



Loess source areas and spatial distribution in the Lower Ebro Valley

Jose Manuel Plata (1), J. Carles Balasch (1), Rafael Rodriguez (1), Jaume Boixadera (1,2), and Rosa M. Poch (1)
(1) Departament de Medi Ambient i Ciències del Sòl, Universitat de Lleida, Catalonia, (2) Departament d'Agricultura, Ramaderia, Pesca i Alimentació, Generalitat de Catalunya

Loess deposits cover 10% of the world continental surface and larger parts in Eurasia but are really limited in Mediterranean areas. In the Iberian Peninsula it has been described mainly in the central Tagus basin and in the Eastern Ebro basin besides other minor outcrops (Andalucía, la Mancha, Girona). These loess deposits have a great potential for climate interpretation that can illustrate environmental changes during the glacial cycles and record past global atmospheric mineral dust dynamics and palaeoenvironmental changes in the Mediterranean. The contribution of this work is to identify with more detail the distribution of loess in the Eastern Ebro basin to the boundary with the Prelitoral Catalan System, as a first step to locate their source areas and to understand their formation conditions and pedogenesis. The spatial distribution of loess outcrops is highly discontinuous over a surface of 2500 km², and therefore it may be considered as the largest loess region in the Iberian Peninsula. These loess deposits overly the Tertiary sediments and the Quaternary terraces of the Central Ebro Valley and the Eastern Móra d'Ebre basin. Representative profiles with primary loess have been determined for the macromorphological characterization of the deposit. Samples were obtained for physico-chemical, particle-size, micromorphological analyses and OSL dating. From several possible source areas, samples were collected from terrace T2 of the Ebro River and from nearby tributaries (Cinca, Segre). Samples were also taken from Tertiary materials for textural analysis, grain-size distribution and heavy mineral analysis, to be compared with loess samples. The studied deposits are very sandy, formed by homogeneous silt and fine sands, are very porous and they form highly stable slopes. The particles are composed of quartz (40-50%), calcite (30-40%) and other minerals as feldspars, biotites and muscovites besides accessory minerals. These sediments are carbonated (around 38% calcite) and contain very little organic matter (<0.05%). To the West of the area some outcrops contain gypsum (up to 28%). The relatively coarse grain size, mineralogy, distribution and depth indicate that the potential source areas are not very far, with a W-NW wind direction. They are probably found at alluvial valleys of the Central basin or at Chiprana endorheic basins and surroundings, where deflation areas are found. The age of the deposits can be classified into two groups. Most of them were formed between 17-34 ky, which correspond to the cold Heinrich phases 1, 2 and 3 of the last Maximum (LGM). In a few cases older outcrops, with ages older than 115 ky, were probably deposited at the end of the penultimate glacial period and underwent pedogenesis during the Eemian warmer period.