Supplemental material to "The SUPECA kinetics for scaling redox reactions in networks of mixed substrates and consumers and an example application to aerobic soil respiration"

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Below we provide auxiliary information for the numerical benchmark of the SUPECA kinetics.

The equations for fixed-point iteration are

$$\left[S_1\right]_{new}=\left[S_1\right]_T\left(1+\frac{\left[M\right]_{old}}{K_{MS1}}+\frac{k_{BS1}\left[B\right]_{old}}{k_{BS2}\left[S_2\right]_{old}}+\frac{k_{BS2}}{k_2^+}\left[B\right]_{old}\frac{\left[S_2\right]_{old}}{\left[S_1\right]_{old}}+\frac{k_{BS1}}{k_2^+}\left[B\right]_{old}\right)^{-1} \tag{S-1}$$

$$\left[S_2\right]_{new}=\left[S_2\right]_T\left(1+\frac{k_{BS2}\left[B\right]_{old}}{k_{BS1}\left[S_1\right]_{old}}+\frac{k_{BS2}}{k_2^+}\left[B\right]_{old}+\frac{k_{BS1}}{k_2^+}\left[B\right]_{old}\frac{\left[S_1\right]_{old}}{\left[S_2\right]_{old}}\right)^{-1} \tag{S-2}$$

$$\left[B\right]_{new}=\left[B\right]_T\left(1+\frac{k_{BS1}\left[S_1\right]_{old}}{k_{BS2}\left[S_2\right]_{old}}+\frac{k_{BS2}\left[S_2\right]_{old}}{k_{BS1}\left[S_1\right]_{old}}+\frac{k_{BS2}}{k_2^+}\left[S_2\right]_{old}+\frac{k_{BS1}}{k_2^+}\left[S_1\right]_{old}\right)^{-1} \tag{S-3}$$

$$\left[M\right]_{new}=\left[M\right]_T\left(1+\frac{\left[S_1\right]_{old}}{K_{MS1}}\right)^{-1} \tag{S-4}$$

The iteration starts with initial condition $\left[S_1\right]_{old}=\left[S_1\right]_T$, $\left[S_2\right]_{old}=\left[S_2\right]_T$, $\left[B\right]_{old}=\left[B\right]_T$, and $\left[M\right]_{old}=\left[M\right]_T$. The iteration stops when the relative change between two consecutive iterations is smaller than 10^{-4}.

Supplementary figure

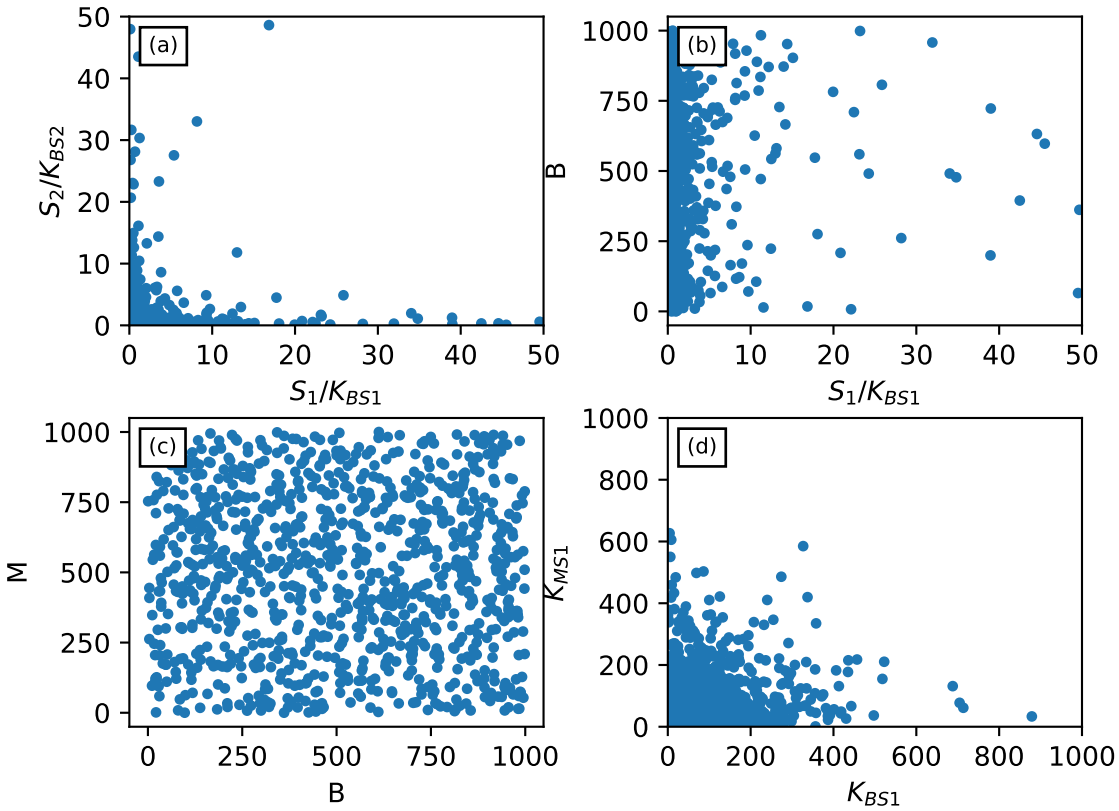

Figure S1. Scatter plots of the parameters used in the numerical benchmark of the SUPECA kinetics (which is Figure 4 in the main text).