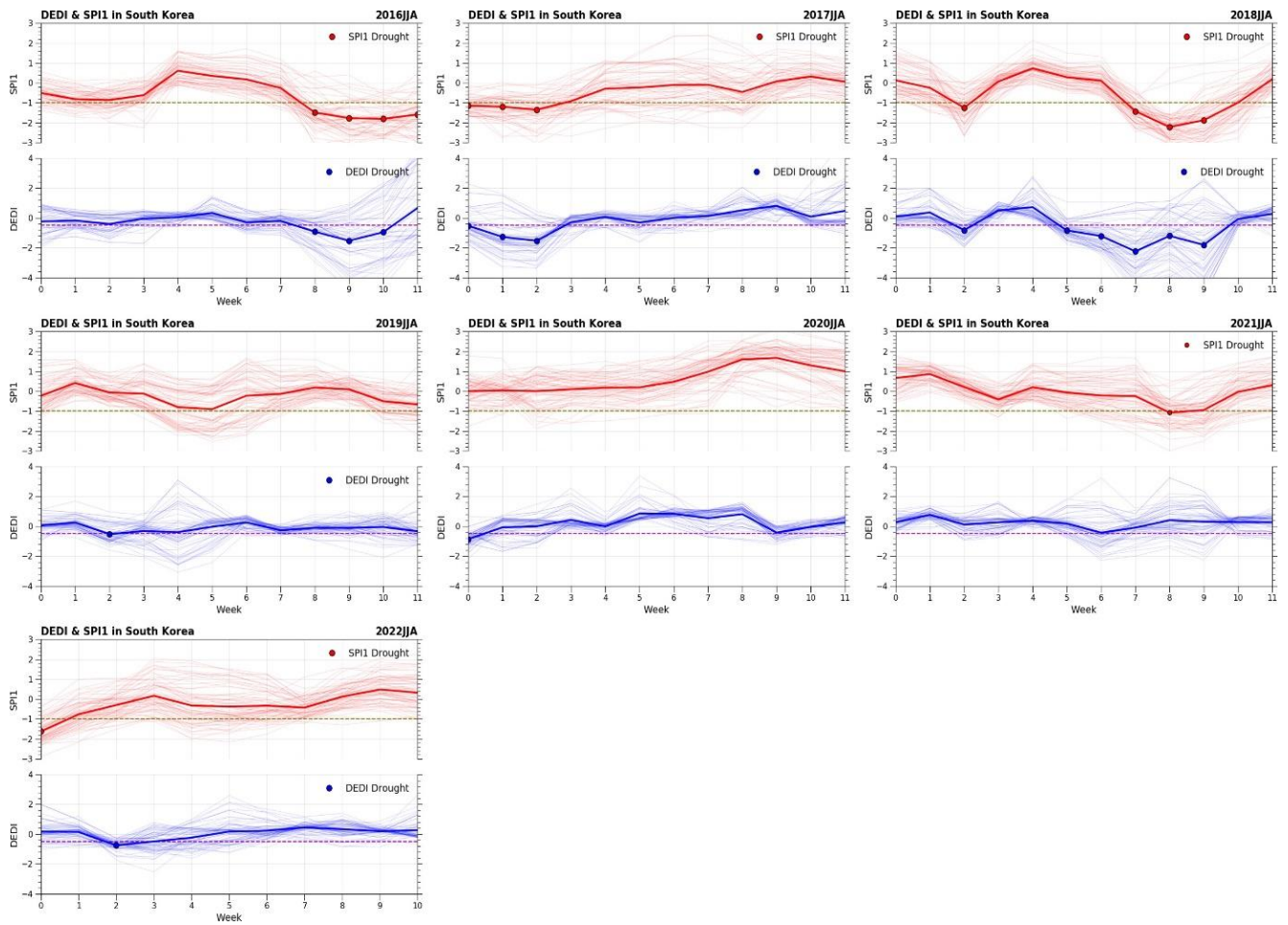*Supplement of*

Modeling on the drought stress impact on the summertime biogenic isoprene emissions in South Korea

Yong-Cheol Jeong et al.

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Figure S1: The SPI1 index (red line) and DEDI index (blue line) in the recent seven summers (2016JJA – 2022JJA) in South Korea. The thin red (blue) lines indicate the SPI1 (DEDI) indices at all available in-situ sites in South Korea and the thick red (blue) line indicates the averaged SPI1 (DEDI) value. The olive and magenta dashed lines denote the drought threshold value in the SPI1 (-1) and DEDI (-0.49), respectively, and the circle was indicated if each averaged index (bold line) was below than this threshold (drought condition).
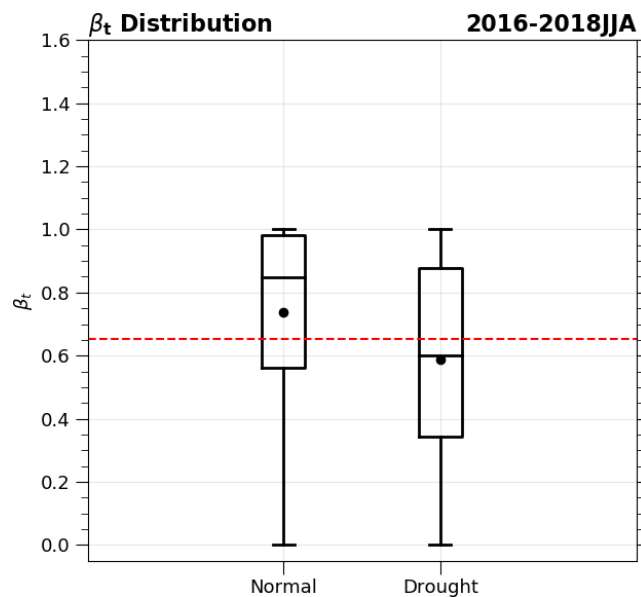
Figure S2: The boxplot for soil moisture stress (β_t) values from the ecophysiology module under the normal and the drought conditions in South Korea. The red dashed line denotes a 60% percentile value of β_t under the drought conditions.
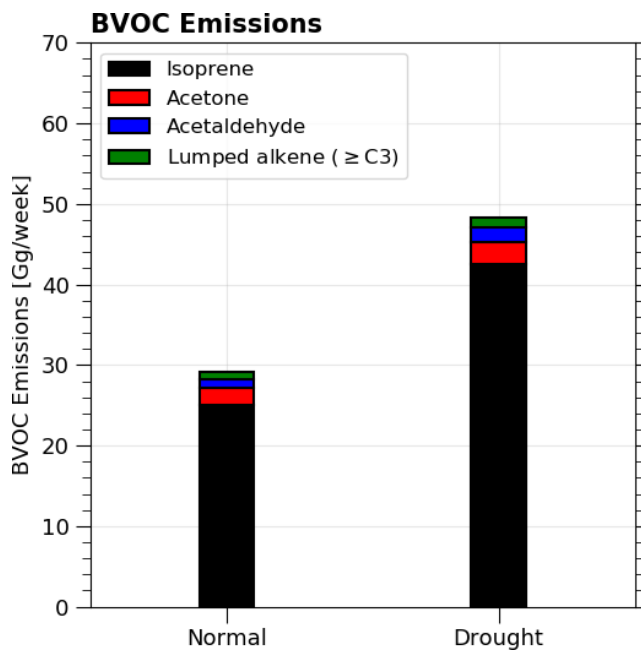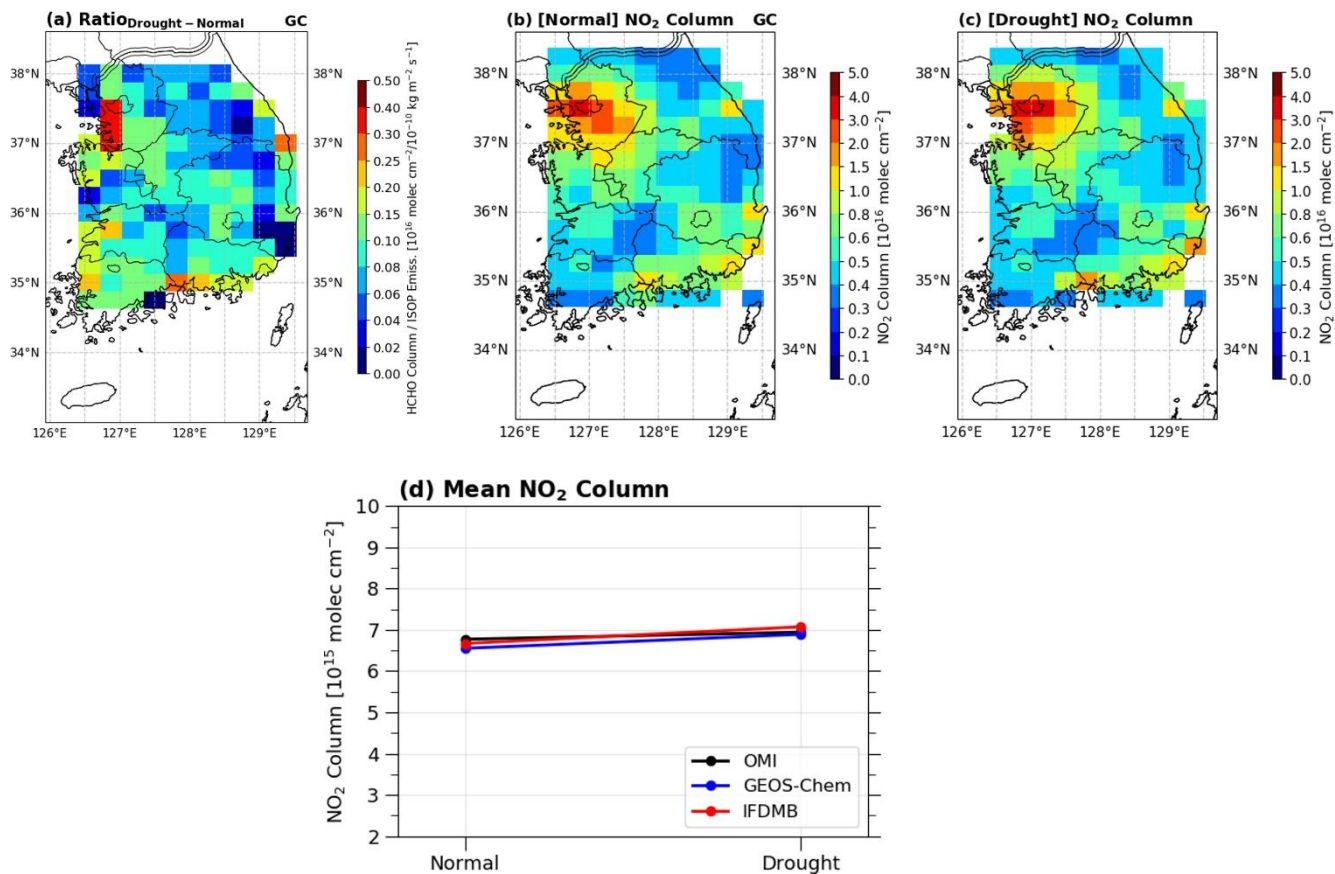

Figure S3: The total amounts of each BVOC emission under the normal and the drought conditions in South Korea in the standard GEOS-Chem. The each BVOCs emission include isoprene, acetone, acetaldehyde, and lumped alkene ($\geq$ C3).

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Figure S4: (a) A ratio between the modeled HCHO column change (Drought – Normal) and the modeled isoprene emissions change in the standard GEOS-Chem. NO₂ column under (b) the normal and (c) the drought conditions in South Korea in the standard GEOS-Chem. (d) Mean NO₂ column under the normal and the drought conditions in South Korea in OMI (black), in standard GEOS-Chem (blue), and in IFDMB (red), respectively.

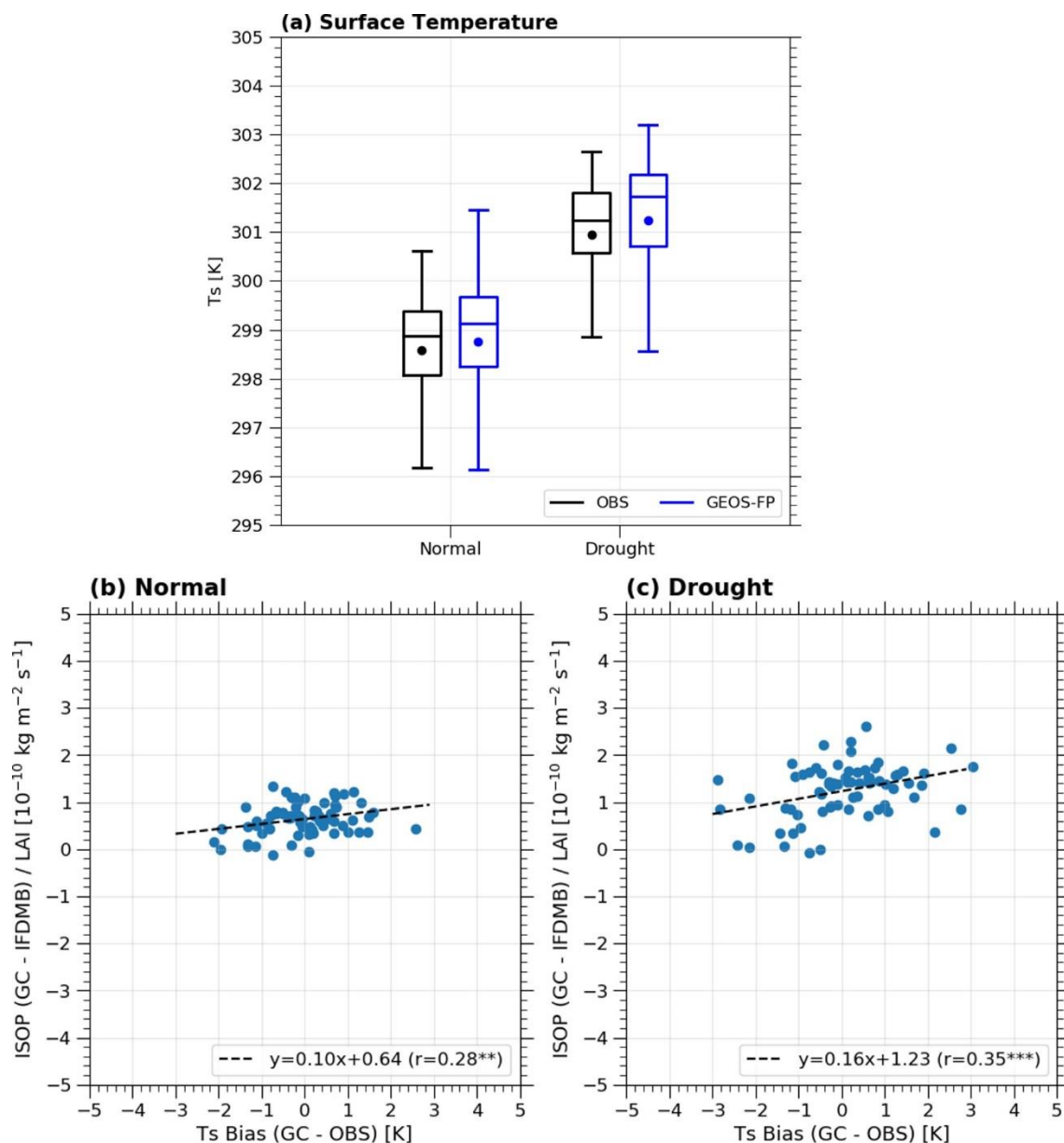25

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Figure S5: (a) The boxplot for surface temperature (Ts) under the normal and drought condition in South Korea. The black and blue boxes are Ts from the observation and from the GEOS-FP, respectively. The observed surface temperature data was provided by Korea Meteorological Administration. The scatterplots between biogenic isoprene emission change (standard GEOS-Chem – IFDMB) and Ts bias (GEOS-FP – observation) under (b) the normal and (c) the drought conditions. The biogenic isoprene emission changes were divided by LAI. The regression equation and correlation coefficient (r) were shown in the right bottom of each figure. The ** (***) indicates a statistically significant r value at a 95% (99%) confidence level.