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Wind erosion erosivity of the climate in Europe - monthly and yearly variability

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The erosivity of the climate depends on the wind velocity, the amount and distribution of precipitation and evaporation. Their interactions determine intensity, frequency and duration of wind erosion events on susceptible surfaces. The driving force of the wind erosion process is analysed for Europe for the years 1959 - 2001. The basic assumptions are: wind erosion takes place only at dry soil surfaces and the transport capacity of the wind increases as a power function after exceeding a soil texture depending threshold wind velocity, as used in many sand transport equations. Surface wind, precipitation and evaporation data were obtained from the ERA40 dataset with a 6 h time interval. Soil textural data on a 0.5° by 0.5° resolution has been obtained from World soil reference database as well as from the European Soil Database. Threshold wind velocities (uthr) were assigned depending on soil texture with 5 m/s for coarse textured, 7 m/s for medium textured, 9 m/s for fine textured , 11 m/s for very fine textured, and 8 m/s for organic soils. For each time step we determined the wind force (WF) from the wind velocity if precipitation $<$ 0.3 mm or precipitation $<$ evaporation with WF = (u - uthr) * u^2. WF was set to zero if u $<$ uthr. The monthly summarized wind forces give the wind force integrals with the time steps per month.Data have been aggregated to provide monthly and yearly integrals for the time frame 1958 to 2002. Additionally, the mean for each month for the whole time period 1958 to 2001 has been computed. Yearly WFI for the whole area of Europe showed a slight linear increase from 1959 up to 2001 with an R2 of 0.29. Such increase was mostly determined by the years 1990-1996 which showed WFI above the values observed for the

remaining years. Additionally, yearly WFI indicate some periodicities at 16, 6.4 and 2.7 years. Detailed investigations for the grid cell of 51N13E (Berlin-Brandenburg) revealed that the years 1962-1966 showed similar WFI compared to the 1990-1996 period. However, the 1962-1966 period was not visible in the whole European dataset. Further on, results from monthly and yearly WFI computed from ERA40 data will be discussed and evaluated against local station meteorology.