Supplementary Materials

Post-penetration excess pore-pressure evolution at cold seeps: sustained negative responses at active vents

This file presents the pressure–voltage calibration of the four differential-pressure sensors and supplementary checks of the pore-pressure background correction. Figures S1–S3 show the calibration, the independent pre-penetration stability check, and the correction sensitivity at S05 and S06. The calibration measurements are provided in Table S1.

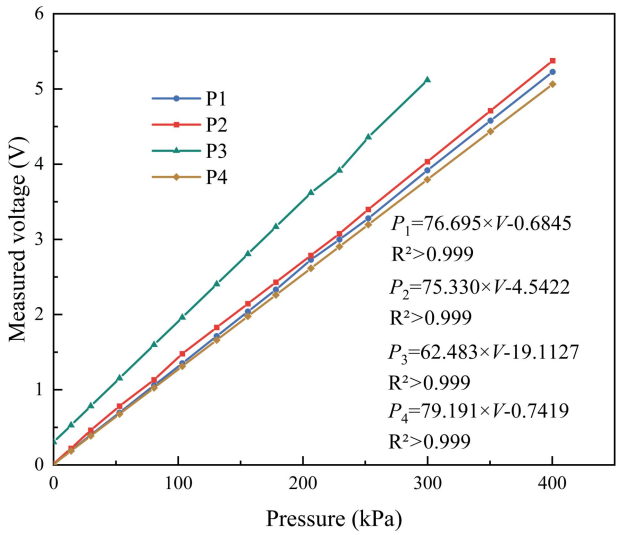


Figure S1 Pressure–voltage calibration curves of the four differential-pressure sensors (P1–P4). The plots show the measured output voltages at the applied positive-pressure calibration points, together with linear regression equations and coefficients of determination.

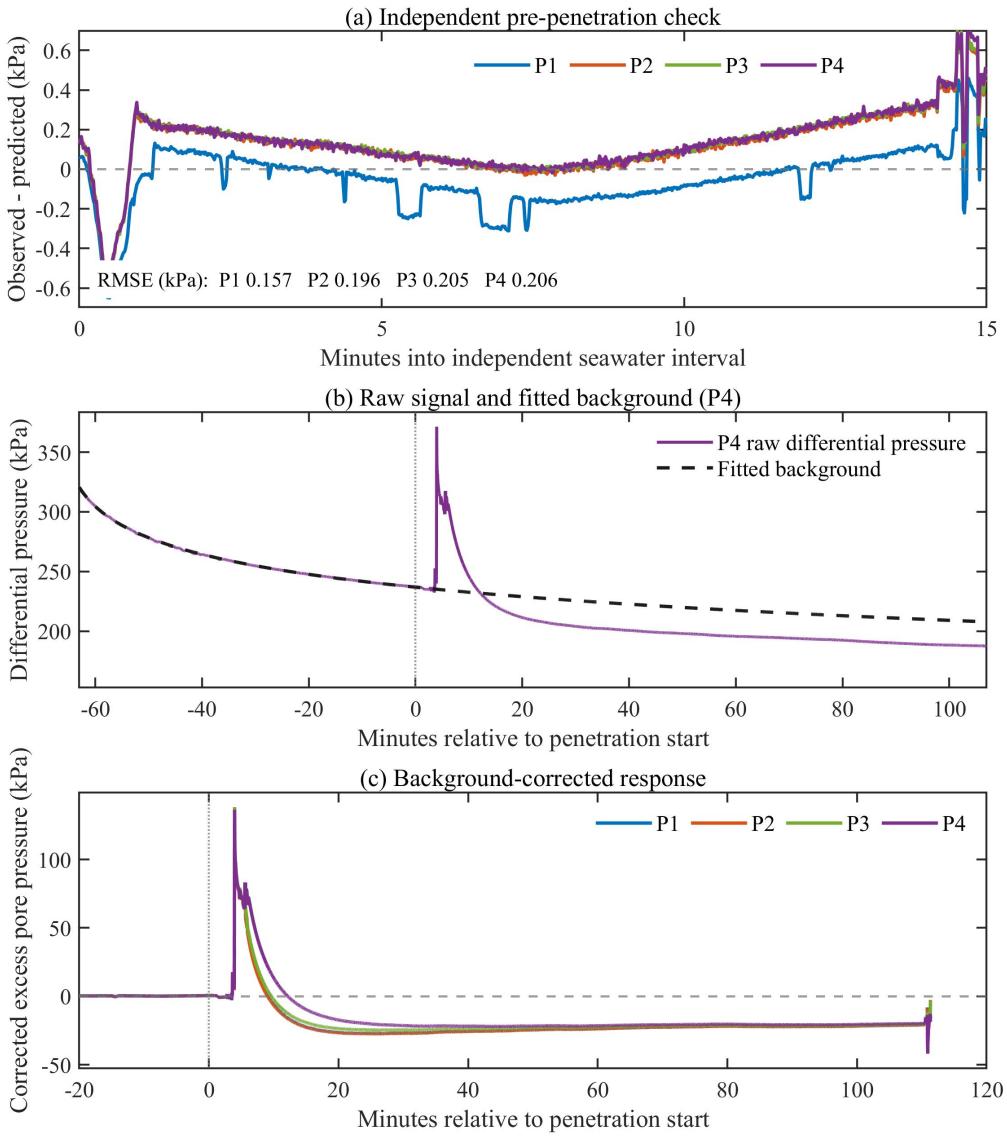


Figure S2 Quality-control check of background correction at site S06. (a) Residuals between observed and independently predicted differential pressures during a 15-min pre-penetration seawater interval (10:43–10:58), after fitting the background to the preceding 48 min of records. (b) Comparison of the raw differential-pressure signal and fitted background for P4. (c) Background-corrected excess pore-pressure responses of channels P1–P4.

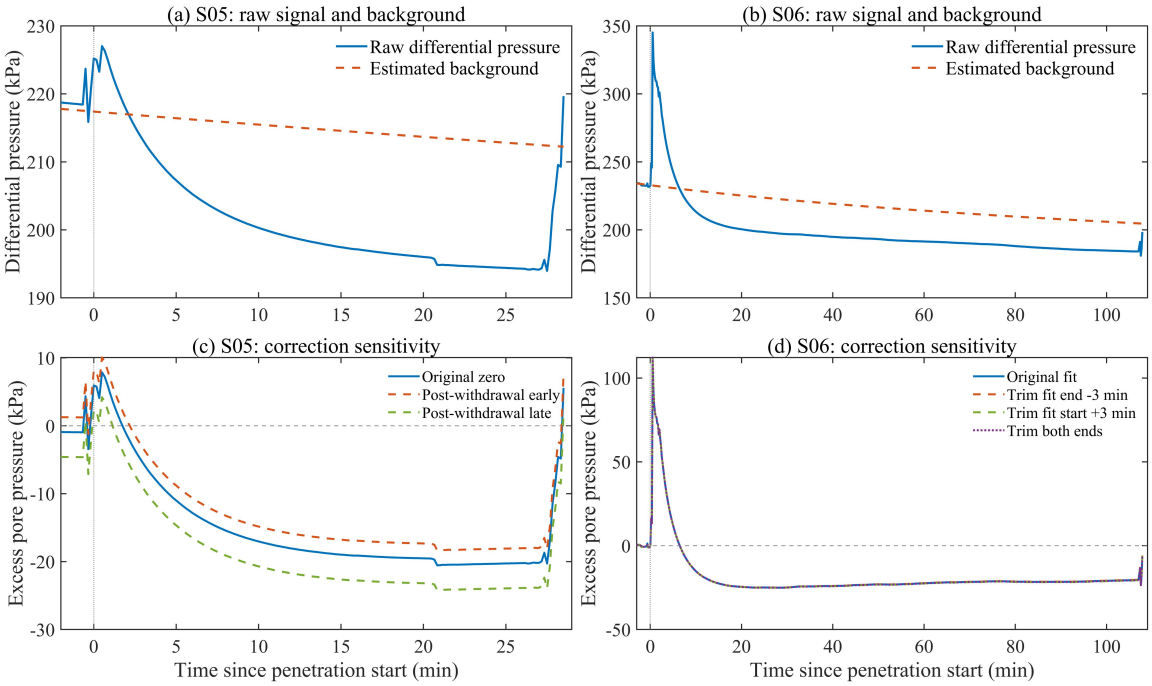


Figure S3. Raw differential-pressure records and sensitivity of background correction at S05 and S06. (a, b) Raw differential-pressure signals and estimated backgrounds at S05 and S06, respectively. (c) S05 corrected responses using the original and alternative local zero-reference intervals. (d) S06 corrected responses using the original background-fitting interval and alternative intervals shifted by 3 min. Displayed responses are based on the mean of available valid P1–P4 channel.

Table S1. Summary of commissioned pressure qualification conditions and outcomes for the integrated vane system

Pressure/kPa	P1/V	P2/V	P3/V	P4/V
0	0.0075	0.01735	0.3036	0.0099
14.013	0.1931	0.2208	0.5285	0.186
29.85	0.3988	0.4613	0.7831	0.3867
52.875	0.6971	0.7827	1.1529	0.6774
80.55	1.058	1.133	1.5974	1.026
103.2	1.3514	1.4797	1.9612	1.3127
130.825	1.7137	1.8293	2.4049	1.6615
155.8	2.039	2.1454	2.8061	1.9768
178.275	2.3324	2.4298	3.1671	2.2605
206.425	2.7296	2.7861	3.6192	2.6158
229.3	2.9979	3.0756	3.9166	2.904
252.425	3.2795	3.3983	4.3581	3.1966
299.825	3.9177	4.0327	5.1194	3.7949
350.475	4.5791	4.7109		4.4357
400.225	5.228	5.3772		5.0639