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Atmos. Chem. Phys., 6, 525-537, 2006
www.atmos-chem-phys.net/6/525/2006/


# Statistical diagnostic and correction of a chemistry-transport model for the prediction of total column ozone

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Abstract. In this paper, we introduce a statistical method for examining and adjusting chemical-transport models. We illustrate the findings with total column ozone predictions, based on the University of Illinois at Urbana-Champaign 2-D (UIUC 2-D) chemical-transport model of the global atmosphere.
We propose a general diagnostic procedure for the model outputs in total ozone over the latitudes ranging from 60° South to 60° North to see if the model captures some typical patterns in the data. The method proceeds in two steps to avoid possible collinearity issues. First, we regress the measurements given by a cohesive data set from the SBUV(/2) satellite system on the model outputs with an autoregressive noise component. Second, we regress the residuals of this first regression on the solar flux, the annual cycle, the Antarctic or Arctic Oscillation, and the Quasi Biennial Oscillation. If the coefficients from this second regression are statistically significant, then they mean that the model did not simulate properly the pattern associated with these factors. Systematic anomalies of the model are identified using data from 1979 to 1995, and statistically corrected afterwards. The 1996–2003 validation sample confirms that the combined approach yields better predictions than the direct UIUC 2-D outputs.

Final Revised Paper (PDF, 1008 KB) | Discussion Paper (ACPD)

Citation: Guillas, S., Tiao, G. C., Wuebbles, D. J., and Zubrow, A.: Statistical diagnostic and correction of a chemistry-transport model for the prediction of total column ozone, Atmos. Chem. Phys., 6, 525-537, 2006. Bibtex | EndNote | Reference Manager



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