

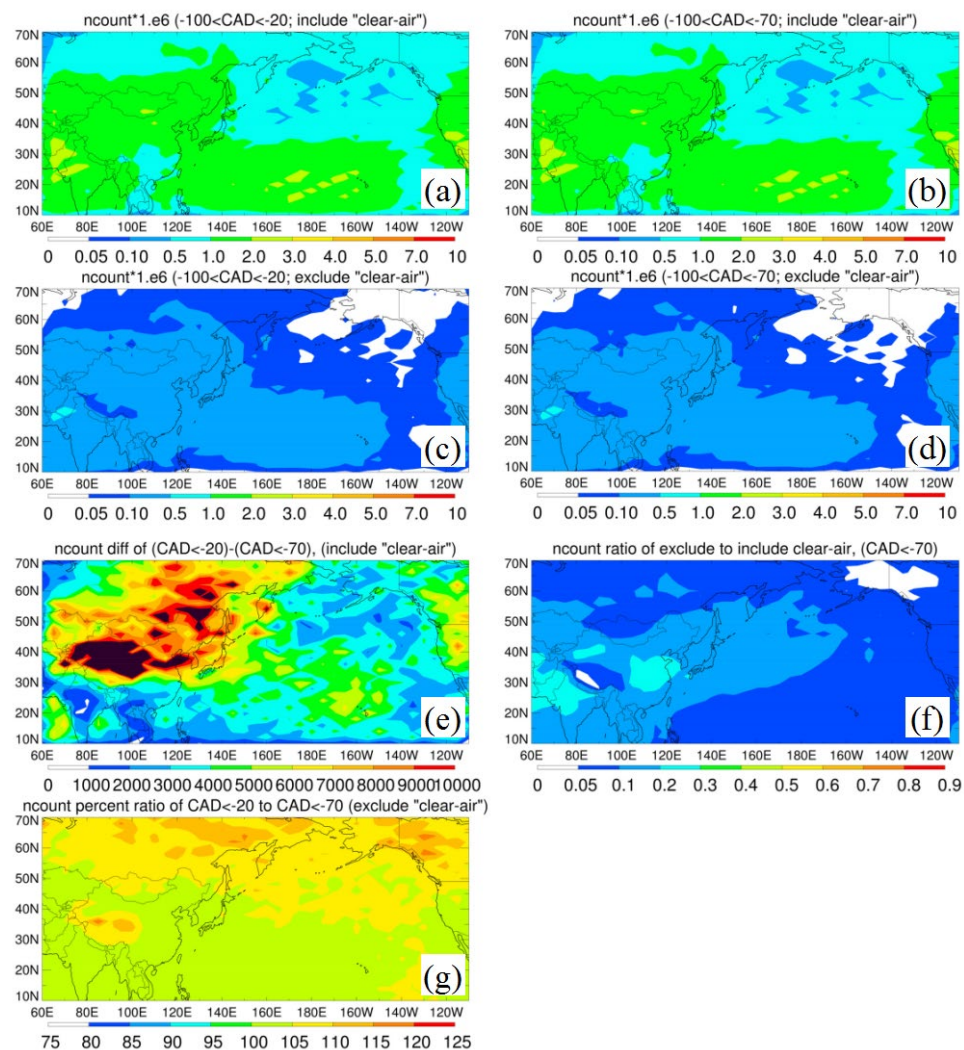


Figure S1. Number of data samples (ncount) in million for January 2007 - December 2011: (a)  $-100 < CAD < -20$  and include clear-air; (b)  $-100 < CAD < -70$  and include clear-air; (c)  $-100 < CAD < -20$  and exclude clear-air; (d)  $-100 < CAD < -70$  and exclude clear-air. (e) ncount ( $-100 < CAD < -20$ , include clear-air) minus ncount ( $-100 < CAD < -70$ , include clear-air), (f) ratio of exclude clear-air to include clear-air ( $-100 < CAD < -70$ ), (g) percent ratio of CAD<-20 to CAD<-70 (exclude clear-air).

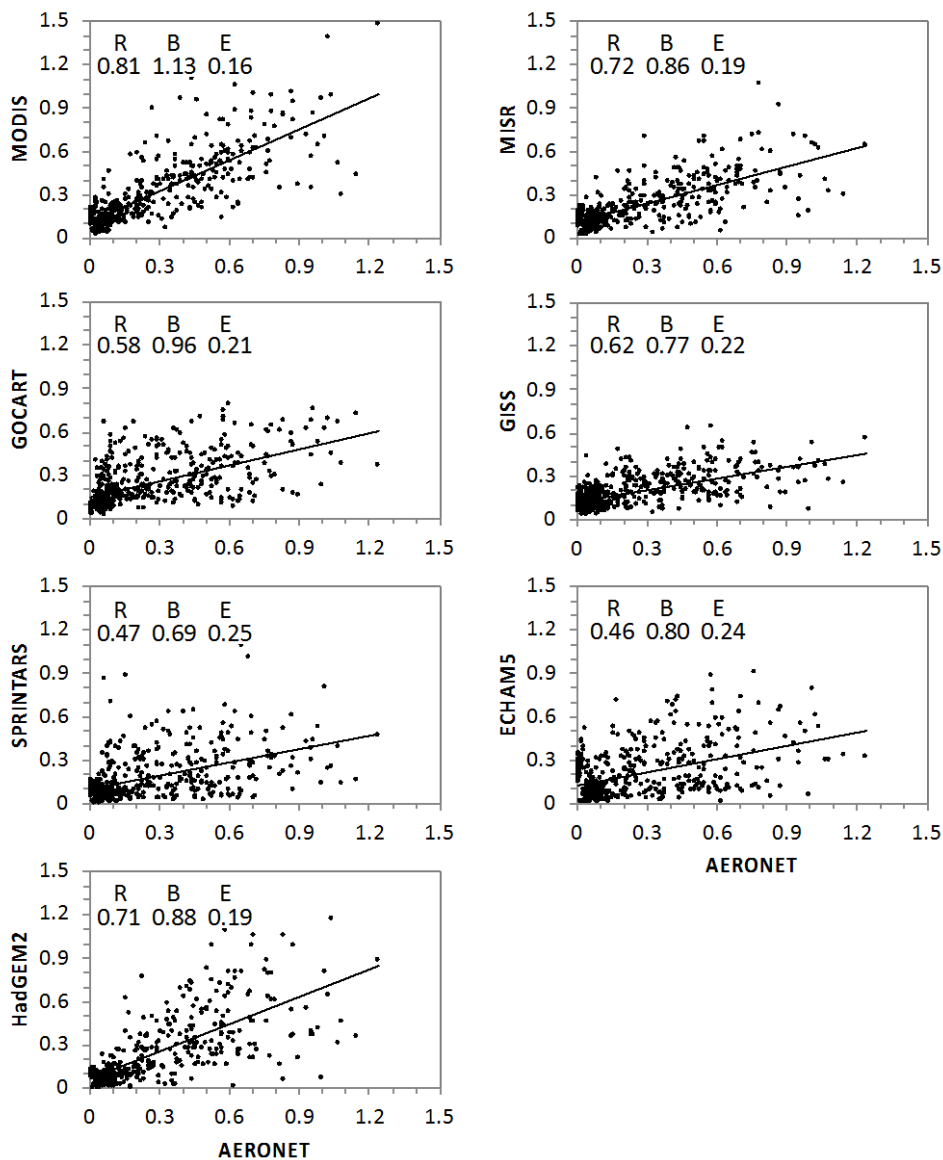


Figure S2. Comparison of monthly mean AOD between AERONET and other satellite data and model values over the study domain. Number of total data point is 474 between 2000 and 2005. R, B, and E are the correlation coefficient, mean bias, and root-mean-square-error, respectively. Mean bias is defined as the sum of the ratio of the modeled or satellite AOD to AERONET AOD.

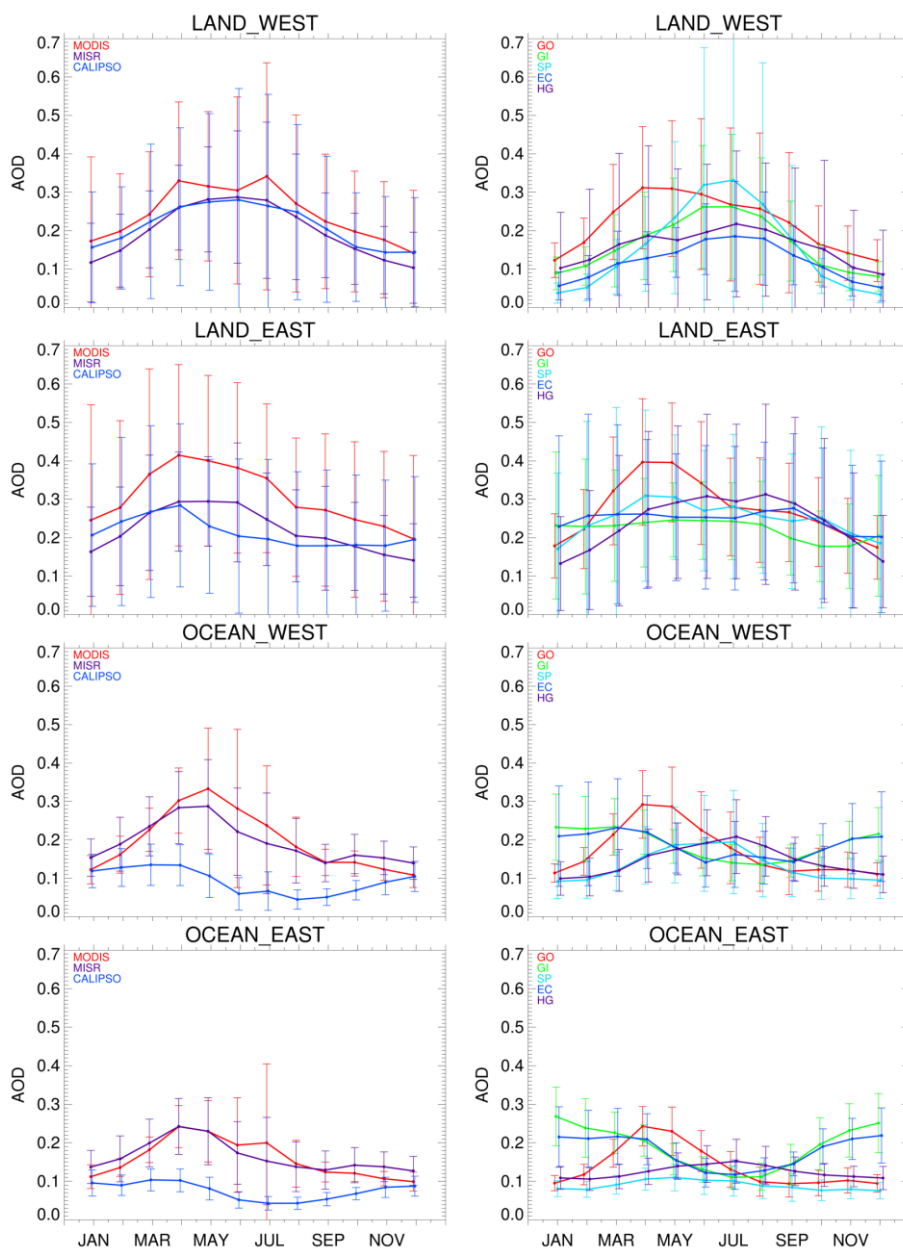


Figure S3. Monthly mean AOD over Land-West (60°E-100°E), Land-East (100°E-140°E), Ocean-West (140°E-180°E), Ocean-East (180°E-140°W) domains from top to bottom. Latitudinal ranges are 20°N to 60°N. Left- and right-columns are from satellites and models, respectively. All model plots are averaged from 2000 to 2005. Vertical bars are the standard deviation of monthly mean values.

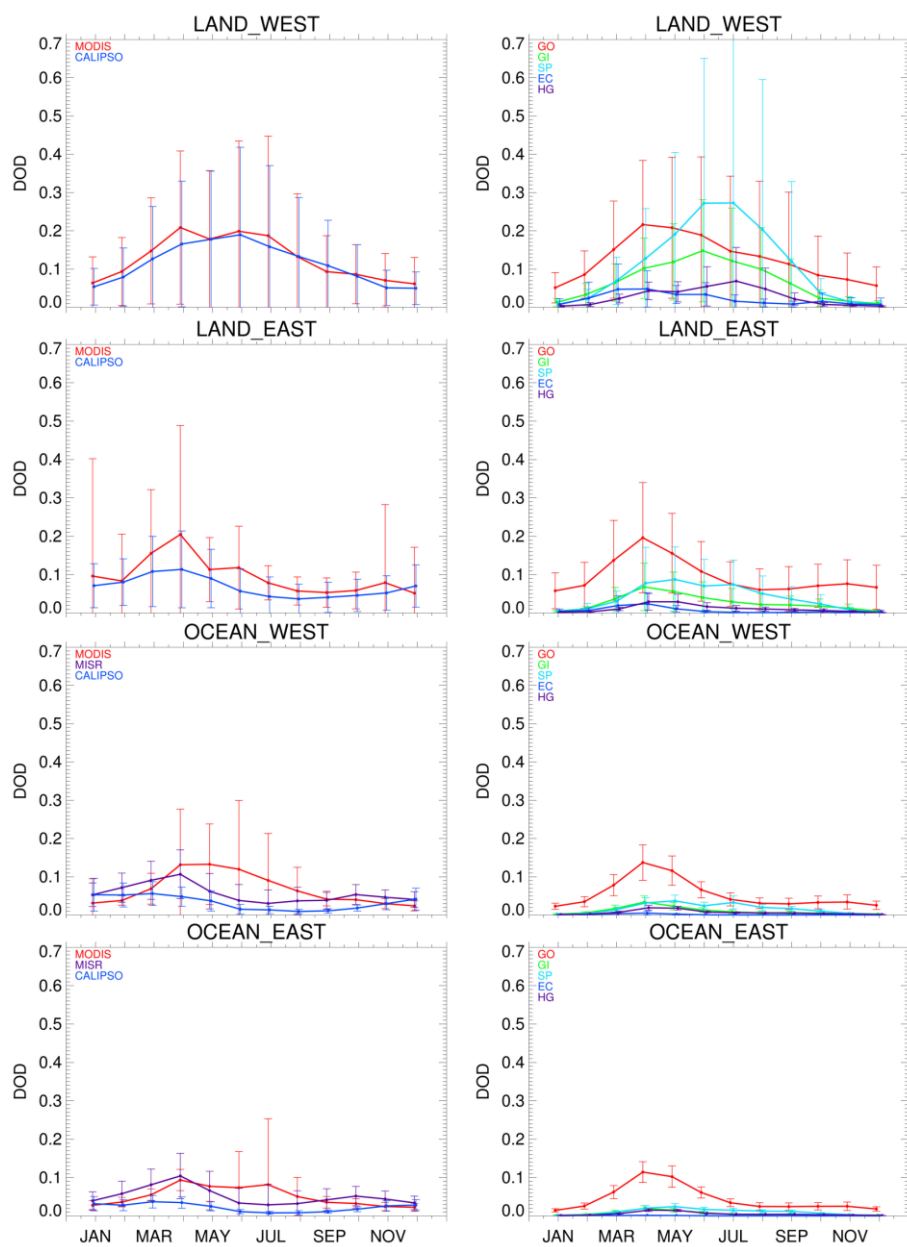


Figure S4. Same as Figure S3 except for DOD.

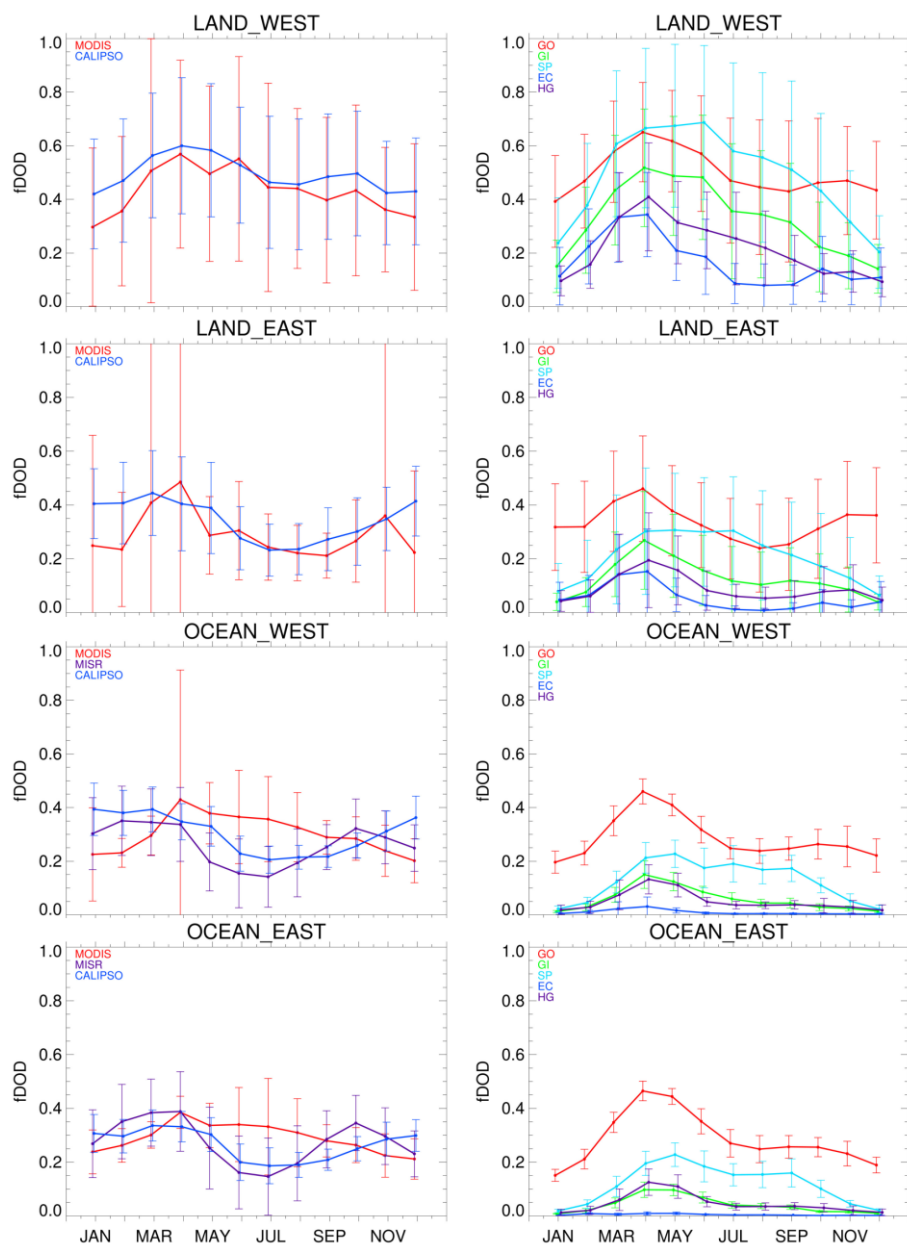


Figure S5. Same as Figure S3 except for  $f_{DOD}$ .

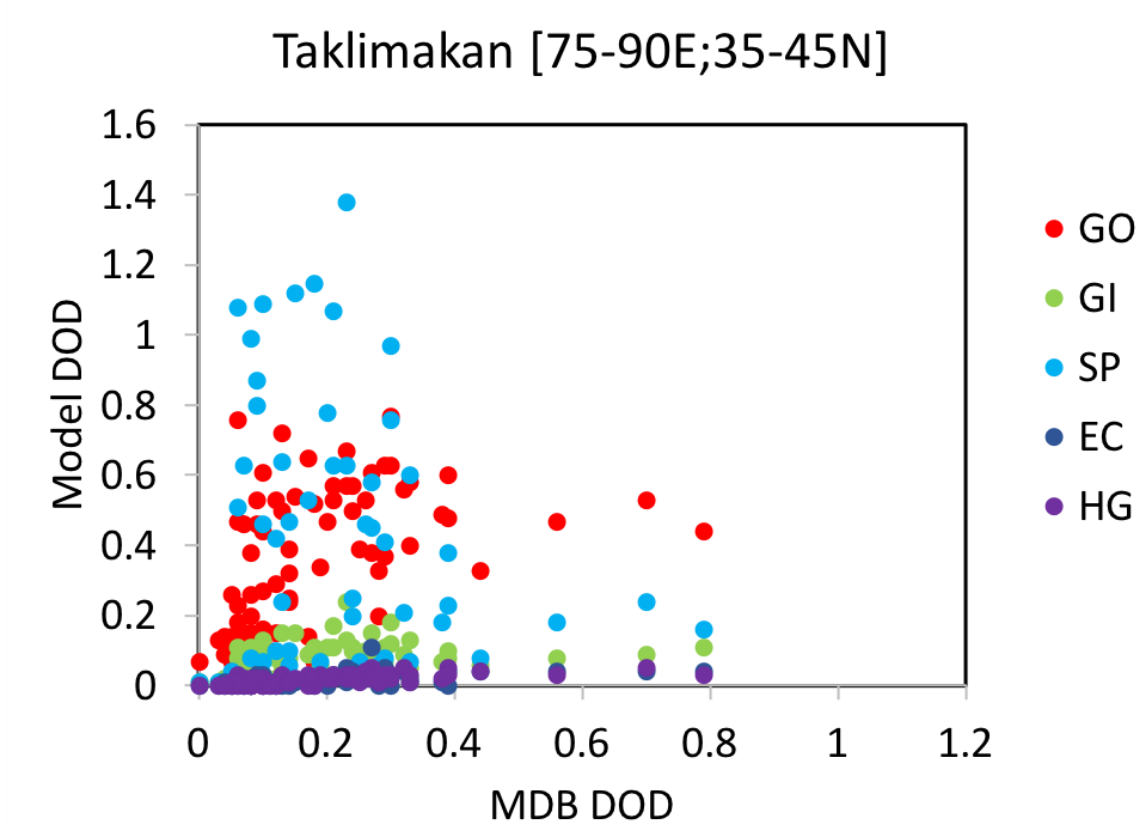


Figure S6. Monthly mean DOD for 2000-2005 over the Taklimakan desert.

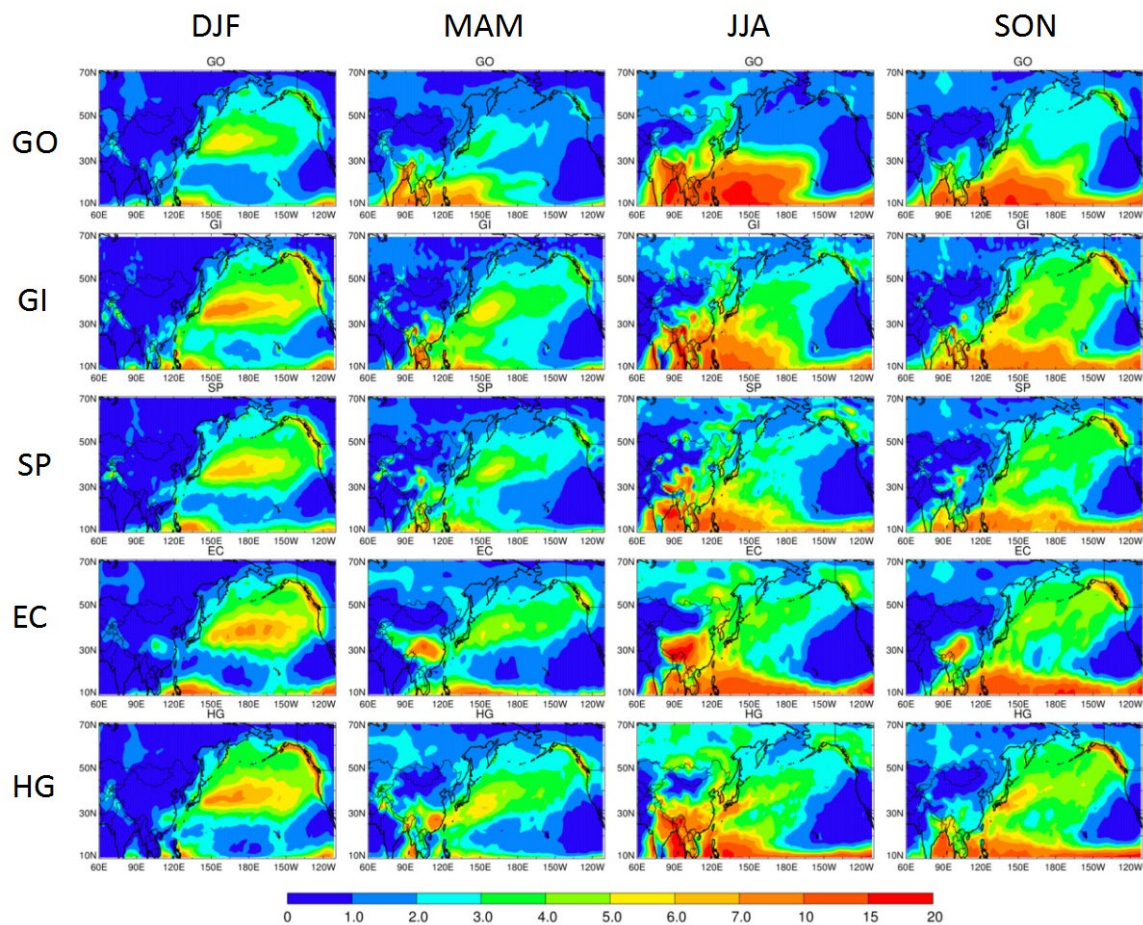


Figure S7. Map of precipitation (mm day<sup>-1</sup>) of each season from models averaged from 2000 to 2005.