Natural Radioactivity Measurements in Fine Aerosols

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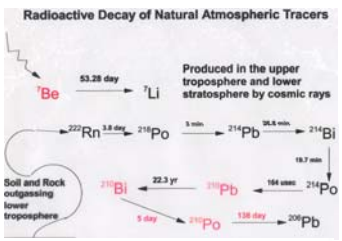
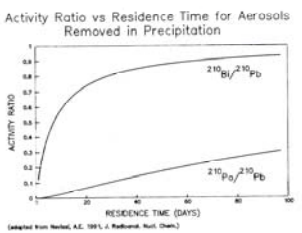
Abstract:

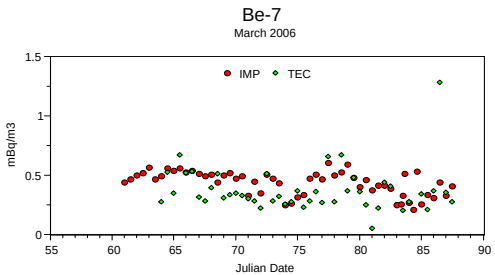
Measurements of ^{7}Be, ^{210}Pb, ^{210}Po, and ^{210}Bi were taken at 12 hour increments (day - night) at the T0 and T1 sites using impactors that allowed 0.1 to 1.0 micron size cuts using high volume sampling instrumentation. Samples were counted using gamma counting for ^{7}Be and ^{210}Pb. Portions of the samples were analyzed for ^{210}Po (138day half-life) and ^{210}Bi (5-day half-life) by dissolving the sample collected on the quartz fiber filter 8x10 inch filters in nitric acid. The dissolved material was then treated with HCL to form the metal chloride complexes and the ^{210}Po and ^{210}Bi separated from the ^{210}Pb by collecting the chloride anion complexes on to anion exchange resin impregnated filters. The samples were then counted using beta and alpha counting equipment. We also are reporting ^{13}C/^{12}C, ^{15}N/^{14}N measurements on the filters using isotope ratio mass spectrometry that will be also analyzed for organic and elemental fractions using accelerator mass spectrometry for ^{14}C. The ^{14}C determinations are being done for OC and EC and are still underway and will be reported later.

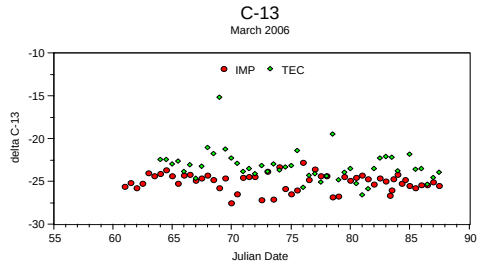
Mexico City in March 2006

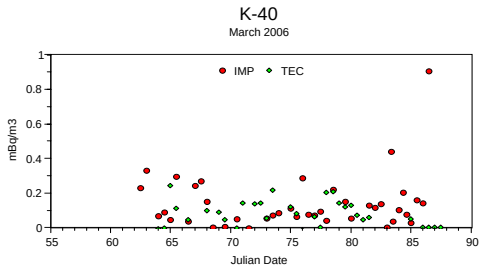
T-1 Site Unversidad Technologica de Tecamac

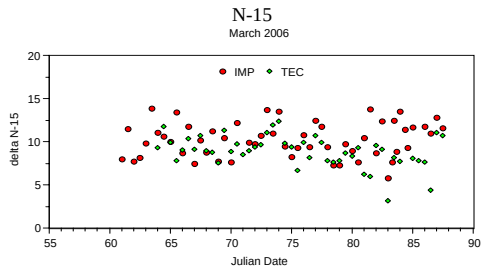


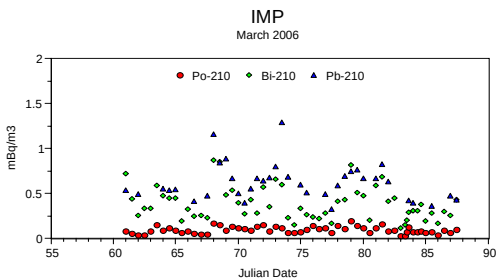


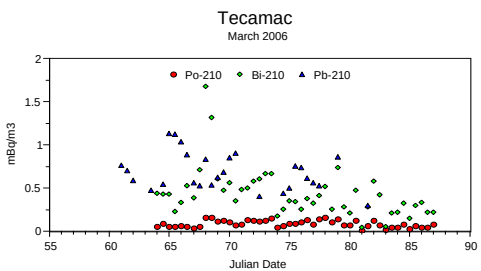


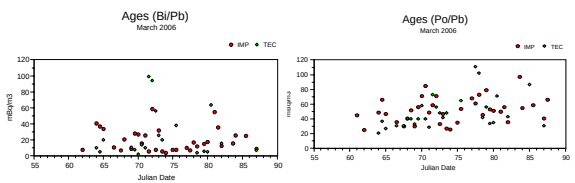


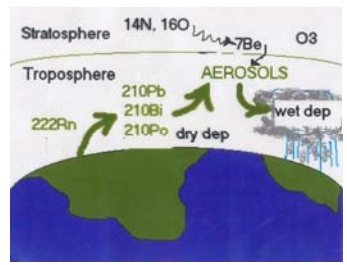












C-13 Data indicate slightly enriched C-13 levels for samples taken at the T-1 site (Tecamac, TEC). This is likely due to biomass burning of C-4 grasses that are enriched in C-13.

Be-7 data are consistent with lower levels anticipated for wintertime and also indicate little mixing from aloft during the period of the study. Samples were taken during rain events that show little if any change in Be-7 concentrations. This is consistent with Be-7 being primarily associated with aerosols that are not hygroscopic (soots and carbonaceous aerosols).

Ages for the aerosol samples indicate importance of background aerosol in the region. Most of the ages are within the 10-60 day time range. Elevated ages at TEC above 100 days are likely contaminated with windblown dust during the filter sample changing and collection. Differences in Bi and Po dates are due to large corrections for Bi due to its short half-life and time lapse from getting samples from Mexico to Argonne National Lab.

We are currently separating OC and EC fractions and will be analyzing them for C-14 at the Center for Accelerator Mass Spectroscopy (CAMS) operated by Lawrence Livermore National Laboratory in collaboration with Dr. Thomas Guilderson.

ACKNOWLEDGEMENTS

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