

Figure S1. (a) Distributions of ozone verticality in desert and in forest for 2018 from AIRS (b) Day/night difference of ozone verticality in desert and in forest for 2018 from AIRS. Note: The magnitudes of ozone verticality are a rough measure of the fraction of the AIRS ozone retrieval determined from the data as opposed to the ozone first guess. A value near unity indicates the retrieval is highly determined by the radiance measurements and thus has high information content. A smaller value indicates the retrieval contains a large fraction of the ozone first guess. The ozone first guess is from an observationally-based climatology. It is provided for each of 17 latitude zones for each month and for the 100 pressure layers for AIRS. The latitude zones are at 10° intervals from 80°S to 80°N . We select AIRS L2 daily observations over a part of the Sahara Desert [20°N , 24°E , 23°N , 27°E]. The forest region located at the same latitude zone [22°N , 106°E , 24°N , 108°E] in Guangxi Province, China.

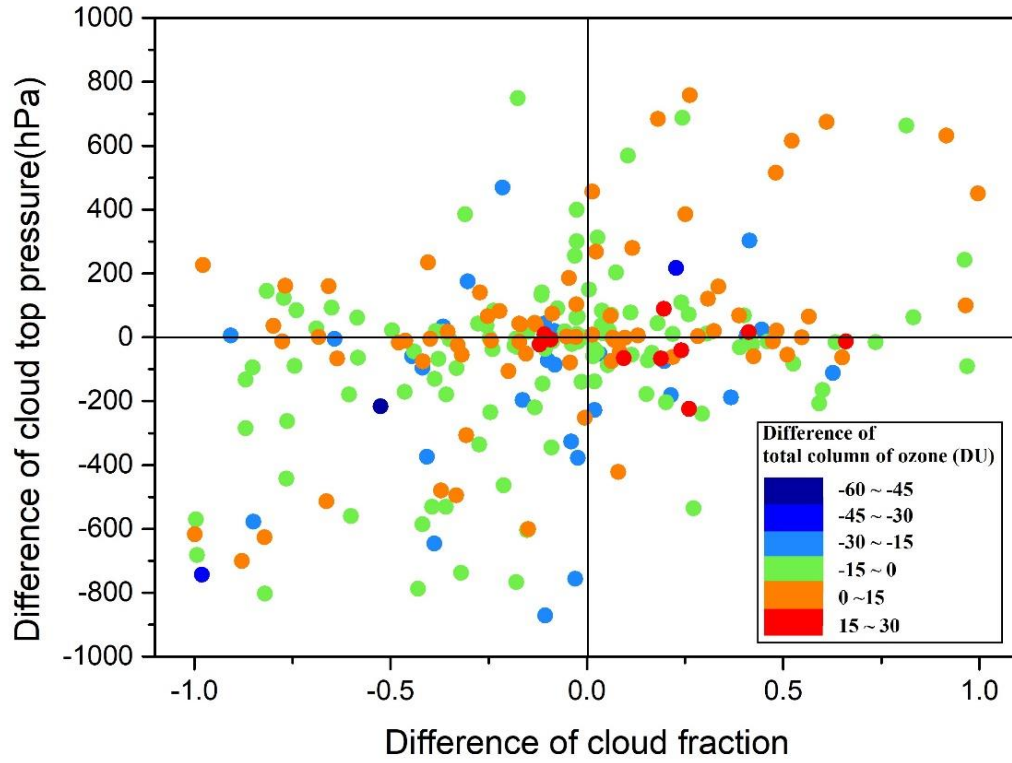


Figure S2. Distributions of day/night difference of cloud fraction (top panel), cloud top pressure (top panel), and total column of ozone over ocean for 2018 from AIRS. We select AIRS L2 daily observations over a part of Pacific Ocean near the South America [20°S, 100°W, 10°S, 90°W] when there are persistent clouds day and night.

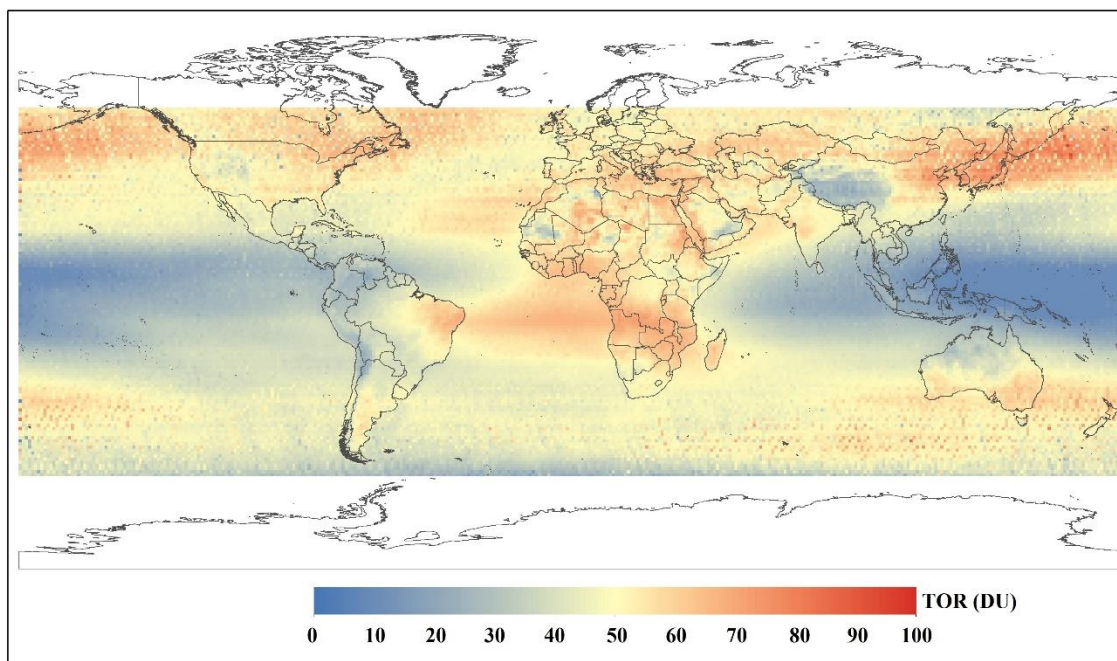


Figure S3. Daytime tropospheric ozone residuals (TOR) averaged for 2005-2018 in 60°S-60°N. The TOR is calculated as AIRS TCO – MLS SCO.

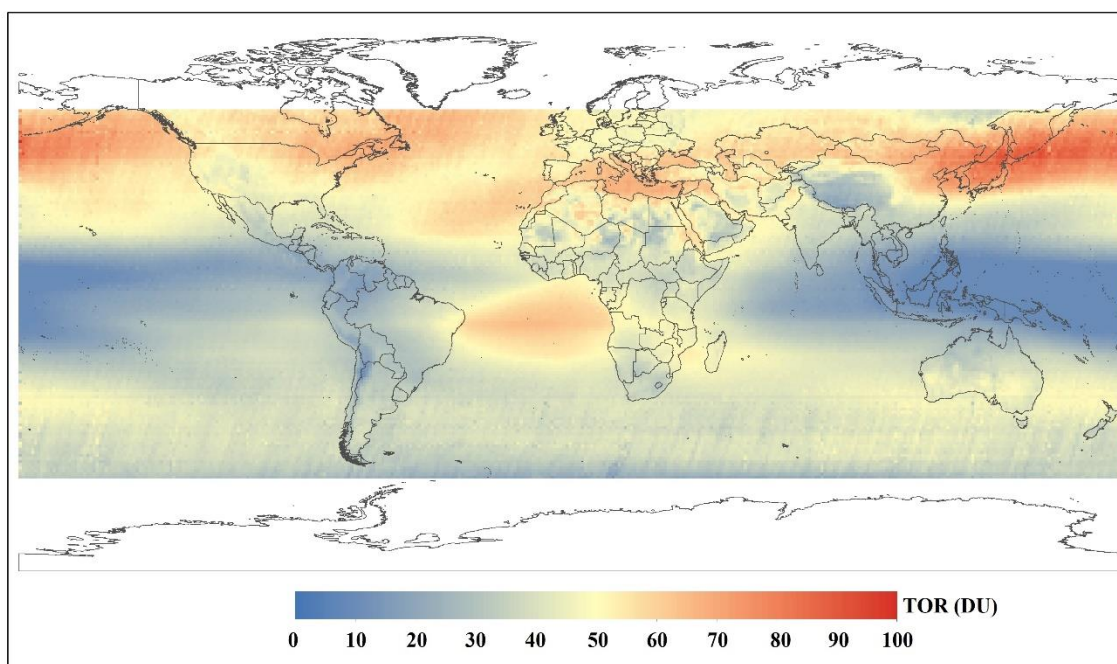


Figure S4. Same as Figure S3, but for nighttime.

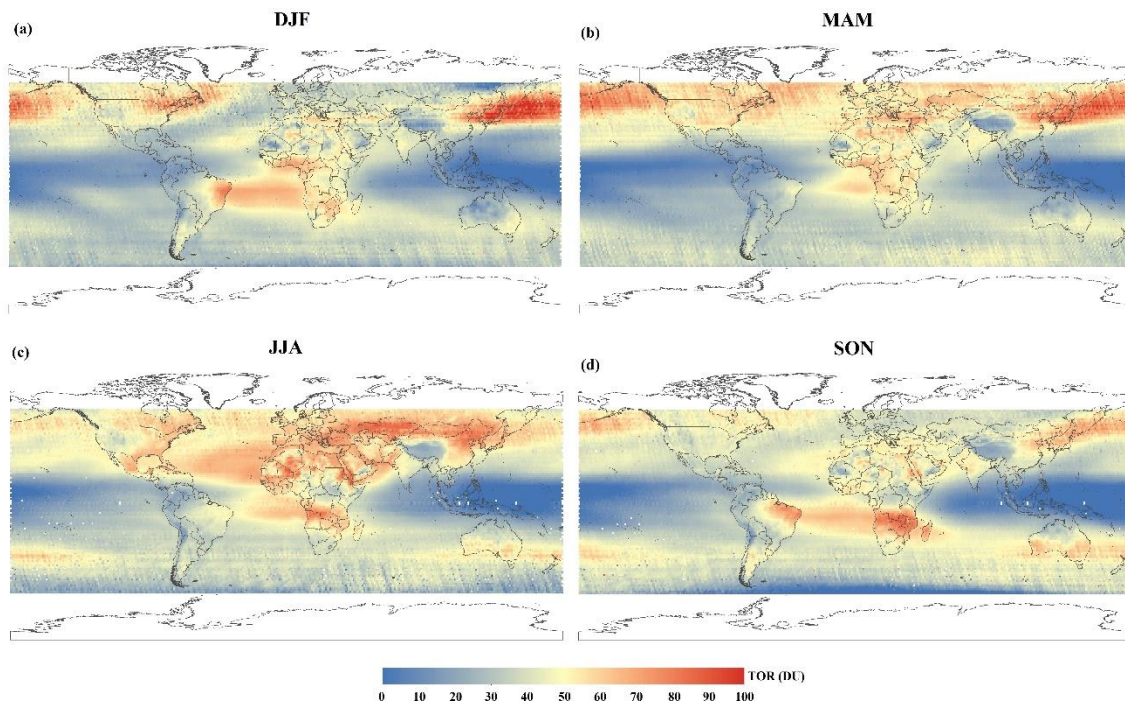


Figure S5. Seasonal daytime TOR averaged for 2005-2018 in 60°S-60°N. (a) DJF. (b) MAM. (c) JJA. (d) SON.

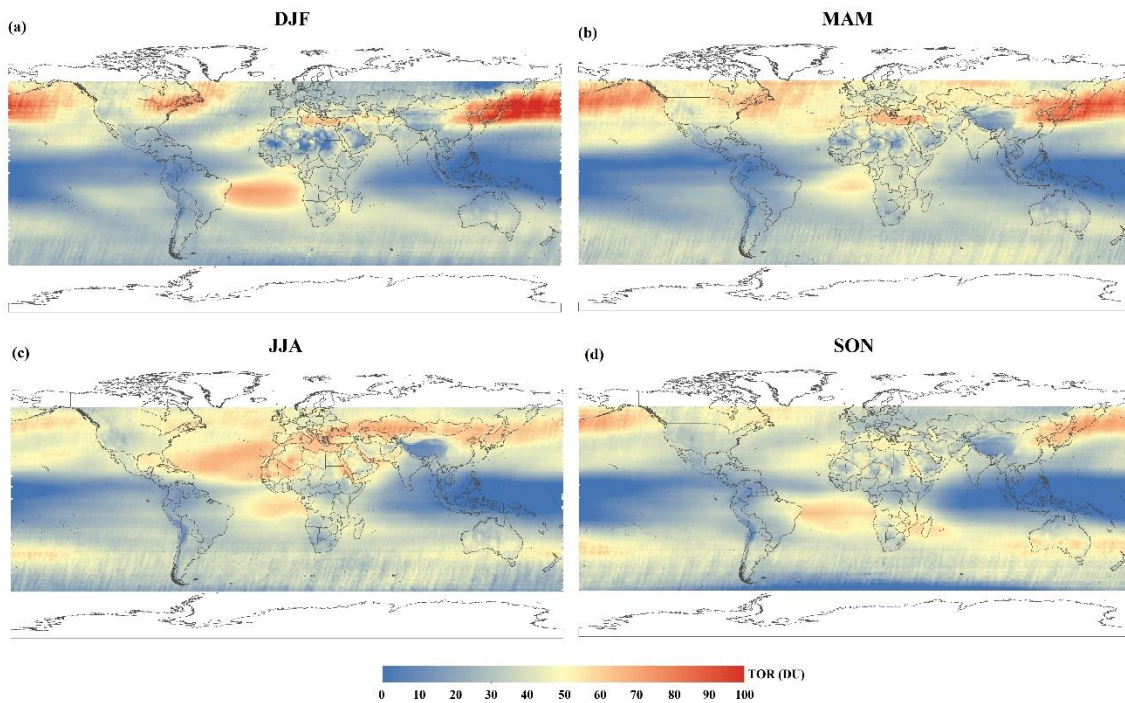


Figure S6. Same as Figure S5, but for nighttime.