

Supplementary materials

Lithology	(a) Thermal parameters				(b) Petrophysical parameters								(c) Mechanical parameters				
					Compaction				Permeability		Elastic		Plastic				
	S.m.c	T.D	H.C.	R.P.	ρ_s	ϕ_r	ϕ_a	ϕ_b	σ_a	σ_b	E_{obs}	Sp.surface	K An.	E	ν	Pt	M
Sandstone	6.32	0.004	700	5e-7	2675	0.01	0.44	0	30	0	10000	4.e6	1	9200	0.24	0.25	1.2
70%-30% sandstone-shale	4.56	0.0032	740	9.5e-7	2665	0.01	0.49	0	28	0	1000	1.7e6	1	7500			
50%-50% sandstone-shale	3.67	0.0027	765	1.3e-6	2660	0.01	0.54	0	13.6	0	100000	1.e7	0.5	5700			
30%-70% sandstone-shale	2.95	0.0023	790	1.5e-6	2650	0.01	0.54	0	20	0	10000	1.2e7	1	5250			
Shale	2.37	0.002	815	1.9e-6	2654	0.04	0.56	0	16	0	20000	N/A	0.2	4500			
Evaporites	4.76	0.001	550	9.e-8	2700	0.01	0.29	0	40	0	10000	5.e7	1	1300			
Limestone	3.57	0.003	795	6.2e-7	2710	0.04	0.56	0	20	0	50000	4.e7	0.1	9000			
Upper crust	3	0.001	1150	3.5e-6	N/A												
Lower crust	2	0.001	1030	7e-7	N/A												
Upper Mantle	3	0	1200	0	N/A												
Water	N/A		3620	N/A	Water Salinity (g/L): 126.004, Water compressibility (1/L): 4.5e-5								N/A				

Table 1: Thermal, petrophysical and mechanical parameters used in the simulation. (a) Thermal parameters. S.m.c: Surface matrix conductivity $W/(m \cdot ^\circ C)$, T.D.: Temperature Dependency ($1/^\circ C$), H.C.: Heat Capacity ($J/(kg \cdot ^\circ C)$), R.P.: Radiogenic Production (W/m^3). (b) Petrophysical parameters. ρ_s : solid volumic mass (kg/m^3), ϕ_r : residual porosity, ϕ_a : observed porosity a, ϕ_b : observed porosity b, σ_a : observed sigma a (MPa), σ_b : observed sigma b (MPa), E_{obs} : Observed elasticity, for the PSM simulation only (MPa), Sp. Surface : Specific surface of the Kozeni Carman porosity-permeability law ($1/m$), K An.: vertical anisotropy multiplier. (c) Mechanical parameters. E: Young Modulus (MPa), ν : poisson ratio, Pt: tensile intercept of the yield surface with the hydrostatic axis (MPa), M: slope of the Critical State Line.