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Spatio-temporal variation in erosivity density over China

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Erosivity density is defined as the ratio of the monthly erosivity to the monthly precipitation in RUSLE2 when mapping rainfall erosivity in the US. Monthly erosivity density was mapped throughout the continental U.S and was multiplied by more widely available monthly precipitation dataset (such as PRSIM data of 4 km grid) to obtain the monthly erosivity. The annual erosivity (rainfall erosivity factor in the USLE and its revised models) is computed as the sum of the monthly erosivity values.
Monthly erosivity density was calculated based on one-minute precipitation data for 18 stations from 1961(1971) through 2000 over central and eastern region of China, as well as the monthly precipitation and erosivity. Monthly erosivity was computed as the sum of storm EI30 generated by erosive storms with precipitation depth equal or greater than 12 mm in a month and monthly precipitation was the sum of total precipitation depth including the rainfall and snow equal or greater than 0.1 mm in the same month based on the same dataset. Seasonal variation analysis shows that erosivity density for 16 stations have similar seasonal variation patterns with precipitation and erosivity, with a single peak occurring in the July or August. Two stations located in Southeast China (Fuzhou and Changting) have double peaks for the precipitation and erosivity, with one peak in the May and June and the other peak in the August, which is connected with the movement of the rain belt induced by the East Asian Monsoon. However, erosivity densities have a single peak for these two stations, appearing in the August. Long-term trend analysis shows that 95% of station*months doesn't have significant trends at an alpha level of 0.05, which suggests that monthly erosivity density is stable along time. Monthly maps of erosivity density and those of its uncertainties were developed based on more than 2000 stations with hourly precipitation data across China by Universal Kriging method. The significance of erosivity density map is that: (1) higher resolution and more widely available monthly precipitation gridded datasets based on meteorological stations, satellite and reanalysis can be used to generate monthly erosivity layers by multiplying erosivity density gridded maps; (2) the monthly precipitation is usually simulated better than daily precipitation by GCM models and can be used to generate future monthly erosivity scenarios by multiplying erosivity density gridded maps on the assumption of the stable monthly erosivity density along the time.