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Supplement of

Simulation of atmospheric N_2O with GEOS-Chem and its adjoint: evaluation of observational constraints

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Supplemental Information

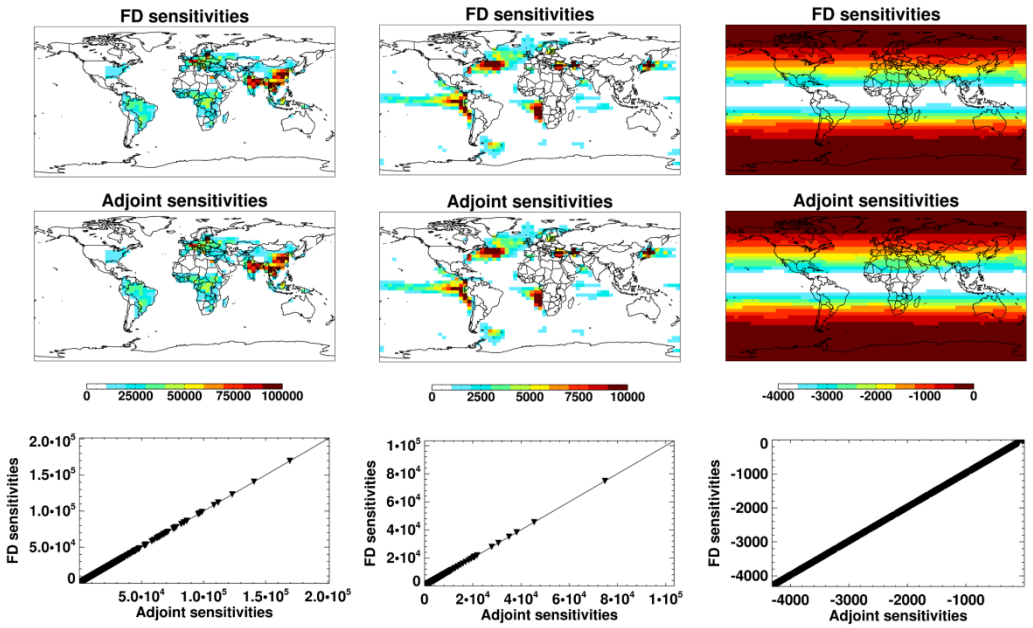

Figure S1. Verification of the N_2O adjoint code. Shown are finite difference sensitivities (FD, upper panels), adjoint sensitivities (middle panels), and comparison between the two for N_2O terrestrial emissions (left panels), ocean emissions (middle panels), and stratospheric loss frequencies (right panels) for a five-day simulation. Sensitivities for emissions were calculated at the surface level in the model; sensitivities for stratospheric loss were calculated at model level 40 (~25 km altitude).

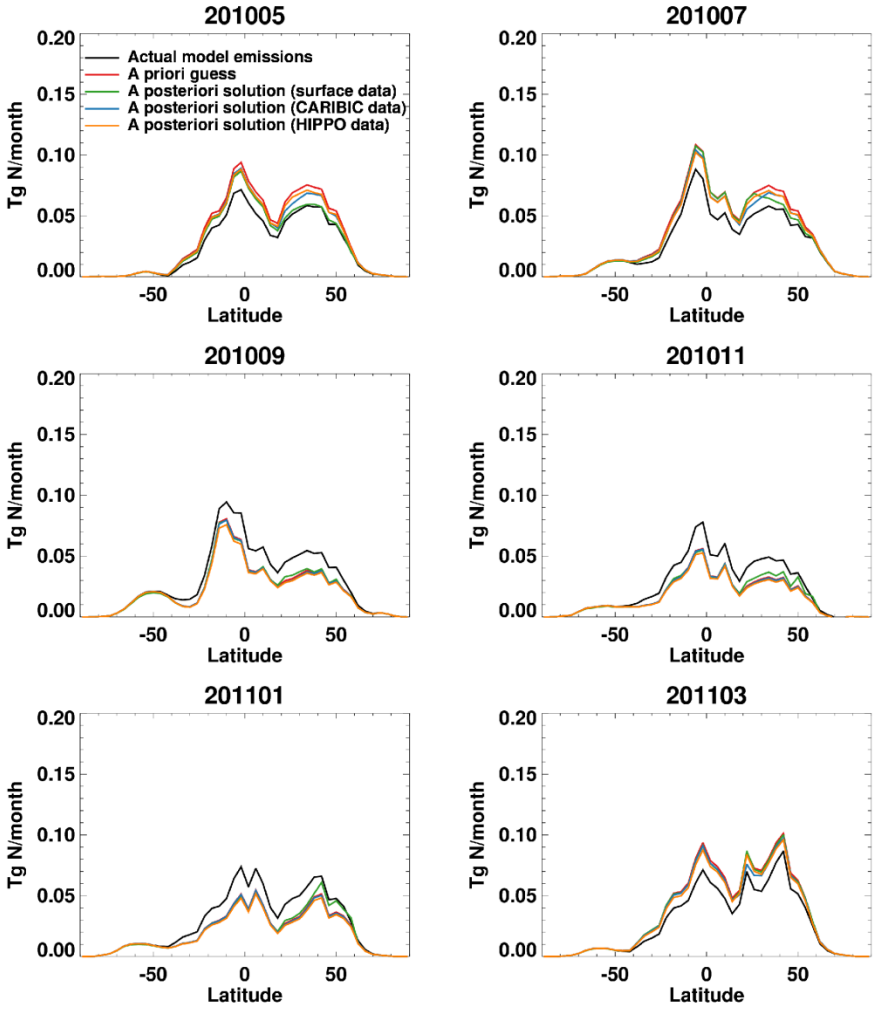

Figure S2. Resolving seasonal emission biases. Shown are zonally-integrated monthly emissions for May 2010, July 2010, September 2010, November 2010, January 2011, and March 2011 with a seasonally-dependent a priori emission bias applied. Actual model emissions are shown in black, model emissions scaled by the a priori guess are shown in red, a posteriori emissions obtained using surface data, CARIBIC data, and HIPPO data are shown in green, blue, and yellow, respectively.