

Biomass burning and polonium-210 in the atmosphere

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Results

Recent measurements showed enhanced concentrations of ^{210}Po and other radionuclides in smoke from forest fires. Concentrations showed increased $^{210}\text{Po}/^{210}\text{Pb}$ ratios in aerosols up to 12. This is one order of magnitude higher than ratios usually reported in aerosols and atmospheric depositions, which often are used to compute mean residence time of aerosols in the planetary boundary layer [1]. Po-210 was highly concentrated in inhalable small particles with aerodynamic diameter $<1\ \mu\text{m}$.

Discussion of results

Combustion of vegetation has the potential to affect $^{210}\text{Po}/^{210}\text{Pb}$ activity ratios in the atmosphere, at least in a regional scale. The use of the $^{210}\text{Po}/^{210}\text{Pb}$ radio chronometer in forest fire regions may conduce to wrong estimates of aerosol residence times. Bi-210 can be taken into account to correct for ^{210}Po input from soil re suspension but it is not suitable for correcting ^{210}Po emissions from high temperature sources. Besides radioactive decay of atmospheric radon as a source of atmospheric ^{210}Po , forest fires and combustion of biomass for power production might be additional sources of polonium to atmosphere, together with coal burning and volcanic emissions. This ^{210}Po additional source in plant biomass combustion originates enhanced lung exposure to radiation doses and may impact on public health, particularly in regions with frequent forest fires [2].

[1] Carvalho et al. (2014) *Science of the Total Environment* **472**, 421–424. [2] Carvalho et al. (2015). IAEA, TRS The Environmental Behaviour of Polonium (in press).