Towards a pan-European service for soil erosion risk monitoring based on remotely-sensed data

G2 model is a new model for erosion, resulted from the cooperation of Joint Research Centre (JRC) SOIL team and the Lab of Forest Management and Remote Sensing, School of Agriculture, Forestry and Natural Environment of the Aristotle University of Thessaloniki in the framework of ‘Geoland2’ project.

Background
G2 allows for mapping estimates of soil loss (in t/ha) from sheet and intertil erosion caused by raindrop splash and surface runoff, on a month-time step on a local to regional scale. G2 inherits its fundamental equations from USLE, especially the estimation of rainfall erosivity and soil erodibility. However, it is innovative in the estimation of the vegetation coverage and management parameter, which is based on a combination of empirical tables from USLE and Gavrilovic (EPM) models. It also introduces a corrective factor to the topographic parameter. The formula of G2 is:

\[ E = \frac{R}{V}S^*T/I \]

- \( E \): erosion (t/ha⁻¹)
- \( R \): rainfall erosivity (original USLE formulas or alternatives developed by G2 or other authors) (MJ mm ha⁻¹ h⁻¹)
- \( V \): vegetation retention (developed by G2 using Biopar data or equivalent and land use/management databases, e.g., CORINE) (dimensionless; \( V > 1 \))
- \( S \): soil erodibility (original USLE formulas or modified USLE by JRC, 2000-5) (t ha⁻¹ MJ⁻¹ 1 mm⁻¹)
- \( T \): topographic influence (USLE modifications, 1996) (dimensionless; \( T > 0 \))
- \( I \): slope intercept (developed by G2 using satellite data; corrective to \( T \); partially analogous to \( P \) of USLE) (dimensionless; \( 1 = c_1 < c_2 \))

G2 employs harmonized standard input data from European and global databases, such as the LUCAS soil database, the European Soil Database (ESDB), the Topsoil Organic Carbon (TOC), BioPar products of geoland2 (GMES), Image 2006 image database, CORINE Land Cover, Landsat TM, the ASTER DEM datasets, and other large public datasets. As a data-oriented model, the cartographic scale of a G2 implementation is determined by the spatial resolution of the input data.


**References**

**Contact**
Panos Panagos, Christos Karydas (Aristotle University of Thessaloniki)  
European Commission - Joint Research Centre  
II5 / Land Resource Management Unit  
Tel. +39 0532 786594 • Email: panos.panagos@jrc.ec.europa.eu  
http://eusoils.jrc.ec.europa.eu

**G2 Applications**
G2 is a dynamic, feasible, easy to run model, providing alternatives for the estimation of all erosion factors. Several published studies of G2 implementation have provided realistic results, e.g. in the cross-borders basin of river Strymonas/Struma (Greece and Bulgaria), in the common basin of rivers Ismi and Erzeni (Albania), and in the Mediterranean island of Crete (Greece). Currently, the model is being implemented at a national scale, in Greece and in Cyprus.