Package: rTRIPLEXCWFlux (via r-universe)

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Type Package

Title Carbon-Water Coupled Model

Version 0.3.0

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Description A carbon-water coupled model (TRIPLEX-CW-Flux) is based on two well-established models: TRIPLEX-Flux model and Penman–Monteith model, and integrates soil moisture and vapor pressure deficits into the stomata conductance submodule to estimate net ecosystem production and evapotranspiration in forest ecosystems.<https://github.com/ShulanSun/rTRIPLEX_CW_Flux>.

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Encoding UTF-8

LazyData true

RoxygenNote 7.2.1

Depends R (>= 2.10)

Suggests knitr, rmarkdown, testthat

VignetteBuilder knitr

URL https://github.com/ShulanSun/rTRIPLEX_CW_Flux

Repository https://shulansun.r-universe.dev

RemoteUrl https://github.com/shulansun/rtriplex_cw_flux

RemoteRef HEAD

RemoteSha 1f54f53fed7a409934deb8d7182267a0a4422645

Contents

`Inputpara` *Information about input parameters*

Description

A dataset containing the list of input parameters and their description.

Usage

```
Inputpara
```

Format

A data frame with 1 rows and 31 variables:

Hw the height at wind measurement (m)

hc the average canopy height (m)

N leaf nitrogen content (percent)

Nm maximum nitrogen content (percent)

m coefficient (-)

g0 initial stomatal conductance (m mol m-2 s-1)

Vm25 maximum carboxylation rate at 25 degrees Celsius (umol m-2 s-1)

Rgas molar gas constant (m3 Pa mol-1 K-1)

O2 oxygen concentration in the atmosphere (Pa)

Ls standard longitude of time zone (-)

Le local longitude (degree)

latitude local latitude (degree)

LAI leaf area index of canopy (m2 m-2)

SWCs saturated soil volumetric moisture content at depth of 30 cm (percent)

SWCw wilting soil volumetric moisture content at depth of 30 cm (percent)

VPD_close the VPD at stomatal closure (kPa)

VPD_open the VPD at stomatal opening (kPa)

Mf biomass density of for leaf (kg C m-2 day-1)

Ms biomass density of for sapwood (kg C m-2 day-1)

Mr biomass density of for root (kg C m-2 day-1)

rmf maintenance respiration coefficient for leaf (-)

rms maintenance respiration coefficient for stem (-)

rmr maintenance respiration coefficient for root (-)

rgf growth respiration coefficient for leaf (-)

rgs growth respiration coefficient for sapwood (-)

rgr growth respiration coefficient for root (-)

raf carbon allocation fraction for leaf (-)

ras carbon allocation fraction for sapwood (-)

rar carbon allocation fraction for root (-)

Q10 temperature sensitivity factor (-)

Tref base temperature for Q10 (degrees Celsius)

`Inputvariable` *Information about input variables*

Description

A dataset containing the list of input variables and their description.

Usage

```
Inputvariable
```

Format

A data frame with 17520 rows and 18 variables:

DATE date. E.g. "2000/01/01".

Vms The wind speed at measured height (m s-1)

Ta air temperature (degrees Celsius)

RH relative humidity (percent)

VPDhpa vapor pressure deficit (hPa)

SVWC30cm soil volumetric moisture at depth of 30 cm (percent)

Rn net radiation at the canopy surface (W m-2)

PPFD photosynthetic photon flux density (umol m-2 s-1)

Rainfall rainfall (mm)

Month the number of month. E.g."1".

Day the day of month. E.g."1".

year studied year. E.g."2019".

time the time of day at 30 min scale (h)

DOY day of year. E.g."1"

Cof carbon dioxide concentration in the atmosphere (ppm)

G Soil heat flux (W m-2)

NEE Observed net ecosystem productivity at 30 min scale (mg CO2 m-2 s-1)

LE Observed latent heat at 30 min scale (W m-2)

`onemonth_exam` *onemonth_exam*

Description

A dataset containing the list of input variables and their description.Just for example.

Usage

```
onemonth_exam
```

Format

A data frame with 1488 rows and 18 variables:

DATE date. E.g. "2000/01/01".

Vms The wind speed at measured height (m s-1)

Ta air temperature (degrees Celsius)

RH relative humidity (percent)

VPDhpa vapor pressure deficit (hPa)

SVWC30cm soil volumetric moisture at depth of 30 cm (percent)

Rn net radiation at the canopy surface (W m-2)

PPFD photosynthetic photon flux density (umol m-2 s-1)

Rainfall rainfall (mm)

Month the number of month. E.g."1".

Day the day of month. E.g."1".

year studied year. E.g."2019".

time the time of day at 30 min scale (h)

DOY day of year. E.g."1".

Cof carbon dioxide concentration in the atmosphere (ppm)

G Soil heat flux (W m-2)

NEE Observed net ecosystem productivity at 30 min scale (mg CO2 m-2 s-1)

LE Observed latent heat at 30 min scale (W m-2)

`result` *Information about model output*

Description

A dataset containing the list of output variables and their description.

Usage

```
result
```

Format

A data frame with 1 rows and 31 variables:

X sequence. E.g."1".

DATE date. E.g. "2000/01/01".

Vms The wind speed at measured height (m s-1)

Ta air temperature (degrees Celsius)

RH relative humidity (percent)

VPDhpa vapor pressure deficit (hPa)

SVWC30cm soil volumetric moisture at depth of 30 cm (percent)

Rn net radiation at the canopy surface (W m-2)

PPFD photosynthetic photon flux density (umol m-2 s-1)

Rainfall rainfall (mm)

Month the number of month. E.g."1".

Day the day of month. E.g."1".

year studied year. E.g."2019".

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Cof carbon dioxide concentration in the atmosphere (ppm)

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NEE Observed net ecosystem productivity at 30 min scale (mg CO2 m-2 s-1)

LE Observed latent heat at 30 min scale (W m-2)

ObserveNEE30 observed net ecosystem production (gC m-2 30 min-1)

OETS observed evapotranspiration (mm 30 min-1)

NEP30min net ecosystem production (gC m-2 30 min-1)

ETS evapotranspiration (mm 30 min-1)

GPP30min gross primary production (gC m-2 30 min-1)

Re30min ecosystem respiration (gC m-2 30 min-1)

TRIPLEX_CW_Flux *Runs a TRIPLEX-CW-Flux model simulation*

Description

Runs the TRIPLEX-CW-Flux model. For more details on input variables and parameters and structure of input visit Inputvariable and Inputpara.

Usage

```
TRIPLEX_CW_Flux(Input_variable, Input_parameter, overyear = FALSE)
```

Arguments

Input_variable	A table as described in Inputpara containing the information about input variables.
Input_parameter	A table as described in Inputvariable containing the information about input parameters.
overyear	If overyear is 'TRUE', this means that the input data is full year data. The outputs of the TRIPLEX_CW_Flux function are a long format dataframe and charts of simulated result for net ecosystem productivity (NEP) and evapotranspiration (ET) at 30 min scale, and monthly variation of the input environmental factors.Otherwise, only one graph for net ecosystem productivity (NEP) and evapotranspiration (ET) at 30 min scale is output.

Value

A list with class "result" containing the simulated results and charts for NEP and ET at 30 min scale, and monthly variation of the input environmental factors. More details on the output is result

References

Evaporation and Environment. Symposia of the Society for Experimental Biology, 19, 205-234. Available at the following web site: https://www.semanticscholar.org/paper/Evaporation-and-environment.-Monteith/428f880c29b7af69e305a2bf73e425dfb9d14ec8

Zhou, X.L., Peng, C.H., Dang, Q.L., Sun, J.F., Wu, H.B., &Hua, D. (2008). Simulating carbon exchange in Canadian Boreal forests: I. Model structure, validation, and sensitivity analysis. Ecological Modelling,219(3-4), 287-299. doi:10.1016/j.ecolmodel.2008.07.011

Examples

```
library(rTRIPLEXCWFlux)
data(Inputpara)
data(onemonth_exam)
out<-TRIPLEX_CW_Flux (Input_variable=onemonth_exam,Input_parameter=Inputpara,overyear=FALSE)
```

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