Geophysical Research Abstracts
Vol. 14, EGU2012-5979, 2012
EGU General Assembly 2012

Pathway of the Fukushima radioactive plume for reaching the Iberian Peninsula

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Activity concentrations of several man-made radionuclides (such as 131I, 132I, 132Te, 134Cs and 137Cs) were detected along the Iberian Peninsula from March 28th to April 7th 2011, including the sampling stations, "El Carmen", located at the Campus of the University of Huelva (37.28° N, 6.91° W) (Southwest Spain). The highest activity concentrations of fission products were obtained on 28th March. After this date, the activity concentrations decreased and remained approximately constant during the following days until reaching values below detection limits.

The study of the air masses by the computation of backward trajectories using the HYSPLIT model allowed to demonstrate that these radionuclide activity concentrations were derived of the atmospheric radionuclide releases from the accident produced in the nuclear power plant of Fukushima (Japan), occurred on March 11th, 2011, after an earthquake happened in the Pacific Ocean (9 degrees on the Richter Scale).

Hourly Kinematic 3D-backward trajectories with a duration of eight days and at three different heights were calculated at 500 m, 1000 m and 1500 m over Huelva city (37.28° N, 6.91° W) from 26th March to 6th April, and at Washington DC (38.89° N, 77.02° W) from 18th to 29th March to check the connection between the air flows from the Pacific Ocean, east coast of North America, where activity concentrations were previously measured by E.P.A, and Iberian Peninsula.

By connecting the results obtained, a wind corridor from the Bering Sea to the Iberian Peninsula was observed in 27th–29th March, coinciding with the maximum of concentrations measured in the south-western Iberian Peninsula. After these days, the progressive change in the dynamics of air masses over the east coast of North America tended to break this wind channelling, despite the continuous arrival of westerly flow over the southwest of the Iberian Peninsula. This change happened in the same dates that a progressive decreasing in the radionuclides concentrations was observed.

This pathway was also verified by the activity concentrations measured of those radionuclides reported in places crossed by this radioactive cloud. In fact, activity concentrations reported by E.P.A., and by IAEA, in several places of Japan, Pacific Ocean and United States of America were according to the expected ones from the air mass trajectory arriving at southwestern Iberian Peninsula.