Text S4: Effectiveness of Hilbert transform on current $SV(t)$ data.

Hilbert transform is suit to extract phase information from relatively slowly varying one dimensional time-series signal such as $SV(t)$ in our data. It is difficult to detect characteristic time events (e.g. a time of peak in a cycle) so that phase information would be difficult to extract from them. Hilbert transform procedure is one of the solutions for this problem in that it transforms a one dimensional scalar signal $(s(t))$ into complex form $(s(t) + is_H(t))$, and calculates the phase for every point of $s(t)$ as an angle on $(s(t), s_H(t))$ plane. This calculation is effective to calculate phase for all the points within a characteristic period and obtain sufficient statistics for the determination of the phase relationship. We subtracted the mean value from original $SV(t)$ signal before transformation as the calculated value is sensitive to low-frequency trends [1].

References

1. Pikovski A, Rosenblum M, Kurths J (2001) Synchronization: A universal concept in nonlinear sciences. Cambridge, MA: Cambridge University Press.