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Radiocesium traces the impact of climate on erosion in Sweden

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Radionuclides, including radiocesium (^{137}Cs), were deposited across large areas of central Sweden after the Chernobyl nuclear power plant accident in 1986. ^{137}Cs is considered highly immobile in the environment due to strong fixation onto fine clay particles. However, due to its long half-life of 30.2 years, it may remain present for several hundred years before reaching negligible levels. Impacts of extreme weather events like floods, erosion or wildfires can disturb the Cs-rich horizon and thus increase the chance of ^{137}Cs remobilisation. With current projections indicating an intensification of climate change in the Northern Hemisphere, the potential risk of ^{137}Cs remobilisation increases. In this study, we hypothesise that moose (*Alces alces*) contamination patterns can be associated with different environmental processes working locally to bury or expose ^{137}Cs. We investigate moose as an environmental tracer of ^{137}Cs anomalies in Sweden between 1986 and 2021. Our case studies focus on Västernorrland and Gävleborg counties, both affected by high initial ^{137}Cs deposition where the surface contamination ranged from 20 to 120 kBq/m^2 in 1986. The activity data of the moose is compared with parameters indicative of climate change, such as temperature and precipitation, as well as the occurrence of erosion and forest fires. Finally, our results show that the decrease of specific activity in moose meat during this period is faster than the biological decay of ^{137}Cs suggests. We interpret this as a transport of ^{137}Cs in the environmental system. Furthermore, we observe an increase in ^{137}Cs activity in Västernorrland county in 1988, 1993 and 1997, which we link to environmental processes driven by climate change.