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Supporting Information for

Sensitive response of atmospheric oxidative capacity to the uncertainty in the emissions of nitric oxide (NO) from soils in Amazonia

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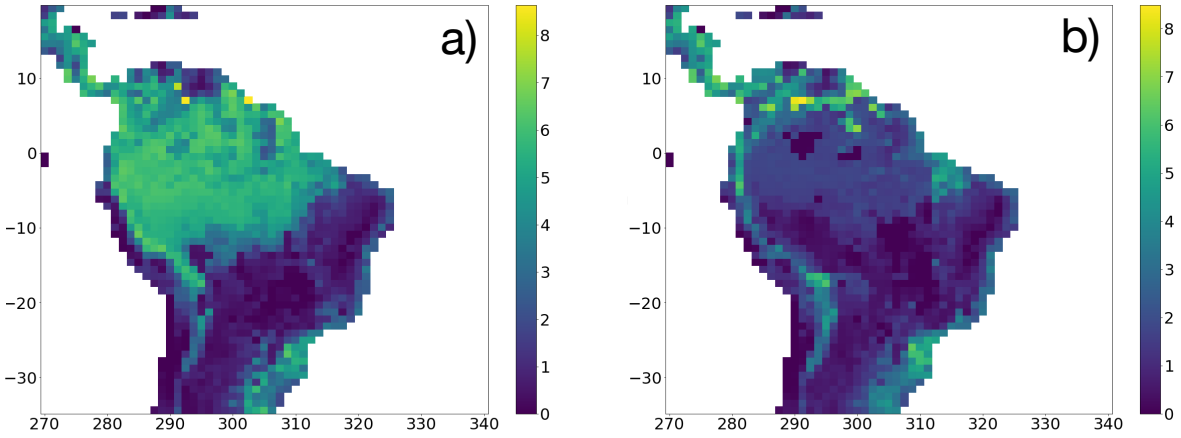

Figure S1. Modeled total leaf area index (LAI, $cm^2\ cm^{-2}$) simulated for August 2002 in the (a) forested and (b) deforested scenarios.

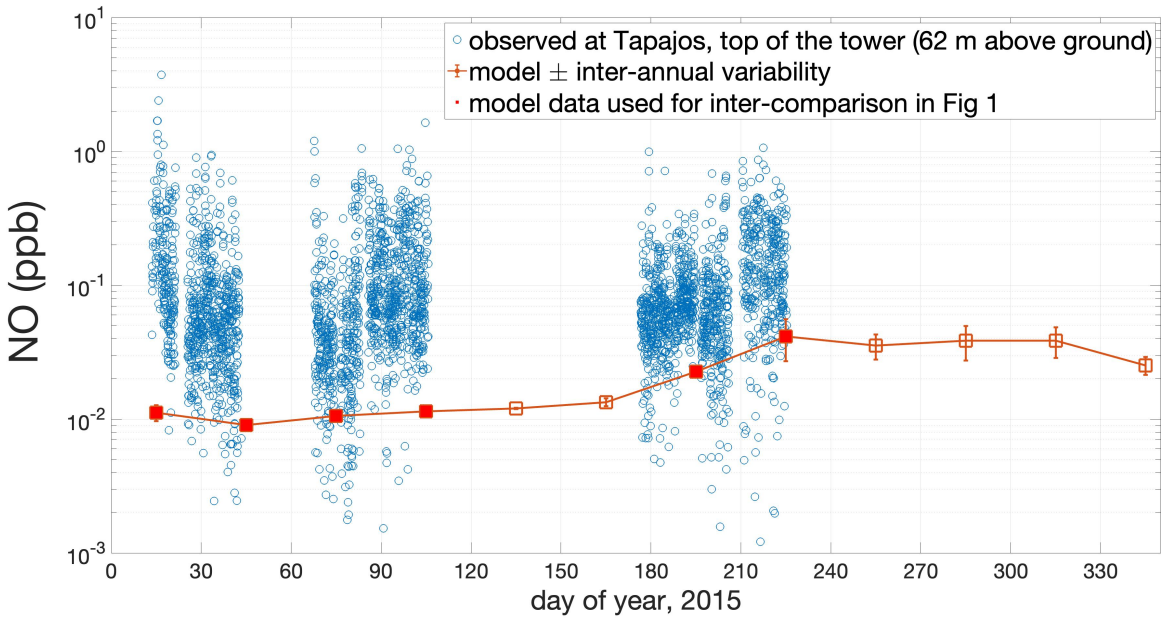

Figure S2. Mixing ratios of NO measured at the top of the tower at Tapajos National Forest in 2015, and modeled by CESM2-CAM-Chem. Error bars on the model values represent the standard deviation of simulations from 2001 to 2005. The model values colored in red indicate the monthly values that were included for the model-observation comparison shown in Figure 1.

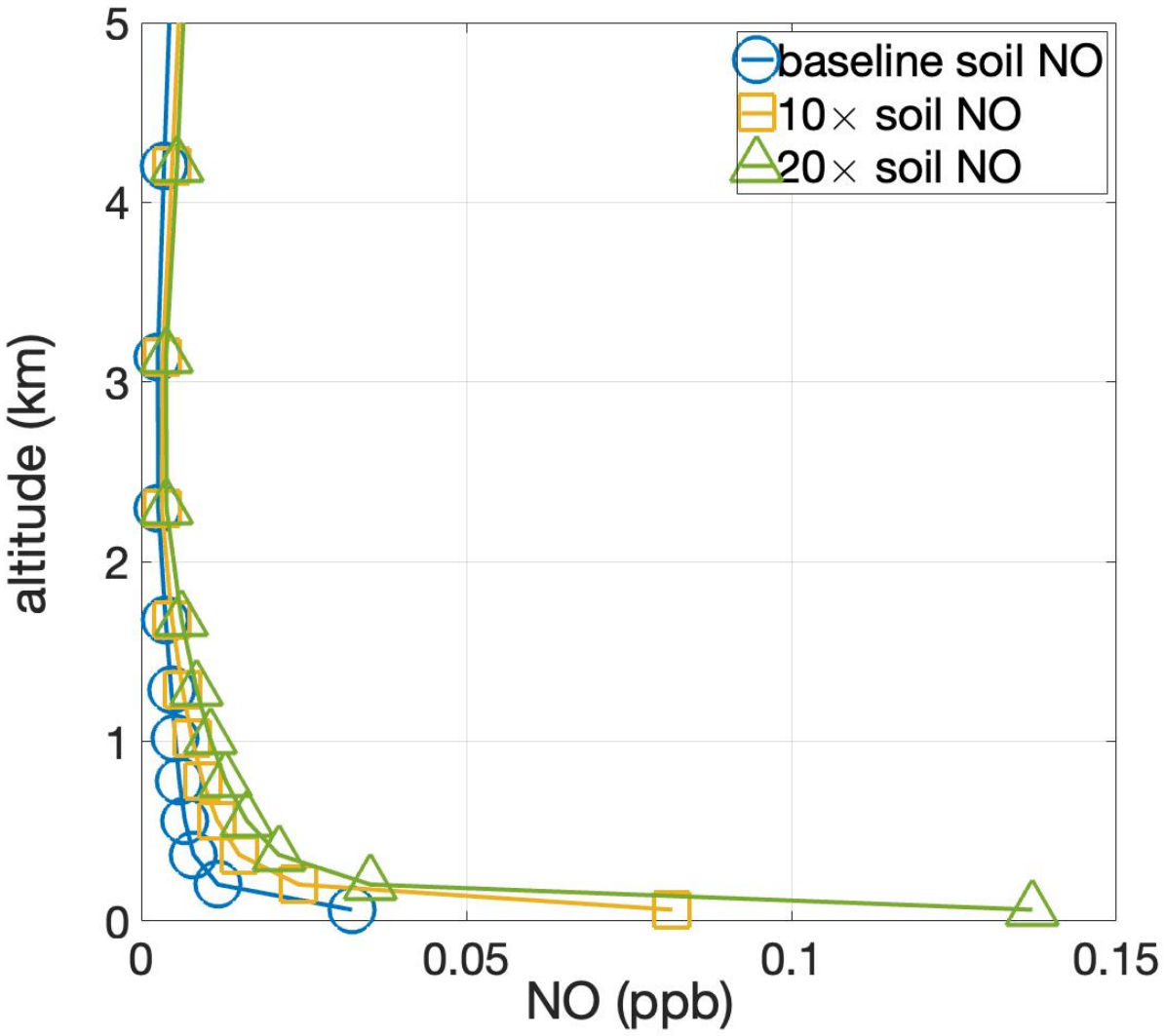

Figure S3. Vertical profiles of NO mixing ratio above the model-grid encompassing the Tapajos National Forest for the three forested scenarios with baseline, 10×, and 20× soil NO emission rates. These profiles represent the model period of August 2003. Pressure was converted to altitude using a 8.5 km scale height.

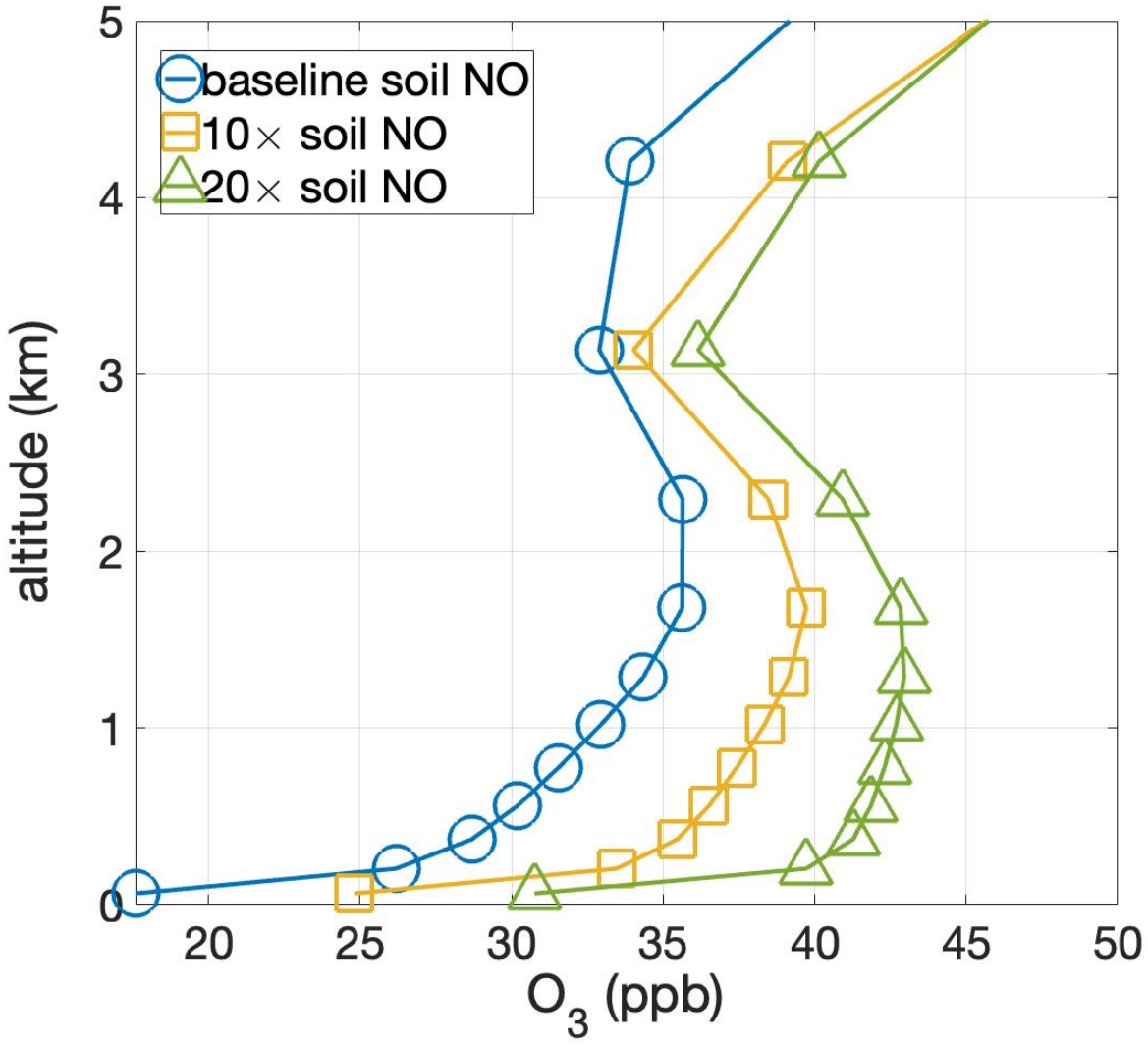

Figure S4. Same as Figure S3 but for O_3.

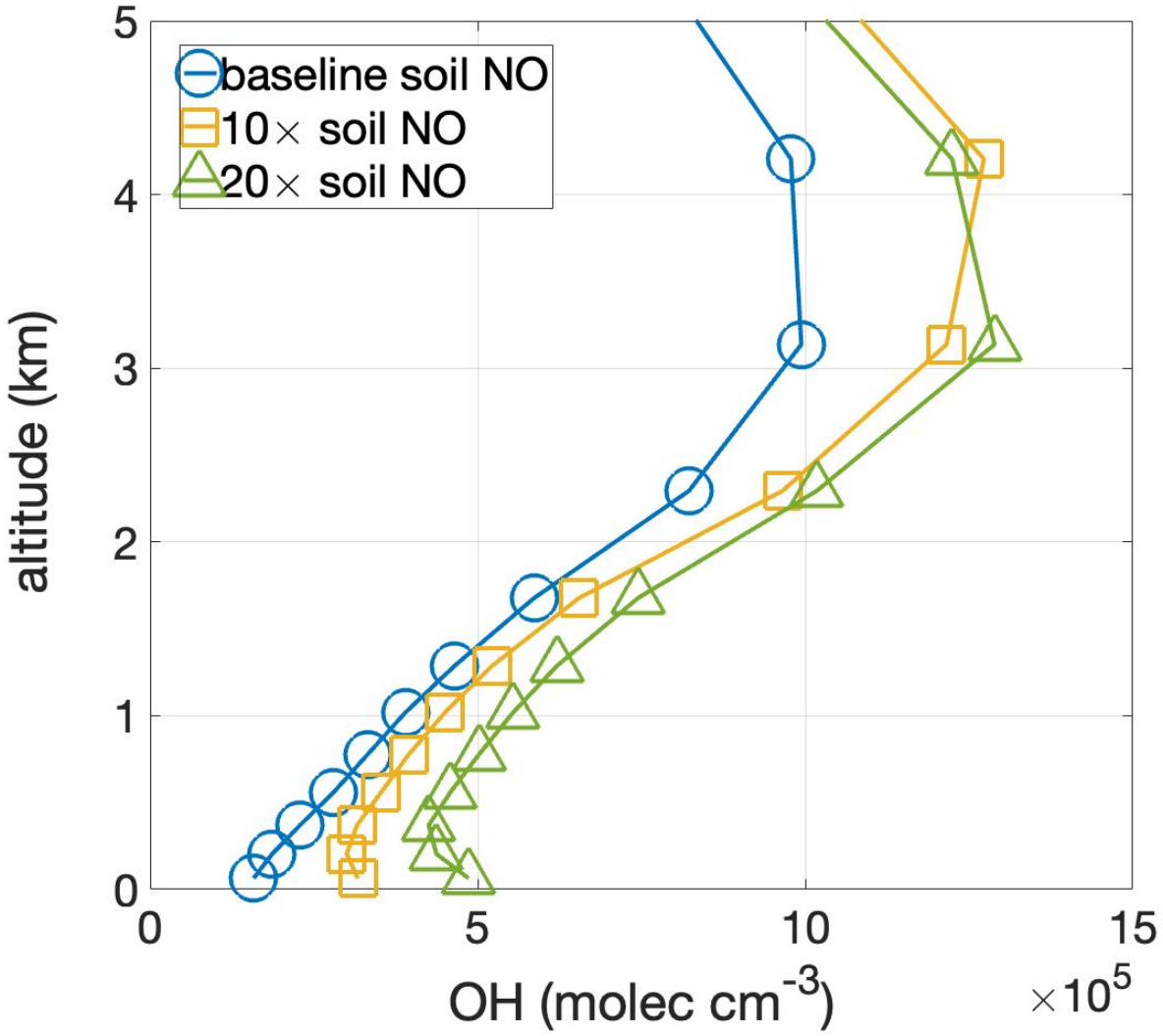

Figure S5. Same as Figure S3 but for OH.

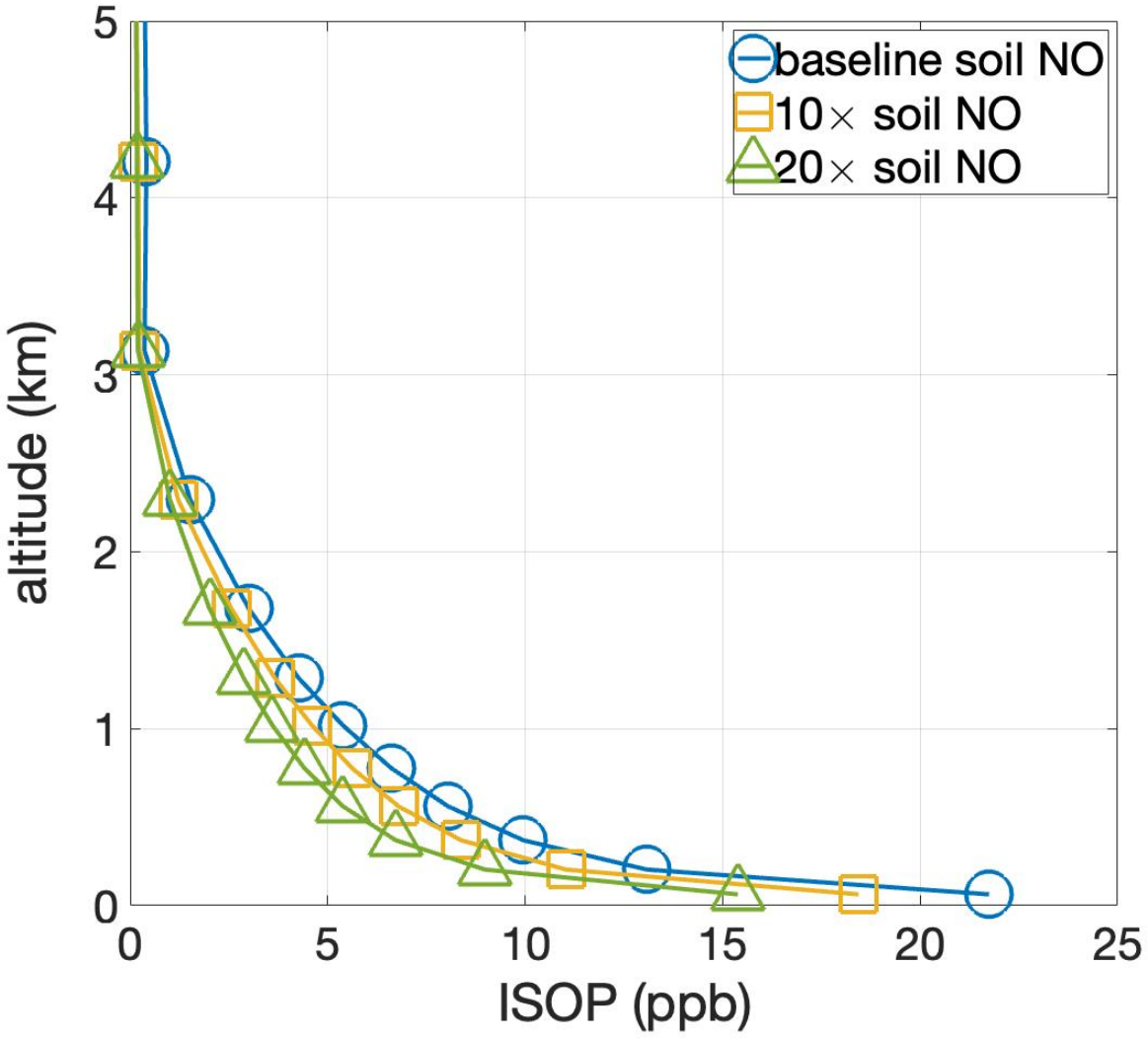

Figure S6. Same as Figure S3 but for isoprene.

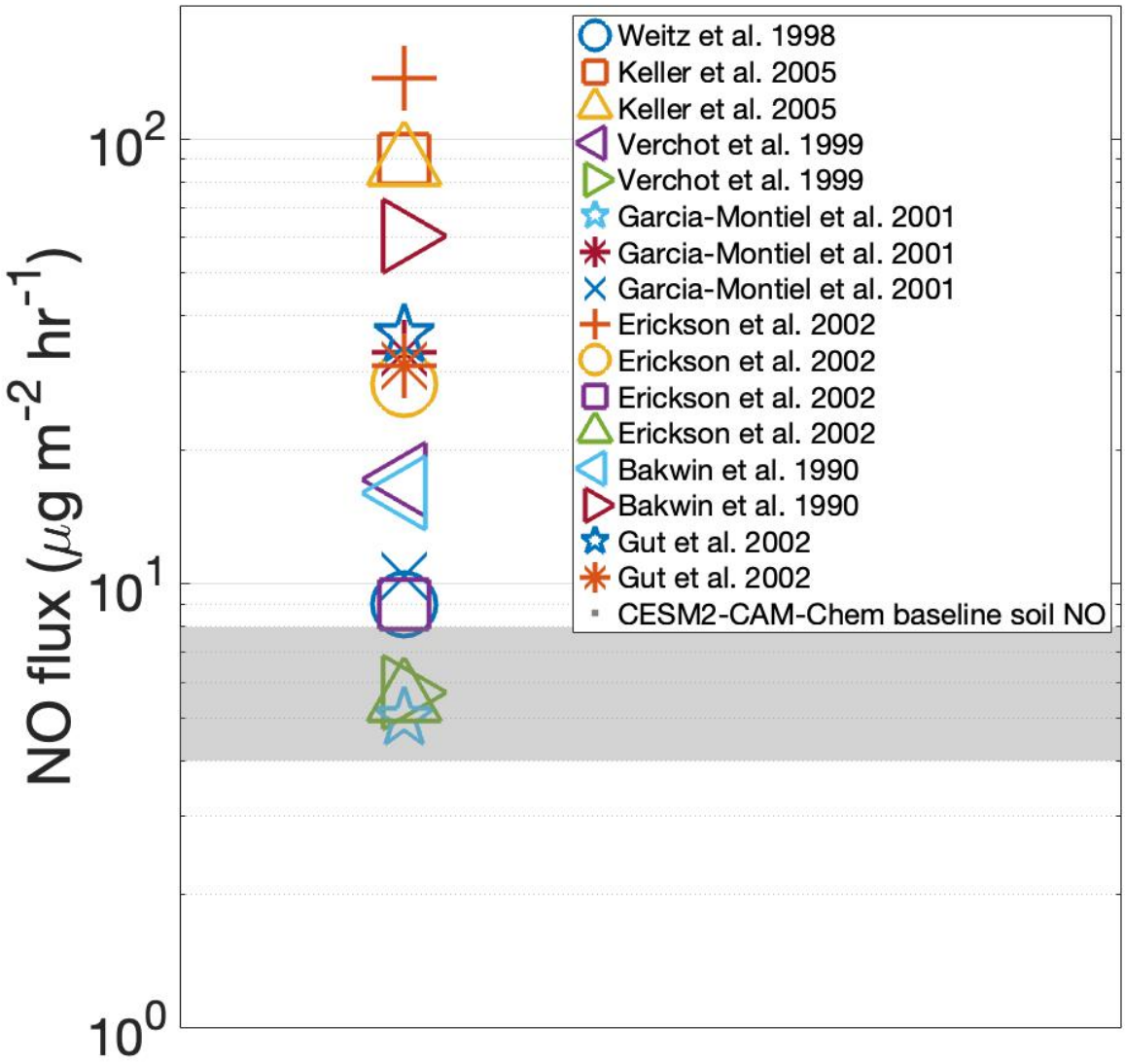

Figure S7. Baseline soil NO emission rates implemented in the CESM2-CAM-Chem as well as those measured over tropical soils in unperturbed forests (Bakwin et al., 1990; Erickson et al., 2002; Garcia-Montiel et al., 2001; Gut et al., 2002; Keller et al., 2005; Verchot et al., 1999; Weitz et al., 1998). The measurements span different time periods and durations, seasons, soil type, etc. This list is by no means complete but shows that the modeled rates reside in the low-end of the range of observations. The shading for the modeled soil NO emission rate represents the minimum and maximum rates over the course of a model year.

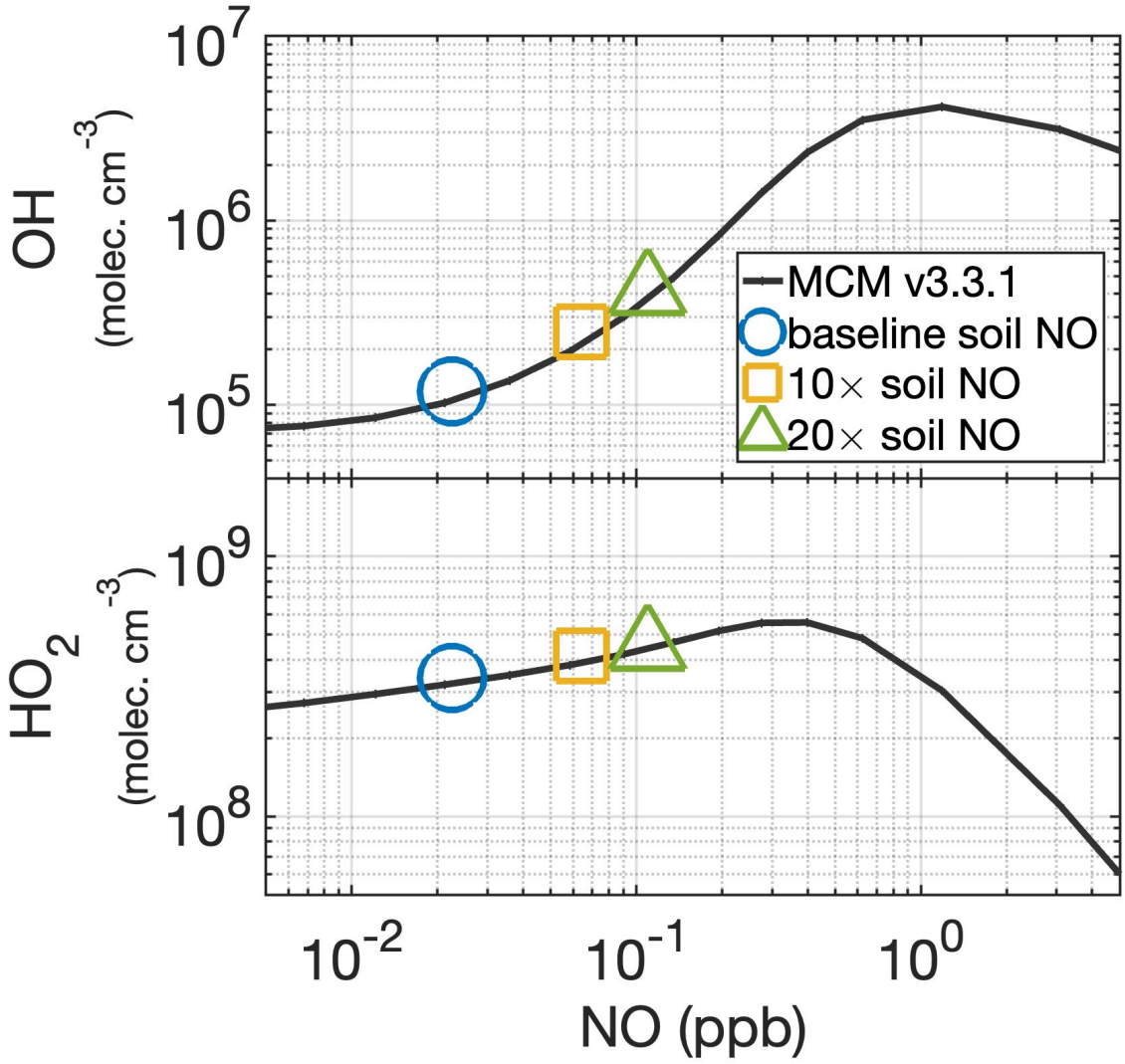

Figure S8. That there is agreement in the modeled concentrations of (a) OH and (b) HO_2 between the Master Chemical Mechanisms and CESM2-CAM-Chem, indicates consistency in the chemical mechanisms included in the two models. The reason for the over-estimation of isoprene mixing ratio by CESM-CAM (Figure 3c) remains yet unresolved.

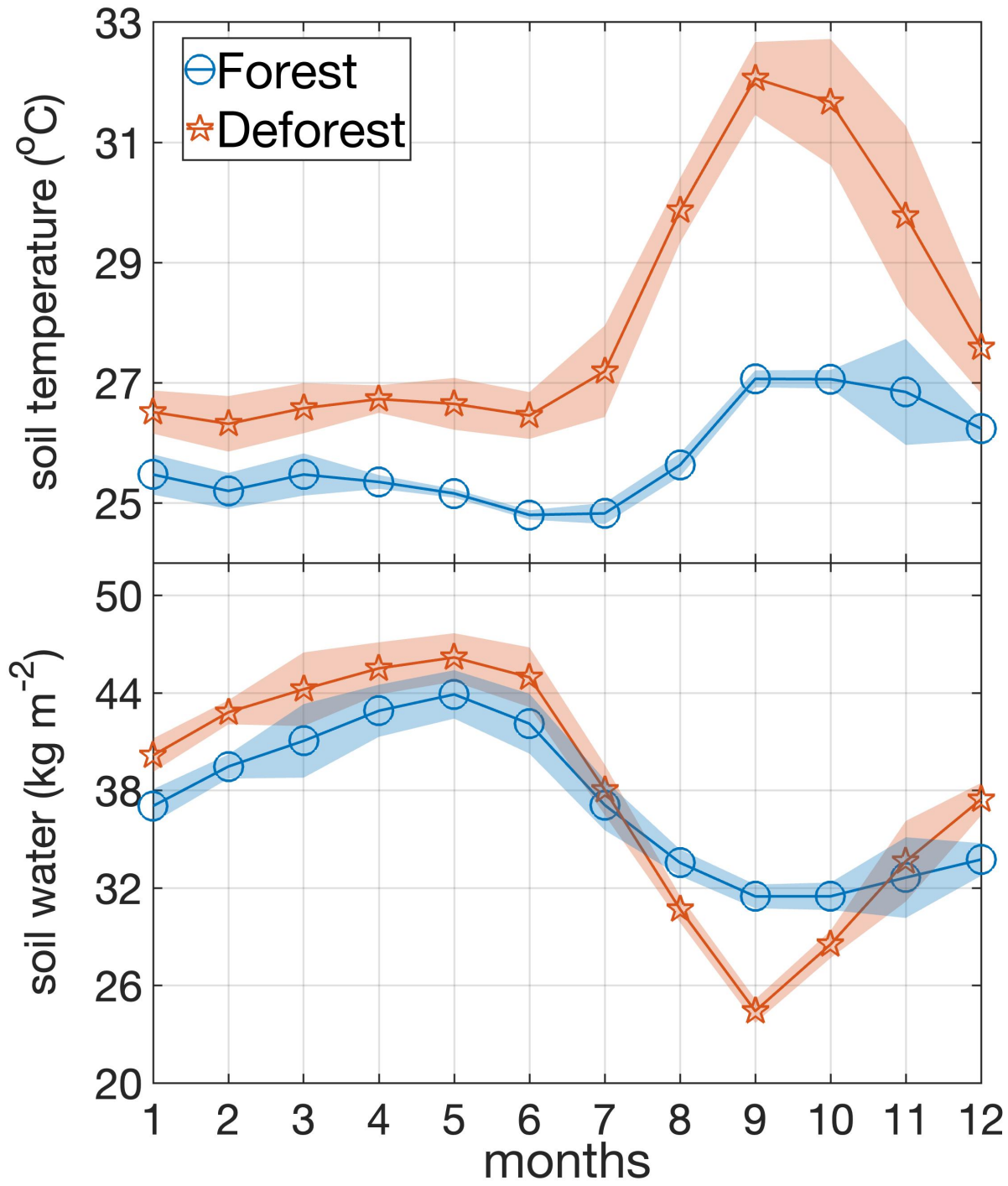

Figure S9. Modeled monthly (top) soil temperature and (bottom) soil moisture for the forested and deforested scenarios. As a result of deforestation, the top 10 cm of the soil is warmer throughout the year. Moisture level of the top 10 cm is more variable (drier in the dry season, and wetter in the wet season).