



## **OMI tropospheric NO<sub>2</sub> profiles from cloud slicing: constraints on surface emissions, convective transport and lightning NO<sub>x</sub>**

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We derive a global climatology of tropospheric NO<sub>2</sub> profiles from OMI cloudy observations for the year 2006 using the cloud slicing method on six pressure levels centered about 280, 380, 500, 620, 720 and 820 hPa. The vertical information contained in OMI tropospheric NO<sub>2</sub> profiles provides global observational constraints that can be used to evaluate chemistry transport models (CTMs) and guide the development of their parameterization schemes. A comparison between OMI and the TM4 model reveals anomalies at the lowest levels that can be related to deficiencies in the model surface emission inventory, anomalies at mid tropospheric levels that can be related to convective transport and horizontal advective diffusion, and anomalies at the upper tropospheric levels that can be related to lightning NO<sub>x</sub> production and the placement of deeply transported NO<sub>2</sub> plumes such as from the Asian summer monsoon.