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# Analysing the Mesoscale Variations of 7Be and 210Pb Concentrations in a Complex Orography, Guadalquivir Valley, Southern Spain

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**Abstract :** The evolution of 7Be and 210Pb activity concentrations in surface air along the Guadalquivir valley (southern Iberian Peninsula) is presented in this study. Samples collected for 48 h, every fifteen days, from September 2012 to November 2013 at two sampling sites (Huelva city in the mouth and Cordoba city in the middle (located 250 km far away)), are used to 1) analysing the spatial variability and 2) understanding the influence of wind conditions on 7Be and 210Pb. Similar average concentrations were registered along the valley. The mean 7Be activity concentration was 4.46 ± 0.21 mBq/m3 at Huelva and 4.33 ± 0.20 mBq/m3 at Cordoba, although registering higher maximum and minimum values at Cordoba (9.44 mBq/m3 and 1.80 mBq/m3) than at Huelva (7.95 mBq/m3 and 1.04 mBq/m3). No significant differences were observed in the 210Pb mean activity concentrations between Cordoba (0.40 ± 0.04 mBq/m3) and Huelva (0.35 ± 0.04 mBq/m3), although the maximum (1.10 mBq/m3 and 0.87 mBq/m3) and minimum (0.02 mBq/m3 and 0.04 mBq/m3) values were recorded in Cordoba. Although similar average concentrations were obtained in both sites, the temporal evolution of both natural radionuclides presents differences between them. The meteorological analysis of two sampling periods, in which large differences on 7Be and 210Pb concentrations are observed, indicates the different impact of surface and upper wind dynamics. The analysis reveals the different impact of the two sea-land breeze patterns usually observed along the valley (pure and non-pure) and the corresponding air masses at higher layers associated with each one. The pure, with short development (around 30 km inland) and increasing accumulation process, favours high concentrations of both radionuclides in Huelva (coastal site), while the non-pure, with winds sweeping the valley until arrive to Cordoba (250 km far away), causes high activity values at this site. These results reveal the impact of mesoscale conditions on these two natural radionuclides, and the importance of these circulations on its spatial and temporal variability.

**Keywords :** 7Be, 210Pb, air masses, mesoscale process
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