Package 'Ecohydmod'

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Type Package

Title Ecohydrological Modelling

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Description Simulates the soil water balance (soil moisture, evapotranspiration, leakage and runoff), rainfall series by using the marked Poisson process and the vegetation growth through the normalized difference vegetation index (NDVI). Please see Souza et al. (2016) <doi:10.1002/hyp.10953>.

License GPL-2

Encoding UTF-8

LazyData FALSE

RoxygenNote 6.0.1

Imports graphics, stats

NeedsCompilation no

Repository CRAN

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Contents

CInt_f *Canopy interceptation*

Description

This function calculates the amount of rain intercepted in the canopy.

Usage

```
CInt_f(R, Rstar)
```

Arguments

R	Rainfall
Rstar	The maximum amount which the canopy intercepts

Details

Interceptation

Value

canopy interceptation

Examples

```
CInt_f(R = 10, Rstar = 3)
```

Et_f *Evapotranspiration*

Description

This function calculates the evapotranspiration based on the soil moisture, soil water retantion curve and vegetation properties.

Usage

```
Et_f(s, Emax, Ew, sh, sw, sstar)
```

Arguments

s	Soil moisture
Emax	Maximum evapotranspiration rate
Ew	Minimum evapotranspiration rate
sh	Soil moisture at hidroscopic point
sw	Soil moisture at wilting point
sstar	Soil moisture below field capacity point

Details

Evapotranspiration function based on the soil moisture

Value

evapotranspiration

Examples

```
Et_f(s = 0.25, Emax = 5, Ew = 0.5, sh = 0.01, sw = 0.15, sstar = 0.40)
```

Lk_f *Leakage*

Description

This function calculates the leakage based on the soil moisture, soil water retantion curve and the soil hydraulic conductivity.

Usage

```
Lk_f(s, Ks, b)
```

Arguments

s	Soil moisture
Ks	Soil saturated hydraulic conductivity
b	The exponent of the water retention curve

Details

Leakage function based on the soil moisture

Value

leakage

Examples

```
Lk_f(s = 0.25, Ks = 2000, b = 4.38)
```

`RainPoisson` *Rainfall series*

Description

This function simulates rainfall series as a stochastic variable, by using marked Poisson process.

Usage

```
RainPoisson(ndays, lambda, alpha)
```

Arguments

`ndays`	Number of days
`lambda`	The frequency of rainfall events (day^-1)
`alpha`	The mean of rainfall event (cm day^-1)

Details

Rainfall series

Value

rainfall series

Examples

```
RainPoisson(ndays = 60, lambda = 0.1, alpha = 0.95)
```

`SimNDVI` *NDVI simulation*

Description

This function simulates the NDVI based on soil moisture and vegetation parameters. Numerical solution.

Usage

```
SimNDVI(s, sw, sstar, kA, kR, Nmax, Nmin, N0)
```

Arguments

s	A vector with soil moisture
sw	Soil moisture at wilting point
sstar	Soil moisture below field capacity point
kA	Constant of assimilation
kR	Constant of respiration
Nmax	Maximum NDVI of the vegetation
Nmin	Minimum NDVI of the vegetation
N0	Initial condiction of NDVI. If it is missing, the average of Nmax and Nmin will be used

Details

NDVI simulation

Value

NDVI series

Examples

```
rain = 10 * RainPoisson(ndays = 365, lambda = 0.05, alpha = 0.60)
s = swb_f(R = rain, Rstar = 3, Emax = 5, Ew = 0.5, Ks = 2000, b = 4.38, Zr = 400,
n = 0.5, sh = 0.01, sw = 0.10, sstar = 0.25, s0 = 0.10, nsteps = 48, gr = T)[,3]
NDVI = SimNDVI(s, sw = 0.10, sstar = 0.35, kA = 0.064, kR = 0.011,
Nmax = 0.93, Nmin = 0.26, N0 = 0.5)
```

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swb_f *Soil water balance*

Description

This function calculates the daily soil water balance and its components based on the rainfall, soil properties and vegetation properties.

Usage

```
swb_f(R, Rstar, Emax, Ew, Ks, b, Zr, n, sh, sw, sstar, nsteps, s0, gr)
```

Arguments

R	Daily rainfall, which should be a vector.
Rstar	The maximum amount which the canopy intercepts
Emax	Maximum evapotranspiration rate
Ew	Minimum evapotranspiration rate
Ks	Soil saturated hydraulic conductivity
b	The exponent of the water retention curve
Zr	Root depth
n	The soil porosity
sh	Soil moisture at hidroscopic point
sw	Soil moisture at wilting point
sstar	Soil moisture below field capacity point
nsteps	Number of steps/division for the numerical solution
s0	Initial soil moisture to start the simulation. If it is missing, s0 is signed equal to sh.
gr	Logical argument to show graphics of results. Default is FALSE

Details

Soil water balance

Value

soil water balance components

Examples

```
rain = 10 * RainPoisson(ndays = 365, lambda = 0.05, alpha = 0.60)
swb_f(R = rain, Rstar = 3, Emax = 5, Ew = 0.5, Ks = 2000, b = 4.38, Zr = 400,
n = 0.5, sh = 0.01, sw = 0.10, sstar = 0.25, s0 = 0.10, nsteps = 48)
```

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