

RUSLE2015: Modelling soil erosion at continental scale using high resolution input layers

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Soil erosion by water is one of the most widespread forms of soil degradation in the Europe. On the occasion of the 2015 celebration of the International Year of Soils, the European Commission's Joint Research Centre (JRC) published the RUSLE2015, a modified modelling approach for assessing soil erosion in Europe by using the best available input data layers. The objective of the recent assessment performed with RUSLE2015 was to improve our knowledge and understanding of soil erosion by water across the European Union and to accentuate the differences and similarities between different regions and countries beyond national borders and nationally adapted models. RUSLE2015 has maximized the use of available homogeneous, updated, pan-European datasets (LUCAS topsoil, LUCAS survey, GAEC, Eurostat crops, Eurostat Management Practices, REDES, DEM 25m, CORINE, European Soil Database) and have used the best suited approach at European scale for modelling soil erosion. The collaboration of JRC with many scientists around Europe and numerous prominent European universities and institutes resulted in an improved assessment of individual risk factors (rainfall erosivity, soil erodibility, cover-management, topography and support practices) and a final harmonized European soil erosion map at high resolution.

The mean soil loss rate in the European Union's erosion-prone lands (agricultural, forests and semi-natural areas) was found to be $2.46 \text{ t ha}^{-1} \text{ yr}^{-1}$, resulting in a total soil loss of 970 Mt annually; equal to an area the size of Berlin (assuming a removal of 1 meter). According to the RUSLE2015 model approximately 12.7% of arable lands in the European Union is estimated to suffer from moderate to high erosion ($>5 \text{ t ha}^{-1} \text{ yr}^{-1}$). This equates to an area of 140,373 km^2 which equals to the surface area of Greece (*Environmental Science & Policy*, **54**, 438-447; 2015). Even the mean erosion rate outstrips the mean formation rate (<1.4 tonnes per ha annually). The recent RUSLE2015 estimated that the policy interventions (i.e. reduced tillage, crop residues, grass margins, cover crops, stone walls and contouring) through the common agricultural policy (CAP) during last decade have reduced the rate of soil loss in the EU by an average of 9.5% overall, and by 20% for arable lands (*NATURE*, **526**, 195). Latest developments in RUSLE2015 allow to incorporate the forthcoming intensification of rainfall (climate changes) and land use changes such as afforestation, land abandonment and arable land expansion. Recently, a module of CENTURY model was coupled with the RUSLE2015 for estimating the effect of erosion in current carbon balance in European agricultural lands.