Free Tropospheric Aerosol Measurements at the Pico Mountain Observatory, Azores (2225m asl)

Claudio Mazzoleni1 (cmazzoleni@mtu.edu), Lynn Mazzoleni1, Paulo Fialho2, Sumit Kumar1, Katja Dzepina1, Michael Dziobak1, Louisa Kramer1, Seth Olsen3, Robert Owen4, Detlev Helmig5, Jacques Hueber5, Swarup China1

1Atmospheric Science Program, Michigan Technological University, 2Azores University, 3University of Illinois, 4Michigan Tech Research Institute, 5University of Colorado, *Currently at the U.S. E.P.A.

Key Points: In this poster we discuss a limited subset of the aerosol measurements performed at the Pico Mountain Observatory. The Black Carbon (BC) mass shows a clear seasonal pattern over a ten-years period. The 2012 scattering measurements show highly variable signals with events with high scattering and periods of very low aerosol loading. Dust events are clearly captured by the aethalometer, as well the nephelometer Ångström exponents. Particles have various shapes, and mixing states, and soot particles typically are very compacted.

The Pico Mountain Observatory

The Pico Mountain Observatory is located on Pico Island in the Azores, Portugal (38.47°N, 28.40°W). The station is far from persistent local sources on the summit caldera at an altitude of 2225 m and it lays typically above the boundary layer during summertime. Air masses reaching the station are often transported from North America and seldom from Europe or North Africa. The station was installed in 2001. 

http://instaar.colorado.edu/groups/pico/

Decadal Black Carbon Dataset

An aethalometer measures light attenuation through a quartz filter at 7 wavelengths. The measured attenuation is calibrated to an equivalent mass of black carbon with an assumed 1/dependence. Data were collected since 2001 over different periods of the year. In 2004 the instrument was operated for most of the year.

BC/Dust Event 2012

Line in the middle of the boxes represent sample median, dots represent mean, lower and upper lines of the boxes are the 25th and 75th percentiles, whiskers indicate the 10th and 90th percentiles

2012 Nephelometer Data

Electron Microscopy

SEM Images of bare soot and irregular particles (a) Pico - 21July2012 and dust particle (b) Pico - 22 July2012

TEM Images of bare (a) Pico - 28 July2012 and compacted-coated soot (b) Pico - 29 July2012

1. Richard Honrath for his pioneering effort in establishing the site and building the collaboration network
2. Mark Wise for assisting in the installation of the particle sizer
3. The Regional Government of Azores has supported politically and financially the Pico Mountain observatory and operation through the Regional Secretariat for Science, Technology and Infrastructures (Project M1.2.1/I/006/2005); (Project M1.2.1/I/001/2008); (Project M1.2.1/I/002/2008) and also the Secretariat for the Environment and the Sea.