Supporting Information

Selected core photographs from Hole 392-U1581B, Subunit IIb

Figure 1: Claystone core sample images recovered in Hole 392-U1581B, Subunit IIb: Samples 62R-1W-70/73, 66R-3W-107/115, 69R-3W-62/76, 71R-1W-63/76, 74R-1W-64/71.

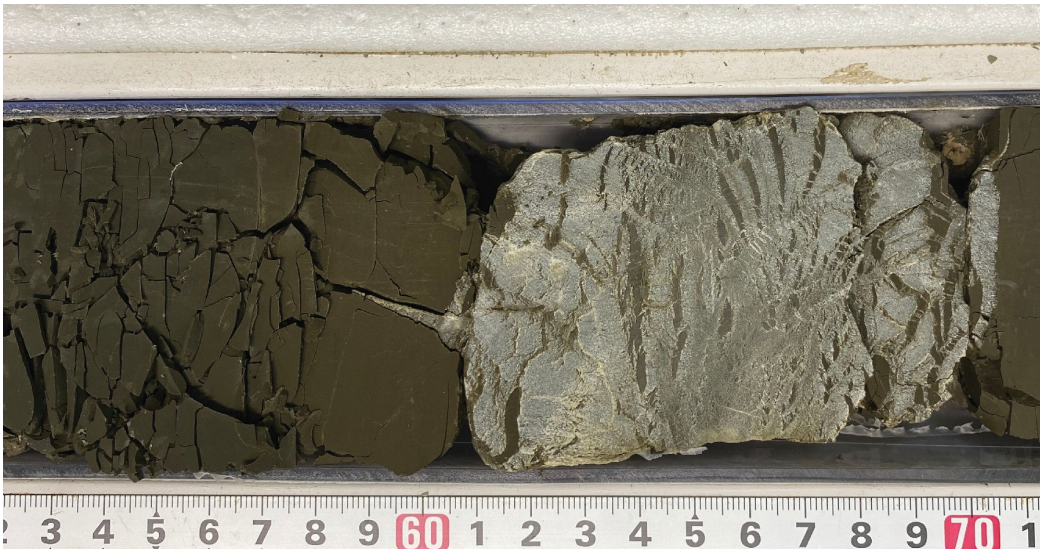

Figure 2: Core photograph of sample 64R-2A-50/75. Zebra-like textures formed by light calcite veins within the brown siderite-rich claystone (core distance of 60-70 cm). Note the upcore intrusion of calcite within the claystone at about 60 cm core distance.

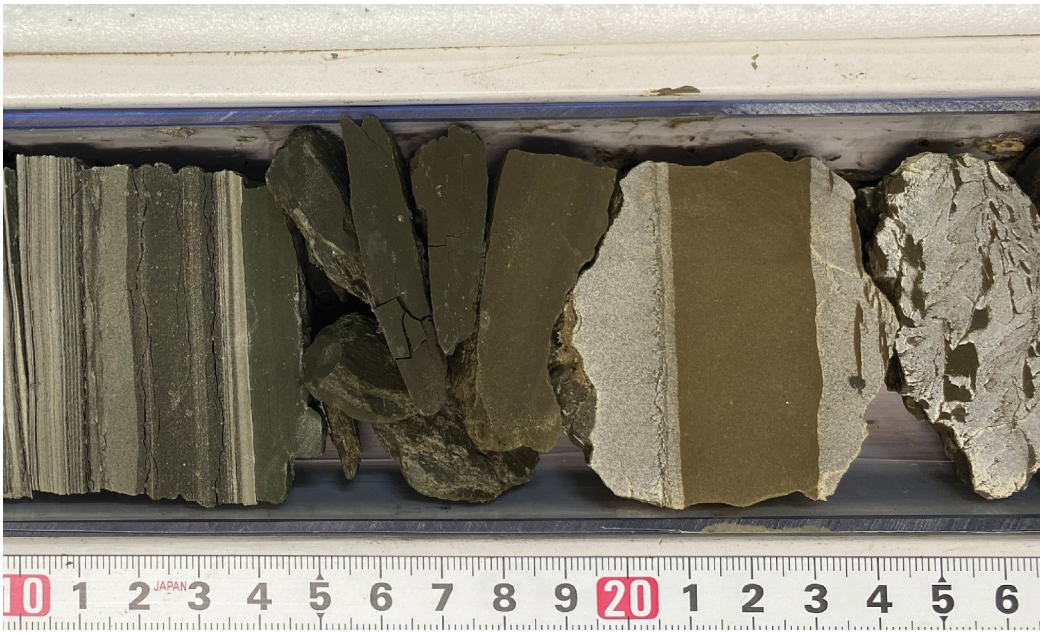

Figure 3: Core photograph of sample 70R-1A-50/76. The core sample shows core disturbances and incomplete recovery.Zebra-like textures formed by light calcite veins within the brown siderite-rich claystone (24-27 cm core distance). Note core biscuits/discs formed during drilling (15-19 cm core distance) and calcified layers within the brown claystone (20-24 cm core distance).

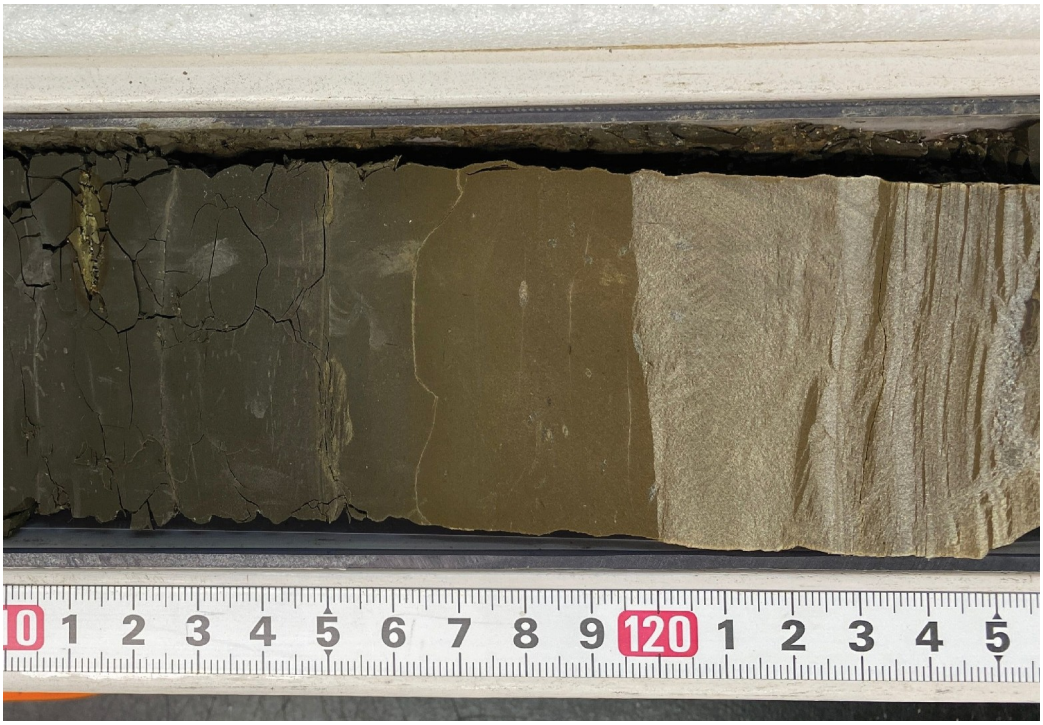

Figure 4: Core photograph of sample 71R-3A-100/125. The color change from dark gray to olive-brown corresponds to diagenetic alteration. The feather-like calcite veins are observed with the brown siderite-rich layer at 120-125 cm core distance. Note a centerline fracture (core distance of 110-115 cm), calcified induced tensile fracture at 116-117 cm core distance and mud-invasion halos at the core distances of 112.5 cm and 115 cm.

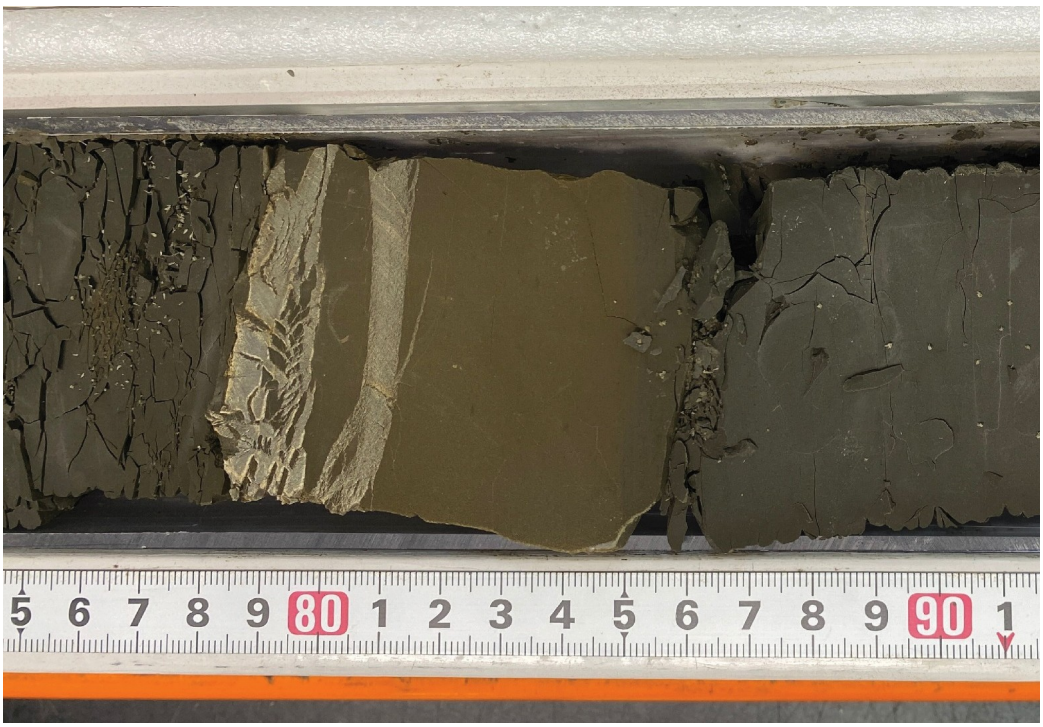

Figure 5: Core photograph of sample 72R-3A-75/100. Zebra-like textures formed by light calcite veins within the brown siderite-rich claystone (core distance of 78-82 cm).

Figure 6: Core photograph of sample 72R-5A-0/26. Zebra-like textures formed by light calcite veins within the brown siderite-rich claystone (core distance of 0-9 cm). Note filled drilling-induced splay fractures at the top of the core.

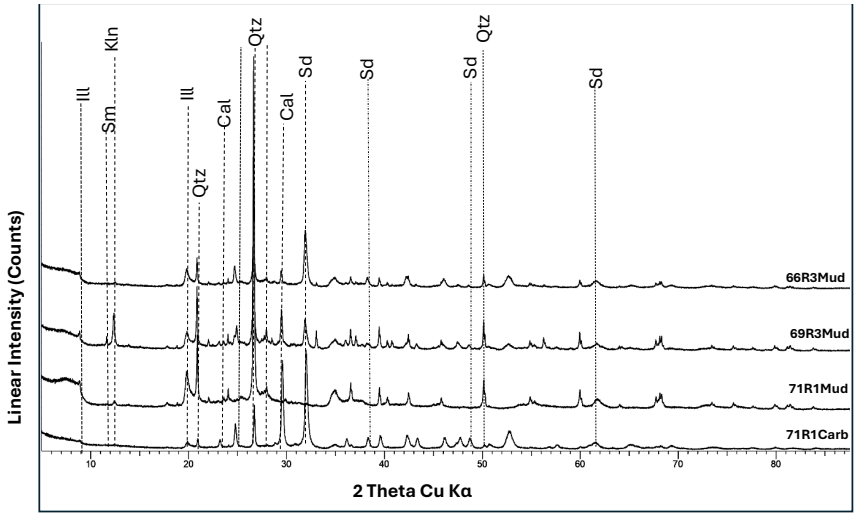

Figure 7: Whole-rock XRD patterns of samples U1581B-71R-1W-63/76(Carb), U1581B-71R-1W-63/76(Mud), U1581B-69R-3W-62/76(Mud) and U1581B-66R-3W-107/115(Mud). The identified phases are presented as IMA (the international mineralogical association) symbols: Qtz (quartz), Sd (siderite), Cal (calcite), Py (pyrite).

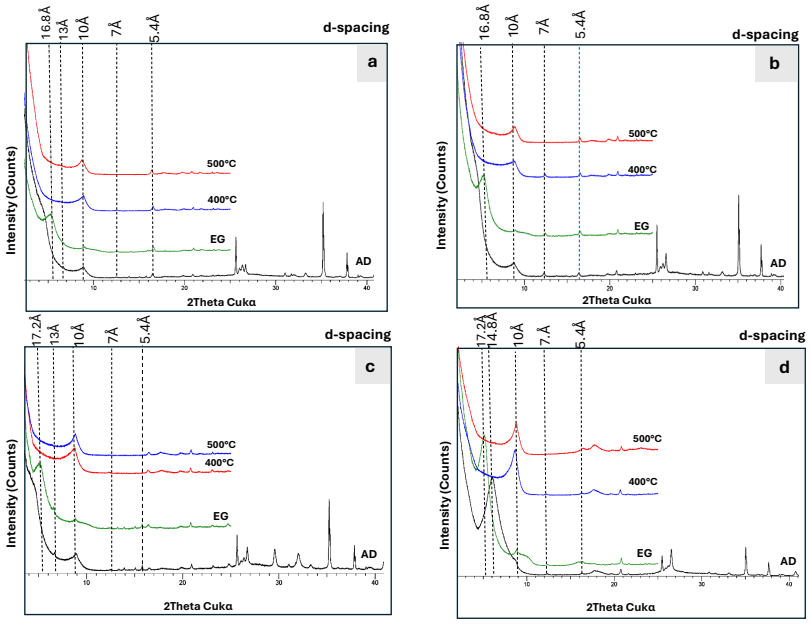

Figure 8: X-ray pattern diffractions of samples U1581B-66R-3W-107/115(Mud) (a), U1581B-69R-3W-62/76(Mud) (b), U1581B-71R-1W-63/76(Carb)(c) and U1581B-71R-1W-63/76(Mud) (d) after treatment air dried (AD), ethylene glycol (EG), heat treatment (400°C) and heat treatment (500°C)

Table 1: Numerical simulation setup for finite element model

Parameter	**Value**	**Description**
Material Properties		
L	0.1 m	Model length
ν_0	0.25	Poisson's ratio
E_0	10×10^9 Pa	Young's modulus (background)
Y_s	5×10^6 Pa	Cohesion (background)
T_s	3×10^6 Pa	Tensile failure stress
ϕ	$\sin(25^\circ)$	Friction angle
ψ	$\sin(8^\circ)$	Dilation angle
Boundary Conditions		
p_f	-1×10^6 Pa	Fluid pressure
P_c	$1, 3, 10 \times 10^6$ Pa	Initial pressure boundary condition
Model Setup		
ampl_{rnd}	0.2	Relative amplitude of random perturbation
n_{node}	[201, 201]	Number of nodes in x and y directions