Properties of Aerosol in the North Atlantic Free Troposphere at the Pico Mountain Observatory, Azores

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Key Points:
- The Pico Mountain Observatory is in an ideal location to sample free tropospheric aerosol transported from North America
- BCeq monthly mean anomalies show a decreasing trend over 11 years with a slope of ~0.0015 μg/m³/year
- Estimated mean single scattering albedo \( \omega_{450nm} = 0.93(\sigma = 0.02) \) and \( \omega_{525nm} = 0.95(\sigma = 0.02) \) for the 2012 season
- Estimated mean hemispheric backscattering fraction \( b_{450nm} = 0.13(\sigma = 0.04) \) and \( b_{525nm} = 0.14(\sigma = 0.04) \) for the 2012 season
- Particle morphology changes during transport and soot is more compacted (higher roundness and convexity) compared to soot collected closer to the sources

Aerosol Morphology - Summer 2012

Pico SEM Sample, July 6
[2] Compacted soot
[3] Embedded soot
[4] Irregularly shaped particle
[5] Relatively more elongated soot
[6] Evaporated particle coating
[7] Soot mixed with dust
[8] Probably liquid organic aerosol

Morphological Classification of soot particles

Aerosol Optical Properties - 2012

BCeq mass concentrations show clear seasonal variability

Est. in 2001 by Richard Honrath (Michigan Technological University)

Sampling characteristics:
- Typically above the boundary layer during summertime

Air transported:
- Often from North America, seldom from Europe or North Africa

Particle morphology changes during transport:
- Embedded soot
- Partly coated soot
- Bare soot

Estimated mean single scattering albedo:
- \( \omega_{450nm} = 0.93(\sigma = 0.02) \)
- \( \omega_{525nm} = 0.95(\sigma = 0.02) \)

Estimated mean hemispheric backscattering fraction:
- \( b_{450nm} = 0.13(\sigma = 0.04) \)
- \( b_{525nm} = 0.14(\sigma = 0.04) \)

Meteorological parameters:
- RH, T, P, wind speed and direction (since 2001)

Additional information at: http://instaar.colorado.edu/groups/pico/

Acknowledgments
- Richard Honrath for his pioneering effort in establishing the site and building the collaboration network
- Mark Wise for assisting in the installation of the particle sizer
- 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 M1.1/4/006/2000; Project M1.1/4/001/2006; Project M1.2.1/I/001/2008) and the Secretariat for the Environment and the Sea.
- No embedded particles were found

Support:
- ASR
- ENERGY
- Office of Science
- National Science Foundation
- Office of Science
- National Science Foundation