US surface ozone trends and extremes from 1980-2014: Quantifying the roles of rising Asian emissions, domestic controls, wildfires, and climate

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Auxiliary materials of this article contain 7 figures not included in the main text. *6 December 2016*

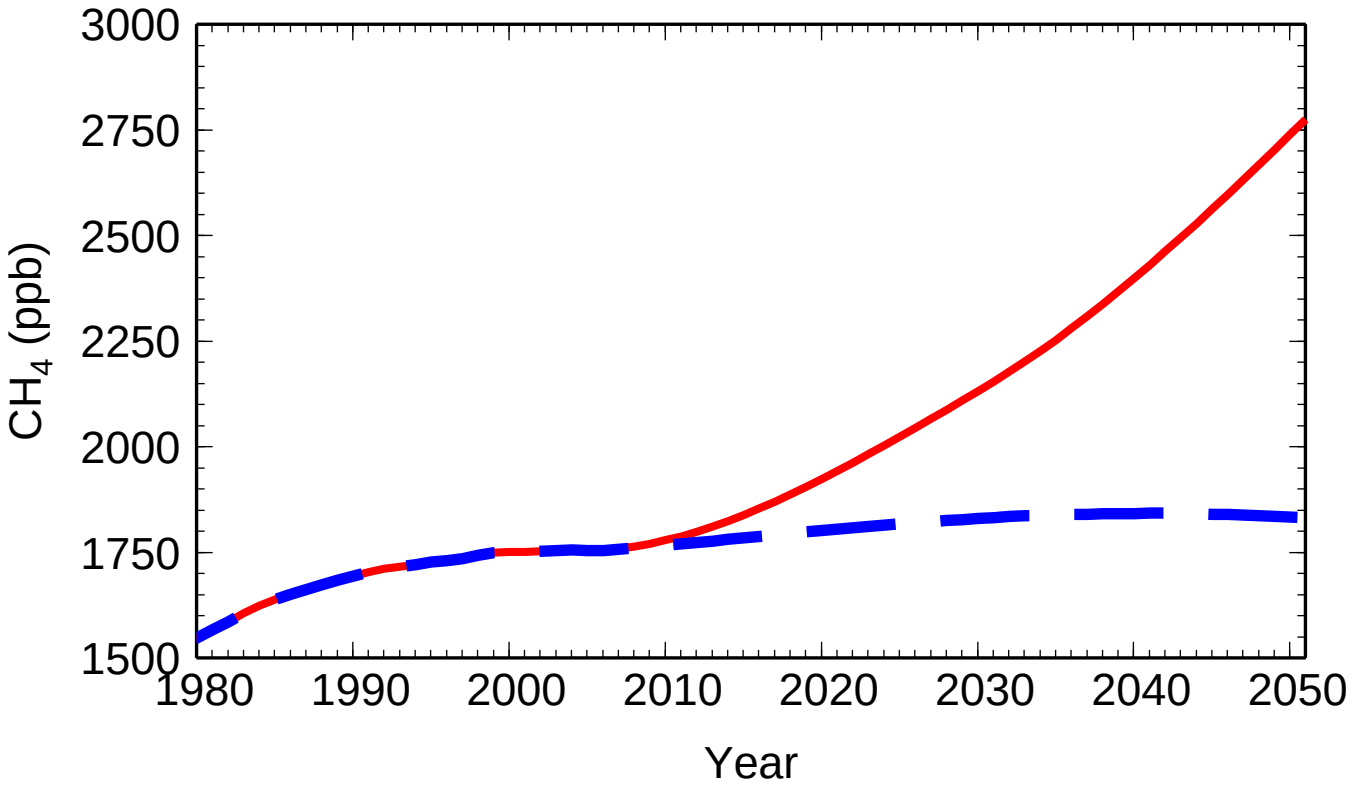

Figure S1. Historical changes in methane concentrations from 1980 to 2010 and future projections beyond 2010 in RCP8.5 (red) versus 4.5 (blue).

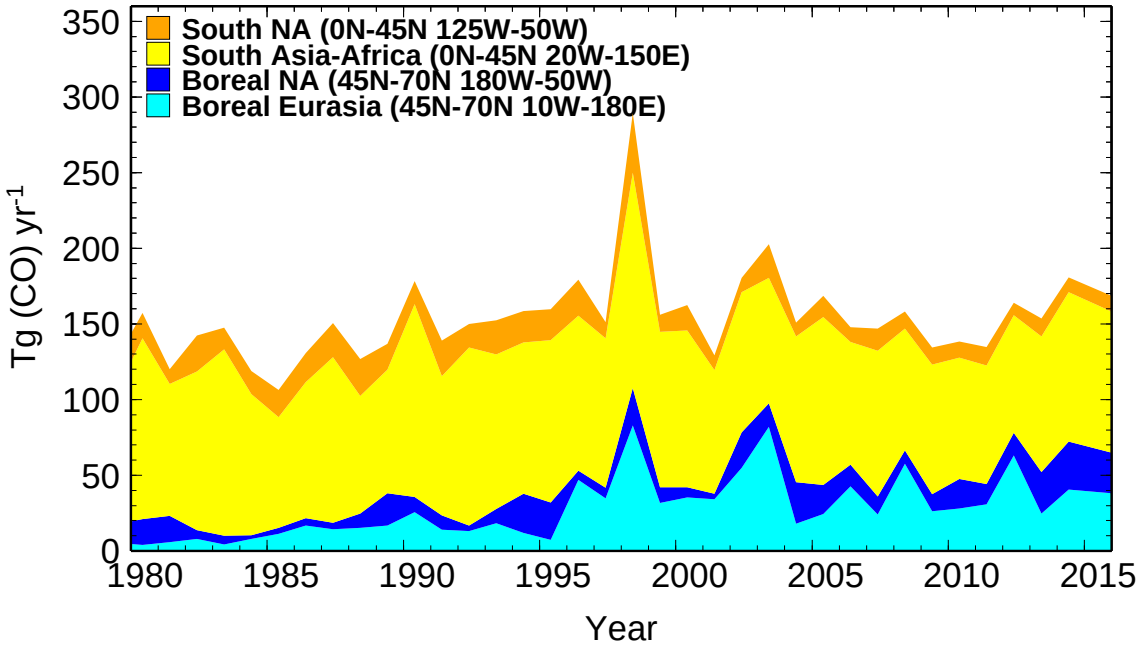

Figure S2. **Interannual variability of biomass burning emissions.** Annual CO emissions from biomass burning in boreal Eurasia (cyan), boreal North America (blue), low-latitude regions of Asia-Africa (yellow) and North America (orange).

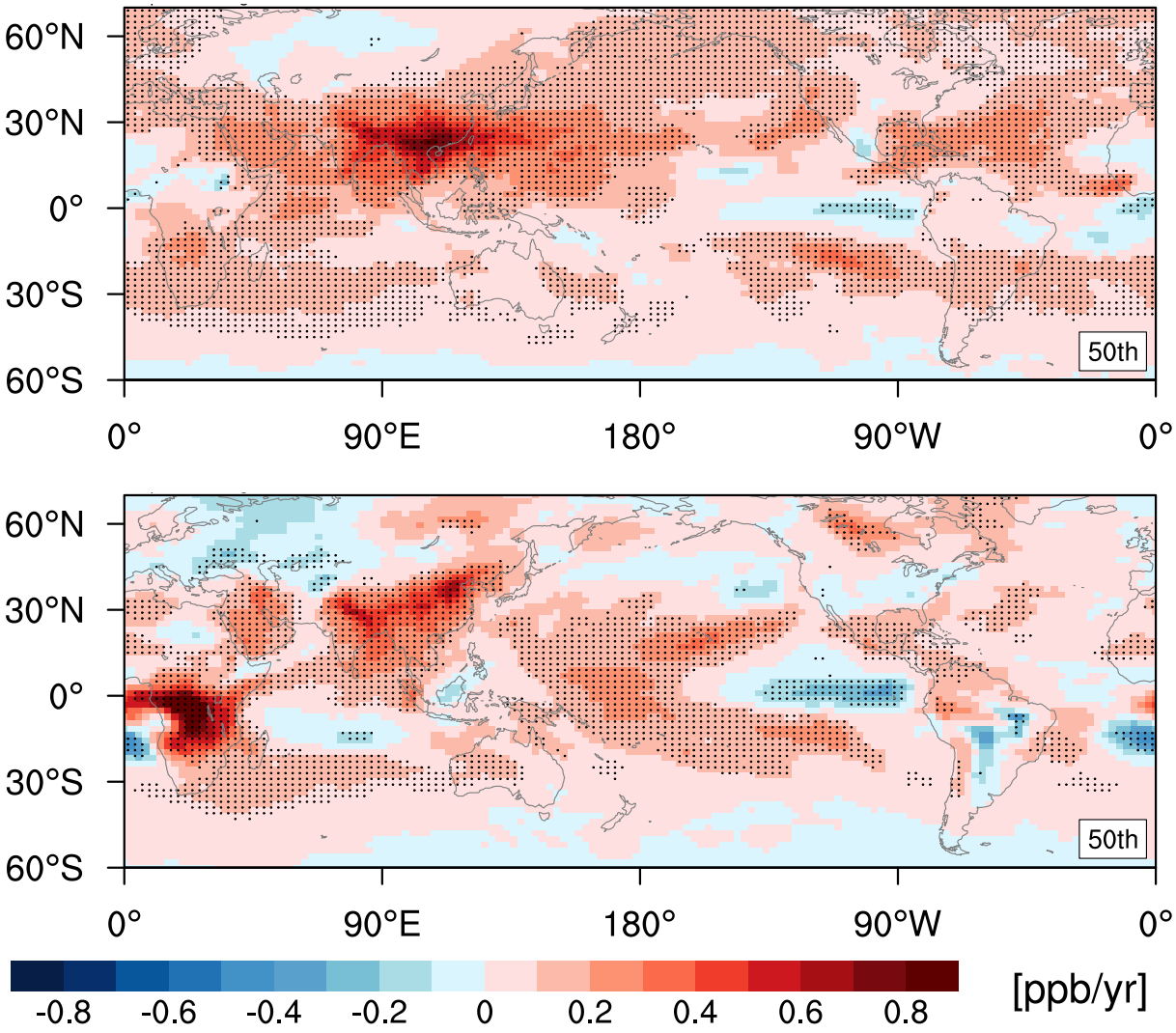

Figure S3. Global distribution of median MAM (top) and JJA (bottom) O_3 trends at 500 hPa from AM3 BASE. Stippling indicates areas where the trend is statistically significant ($p<0.05$).

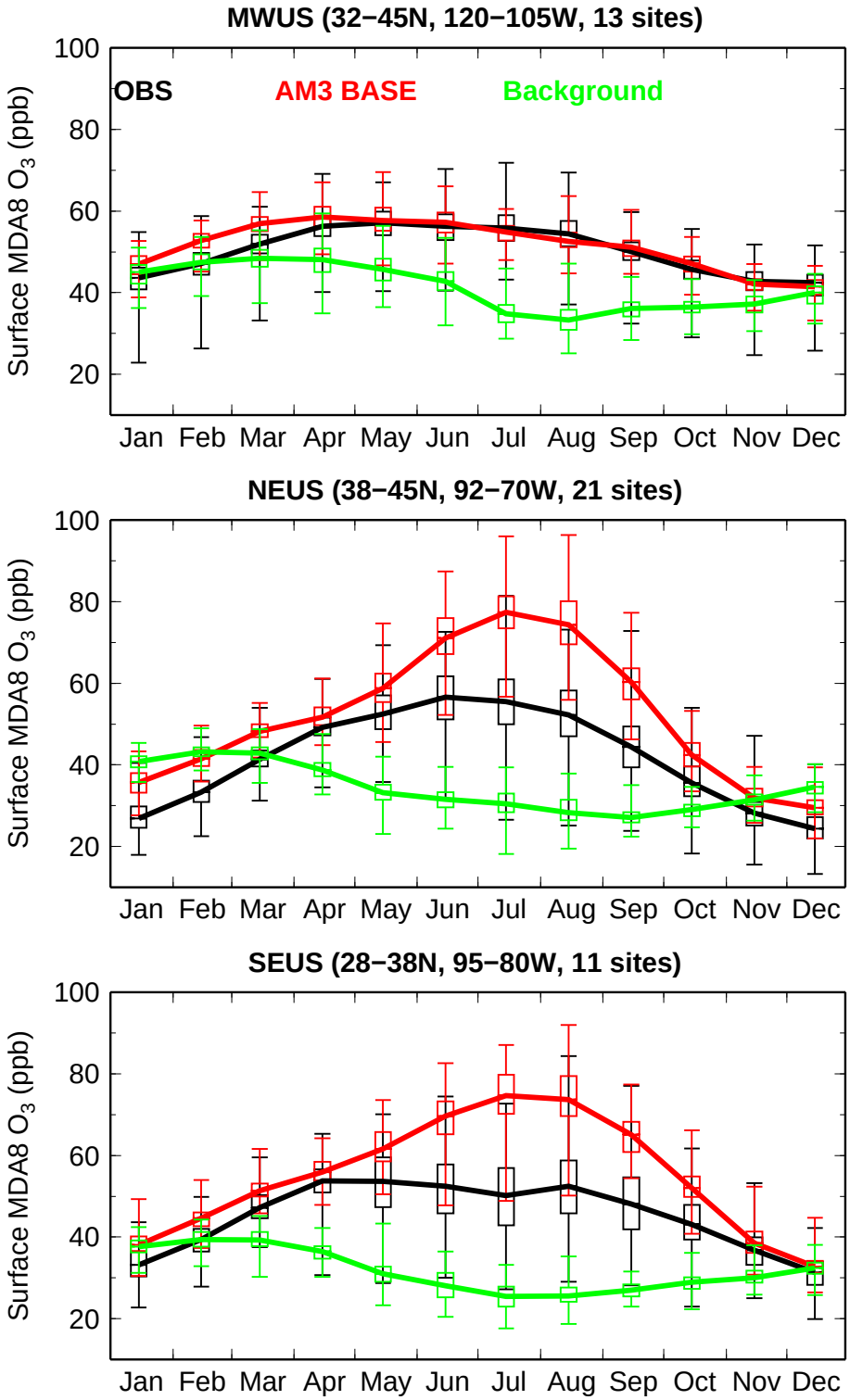

Figure S4. Monthly mean suface MDA8 O_3 concentrations for 1988-2014 as observed (black) and simulated (red) in AM3 BASE. Also shown is simulated background O_3 (green). The box-and-whisker plots represent minimum, 25th, 50th, 75th, and maximum values for all years across the sites falling within the given latitude, longitude, and altitude boundaries.

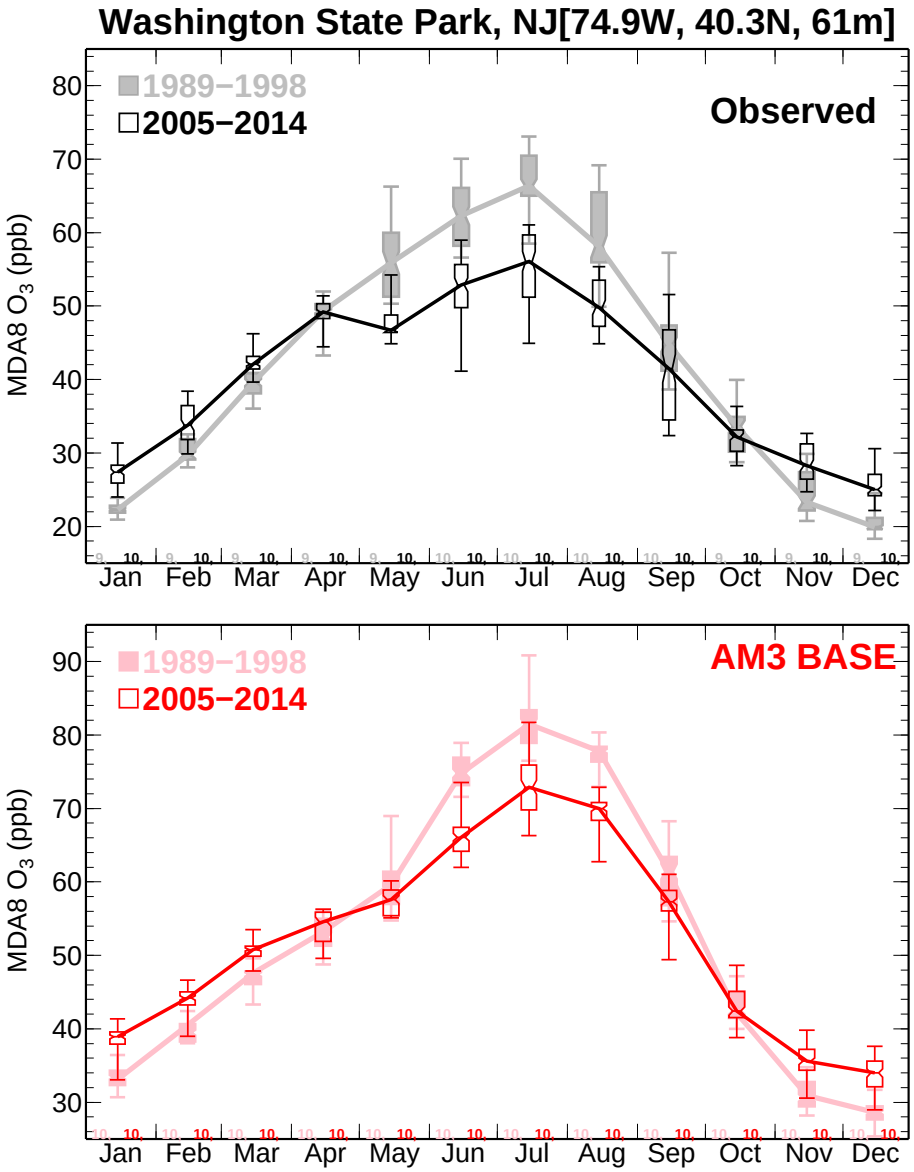

Figure S5. The changing O_3 seasonal cycle from 1989-1998 (closed boxes) to 2005-2014 (open boxes) at Washington State Park in New Jersey as observed (top) and simulated (bottom) in the GFDL-AM3 model. The box-and-whisker plots represent the minimum, 25th, 50th, 75th, and maximum moonthly values across the years.

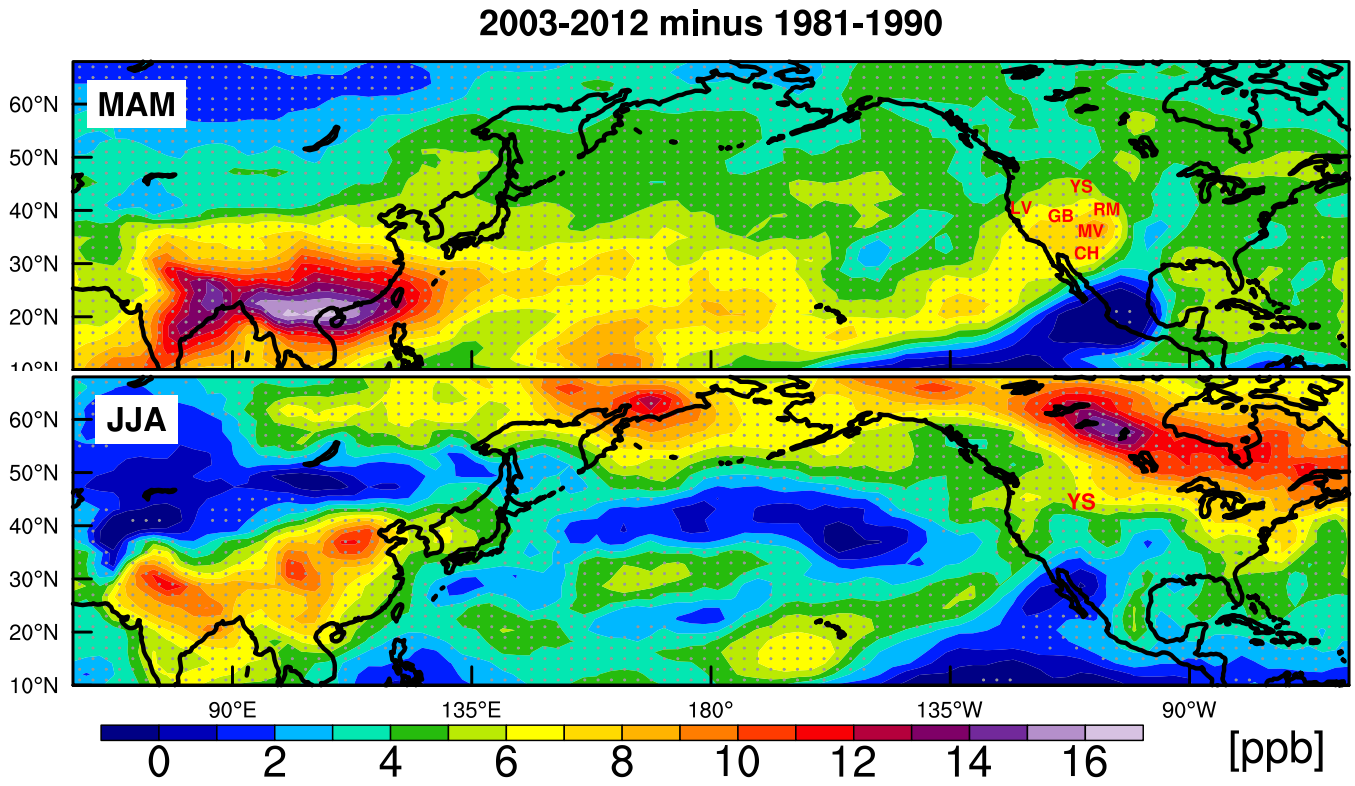

Figure S6. Maps of changes in decadal mean O_3 at 700 hPa from 1981-1990 to 2003-2012 from the Background simulation for spring versus summer. Stippling denotes areas where the change is statistically significant based on Student's *t*-test ($p<0.05$). Letters in red denote the WUS CASTNet sites where signficant ozone increases have been observed.

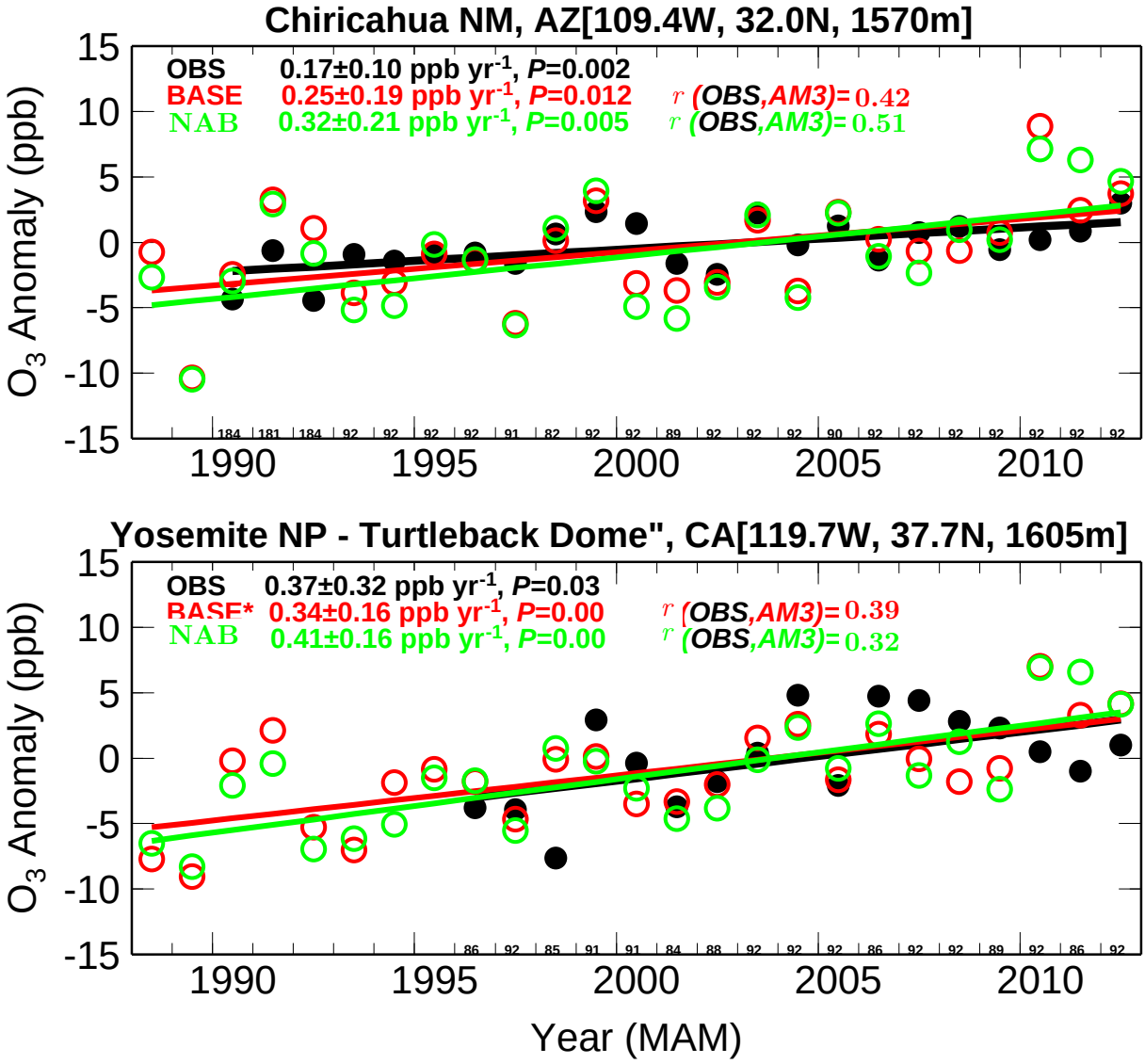

Figure S7. Same as Figure 13 in the main text, but for Yosemite and Chiricahua.