

NO_x Time Series and NO_y Speciation in the Tropical Marine Boundary Layer at the Cape Verde Atmospheric Observatory

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Oxides of nitrogen (NO + NO₂ = NO_x) have been measured in the subtropical marine boundary layer at the Cape Verde Atmospheric Observatory (16° 51' N, 24° 52' W) in the east Atlantic Ocean. Presented in Figure 1 is a time series of NO and NO₂ during Oct 2006 - Dec 2014, exhibiting seasonal cycles with winter maxima and summer minima. Seasonality is most noticeable in recent (2013 – present) data where there have been improvements in the instrument and data processing. The source of this seasonality and wide variation in NO_x is predominantly due to the seasonal cycle in tropospheric OH concentration. In addition, the observations show a deviation from the expected photostationary steady state NO:NO₂ ratio, with NO₂ higher than predicted. We suggest this may be as a result of the rapid decomposition of NO_y species in this photochemically active region. To validate this hypothesis a novel four channel thermal dissociation inlet coupled to the existing photolytic/chemiluminescence analyser has been installed since January 2015. This inlet is capable of quantifying peroxy nitrates, alkyl nitrates, nitric acid and total atmospheric reactive nitrogen by thermal or catalytic conversion of the individual class of species into NO_x. The preliminary results of this will be presented in the context of the NO_x time series and well as discussion of the measurement uncertainties.

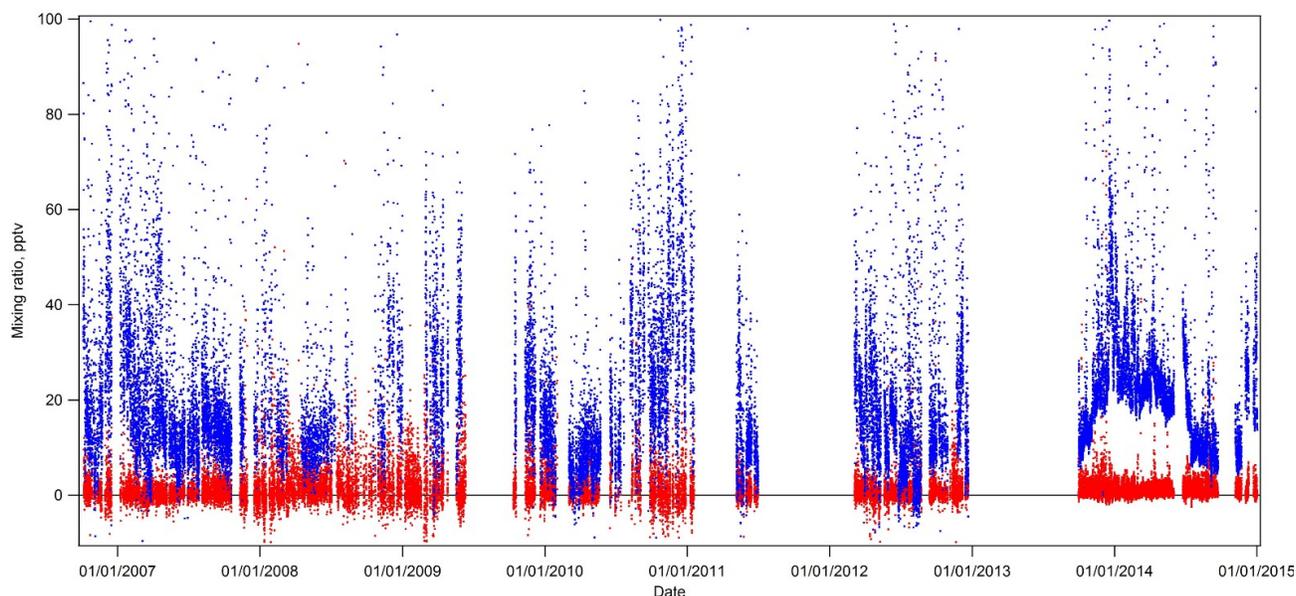


Figure 1. NO and NO₂ time series recorded at the Cape Verde Atmospheric Observatory, 2006 - 2014.