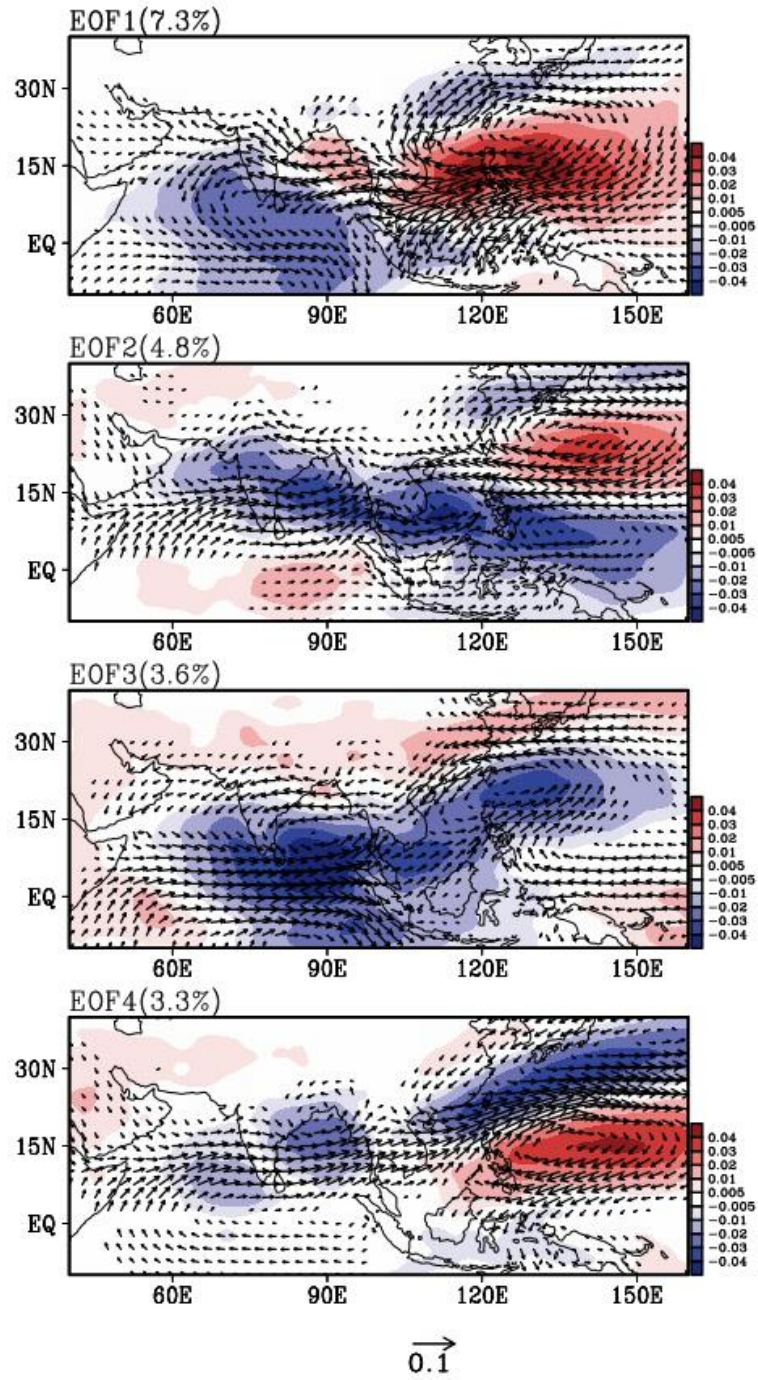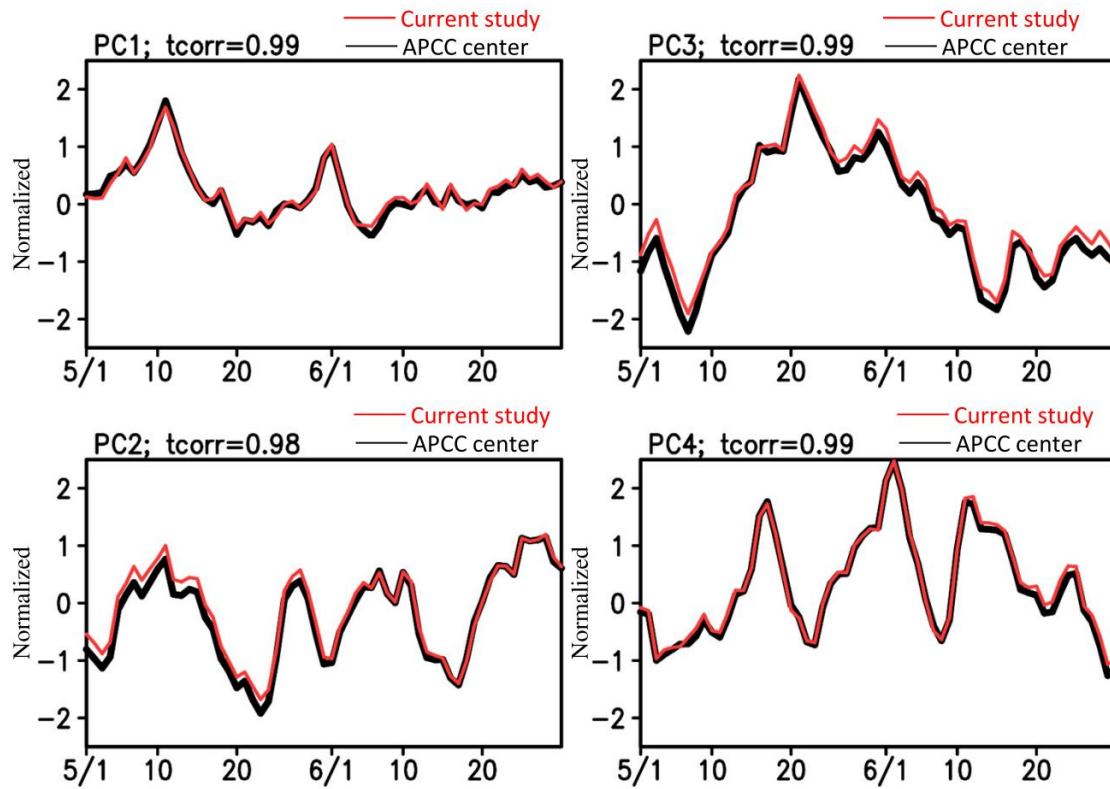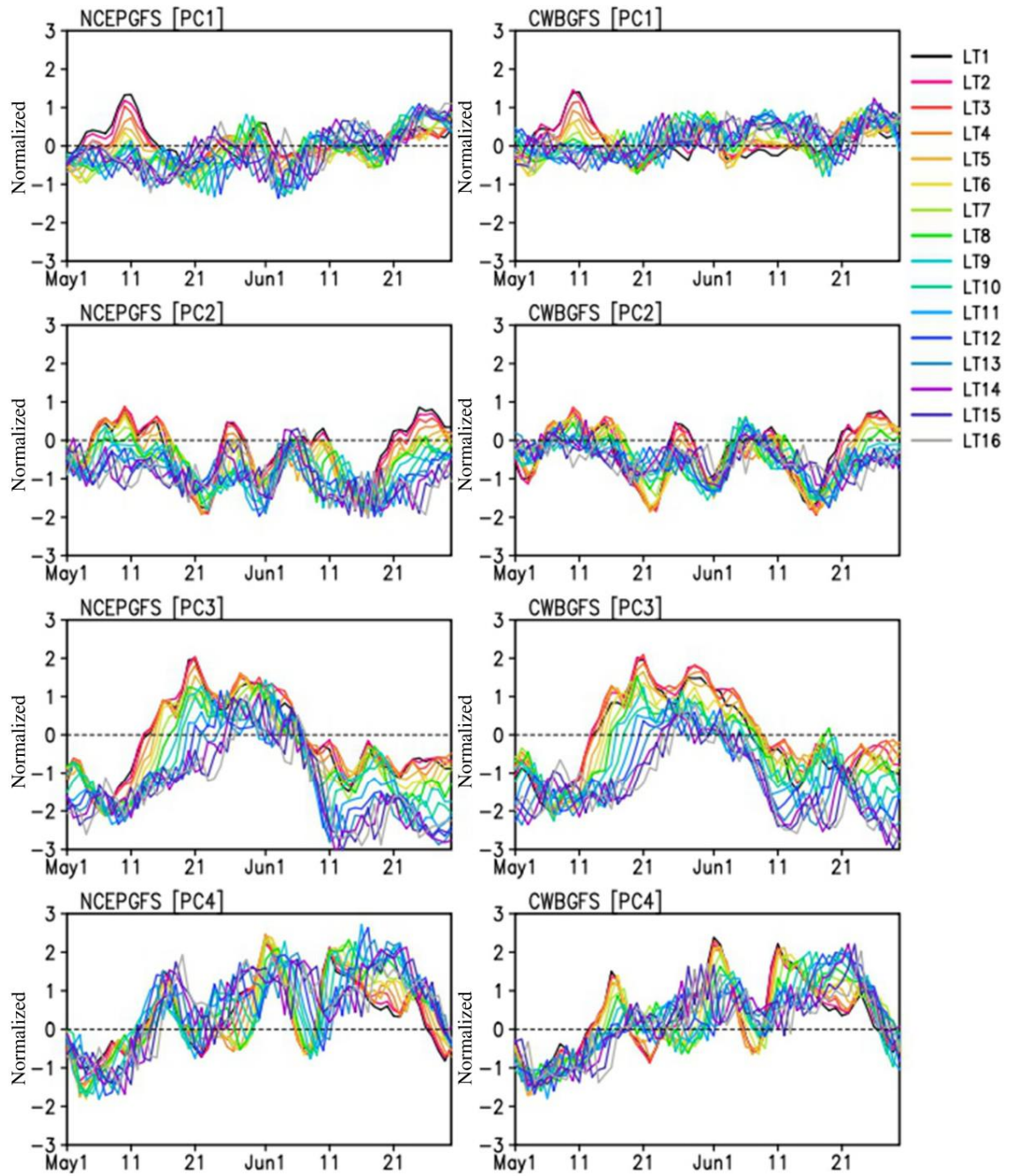**Fig. S1** The EOF patterns of normalized daily anomalies of OLR (shaded) and 850hPa wind fields (vectors) used in this study for generating the index of BSISOs following the methodology described in Section 2.
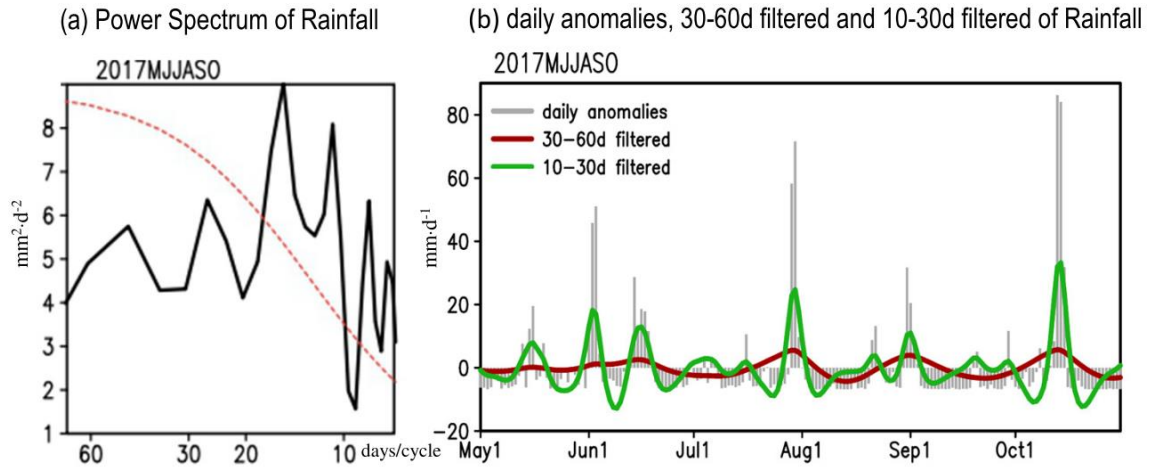
Fig. S2 A comparison between time series of PCs of BSISOs during May and June 2017, generated by this study (red line) and provided by the APCC center in Korea (black line). The value of temporal correlation (tcorr) between them is given in the top of each figure.

Fig. S3 The forecasted time series of PCs of BSISOs during May and June 2017, extracted from NCEPgfs (left panel) and CWBgfs (right panel) following the methodology described in Section 2.

Fig. S4 (a) Similar to Fig. 3 in the manuscript, but for the power spectrum of daily rainfall in Taiwan during May to October 2017, extracted from the GPM IMERG data. The red dashed line added in (a) indicates the related 95% confidence interval. (b) Similar to Fig. 4c in the manuscript, but for the time series of daily anomalies (gray bars), 10-30 day bandpass filtered (green line) and 30-60 day bandpass filtered (red line) of daily rainfall in Taiwan during May to October 2017.
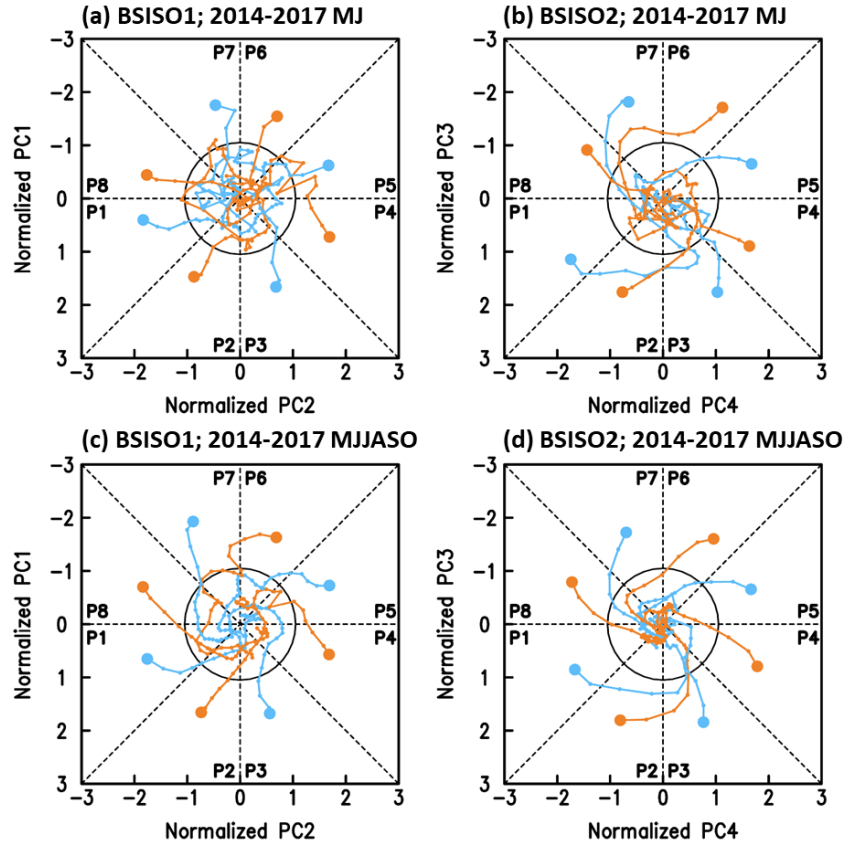
Supplementary Material

(a) Power Spectrum of Rainfall   (b) daily anomalies, 30-60d filtered and 10-30d filtered of Rainfall
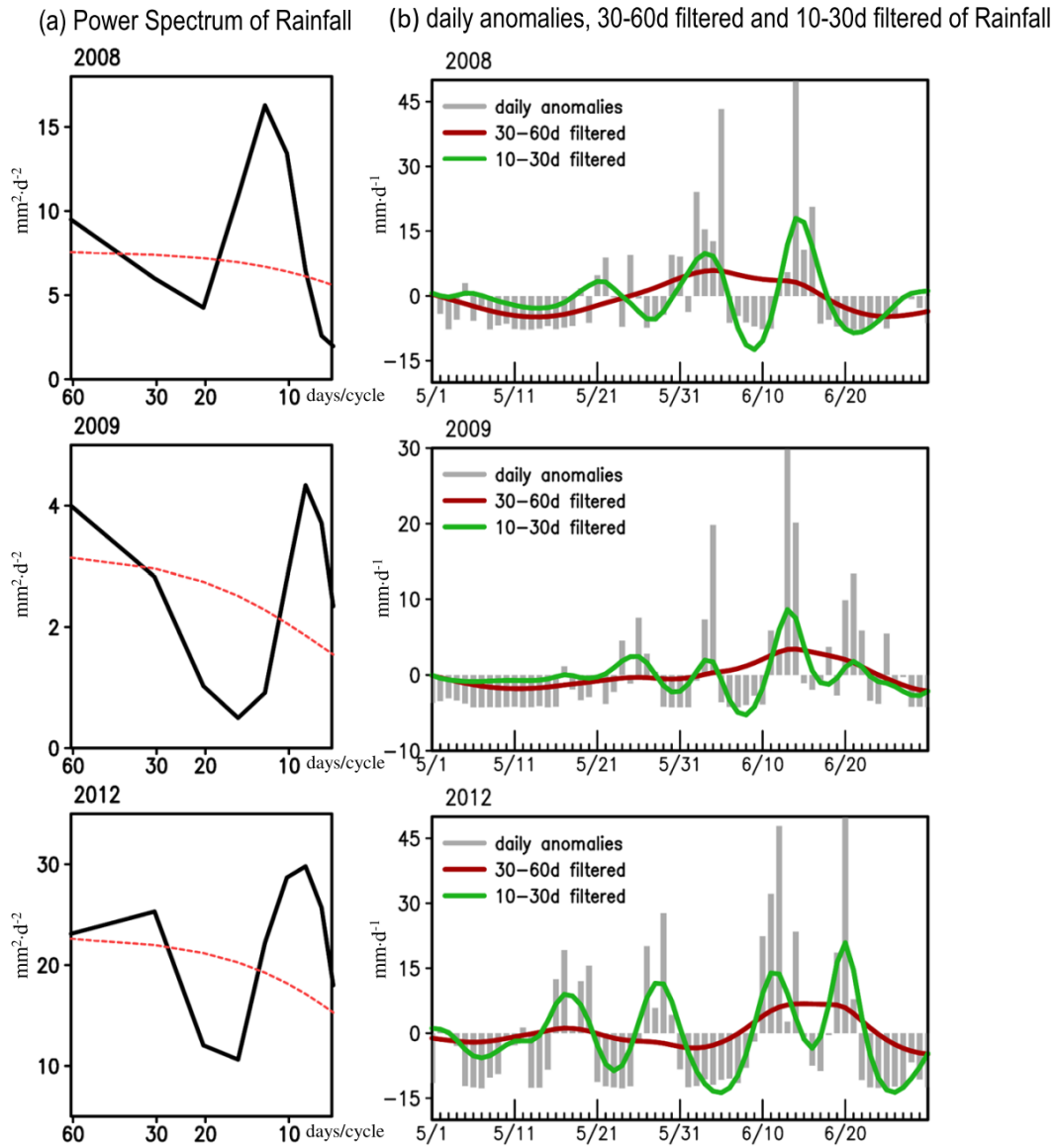
Fig. S5 (a) Similar to Fig. 3 in the manuscript, but for the power spectrum of daily rainfall in Taiwan during May and June of 2008, 2009 and 2012, extracted from the TRMM (The Tropical Rainfall Measuring Mission) 3B42 data. The red dashed lines added in (a) indicate the related 95% confidence interval. (b) Similar to Fig. 4c in the manuscript, but for the time series of daily anomalies (gray bars), 10-30 day bandpass filtered (green line) and 30-60 day bandpass filtered (red line) of daily rainfall in Taiwan during May and June of 2008, 2009 and 2012.
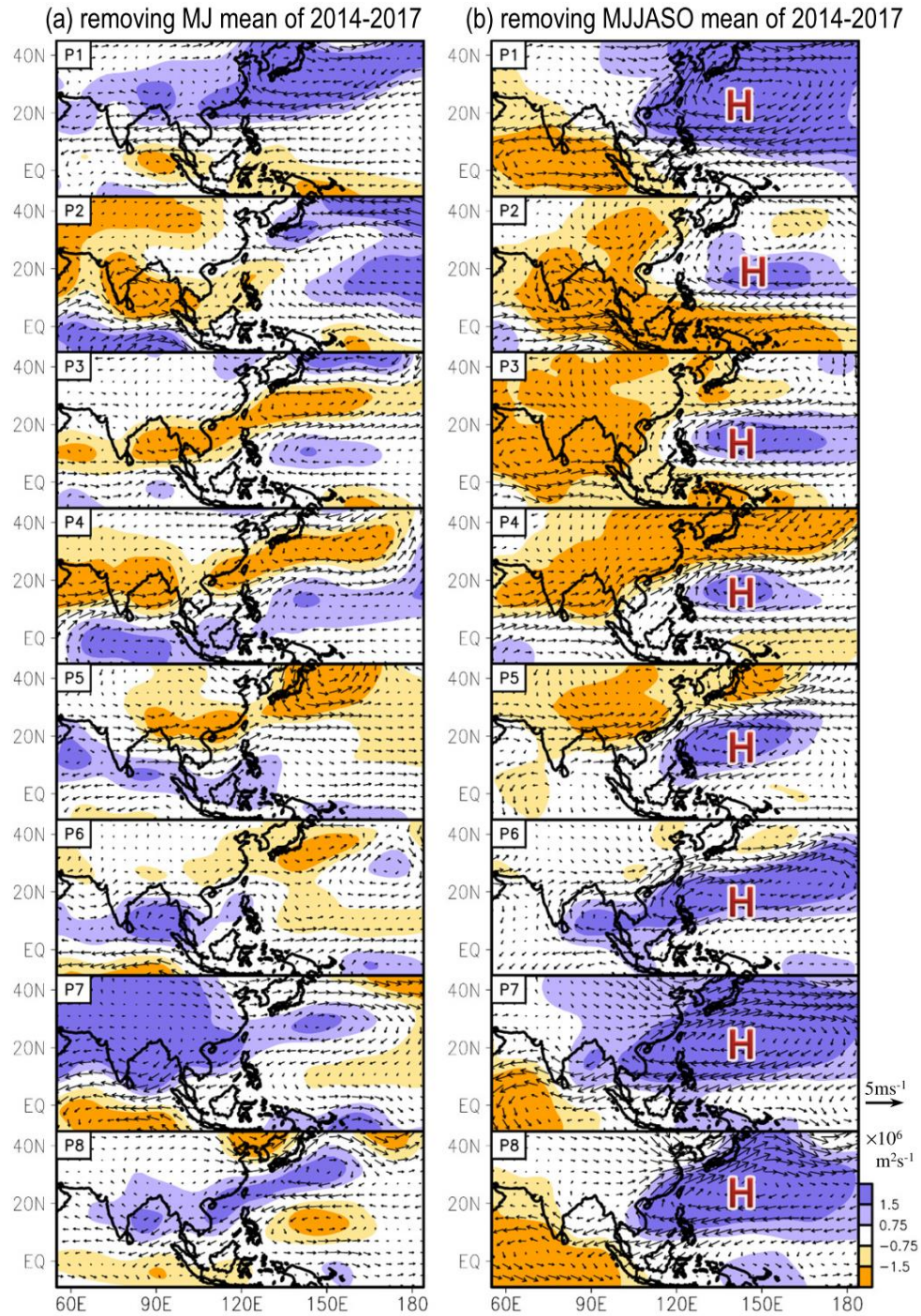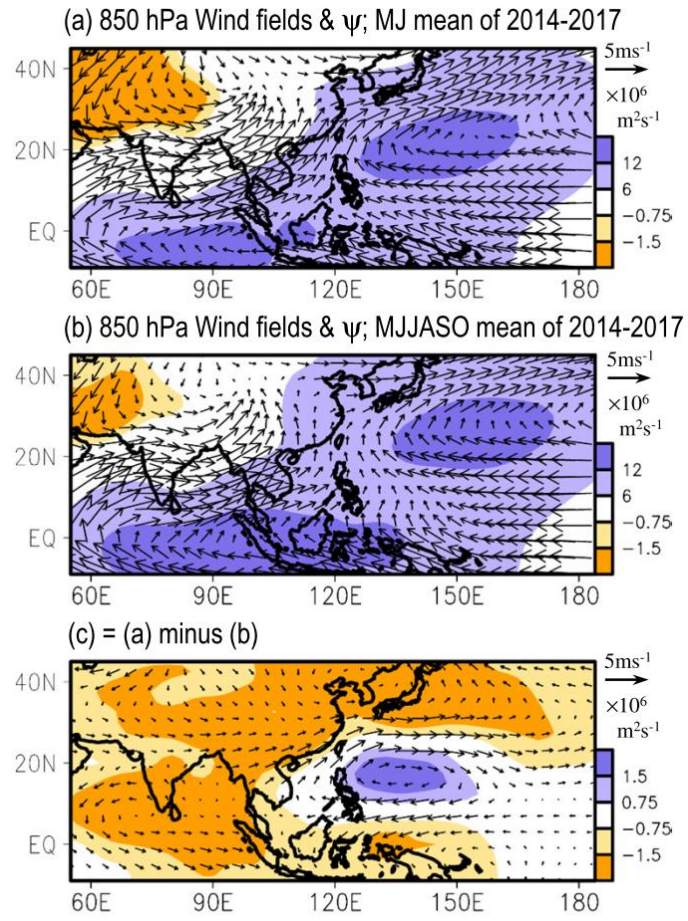
Fig. S6 This chart is generated following Fig. 8 of Lee et al. [10], but for (a) BSISO1 during 2014-2017 MJ; (b) BSISO2 during 2014-2017 MJ; (c) BSISO1 during 2014-2017 MJJASO and (d) BSISO2 during 2014-2017 MJJASO. For each initial phases [odd number (blue) and even number (orange)], storing cases are selected when the amplitude of BSISO > 1.5. After that, data for each of the next 30 days from the initial day are averaged for all selected strong cases to show the evolution of the index of BSISO.

Fig. S7 (a) The composite daily anomalies (MJ mean of 2014-2017 removed) of 850-hPa wind vectors and related stream function (ψ; shaded) for each phase of BSISO2 during May and June 2014-2017. The information of the phases (P1 to P8) is provided in the top left. (b) is similar to (a), but for the daily anomalies that remove mean value of 2014-2017 MJJASO. In (b), "H" is added to indicate the high system pattern revealed in all phases of BSISO2.

Fig. S8 (a) The MJ mean of 850-hPa wind vectors and related stream function (ψ; shaded) averaged during 2014-2017. (b) is similar to (a), but for the MJJASO mean of 2014-2017. (c) is the difference between (a) and (b).