Modelling Deposition and Erosion rates with RadioNuclides (MODERN) – Part 2: A comparison of different models to convert 239+240Pu inventories into soil redistribution rates at unploughed sites

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Sheet erosion is one of the major threats to alpine soils. To quantify its role and impact in the degradation processes of alpine grasslands, the application of Fallout Radionuclides (FRN) showed very promising results. The specific characteristics of plutonium 239ă+ă240 (239+240 Pu), such as the homogeneous fallout distribution, the long half-life and the cost and time effective measurements make this tracer application for investigating soil degradation in Alpine grasslands more suitable than any other FRN (e.g. 137 Cs). However, the conversion of 239+240 Pu inventories into soil erosion rates remains a challenge. Currently available conversion models have been developed mainly for 137 Cs with later adaptation to other FRN (e.g. Excess 210 Pb, and 7 Be), each model being defined for specific land use (ploughed and/or unploughed) and processes (erosion or deposition). As such, they may fail in describing correctly the distribution of Pu isotopes in the soil. A new conversion model, MODERN, with an adaptable algorithm to estimate erosion and deposition rates from any FRN inventory changes was recently proposed (Arata etăal., submitted). In this complementary contribution, the authors compare the application of MODERN to other available conversion models. The results show a good agreement between soil redistribution rates obtained from MODERN and from the models currently used by the FRN scientific community (i.e. the Inventory Method).
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