

Mapping of European Soil Erosion: The PESERA- RDI model.

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The PESERA-RDI_GRID coarse scale model distributes a point-based model across Europe generating a series of physically based estimates of potential monthly erosion at 1km grid resolution. The PESERA-RDI model extends erosion indicators to a full range of European environments based on those originally developed within the MEDALUS project from previous concepts (Kirkby & Neale, 1987; de Ploey et al, 1991; Kirkby & Cox, 1995). The MODEM project set out to apply these regional scale indicators of desertification to interpret remotely sensed images, and so assess current desertification and its sensitivity to future environmental change.

The PESERA-RDI model, which expands from the concepts of both MEDALUS and MODEM, is based on a simple and conservative erosion model, making use of land-use, topographic, soil and climatic data. The model estimates ground cover, surface crusting, runoff and sediment transport, to give an estimate of water and sediment delivered to stream channels. The estimates are consistent with finer scale erosion models for flow strips, evaluated at the slope base; and are integrated across the frequency distribution of storm magnitudes. The model is based on a partition of daily Precipitation into Hortonian and Saturation Overland flow, Subsurface flow and Evapo-transpiration. Hortonian overland flow, which is mainly responsible for soil erosion, is generated with respect to local soil and sub-surface moisture characteristics. Allowance is also made for snow accumulation and melting. The emphasis of the PESERA-RDI model is the prediction of hillslope erosion, and the delivery of erosion products to the base of each hillslope. Channel delivery processes and channel routing are explicitly not considered.

As the components are explicit, the impact of changes in land use or climate can also be demonstrated, so that sensitivity to changed conditions can be explored.

Preliminary model results are available, and forecasts are now being calibrated against runoff plot and small catchment data.

The model is currently being applied at a 1 km resolution for the whole of Europe except for some areas where some data is missing. With data at finer resolution, the model may be applied at 250m or better resolution to areas of particular concern. The scope of applying available global data sources, to apply the model world-wide at a resolution of 10km is being explored, although with some inevitable degradation of quality.