Package 'lue'

May 8, 2026

Type Package

Title Light Use Efficiency Model to Estimate Biomass and YIELD with and Without Vapour Pressure Deficit

Version 0.2.1

Depends R(>= 2.10.0)

Author Maninder Singh Dhillon [aut,cre], Thorsten Dahms [ctb], Leon Nill [ctb]

Maintainer Maninder Singh Dhillon <manidhillon1989@gmail.com>

Description
Contains LUE_BIOMASS(),LUE_BIOMASS_VPD(), LUE_YIELD() and LUE_YIELD_VPD() to estimate aboveground biomass and crop yield firstly by calculating the Absorbed Photosynthetically Active Radiation (APAR) and secondly the actual values of light use efficiency with and without vapour presure deficit Shi et al.(2007) <doi:10.2134/agronj2006.0260>.

License GPL-2

Encoding UTF-8

LazyData true

Imports raster,ncdf4

RoxygenNote 6.0.1

Repository CRAN

NeedsCompilation no

Date/Publication 2018-06-14 12:39:16 UTC

Contents

`fpar` *Fpar data*

Description

Input datasets

Usage

```
fpar
```

Format

A raster (.tif)

`LUE_BIOMASS` *Light Use Efficiency Model to Estimate Biomass*

Description

Contains LUE_BIOMASS() to estimate aboveground biomass firstly by calculating the Absorbed Photosynthetically Active Radiation (APAR) and secondly the actual values of light use efficiency Shi et al.(2007) <doi:10.2134/agronj2006.0260>.

Usage

```
LUE_BIOMASS(fpar_raster,par,tmin,tmin_min,tmin_max,LUE_optimal)
```

Arguments

`fpar_raster`	fraction of photosynthetically active radiation (fpar) per day raster with .tif format
`par`	clear sky surface photosynthetically active radiation (par) per day raster with .nc file format.
`tmin`	Minimum temperature at 2 metres since previous post-processing per day raster with .nc file format.
`tmin_min`	minimum value of tmin used for the threshold
`tmin_max`	maximum value of tmin used for the threshold
`LUE_optimal`	optical lue value with respect to crop type for example wheat crop LUE_optimal is 3.0 (Djumaniyazova et al., 2010)

Format

A Biomass raster

Value

Biomass raster

References

Djumaniyazova Y, Sommer R, Ibragimov N, Ruzimov J, Lamers J & Vlek P (2010) Simulating water use and N response of winter wheat in the irrigated floodplains of Northwest Uzbekistan. Field Crops Research 116, 239-251.

Shi Z, Ruecker G R,Mueller M, Conrad C, Ibragimov N, Lamers J P A, Martius C, Strunz G, Dech S & Vlek P L G (2007) Modeling of Cotton Yields in the Amu Darya River Floodplains of Uzbekistan Integrating Multitemporal Remote Sensing and Minimum Field Data. Agronomy Journal 99, 1317-1326.

Examples

```
## Not run:
## load the data
data(fpar)
data(par1)
data(tmin)
LUE_BIOMASS(fpar,par1,tmin,-2,12,3)

## End(Not run)
library(raster)
fparr <- raster(nc=2, nr=2)
values(fparr)<-runif(ncell(fparr),min =0.2,max= 0.8)
par11<- brick(nc=2, nr=2, nl=2)
values(par11)<-runif(ncell(par11),min =169076.9,max= 924474.6)
tminn <- brick(nc=2, nr=2, nl=2)
values(tminn)<-runif(ncell(tminn),min = 278,max= 281)
LUE_BIOMASS(fparr,par11,tminn,-2,12,3)
```

LUE_BIOMASS_VPD *Light Use Efficiency Model to Estimate Biomass with Vapour Pressure Deficit*

Description

LUE_BIOMASS_VPD() to estimate aboveground biomass firstly by calculating the Absorbed Photosynthetically Active Radiation (APAR) and secondly the actual values of light use efficiency by including vapour pressure deficit of the crops Shi et al.(2007) <doi:10.2134/agronj2006.0260>.

Usage

```
LUE_BIOMASS_VPD(fpar_raster,par,tmin,tmax,tdew,
tmin_min,tmin_max,vpd_max, vpd_min,LUE_optimal)
```

Arguments

fpar_raster	fraction of photosynthetically active radiation (fpar) per day raster with .tif format
par	clear sky surface photosynthetically active radiation (par) per day raster with .nc file format.
tmin	Minimum temperature at 2 metres since previous post-processing per day raster with .nc file format.
tmax	Maximum temperature at 2 metres since previous post-processing per day raster with .nc file format.
tdew	Dewpoint temperature at 2 metres since previous post-processing per day raster with .nc file format.
tmin_min	minimum value of tmin used for the threshold
tmin_max	maximum value of tmin used for the threshold
vpd_max	maximum value of vapour pressure deficit used for the threshold
vpd_min	minimum value of vapour pressure deficit used for the threshold
LUE_optimal	optical lue value with respect to crop type for example wheat crop LUE_optimal is 3.0 (Djumaniyazova et al., 2010)

Format

A Biomass raster

Value

Biomass raster

References

Djumaniyazova Y, Sommer R, Ibragimov N, Ruzimov J, Lamers J & Vlek P (2010) Simulating water use and N response of winter wheat in the irrigated floodplains of Northwest Uzbekistan. Field Crops Research 116, 239-251.

Shi Z, Ruecker G R,Mueller M, Conrad C, Ibragimov N, Lamers J P A, Martius C, Strunz G, Dech S & Vlek P L G (2007) Modeling of Cotton Yields in the Amu Darya River Floodplains of Uzbekistan Integrating Multitemporal Remote Sensing and Minimum Field Data. Agronomy Journal 99, 1317-1326.

Examples

```
## Not run:
## load the data
data(fpar)
data(par1)
data(tmin)
data(tmax)
data(tdew)
LUE_BIOMASS_VPD(fpar,par1,tmin,tmax,tdew,-2,12,1.5,4,3)
```

```
## End(Not run)
library(raster)
fparr <- raster(nc=2, nr=2)
values(fparr)<-runif(ncell(fparr),min =0.2,max= 0.8)
par11<- brick(nc=2, nr=2, nl=2)
values(par11)<-runif(ncell(par11),min =169076.9,max= 924474.6)
tminn <- brick(nc=2, nr=2, nl=2)
values(tminn)<-runif(ncell(tminn),min = 278,max= 281)
tmaxx <- brick(nc=2, nr=2, nl=2)
values(tmaxx)<-runif(ncell(tmaxx),min = 278,max= 281)
tdeww <- brick(nc=2, nr=2, nl=2)
values(tdeww)<-runif(ncell(tdeww),min = 278,max= 281)
LUE_BIOMASS_VPD(fparr,par11,tminn,tmaxx,tdeww,-2,12,1.5,4,3)
```

LUE_YIELD *Light Use Efficiency Model to Estimate Crop Yield*

Description

Contains LUE_YIELD() to estimate aboveground biomass firstly by calculating the Absorbed Photosynthetically Active Radiation (APAR) and secondly the actual values of light use efficiency Shi et al.(2007) <doi:10.2134/agronj2006.0260>.

Usage

```
LUE_YIELD(fpar_raster,par,tmin,tmin_min,tmin_max,LUE_optimal)
```

Arguments

fpar_raster	fraction of photosynthetically active radiation (fpar) per day raster with .tif format
par	clear sky surface photosynthetically active radiation (par) per day raster with .nc file format.
tmin	Minimum temperature at 2 metres since previous post-processing per day raster with .nc file format.
tmin_min	minimum value of tmin used for the threshold
tmin_max	maximum value of tmin used for the threshold
LUE_optimal	optical lue value with respect to crop type for example wheat crop LUE_optimal is 3.0 (Djumaniyazova et al., 2010)

Format

A Biomass raster

Value

Yield raster

References

Djumaniyazova Y, Sommer R, Ibragimov N, Ruzimov J, Lamers J & Vlek P (2010) Simulating water use and N response of winter wheat in the irrigated floodplains of Northwest Uzbekistan. Field Crops Research 116, 239-251.

Shi Z, Ruecker G R,Mueller M, Conrad C, Ibragimov N, Lamers J P A, Martius C, Strunz G, Dech S & Vlek P L G (2007) Modeling of Cotton Yields in the Amu Darya River Floodplains of Uzbekistan Integrating Multitemporal Remote Sensing and Minimum Field Data. Agronomy Journal 99, 1317-1326.

Examples

```
## Not run:
## load the data
data(fpar)
data(par1)
data(tmin)
LUE_YIELD(fpar,par1,tmin,-2,12,3)

## End(Not run)
library(raster)
fparr <- raster(nc=2, nr=2)
values(fparr)<-runif(ncell(fparr),min =0.2,max= 0.8)
par11<- brick(nc=2, nr=2, nl=2)
values(par11)<-runif(ncell(par11),min =169076.9,max= 924474.6)
tminn <- brick(nc=2, nr=2, nl=2)
values(tminn)<-runif(ncell(tminn),min = 278,max= 281)
LUE_YIELD(fparr,par11,tminn,-2,12,3)
```

`LUE_YIELD_VPD` *Light Use Efficiency Model to Estimate Crop Yield with Vapour Pressure Deficit*

Description

LUE_YIELD_VPD() to estimate crop yield firstly by calculating the Absorbed Photosynthetically Active Radiation (APAR) and secondly the actual values of light use efficiency by including vapour pressure deficit of the crops Shi et al.(2007) <doi:10.2134/agronj2006.0260>.

Usage

```
LUE_YIELD_VPD(fpar_raster,par,tmin,tmax,tdew,
tmin_min,tmin_max,vpd_max, vpd_min,LUE_optimal)
```

Arguments

`fpar_raster`	fraction of photosynthetically active radiation (fpar) per day raster with .tif format

par	clear sky surface photosynthetically active radiation (par) per day raster with .nc file format.
tmin	Minimum temperature at 2 metres since previous post-processing per day raster with .nc file format.
tmax	Maximum temperature at 2 metres since previous post-processing per day raster with .nc file format.
tdew	Dewpoint temperature at 2 metres since previous post-processing per day raster with .nc file format.
tmin_min	minimum value of tmin used for the threshold
tmin_max	maximum value of tmin used for the threshold
vpd_max	maximum value of vapour pressure deficit used for the threshold
vpd_min	minimum value of vapour pressure deficit used for the threshold
LUE_optimal	optical lue value with respect to crop type for example wheat crop LUE_optimal is 3.0 (Djumaniyazova et al., 2010)

Format

A Biomass raster

Value

Yield raster

References

Djumaniyazova Y, Sommer R, Ibragimov N, Ruzimov J, Lamers J & Vlek P (2010) Simulating water use and N response of winter wheat in the irrigated floodplains of Northwest Uzbekistan. Field Crops Research 116, 239-251.

Shi Z, Ruecker G R,Mueller M, Conrad C, Ibragimov N, Lamers J P A, Martius C, Strunz G, Dech S & Vlek P L G (2007) Modeling of Cotton Yields in the Amu Darya River Floodplains of Uzbekistan Integrating Multitemporal Remote Sensing and Minimum Field Data. Agronomy Journal 99, 1317-1326.

Examples

```
## Not run:
## load the data
data(fpar)
data(par1)
data(tmin)
data(tmax)
data(tdew)
LUE_YIELD_VPD(fpar,par1,tmin,tmax,tdew,-2,12,1.5,4,3)

## End(Not run)
library(raster)
fparr <- raster(nc=2, nr=2)
values(fparr)<-runif(ncell(fparr),min =0.2,max= 0.8)
```

```
par11<- brick(nc=2, nr=2, nl=2)
values(par11)<-runif(ncell(par11),min =169076.9,max= 924474.6)
tminn <- brick(nc=2, nr=2, nl=2)
values(tminn)<-runif(ncell(tminn),min = 278,max= 281)
tmaxx <- brick(nc=2, nr=2, nl=2)
values(tmaxx)<-runif(ncell(tmaxx),min = 278,max= 281)
tdeww <- brick(nc=2, nr=2, nl=2)
values(tdeww)<-runif(ncell(tdeww),min = 278,max= 281)
LUE_YIELD_VPD(fparr,par11,tminn,tmaxx,tdeww,-2,12,1.5,4,3)
```

---

par1 *Photosynthetically Active Radiation*

Description

Input par dataset

Usage

```
par1
```

Format

A rasterbrick (.nc)

---

tdew *Dewpoint Temperature*

Description

Input dewpoint temperature dataset

Usage

```
tdew
```

Format

A rasterbrick (.nc)

tmax *Maximum temperature data*

Description

Input maximum temperature dataset

Usage

```
tmax
```

Format

A rasterbrick (.nc)

tmin *Minimum temperature data*

Description

Input minimum temperature dataset

Usage

```
tmin
```

Format

A raster (.nc)

Index