NITROGEN OXIDES IN THE LOWER FREE TROPOSPHERE OF THE CENTRAL NORTH ATLANTIC: MEASUREMENTS AT THE PICO-NARE SITE FROM SUMMER TO EARLY WINTER

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The seasonal variation of nitrogen oxides levels in remote regions is inadequately constrained, due to a sparsity of direct measurements. Global chemical transport model simulations have been used to characterize the full spatial and temporal distribution of tropospheric nitrogen oxides, in order to calculate the resulting impact of nitrogen oxides emissions on rates of in-situ ozone production. However, significant discrepancies among models still remain. To address the need to better understand the evolution and impacts of nitrogen oxides export to the central North Atlantic lower troposphere on a seasonal basis, an automated system for measurement of NO, NO$_2$ and NO$_y$ (total reactive nitrogen oxides) was installed at the existing PICO-NARE research station (http://www.cee.mtu.edu/~reh/pico) at the top of Pico mountain (2250 meters above sea level) in the Azores Islands during summer 2002. NO, NO$_2$ and NO$_y$ are determined using chemiluminescence detection of NO, photolytic dissociation of NO$_2$ to NO, and Au-catalyzed reduction by CO of NO$_y$ compounds to NO. Measurements will be made practically continuously during approximately two years. Here, we present measurements of NO$_x$ and NO$_y$ during the startup period of late August to mid-December 2002. These first measurements present a limited number of observations during summer, fall, and early winter seasons, and include periods of apparently clean background air as well as periods of elevated nitrogen oxides levels. These periods will be analyzed in combination with simultaneous observations of
CO, O$_3$, aerosol black carbon, and meteorological parameters (currently being made at the station) and analysis of back-trajectories. Additionally, a characterization and description of the automated NO$_x$ system will be also presented.