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## A Rainfall Erosivity database for Brazil from MSWEP rainfall dataset

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In erosion studies the behavior of rainfall is primordial, since rain is responsible for the first stage of the erosion process: the detachment of soil particles. The erosive potential of rainfall, erosivity, is considered in the universal soil loss equations (R)USLE family through the parameter R, or R factor. This factor is calculated from the rainfall erosivity index, which is the product of kinetic energy of the rain by the maximum intensity of the rain of 30 minutes of duration. As sub-hour rainfall data is not always available, there are in the literature a series of equations obtained from regression, which use monthly and annual rainfall and present a good estimate of erosivity for your study site. In Brazil, in addition to limitations regarding the temporal resolution of rainfall data, there are also spatial limitations. Monitoring stations are concentrated mostly in urbanized areas, usually near the coast. The other regions, such as agricultural and forest areas, are poorly monitored, and these areas are of great interest for monitoring erosion, not only because they are periodically exposed soil areas, but also because of the high rainfall rates that humid forests like Amazon have. MSWEP is a rainfall database that combines observed, satellite and reanalysis data. It has global coverage, temporal resolution of 3 hours, spatial 0.1° and data from 1979 to 2016. Databases like this have great potential to be used in areas such as Brazil, due to its spatial and temporal resolution. In this context, considering the relevance that the soil loss equations still present today, this work developed a rainfall erosivity database entitled REDB-BR (Rainfall Erosivity Database for Brazil). It provides the R factor in a 0.1° resolution grid, developed with 37 years of rainfall data from the MSWEP dataset. The R factor was calculated through 73 erosivity index regression equations, which mostly uses the Modified Fournier Index (MFI), a relation between monthly precipitation and annual precipitation. Thiessen polygons were used in order to spatialize and define the areas of each equation. Over the Brazilian territory, the R factor ranges from 1.200 to 20.000 MJ mm ha<sup>-1</sup> h<sup>-1</sup> year<sup>-1</sup>, with the higher values in the North region, and the lowest values in the Northeast. The spatial patterns of erosivity are very similar to the climatic zones of Brazil. The R factor map takes advantage of MSWEP dataset and presents a spatial resolution very detailed to a country with continental scale such as Brazil. The database includes the equations shapefile and table, Thiessen Polygons shapefile and the R factor map in raster format, which allows more possibilities of application. The database can be accessed at [https://zenodo.org/record/4428308#.X\\_hxsOhKiUk](https://zenodo.org/record/4428308#.X_hxsOhKiUk). We identified sudden changes in behavior between the delimited areas, which suggests a need for more regression equations in order to better represent the behavior of the erosivity in the Brazilian territory.

