

Package ‘porce’

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Title Photosynthesis, allocation, Organic matter dynamics and
RadioCarbon Exchange (Porce) model

Version 0.0.1

Description

Set of functions, classes and methods to model carbon and radiocarbon dynamics in ecosystems.

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Depends R (>= 3.5.0)

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convolutionfun	<i>Convolution function</i>
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Description

Computes the convolution function between two functions f and g. Instead of returning a numerical value, this function returns a function.

Usage

```
convolutionfun(t, t0 = 0, f, g)
```

Arguments

t	a vector of time points
t0	initial time
f	a function to convolve
g	a function to convolve

Value

a convolution function between f and g

Examples

```
tms<-seq(0,10, by=0.1)
cosconvfun<-convolutionfun(f=cos, g=cos) # convolve cosine function with itself
solfun<-function(t){ (t*cos(t) + sin(t))/2} # analytical solution (Braun 1993, Dif Eq and App, Springer, p. 254)
x1<-sapply(X=tms, FUN=cosconvfun)
x2<-sapply(X=tms, FUN=solfun)

plot(tms, x1, type="l")
lines(tms, x2, col=2)
```

EmanuelModel	<i>Terrestrial carbon model of Emanuel</i>
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Description

This function returns the model of Emanuel as an object of class lam. It is mostly a constructor of the model to be used for further analysis.

Usage

```
EmanuelModel()
```

Value

a model of class lam

Examples

```
EmanuelModel()
```

equilibriumOutflux	<i>Equilibrium output flux for a linear autonomous model</i>
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Description

Equilibrium output flux for a linear autonomous model

Usage

```
equilibriumOutflux(model)
```

Arguments

model	an object of class lam, a linear autonomous model
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Value

a vector with the output fluxes for all compartments

equilibriumStock	<i>Equilibrium stocks for a linear autonomous model</i>
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Description

Equilibrium stocks for a linear autonomous model

Usage

```
equilibriumStock(model)
```

Arguments

model	an object of class lam, a linear autonomous model
-------	---

Value

a vector with the equilibrium stocks for all compartments

erf	<i>Equilibrium response function</i>
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Description

Builds an equilibrium response function from a model object of class lam

Usage

```
erf(model)
```

Arguments

model	A model of class lam
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Value

A function that takes time as main argument

Examples

```
EmanuelERF<-erf(model=EmanuelModel())
tms<-seq(0,100)
em<-sapply(tms, EmanuelERF)
plot(tms, em, type="l")
```

inputGPP	<i>Input vector from a scalar gpp value</i>
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Description

Input vector from a scalar gpp value

Usage

```
inputGPP(gpp, npools = 7)
```

Arguments

gpp	a scalar value of gross primary production
npools	integer. Number of pools in the system

Value

a vector of npool elements with GPP as first argument

Examples

```
inputGPP(25, 7)
```

irf	<i>Impulse response function</i>
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Description

Builds an impulse response function from a model object of class lam

Usage

```
irf(model)
```

Arguments

model A model of class lam

Value

A function that takes time as main argument

Examples

```
EmanuelIRF<-irf(model=EmanuelModel())
tms<-seq(0,100)
em<-sapply(tms, EmanuelIRF)
plot(tms, em, type="l")
```

lam-class	<i>Linear autonomous model</i>
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Description

Linear autonomous model

Value

An object of lam class

Slots

input numeric vector with inputs for each compartment.

matrix a compartmental matrix with dimension equal to length of input.

Examples

```
toyModel<-lam(input=c(1,2,3), matrix=diag(-1,3,3))
```

makeB	<i>Compartmental matrix from a set of prior parameters of Porce model</i>
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Description

This function builds a compartmental matrix of seven pools using a set of 16 parameter values. It is mostly used to build a matrix from the parameter values stored in the modpars dataset.

Usage

```
makeB(pars)
```

Arguments

`pars` a numeric vector of 16 parameter values

Value

A compartmental matrix of dimension 7

Examples

```
makeB(pars=modpars[1,])
```

modpars	<i>Model parameters for Porce</i>
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Description

A dataset of model parameters that can be used as prior information for the Porce model. The dataset corresponds to a seven pool model developed for the Porce region of Colombia.

Usage

```
data(modpars)
```

Format

An object of class `matrix` (inherits from `array`) with 1000 rows and 16 columns.

References

Sierra et al. (2021). *Journal of Ecology* 109(8): 2845–2855.

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