Package 'AquaBEHER'

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Type Package

Title Estimation of rainy season calandar and soil water balance for agriculture

Version 0.1.0

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Description This R package computes and integrates daily reference evapotranspiration (Eto) into FAO56 water balance model. The AquaBEHER package can estimate daily parameters of crop and soil water balances parameters for agricultural crops. The package can also estimate rainy season calandar (Onset, Cessation and Duration) based on agroclimatic approach.

License GPL (>= 3)

Encoding UTF-8

LazyData true

RoxygenNote 7.2.1

Roxygen list(markdown = TRUE)

Suggests knitr, rmarkdown

VignetteBuilder knitr

Depends R (>= 2.10)

R topics documented:

calcEto *Potential Evapotranspiration*

Description

This function calculates Penman-Monteith, Priestley Taylor and Hargreaves-Samani Potential Evapotranspiration using the method described by Allen et al, (1998)

Usage

```
calcEto(data)
```

Arguments

data	= a dataframe containing the required climate variables: Columns must contain the following parameters:

```
Station_Name: weather station name
Lat: latitude of the site in decimal degrees [°]
Lon: longitude of the site in decimal degrees [°]
Elev: elevation above sea level [m]
Year: year in YYYY format
Month: month in MM format
Day: day of record
Tmax: daily maximum temperature at 2m height [°C]
Tmin: daily minimum temperature at 2m height [°C]
```

Value

The function generates a list containing the following components:

`ET.Daily`: Daily estimations of reference crop evapotranspiration (mm/day)

`Ra.Daily`: Daily estimations of extraterristrial radiation (MJ/m2/day)

`Slope.Daily`: Daily estimations of slope of vapour pressure curve (kPa/°C)

`ET.type`: Type of the estimation obtained

References

Allen, R.G., L.S. Pereira, D. Raes, and M. Smith. 1998. 'Crop evapotranspiration-Guidelines for Computing Crop Water requirements

Examples

```
calcEto(climateData)
```

`calcSeasCal` *Rainy Season Calandar*

Description

This function calculates rainy season calander based on Agroclimatic approach

Usage

```
calcSeasCal(
  data,
  onsetWind.start,
  onsetWind.end,
  e_thresh = 0.25,
  AW_thr = 10,
  soilWHC
)
```

Arguments

`data`	= a dataframe. It should bu an object as returned by calcWatBal
`onsetWind.start`	onset start
`onsetWind.end`	onset end
`e_thresh`	thgreshold
`AW_thr`	PAW
`soilWHC`	Whater holding capacity of the soil

Value

The function generates a data frame containing the following components:

`Year:` year

`Onset.DOY:` onset in DOY

`Onset.index:` onset index

`Cesation.DOY:` ce in DOY

`Cesation.index:` ce in index

`SeasDur:` durtion of the season

References

Allen, R.G.; Pereira, L.S.; Raes, D.; Smith, M. Crop Evapotranspiration: Guidelines for Computing Crop Water Requirements; FAO Irrigation and Drainage Paper no. 56; FAO: Rome, Italy, 1998; ISBN 92-5-104219-5.

Doorenbos, J. and Pruitt, W.O. 1975. Guidelines for predicting crop water requirements, Irrigation and Drainage Paper 24, Food and Agriculture Organization of the United Nations, Rome, 179 p.

Examples

```
data(climateData)

Eto.daily <- calcEto(climateData)

climateData$Eto <- Eto.daily$ET.Daily

 soilWHC = 100

watBal.daily <- calcWatBal(climateData, soilWHC)

onsetWind.start = "1980-09-01"
onsetWind.end = "1981-01-31"

seasCal.dF <- calcSeasCal(watBal.daily, onsetWind.start, onsetWind.end,
                          e_thresh = 0.25, AW_thr = 10, soilWHC)
```

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calcWatBal *Soil Water Balance*

Description

This function calculates a daily water balance computation for the root zone according to algorithms described in the FAO Irrigation and drainage paper 56

Usage

```
calcWatBal(data, soilWHC)
```

Arguments

data	= a dataframe containing the required climate variables: Columns must contain the following parameters:

```
Station_Name: weather station name
Lat: latitude of the site in decimal degrees
Lon: longitude of the site in decimal degrees
Elev: elevation above sea level (m)
Year: year in YYYY format
Month: month in MM format
Day: day of record
Rain:
Tmax: daily maximum temperature at 2m height (°C)
Tmin: daily minimum temperature at 2m height (°C)
Eto:
```

soilWHC	Whater holding capacity of the soil

Value

The function generates a data frame containing the following components:

cumRAIN:

DEMAND:

RUNOFF:

ERATIO:

AVAIL:

References

Allen, R.G.; Pereira, L.S.; Raes, D.; Smith, M. Crop Evapotranspiration: Guidelines for Computing Crop Water Requirements; FAO Irrigation and Drainage Paper no. 56; FAO: Rome, Italy, 1998; ISBN 92-5-104219-5.

Doorenbos, J. and Pruitt, W.O. 1975. Guidelines for predicting crop water requirements, Irrigation and Drainage Paper 24, Food and Agriculture Organization of the United Nations, Rome, 179 p.

Examples

```
data(climateData)

Eto.daily <- calcEto(climateData)

climateData$Eto <- Eto.daily$ET.Daily

 soilWHC = 100

watBal.daily <- calcWatBal(climateData, soilWHC)

plot(watBal.daily$ERATIO*100, ty="l")
lines(watBal.daily$Eto, col="red")
lines(watBal.daily$Rain, col="blue")
```

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climateData *Raw Climate Data Required for Calculating Evapotranspiration*

Description

A example data set contains the raw climate data including the variables required for calculating evapotranspiration in function calcEto over the period between 1/1/1980 and 12/31/1984 at Nampula station in Mozambique.

Usage

```
data(climateData)
```

Format

A data frame with 1827 rows and 11 variables:

`Station_ID` weather station ID

`Station_Name` weather station name

`Lat` latitude of the site in decimal degrees

`Lon` longitude of the site in decimal degrees

`Elev` elevation above sea level in (m)

`Year` year of record "yyyy"

`Month` month of record "mm"

`Day` day of record "dd"

`Rain` daily rainfall in (mm)

`Tmax` daily maximum temperature at 2m height in (°C)

`Tmin` daily minimum temperature at 2m height in (°C)

Source

INAM - Instituto Nacional de Meteorologia, Mozambique

Examples

```
data(climateData)

head(climateData)
```

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