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# Quantifying the impact of soil erosion on soil security by using alternative fallout radionuclides

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Soil erosion by water is a severe problem throughout the world that threatens soil security and the health of water bodies. This problem is aggravated by global climate change, leading to more intense rainfall and drought events. Moreover, soil erosion also intensifies the impacts of drought by reducing the soils' capacity to hold water and maintain sustainable crop yields. This project aims to evaluate the current status and future evolution of soil security in the Guadalquivir basin. For this purpose, we use a combination of predictive modelling and estimations of long-term soil erosion-deposition rates based on field observations and measurements of fallout radionuclide (FRN) tracers in representative catchments. We test and apply a novel method for analyzing $^{239+240}$Pu isotopes, that offers a much cheaper way of analysis and hence a potential new standard to estimate long-term soil erosion-deposition rates. Spatially distributed estimations of long-term soil erosion-deposition rates are used to calibrate and evaluate the soil erosion models RUSLE and MMF-TWI which will then be used to assess present and future soil resource status in the catchments of study. Here, we present the preliminary results of this project, particularly the results obtained by the analysis of $^{239+240}$Pu isotopes in an olive grove catchment and how these results compare against the more established $^{137}$Cs analysis and estimations of soil truncation based on measurements of the height of olive tree mounds.