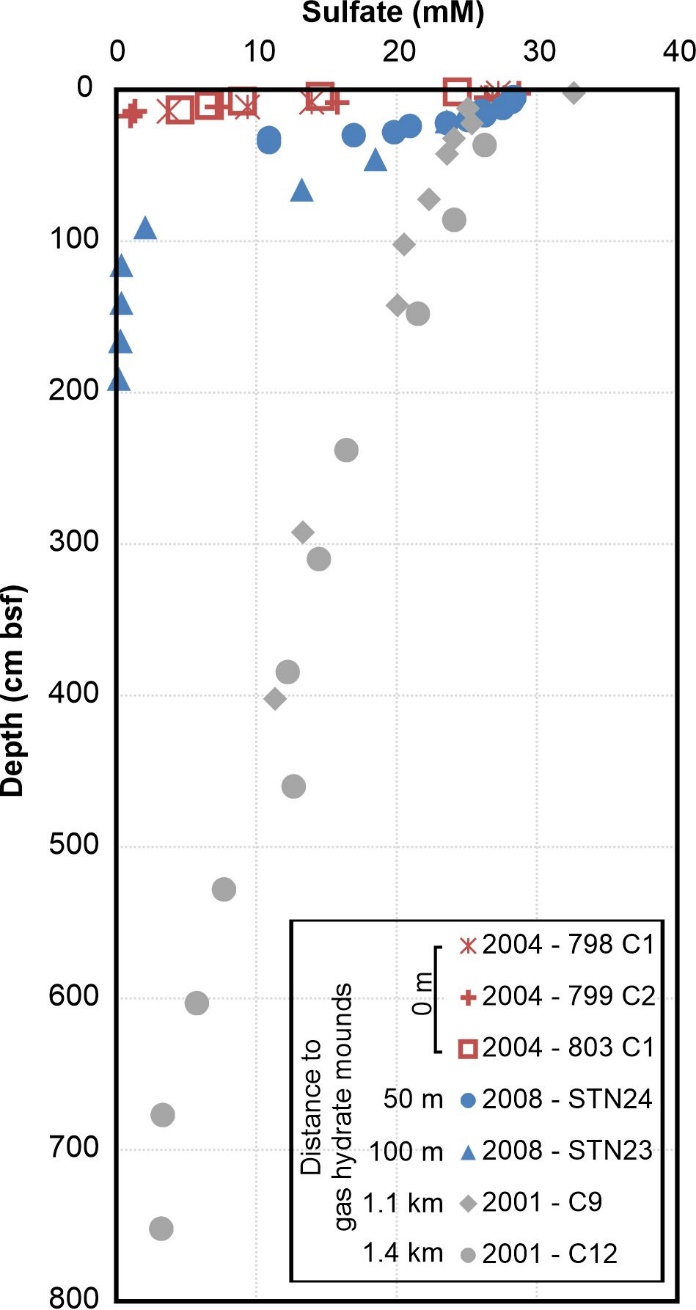
**Supplementary Figure S6.** High resolution image of core-photographs. Added are the Munsell colour charts.



**Supplementary Figure S7.** Results of magnetic susceptibility and electrical resistivity measurements as well as core images for the two piston cores recovered (locations shown in Figure 8). A higher-resolution version of the core photos is given in Figure S6. The lower panel shows estimated porosity values from the resistivity data using a simplified Archie’s (Archie, 1942) relationship (details see text). Potential outliers from core disturbance are marked as open symbols on all data panels.



**Supplementary Figure S8.** Results of electrical resistivity measurements and converted porosity using a simplified Archie’s (Archie, 1942) relationship (details see text) for two piston cores recovered in 2001 (*Ventflux2*) ~1 km SW of the hydrate mounds (locations shown in Figure 2).



**Supplementary Figure S9.** Pore water sulfate concentrations (mM) derived from piston and push cores taken in Barkley Canyon and adjacent region. Push cores are taken at one of the gas hydrate mounds directly, whereas piston cores were taken at different distances to the mounds.