

# Was the $^{137}\text{Cs}$ found in Saharan dust deposited across Europe in March 2022 caused by French nuclear tests in Algeria?

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Europe is frequently affected by outbreaks of Saharan dust, which raises questions about the associated radioactivity because this dust may come from areas of North Africa where France carried out nuclear weapons tests in the 1960s (Figure 1). In March 2022, after a spectacular Saharan dust outbreak in Europe, a citizen's participatory science campaign was launched through the use of social media. 110 samples were collected from six Western European countries, 53 of which were considered to be scientifically representative based on samples' chemical and size distribution analyses. By combining mineralogical and geochemical fingerprint analyses with that of backward trajectory and satellite products, we were able to show that the origin of this dust outbreak observed in Europe was mainly located in southern Algeria, where four French atmospheric nuclear tests were conducted in the 1960s. Although radioactive contamination was detected in all samples, their radioactivity never exceeded levels permitted in food in the European Union (several hundreds of Bq/kg depending on food) and corresponded to negligible radiation dose rates. Moreover,  $^{240}\text{Pu}/^{239}\text{Pu}$  atomic ratios in the collected dust remained within the range of signatures attributed to the global fallout and they were significantly different from the signature expected from fallout associated with French nuclear weapon tests (Figure 2). Accordingly, we concluded that the artificial radionuclides in the dust collected in the current research originated from the global fallout, which is largely dominated by nuclear weapon tests conducted by the USA and former USSR. This study also suggests that major dust supplies to Western Europe, even if impressive and recurrent, do not present any risk for public health in terms of radioactivity exposition.

Figure 1 Dust Column Mass Density, time average

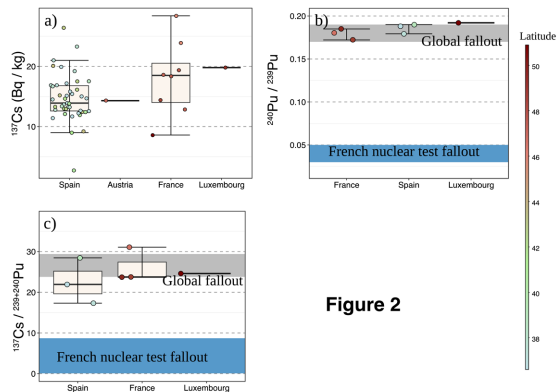
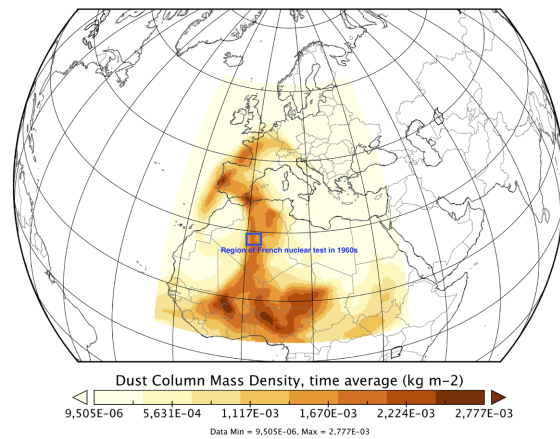


Figure 2