Package ‘isocalcR’

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Type Package
Title Isotope Calculations in R
Version 0.0.2
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Description Perform common calculations based on published stable isotope theory, such as calculating carbon isotope discrimination and intrinsic water use efficiency from wood or leaf carbon isotope composition. See Farquhar, O'Leary, and Berry (1982) <doi:10.1071/PP9820121>.
License GPL-3
URL https://github.com/justinmathias/isocalcR
BugReports https://github.com/justinmathias/isocalcR/issues
Depends R (>= 4.0.0)
Imports dplyr (>= 1.0.6)
Encoding UTF-8
Language en-US
LazyData true
Suggests rmarkdown, knitr, testthat (>= 3.0.0)
VignetteBuilder knitr
Config/testthat/edition 3
RoxygenNote 7.1.1
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Repository CRAN
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R topics documented:

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Description

Compiled records of atmospheric CO2 concentrations and stable carbon isotopes to reconstruct climate and derive plant ecophysiological indices from tree rings. Data are from Belmecheri, Lavergne, 2020, Dendrochronologia. Updated based on their methodology beyond C.E. 2019.

Usage

data(CO2data)

Format

A data frame with 2020 rows and 3 variables:

yr Year of CO2 and d13CO2 measurement
Ca Atmospheric CO2 concentration, in ppm
d13C.atm Atmospheric d13CO2, in per mille, %

Source


References


Examples

    data(CO2data)
    head(CO2data)
**Description**

Calculates leaf intercellular CO2 concentration given plant tissue d13C signature.

**Usage**

\[
d13C.to.Ci(d13C, year, elevation, temp, frac = 0)
\]

**Arguments**

- **d13C**: Measured plant tissue carbon isotope signature, per mille (‰)
- **year**: Year to which the sample corresponds
- **elevation**: Elevation (m.a.s.l.) of the sample, necessary to account for photorespiration processes
- **temp**: Leaf temperature (°C)
- **frac**: Post-photosynthetic fractionation factor, defaults to 0 assuming leaf material, user should supply reasonable value if from wood (generally -1.9 to -2.1)

**Value**

The concentration of leaf intercellular CO2 (Ci) in parts per million (ppm)

**References**


Examples

d13C.to.CiCa(-27, 2015, 900, 24)

<table>
<thead>
<tr>
<th>d13C.to.CiCa</th>
<th>d13C.to.CiCa</th>
</tr>
</thead>
</table>

Description

Calculates the ratio of the concentration of leaf intercellular to atmospheric CO2, unitless.

Usage

d13C.to.CiCa(d13C, year, elevation, temp, frac = 0)

Arguments

| d13C | Measured plant tissue carbon isotope signature, per mille (‰) |
| year | Year to which the sample corresponds |
| elevation | Elevation (m.a.s.l.) of the sample, necessary to account for photorespiration processes |
| temp | Leaf temperature (°C) |
| frac | Post-photosynthetic fractionation factor, defaults to 0 assuming leaf material, user should supply reasonable value if from wood (generally -1.9 - -2.1) |

Value

The ratio of leaf intercellular to atmospheric CO2 (Ci/Ca), unitless
References


Examples

d13C.to.CiCa(-27, 2015, 900, 24)

d13C.to.D13C

d13C.to.D13C

d13C.to.D13C

d13C.to.D13C

d13C.to.D13C

Description

Calculates leaf carbon isotope discrimination given plant tissue d13C signature.

Usage

d13C.to.D13C(d13C, year, frac = 0)
Arguments

d13C  Measured plant tissue carbon isotope signature, per mille (‰)

year  Year to which the sample corresponds

frac  Post-photosynthetic fractionation factor, defaults to 0 assuming leaf material, user should supply reasonable value if from wood (generally -1.9 - -2.1)

Value

Carbon isotope discrimination in units of per mille (‰)

References


Examples

d13C.to.D13C(-27, 2015)

d13C.to.diffCaCi  d13C.to.diffCaCi

Description

Calculates the difference between the atmospheric CO2 concentration and the leaf intercellular CO2 concentration in parts per mil (ppm)
Usage

d13C.to.diffCaCi(d13C, year, elevation, temp, frac = 0)

Arguments

d13C  Measured plant tissue carbon isotope signature, per mille (%)
year  Year to which the sample corresponds
elevation  Elevation (m.a.s.l.) of the sample, necessary to account for photorespiration processes
temp  Leaf temperature (°C)
frac  Post-photosynthetic fractionation factor, defaults to 0 assuming leaf material, user should supply reasonable value if from wood (generally -1.9 - -2.1)

Value

The difference between atmospheric and leaf intercellular CO2 concentrations (ppm).

References


Examples

d13C.to.diffCaCi(-27, 2015, 900, 24)

Description
Calculates leaf intrinsic water use efficiency given plant tissue d13C signature.

Usage

d13C.to.iWUE(d13C, year, elevation, temp, frac = 0)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>d13C</td>
<td>Measured plant tissue carbon isotope signature, per mille (‰)</td>
</tr>
<tr>
<td>year</td>
<td>Year to which the sample corresponds</td>
</tr>
<tr>
<td>elevation</td>
<td>Elevation (m.a.s.l.) of the sample, necessary to account for photorespiration processes</td>
</tr>
<tr>
<td>temp</td>
<td>Leaf temperature (°C)</td>
</tr>
<tr>
<td>frac</td>
<td>Post-photosynthetic fractionation factor, defaults to 0 assuming leaf material, user should supply reasonable value if from wood (generally -1.9 - -2.1)</td>
</tr>
</tbody>
</table>

Value
Intrinsic water use efficiency in units of micromol CO2 per mol H2O

References


Examples

d13C.to.iWUE(-27, 2015, 900, 24)
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