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An improved technique for deriving long-term trends in ozone

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One of the goals of the recently published Scientific Assessment of Ozone Depletion was to derive the long-term trends in both stratospheric and tropospheric ozone. This was performed, most often, from a multiple linear regression of merged satellite ozone data sets. As mentioned in that report, three factors with a potential major impact were not readily accounted for in those analyses: diurnal variability of ozone, biases between data sets, and long-term drifts between data sets. Herein we discuss an additional complication that is intricately tied to these three factors in this kind of analysis, namely the non-uniform temporal, spatial, and diurnal sampling of the different instruments used for these merged data sets. This non-uniform sampling can have a detrimental impact not only on the regression techniques used to derive long-term trends in ozone but also on other analyses performed to determine diurnal variability or the magnitude of potential biases and drifts between data sets. Additionally, we discuss a recently developed technique that not only accounts for the potential sampling issues, but also the perceived diurnal variability, as well as any potential bias and/or drift between instruments in a single analysis.