

Text S2. The algorithm for computing quasi-multiparameter sensitivity (QMPS)

Let $\mathbf{p} = (p_1, p_2, \dots, p_n)$ be a kinetic parameter vector and $\mathbf{p}' = (p'_1, p'_2, \dots, p'_n)$ be a perturbed parameter vector, where n is the number of kinetic parameters. $q(\mathbf{p})$ is the target function (i.e. period or amplitude). Δ is the perturbation values given to each parameter ($\Delta = 0.001$ in this study). The pseudocode for the calculation of QMPS is shown in the below box. The final value of sum is $|QMPS(q, \mathbf{p})|^2$.

```
Run simulation with  $\mathbf{p}$  and get  $q(\mathbf{p})$ 
 $sum \leftarrow 0$ 
For  $i$  from 1 to  $n$  :
     $\mathbf{p}' \leftarrow \mathbf{p}$  # This line refreshes  $\mathbf{p}'$ 
     $p'_i \leftarrow p_i(1 + \Delta)$ 
    Run simulation with  $\mathbf{p}'$  and get  $q(\mathbf{p}')$ 
     $sum \leftarrow sum + \left( \frac{\ln q(\mathbf{p}') - \ln q(\mathbf{p})}{\ln p'_i - \ln p_i} \right)^2$ 
End
```