Supplementary material

1 Development of a database of daily rainfall erosivity

Daily erosivity was computed from the SAIH dataset following the RUSLE methodology (Renard et al. 1997). Daily rainfall amounts were also calculated from the SAIH dataset. This allowed fitting an exponential relationship between both variables (Richardson et al., 1983):

$$EI_m = a_m P^{b_m} + \varepsilon, \quad m = \{1,...,12\}, \tag{1}$$

where a and b are empirical parameters and ε is a random, normally distributed error. Parameters a and b are adjusted month-by-month (m) to take seasonal variations in rainfall characteristics into account. Parameter estimation was achieved by weighted least squares (WLS) regression after a logarithmic transformation of the terms in equation (1). Weights were assigned to the observations in order to reduce the excessive influence of small erosive events during parameterization. Spatial interpolation of the parameters a_m and b_m by local splines allowed obtaining values of these parameters over the study area. This allowed applying equation (1) to the daily precipitation values of the AEMET dataset, to obtain a daily erosivity database for the period 1955-2006.

2 Time series of atmospheric teleconnection indices

To calculate the daily indices for the atmospheric teleconnection patterns (namely NAOi, MOi and WeMOi) daily sea-level pressure grids from the ds010.0 Daily Northern Hemisphere Sea Level Pressure Grids data set (University Corporation for Atmospheric Research, 1979) were used (Figure 2.23). Following Jones *et al.* (1997) a North Atlantic Oscillation index (NAOi) was calculated as the normalized difference between time series of sea level pressure recorded at two points in the southwest Iberian Peninsula (Gibraltar, 35ºN 5ºW) and southwest Iceland (Reykjavik, 65ºN, 20ºW). MOi, as defined by Palutikof (2003), was calculated as the daily normalized difference between the SLP at Gibraltar (35ºN 5ºW) and Lod (Israel), 30ºN, 35ºE. WeMOi was calculated as the daily normalized difference between the SLP at Gibraltar (35ºN 5ºW) and Parma (45ºN, 10ºE).