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- ▣ Title and Author Search

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Effects of urban pollution on UV spectral irradiances

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Abstract. Spectral measurements of UV irradiances at Tokyo are compared with corresponding measurements at a pristine site (Lauder New Zealand) to identify the causes of the reductions in urban UV irradiances, and to quantify their effects. Tropospheric extinctions in Tokyo were found to be up to ~40% greater than at Lauder. Most of these differences can be explained by differences in cloud and aerosols, but ozone differences are also important in the summer. Examining spectral signatures of tropospheric transmission of both sites shows that reductions due to mean NO₂ and SO₂ amounts are generally small. However, at times the amount of NO₂ can be 10 times higher than the mean amount, and on these days it can decrease the UVA irradiance up to 40%. If SO₂ shows comparable day to day variability, it would contribute to significant reductions in UVB irradiances. The results indicate that at Tokyo, interactions between the larger burden of tropospheric ozone and aerosols also have a significant effect. These results have important implications for our ability to accurately retrieve surface UV irradiances at polluted sites from satellites that use backscattered UV. Supplementary data characterising these boundary layer effects are probably needed.

▣ [Final Revised Paper](#) (PDF, 7409 KB) ▣ [Discussion Paper](#) (ACPD)

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