

Long-Term Monitoring of Volatile Organic Compounds (VOCs) in the Free Troposphere Above the UK

S. Punjabi¹, J.R. Hopkins² and A.C. Lewis²

¹Department of Chemistry, University of York, York YO10 5DD, United Kingdom; +4401904 43 4472, E-mail: sp575@york.ac.uk

²National Centre for Atmospheric Science, University of York, York YO105DD, United Kingdom

Preliminary results are presented from a long-term study of C₂-C₈ VOCs in the free troposphere above the UK. The study is conducted during UK flights aboard the FAAM BAe146 aircraft over the period Jan 2009 - Jan 2011. Samples are collected using the Whole Air Sampling system and subsequently analysed using a dual channel gas chromatograph with flame ionization detector. A seasonal cycle is exhibited by the majority of measured VOCs with concentration maxima in winter and minima in summer. Comparison with the Penkett et al. study (58°N) reveals a significant decrease (up to 45%) in acetylene, benzene, toluene, butane and pentane over the entire seasonal cycle. Ethane and propane, however, reveal relatively little change in winter maxima concentrations compared with the Penkett et al. study, but a large decrease in summer minima values (up to 50%). This is reflected by the increase in amplitude of the ethane seasonal cycle. The delay in the winter maxima in the Arctic cycle (using data from Laurila and Hakola (1996)) is observed due to the almost negligible photochemical activity during the extended winter of the polar region.

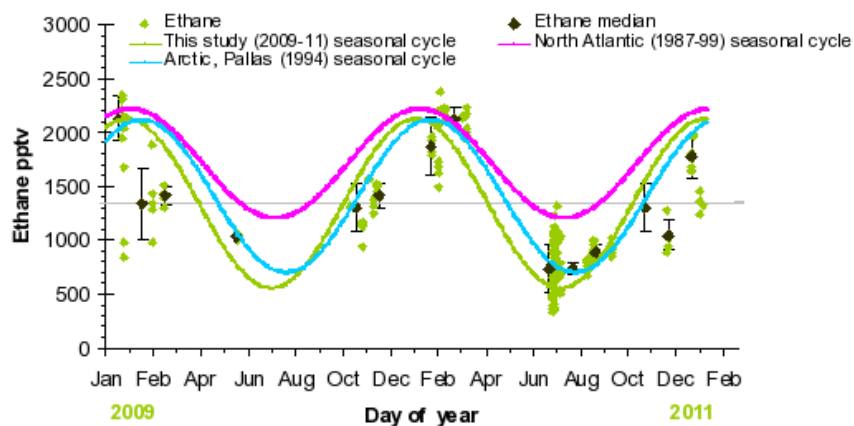


Figure 1. UK free troposphere data compared with North Atlantic (Penkett et al study (1993)), and Arctic site Pallas, Finland (Laurila and Hakola study (1994)) for ethane.

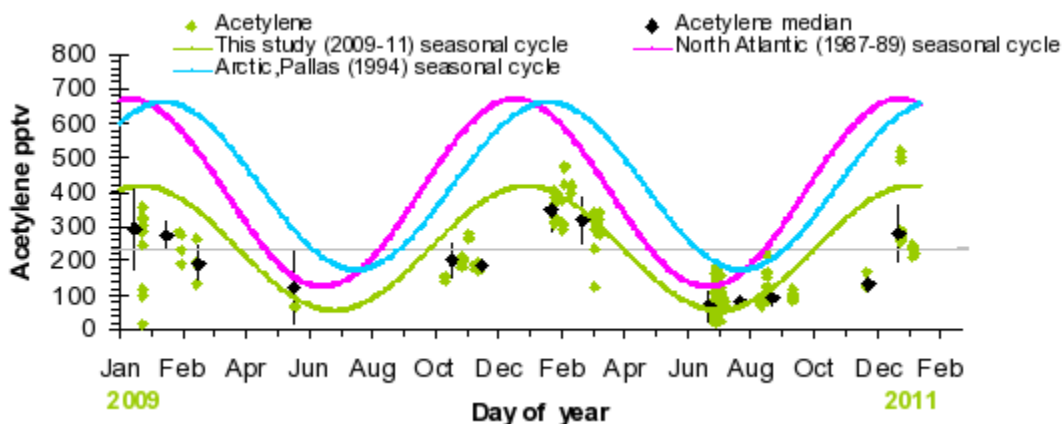


Figure 2. UK free troposphere data compared with North Atlantic (Penkett et al study (1993)), and Arctic site Pallas, Finland (Laurila and Hakola study (1994)) for acetylene.