

Non-Methane Hydrocarbon Measurements for Long Range Transport Studies at Pico Mountain, Azores, Portugal

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The Pico-NARE International Chemical Observatory is located at an elevation of 2225 m on the summit caldera of an inactive volcano on the Island of Pico, Azores, Portugal. During spring 2004 an automated gas chromatography (GC) system was installed at the station for continuous measurements of long-lived C2-C7 hydrocarbons (NMHC). The GC instrument is tailored towards the measurement challenges at this remote and high-altitude site. All GC consumable gases are prepared in situ. Total power use remains below 700 Watts at all times. Sample collection and analysis is performed without use of cryogen. Hydrocarbons are focused on a multi-stage solid adsorbent trap and analyzed after thermal desorption on an Alumina-PLOT column. GC operation can be controlled remotely from our Boulder laboratory. Data are downloaded daily. For analysis of C2-C3 and C4-C7 hydrocarbons, 600-ml and 3000-ml samples are alternated, respectively. Detection limits are ~5-10 ppt, sufficient for quantification of ~5 NMHCs at their northern hemisphere tropospheric background concentrations. See Figure 1 for an example chromatogram of a 600-ml air sample collected at the Pico observatory. Quantitative measurements began in July 2004 during the Intercontinental Transport and Chemical Transformation (ITCT2K4) campaign. This instrument has become more and more reliable and has now been running unattended and continuously for months at a time. The station remains well above the marine boundary layer at most times. Hydrocarbon concentrations frequently are representative for free tropospheric air, but do increase during transport events when pollution or wildfire outflow from North America is encountered.

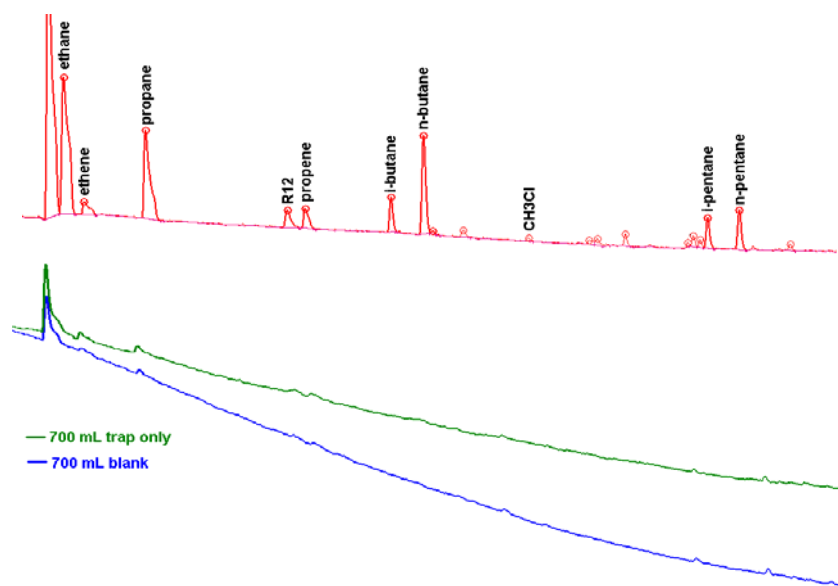


Figure 1. Chromatogram of a 600 ml air sample collected at the Pico observatory (top) in comparison with a system blank and a zero air blank sample (bottom) analyzed under the same conditions. The major identified and quantified compounds in the sample chromatogram are ethane, ethene, propane, propene, iso-butane, n-butane, iso-pentane, and n-pentane.