

A Ten-Year (2006-2016) Record of Non-methane Hydrocarbons (NMHCs) in the Subtropical Marine Boundary Layer at the Cape Verde Atmospheric Observatory

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Continuous and *in situ* hourly measurements of more than fifteen Volatile Organic Compounds (VOCs) have been made in the subtropical marine boundary layer at the Cape Verde Atmospheric Observatory (16° 51' N, 24° 52' W, 20m asl) in the east Atlantic Ocean. The observations began in October 2006 and continue today. Typical ambient mixing ratios range from as low as a few parts per trillion for reactive VOCs such as butane and toluene to a few parts per billion for the longest-lived species ethane. Light alkanes have showed well-defined seasonal cycles with winter maximum and summer minimum, consistent with the seasonal variation of the hydroxyl (OH) radical (Fig.1). Upwards trends in ethane and propane have been observed in recent years, consistent with other background locations in the Northern Hemisphere. Detection limits for the Gas Chromatography – Flame Ionisation Detection (GC-FID) system are below 5 ppt for most VOCs except for ethane and propane (around 7 ppt). In addition to using a certified multicomponent laboratory standard, real air monthly target gas measurements are also used to support quality assurance. Measurement uncertainties are below 10% for ethane and propane. The instrument is unusual in that it includes measurements of a small number of oxygenated compounds, although the calibration of these remains a challenge. Relative response factors for acetaldehyde, acetone and methanol have been estimated using two different methods; i) Teflon permeation tube calibration sources and ii) a National Physical Lab (NPL) 5 ppm gas standard in nitrogen. A good agreement has been seen between these two calibration approaches for acetaldehyde and acetone, but not for methanol. A lack of calibration consistency still limits the reporting of some OVOCs to GAW from this station. In addition to performing routine data and instrument checks, a set of additional post-analysis QA tools are now applied to all VOC data before submission to data repositories.

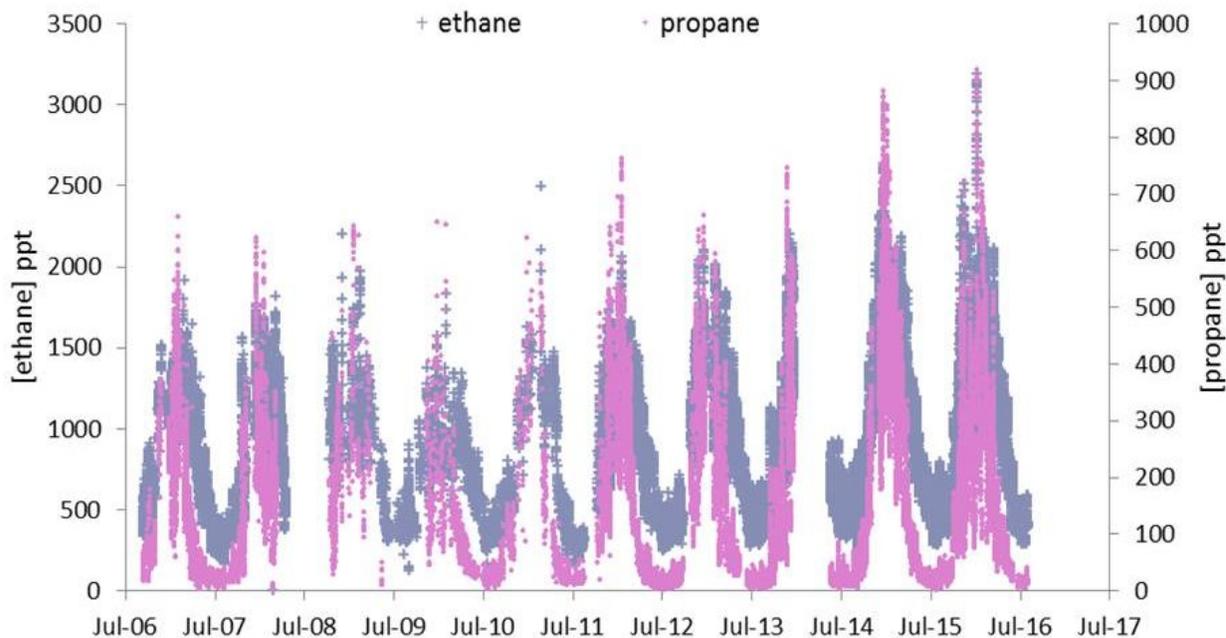


Figure 1. Ethane and propane time series