

Supplementary Materials

of

Field scale probabilistic assessment of CO<sub>2</sub> generation by Carbonate/Clay Reactions in sedimentary basins.

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Phase	$\mu_A$	$\mu_D$	$\psi(1,1)$	$\psi(2,2)$	$\psi(1,2) = \psi(2,1)$
Dolomite	-1781.4513	647.14323	0.0104	0.0017	-0.0042
Kaolinite	-982.6440	353.0673	13.1892	1.9185	-5.0267
Quartz	-19.987746	6.8807392	0	0	0
CO <sub>2</sub>	-593.13177	212.78902	13.1892	1.9185	-5.0267
H <sub>2</sub> O	-23.214004	5.9253394	0	0	0
Clinochlore	-2858.9199	1029.1247	13.1892	1.9185	-5.0267
Calcite	-851.1478	310.0792	0.0104	0.0017	-0.0042
Microcline	-639.62283	231.07535	13.1892	1.9185	-5.0267
Beidellite	-1235.8761	441.95034	13.1892	1.9185	-5.0267
Illite	-1339.8366	480.08976	13.1892	1.9185	-5.0267
Albite	-689.96847	249.38627	13.1892	1.9185	-5.0267
Analcime	-701.77143	252.2284	13.1892	1.9185	-5.0267

**Table S 1:** Characterization of means ( $\mu_A$  and  $\mu_D$ ) and the entries of the covariance matrix ( $\psi$ ) of the bivariate Gaussian random variables  $\tilde{A}$  and  $\tilde{D}$  for all phases included in CCR1, CCR2 and CCR3: calcite, kaolinite, dolomite, CO<sub>2</sub>, H<sub>2</sub>O, clinochlore, microcline, beidellite, illite, albite, analcime.

Phase	$B$	$C$	$E$
Dolomite	$-2.8852827 \times 10^{-1}$	$9.9264201 \times 10^4$	$-5.5534198 \times 10^6$
Kaolinite	$-1.6227654 \times 10^{-1}$	$5.7278099 \times 10^4$	$-2.5386392 \times 10^6$
Quartz	$-2.1688586 \times 10^{-3}$	$5.5357231 \times 10^2$	$-8.4503401 \times 10^4$
CO <sub>2</sub>	$-9.6074033E \times 10^{-2}$	$3.2546625 \times 10^4$	$-1.9324505 \times 10^6$
H <sub>2</sub> O	$-4.7007808 \times 10^{-4}$	$3.0569427 \times 10^3$	$-4.880326 \times 10^3$
Clinochlore	$-4.4322807 \times 10^{-1}$	$1.7663305 \times 10^5$	$-7.6602963 \times 10^6$
Calcite	$-1.3947146 \times 10^{-1}$	$4.6881027 \times 10^4$	$-2.6591521 \times 10^6$
Microcline	$-1.0356825 \times 10^{-1}$	$3.522897 \times 10^4$	$-1.723989 \times 10^6$
Beidellite	$-1.9667428 \times 10^{-1}$	$7.2285809 \times 10^4$	$-3.392105 \times 10^6$
Illite	$-2.127979 \times 10^{-1}$	$7.9520722 \times 10^4$	$-3.7078528 \times 10^6$
Albite	$-1.1425341 \times 10^{-1}$	$3.8942781 \times 10^4$	$-1.8606376 \times 10^6$
Analcime	$-1.0854141 \times 10^{-1}$	$4.1184756 \times 10^4$	$-1.909524 \times 10^6$

**Table S 2:** Deterministic values of  $B$ ,  $C$  and  $E$  parameters for all phases included in CCR1, CCR2 and CCR3: calcite, kaolinite, dolomite, CO<sub>2</sub>, H<sub>2</sub>O, clinochlore, microcline, beidellite, illite, albite, analcime.