



BE-7 AS TRACER FOR SIZE DISTRIBUTION OF PARTICULATE AT DIFFERENT LOCATIONS AND UNDER DIFFERENT METEOROLOGICAL CONDITIONS

F. Groppi^{a*}, S. Manenti^a, A. Ioannidou^b

^a *UNIMI & INFN, L.A.S.A. Laboratory: via F.lli Cervi, 201, Segrate (MI), I-20090, Italy;*

^b *Aristotle University, Physics Department: Thessaloniki, Greece*

**Corresponding author: flavia.groppi@mi.infn.it*

Introduction

The aerosol particles in the atmosphere are liquid or solid particles, with sizes from fraction of μm to several hundreds of μm . Atmospheric aerosols may be emitted by both natural and anthropogenic sources. Airborne radionuclides that absorbed on the surface of aerosol particles form the radioactive aerosols and their behaviour is determined by the behaviour of their carrier aerosol particles. Beryllium-7 is a cosmogenic radionuclide that decays with a 53.3 day half-life: once it is formed is attached to aerosol particles, transported by winds and removed by wet and dry deposition in the troposphere. The particle composition and size distribution of radioactive aerosols and their carrier aerosol particles at a site affected by a number of factors like their source, fog and cloud droplet formation, evaporation and condensation, washout, rainout, dispersion conditions, the season of the year and the local meteorological conditions. We study the size distribution of aerosol particles at different locations during the four seasons of a year by mean the Be-7 activity. Since local meteorological conditions might affect strongly the AMAD (Activity Median Aerodynamic Diameter) of ^7Be aerosols and disappear any fluctuation due to the location, all measurements under different seasons and under different environments were carried out with a parallel measurement at a reference station, thanking to that we can use two compatible 1ACFM cascade impactors.

Description of the Work or Project

Aerosol samplings for measuring the activity concentrations of the short lived cosmogenic radionuclide ^7Be in surface air were carried out during the year 2011 in the open air at four different locations in Northern Italy and during the four seasons, in a reference station - suburban industrialised area of Segrate, Milan at the border of the Milan east beltway, (b) an urban area in downtown Milan, (c) a rural-residential area on the shore of Lake Maggiore and (d) a rural area at Monte Rosa mountain. All samples were collected at 170 cm height from the ground as an attempt to reproduce human condition of breathing, by two 1 ACFM 9-stage cascade impactor simultaneously with regulated air flow rate of $1\text{cfm}=28.3\text{ L min}^{-1}=1.70\text{m}^3\text{ h}^{-1}$). At the end of the collection procedure, the filters were measured by gamma spectrometry with low background HPGe detectors.

Conclusions

The activity size distributions of the natural radionuclide tracer ^7Be has been determined in different place for the four season of the year and under different local meteorological conditions, identifying ^7Be activity size distribution as an index of air pollutant levels. Further trace element analysis of the filter samples will allow the connection of ^7Be aerosol AMAD values and the composition of the air pollutants.

Keywords: AMAD, Be-7, natural radioactivity, aerosol, radiotracers, impactors.