# Package ‘rshift’

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**Type** Package

**Title** Paleoecology Functions for Regime Shift Analysis

**Version** 2.1.1

**Description** Contains a variety of functions, based around
regime shift analysis of paleoecological data.
Citations:
Rodionov() from Rodionov (2004) <doi:10.1029/2004GL019448>
Lanzante() from Lanzante (1996) <doi:10.1002/(SICI)1097-0088(199611)16:11%3C1197::AID-JOC89%3E3.0.CO;2-L>
Hellinger_trans from Numerical Ecology, Legendre & Legendre (ISBN 9780444538680)
rolling_autoc from Liu, Gao & Wang (2018) <doi:10.1016/j.scitotenv.2018.06.276>
Sample data sets lake_data & lake_RSI processed from Bush, Silman & Urrego (2004) <doi:10.1126/science.1090795>.

**Suggests** R.rsp

**VignetteBuilder** R.rsp

**Depends** R (>= 3.5.0)

**Imports** grid, zoo, tibble, dplyr, ggplot2, magrittr

**License** MIT + file LICENSE

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.2

**NeedsCompilation** no

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**Repository** CRAN

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# R topics documented:



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## absolute_to_percentage *Converts absolute abundance data to a percentage of total abundance for each site*

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### Description

Converts absolute abundance data to a percentage of total abundance for each site

### Usage

```
absolute_to_percentage(data, col, site)
```

### Arguments

| | |
|---|---|
| `data` | The dataframe to be used. |
| `col` | The column that change is being measured on. |
| `site` | The column containing the site of each sample. |

### Value

The ‘data‘ dataframe with an added ’percentage’ column.

Hellinger_trans *Hellinger transform*

## Description

Hellinger transforms data (Legendre and Legendre, Numerical Ecology)

## Usage

```
Hellinger_trans(data, col, site)
```

## Arguments

| | |
|---|---|
| data | The dataframe to be used. |
| col | The column that change is being measured on. |
| site | The column containing the site of each sample. |

## Value

The ‘data‘ dataframe with an added ’hellinger_trans_vals’ column.

lake_data *DCA-ordinated pollen data from Lake Consuelo*

## Description

A dataset containing pre-processed DCA-ordinated data from Bush, Silman & Urrego (2004) <doi:10.1126/science.1090795>

## Usage

```
data(lake_data)
```

## Format

A data frame with 39 rows and 2 variables

## Details

- DCA1 - DCA values for each timepoint from the raw dataset.
- Age - timepoint of each sample that has been DCA-ordinated.

`lake_RSI` *DCA-ordinated pollen data from Lake Consuelo with RSI values*

## Description

A dataset containing pre-processed DCA-ordinated data from Bush, Silman & Urrego (2004) <doi:10.1126/science.1090795>. This data has been processed using Rodionov(lake_data, "DCA1", "Age", l=5, merge=TRUE)

## Usage

```
data(lake_RSI)
```

## Format

A data frame with 39 rows and 3 variables

## Details

- DCA1 - DCA values for each timepoint from the raw dataset.
- Age - timepoint of each sample that has been DCA-ordinated.
- RSI - Regime Shift Index (see docs for Rodionov()) for each timepoint.

`Lanzante` *Lanzante L-test*

## Description

performs the L-method for detection of regime shifts (Lanzante, 1996)

## Usage

```
Lanzante(data, col, time, p = 0.05, merge = FALSE)
```

## Arguments

| | |
|---|---|
| `data` | The dataframe to be used. |
| `col` | The column we are measuring change on. |
| `time` | The column containing time units (e.g. age of a subsample) |
| `p` | The largest p-value you want to check regime shifts for. Defaults to p = 0.05. |
| `merge` | Sets the result to be either a regime-shift only table (if FALSE), or an addition to the original table (if TRUE) |

### Value

If merge = FALSE (default), produces a 2-column table of time (the time value for each regime shift) and p (the p-value for each regime shift). If merge = TRUE, returns the original dataset with an extra p-value column, giving the p-value for each time unit - 0 for non-shift years.

### Examples

```
Lanzante(lake_data, "DCA1", "Age")
Lanzante(lake_data, "DCA1", "Age", p=0.10, merge=TRUE)
```

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## Rodionov — *Rodionov (2004)'s STARS algorithm*

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### Description

performs STARS analysis (Rodionov, 2004) on a dataset

### Usage

```
Rodionov(data, col, time, l, prob = 0.95, startrow = 1, merge = FALSE)
```

### Arguments

| | |
|---|---|
| `data` | The dataframe to be used. |
| `col` | The column we are measuring change on. |
| `time` | The column containing time units (e.g. age of a subsample) |
| `l` | The cut-off length of a regime; affects sensitivity (see Rodionov, 2004) |
| `prob` | The p-value for significance of a regime shift. Defaults to p = 0.05. |
| `startrow` | What row the analysis starts at. Defaults to 1. |
| `merge` | Sets the result to be either a regime-shift only table (if FALSE), or an addition to the original table (if TRUE) |

### Value

If merge = FALSE (default), produces a 2-column table of time (the time value for each regime shift) and RSI (the regime shift index for each regime shift). If merge = TRUE, returns the original dataset with an extra RSI column, giving the regime shift index for each time unit - 0 for non-shift years.

### Examples

```
Rodionov(lake_data, "DCA1", "Age", l=5)
Rodionov(lake_data, "DCA1", "Age", l=5, prob=0.99, startrow=2, merge=TRUE)
```

## rolling_autoc *Rolling autocorrelation*

### Description

finds lag-1 autocorrelation in a rolling window; can be used to predict resilience (Liu, Gao, & Wang, 2018)

### Usage

```
rolling_autoc(data, col, l)
```

### Arguments

| | |
|---|---|
| `data` | The dataframe that will be used. |
| `col` | The column we are measuring change on. |
| `l` | The time interval (no. of columns) used in the autocorrelation. |

### Value

A table of rolling lag-1 autocorrelation values.

## RSI_graph *Regime Shift Index graph*

### Description

creates two graphs, one of data and one of the RSI, as seen in Rodionov (2004)

### Usage

```
RSI_graph(data, col, time, rsi)
```

### Arguments

| | |
|---|---|
| `data` | The dataframe that will be used. |
| `col` | The column we are measuring change on. |
| `time` | The column containing time units (e.g. age of a subsample) |
| `rsi` | The column containing RSI values (for best visualisation use Rodionov() with merge=TRUE) |

### Value

Two graphs, one on top of the other; one of col against time and one of RSI against time.

## Examples

```
RSI_graph(lake_RSI, "DCA1", "Age", "RSI")
```

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