Package 'SoilConservation'

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Type Package

Title Soil and Water Conservation

Version 1.0.1

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Imports stats

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Depends R (>= 3.5.1)

Description
Includes four functions: RFactor_calc(), RFactor_est(), KFactor() and SoilLoss(). The rainfall erosivity factors can be calculated or estimated, and soil erodibility will be estimated by the equation extracted from the monograph. Soil loss will be estimated by the product of five factors (rainfall erosivity, soil erodibility, length and steepness slope, cover-management factor and support practice factor. In the future, additional functions can be included. This efforts to advance research in soil and water conservation, with fast and accurate results.

License GPL-3

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Soil and Water Conservation.

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Details

Package:	SoilConservation
Type:	Package
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Date:	2024-12-14
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Author(s)

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References

Arnoldus H. M. J. (1980). An approximation of the rainfall factor in the universal soil loss equation. In: De Boodt M, Gabriels D (eds) Assessment of erosion. JohnWiley & Sons, Chichister, pp 127–132. <https:...>.

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Wischmeier, W. and Smith, D. (1978). Predicting rainfall erosion losses: a guide to conservation planning. Agricultural Handbook No. 537. U.S. Department of Agriculture, Washington DC, USA. <https:...>

`Data_Erodibility` *Erodibility dataset.*

Description

Dataset of physical and chemical attributes used in estimating soil erodibility.

Usage

```
data(Data_Erodibility)
```

Format

Physical and chemical attributes used in estimating soil erodibility.

Author(s)

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

References

Denardin, J. E. (1990). "Erodibilidade de solo estimada por meio de parâmetros físicos e químicos". Piracicaba, ESALQ, 1990. 81p. (Tese de Doutorado). <https:...>

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Examples

```
data(Data_Erodibility)
head(Data_Erodibility)
```

Data_Rainfall_minutes *Rainfall dataset.*

Description

Sub-hourly rainfall data for the municipality of Peixe, TO, for the period January to December 2023.

Usage

```
data(Data_Rainfall_minutes)
```

Format

Data set with 22,032 observations with 3 variables, referring to precipitation from January to December 2023, in the municipality of Peixe, TO, Brazil. The columns being: date, times and rainfall.

Author(s)

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

References

Cemaden (2024). Centro nacional de monitoramento e alertas de desastres naturais - <http://www.cemaden.gov.br/apresentac

Examples

```
data(Data_Rainfall_minutes)
head(Data_Rainfall_minutes)
```

Data_Rainfall_month *Rainfall dataset.*

Description

Monthly rainfall data for the municipality of Peixe, TO, for the period from 2013 to 2023 (Source: BDMEP-INMET, 2024).

Usage

```
data(Data_Rainfall_month)
```

Format

Dataset monthly referring to rainfall in 2013 and 2023, in the municipality of Peixe, TO, Brazil.

Author(s)

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

References

INMET - Instituto Nacional de Meteorologia (2018). “BDMEP - Banco de Dados Meteorológicos para Ensino e Pesquisa - Série Histórica - Dados Mensais – Precipitação (mm)”. Brasília.

Examples

```
data(Data_Rainfall_month)
head(Data_Rainfall_month)
```

`Data_SoilLoss` *Water erosion dataset.*

Description

Dataset of erosivity, erodibility, topography, LULC, and support conservation practices.

Usage

```
data(Data_SoilLoss)
```

Format

Dataset of erosivity, erodibility, topography, LULC, and support conservation practices of several years.

Author(s)

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

Examples

```
data(Data_SoilLoss)
head(Data_SoilLoss)
```

`KFactor` *Estimates soil erodibility.*

Description

The function estimates the soil erodibility factor.

Usage

```
KFactor(df_kfactor)
```

Arguments

df_kfactor	Data to be analyzed.

Value

kfactor	Tabulated results of the k factor.

Author(s)

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

References

Godoi, R. F.; Rodrigues, D. B.; Borrelli, P.; Oliveira, P. T. S. (2021). "High-resolution soil erodibility map of Brazil". Science of The Total Environment, v. 781, p. 146673. <doi:10.1016/j.scitotenv.2021.146673>.

Wischmeier, W. and Smith, D. (1978). Predicting rainfall erosion losses: a guide to conservation planning. Agricultural Handbook No. 537. U.S. Department of Agriculture, Washington DC, USA. <https:...>

Examples

```
data(Data_Erodibility)
kfactor <- KFactor(Data_Erodibility)
round(kfactor,6) # result K factor
```

RFactor_calc *Determination the rainfall erosivity .*

Description

The function calculates the rainfall erosivity factor.

Usage

```
RFactor_calc(data, erosive.precip = 10, equation = "WS")
```

Arguments

data	Data to be analyzed.
erosive.precip	Precipitation considered erosive (default = 10).
equation	"WS" - Wischmeier and Smith (defaul), "BF" - Brown and Foster, "RUSLE2" - USDA-Agriculture Research Service.

Value

result	Tabulated results.
record	Record of rainfall relative to 5, 10, 15, 30 or 60 minutes.

Author(s)

Dione Pereira Cardoso

Paulo Cesar Ossani

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References

Brown, L.C. and Foster, G.R. (1987). Storm erosivity using idealized intensity distributions. Trans. ASAE 30, 2, 379–386. <https:...>.

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Wischmeier, W. and Smith, D. (1978). Predicting rainfall erosion losses: a guide to conservation planning. Agricultural Handbook No. 537. U.S. Department of Agriculture, Washington DC, USA. <https:...>.

Examples

```
data(Data_Rainfall_minutes)
res <- RFactor_calc(Data_Rainfall_minutes, erosive.precip = 10, equation = "WS")
res$result
```

RFactor_est *Estimation the rainfall erosivity.*

Description

The function estimates the rainfall erosivity factor.

Usage

```
RFactor_est(data, latitude, longitude)
```

Arguments

data	Data to be analyzed.
latitude	Latitude
longitude	Longitude

Value

RFactor	Estimated rainfall erosivity.
equation	Equation used for estimations.

Author(s)

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Junior Cesar Avanzi

References

Arnoldus H. M. J. (1980). An approximation of the rainfall factor in the universal soil loss equation. In: De Boodt M, Gabriels D (eds) Assessment of erosion. JohnWiley & Sons, Chichister, pp 127–132. <https:...>.

Oliveira, P. T. S. and Wendland, E.; Nearing, M. A. (2013). "Rainfall erosivity in Brazil: A review". Catena, v. 100, p. 139-147, 2013. <doi:10.1016/j.catena.2012.08.006>.

Examples

```
data(Data_Rainfall_month)
rfactor <- RFactor_est(Data_Rainfall_month[,2:13],
                       latitude = -12.01527777,
                       longitude = -48.544444440)
rfactor$RFactor
rfactor$equation
```

SoilLoss *Estimation soil losses by water erosion.*

Description

The function estimates soil losses according to USLE and its revised versions (RUSLE).

Usage

```
SoilLoss(df_SoilLoss)
```

Arguments

df_SoilLoss	Data to be analyzed.

Value

result.A	Tabulated results of the A (Soil loss).

Author(s)

Dione Pereira Cardoso

Paulo Cesar Ossani

Junior Cesar Avanzi

References

Wischmeier, W. and Smith, D. (1978). Predicting rainfall erosion losses: a guide to conservation planning. Agricultural Handbook No. 537. U.S. Department of Agriculture, Washington DC, USA. <https:...>.

Examples

```
data(Data_SoilLoss)
SoilLoss <- SoilLoss(Data_SoilLoss[,2:6])
round(SoilLoss,2) # result Soil loss
```

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