ASSOCIATION FOR TREE-RING RESEARCH

GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE

DENDROTOOLS R PACKAGE: DENDROCLIMATOLOGICAL ANALYSIS USING DAILY CLIMATE DATA AND SIMPLE NONLINEAR MACHINE LEARNING METHODS

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PRE-CONFERENCE
ONLINE WORKSHOP
Lund, Sweden

KEYWORDS OF THE WORKSHOP

Daily climate data

dendroTools R package

Sources of daily data

Daily vs. monthly analysis

Partial correlation coefficients

Machine learning

Nonlinear models

DAILY CLIMATE DATA

WHY SHOULD WE CONSIDER DAILY DATA?

12 months versus 365 days

The optimal signal is most likely outside of monthly boundaries

The ability of studying temporal shifts in optimal climate signals

GREAT BUT THERE IS NO DAILY CLIMATE DATA, RIGHT?

KNMI Climate Explorer – daily fields and daily observations

https://climexp.knmi.nl/selectdailyfield2.cgi?id=someone@somewhere

Select a field by following its link (alternative)

Observations	Tmean	Tmax	Tmin	Prcp	SLP	Glob. Rad.	Elev	
CPC 0.5° global 1979-now				x,x				
CPC 0.25° CONUS 1948-now				x,x				
GPCC 1° 1988-now				x,x				
GPCP v1.3 1° 1997-now				x				
CMORPH 0.5° 1998-now				x				
CHIRPS 2.0 Africa 0.25° 1981-now				x				
KNMI Radar 1km 2009-now				x				
GPM IMERG V06 2000-now				0.5°, 0.2°				
UMD/NCEI 1° OLR 1979-now				x				
Berkeley 1880-now 1° anomalies	x	x	x					
Berkeley 1880-now 1° full	x	x	x					
E-OBS 1920-now 0.25° Europe	x	x	x	x	x	x	x	
AWAP 1900/1910-now 0.25° Australia		x	x	x				
SST OI v2 1982-now	SST, anomaly							
Copernicus 1/4°	sea level anomaly, dynamic topography, zonal geostrophic velocity, meridional geostrophic velocity							

GREAT BUT THERE IS NO DAILY CLIMATE DATA, RIGHT?

KNMI Climate Explorer – daily fields and daily observations

https://climexp.knmi.nl/selectdailyfield2.cgi?id=someone@somewhere

Select a daily time series

Historical observations

GHCN-D	pure ECA&D	blended ECA&D	HCDN
○precipitation ○precip+GTS	○precipitation	○precipitation	○US runoff
○average temperature	○mean temperature	○mean temperature	
○minimum temperature	○minimum temperature	○minimum temperature	
○maximum temperature	○maximum temperature	○maximum temperature	
○snowfall	○pressure	○pressure	
○snow depth	○snow depth	○snow depth	
	○cloud cover	○cloud cover	
	○global radiation	○global radiation	
(full lists)	wind ○speed ○gust ○direction	wind ○speed ○gust ○direction	

Select

- stations with a name containing
- 10 stations near °N, °E (world map)

GREAT BUT THERE IS NO DAILY CLIMATE DATA, RIGHT?

E-OBS Gridded Climate Datasets

- 1950 – 2021 (recent)
- updated regularly
- 1920 – 1950 (research status)
- 0.1 and 0.25 deg. regular grid

Version	Release date	Period covered	Modification
23.1e	March 2021	1950-01-01 - 2020-12-31	E-OBS v23.1e has been extended with relative humidity fields (abbreviation HU, starting 1980-01-01). Global radiation is now available from 1950-01-01 onwards. The full ensemble (100 members for temperature, precipitation, sea level pressure and relative humidity, 10 for radiation) can be made available on request. New series have been included for Ukraine. Precipitation series for Serbia have been shifted by 1 day since 2009. Continued monthly, half-yearly and yearly updates for Germany, Czech Republic, Bosnia and Herzegovina, Norway, Slovenia, Finland, Ireland, Sweden, Luxembourg, Netherlands, Portugal, Spain, Switzerland, France, Denmark, UK and the regional meteorological service of Catalonia (Spain). More detailed information can be found on the page comparing versions 23.0e and 22.0e. Note that on 30 March 2021 all v23.0e files have been replaced with v23.1e. This replacement affects only the temperature datasets for the period Jun-Dec 2020 over an area in Northern France.
22.0e	December 2020	1950-01-01 - 2020-06-30	The full ensemble (100 members for temperature, precipitation and sea level pressure, 10 for radiation) can be made available on request. New series and updates have been included for Russia, France and Calabria (Italy). Some series in Scandinavian countries that were not provided by their own national meteorogical services have been removed. Precipitation series in Norway have been shifted by one day due to an error in the processing of these data in E-OBSv21.0e. Continued monthly, half-yearly and yearly updates for Germany, Czech Republic, Bosnia and Herzegovina, Norway, Slovenia, Finland, Ireland, Sweden,

GREAT BUT THERE IS NO DAILY CLIMATE DATA, RIGHT?

A forcings dataset of gridded land surface blend of CRU and Japanese reanalysis (JRA) data

- https://archive.ceda.ac.uk/
- Global 0.5 deg. regular grid
- 1900 – 2019
- 6 hourly time-step

Update Frequency:	Not Planned
Status:	Completed
Online Status:	ONLINE
Publication State:	Published
Publication Date:	2020-11-26
Download Stats:	last 12 months

Coverage

Temporal Range

Start time:	1901-01-01T00:00:00
End time:	2019-12-31T23:59:59

Geographic Extent

90.0000°

GREAT BUT THERE IS NO DAILY CLIMATE DATA, RIGHT?

- Joint Research Centre, AgriForCast Resources Portal
- ERA5 hourly data on pressure levels from 1979 to present
- CHELSA – Free climate data at high resolution
- NOAA daily datasets
- National meteorological agencies

DENDROTOOLS R PACKAGE

dendroTools: Linear and Nonlinear Methods for Analyzing Daily and Monthly Dendroclimatological Data

Provides novel dendroclimatological methods, primarily used by the Tree-ring research community. There are four core functions. The first one is daily_response(), which finds the optimal sequence of days that are related to one or more tree-ring proxy records. Similar function is daily_response_seascorr(), which implements partial correlations in the analysis of daily response functions. For the enthusiast of monthly data, there is monthly_response() function. The last core function is compare_methods(), which effectively compares several linear and nonlinear regression algorithms on the task of climate reconstruction.

Version:	1.1.3
Depends:	R (≥ 3.4)
Imports:	ggplot2 (≥ 2.2.0), brnn (≥ 0.6), reshape2 (≥ 1.4.2), scales (≥ 0.4.1), stats, oce (≥ 1.2-0), MLmetrics (≥ 1.1.1), dplyr (≥ 0.7.0), gridExtra (≥ 2.2.1), knitr (≥ 1.19), magrittr (≥ 1.5), plotly (≥ 4.7.1), randomForest (≥ 4.6-14), Cubist (≥ 0.2.2), lubridate (≥ 1.7.4), psych (≥ 1.8.3.3), boot (≥ 1.3-22), viridis (≥ 0.5.1)
Suggests:	testthat, dplR, rmarkdown
Published:	2021-03-16
Author:	Jernej Jevsenak [aut, cre]
Maintainer:	Jernej Jevsenak <jernej.jevsenak at gmail.com>
BugReports:	https://github.com/jernejjevsenak/dendroTools/issues
License:	GPL-3
URL:	https://github.com/jernejjevsenak/dendroTools
NeedsCompilation:	no
Citation:	dendroTools citation info
Materials:	NEWS
CRAN checks:	dendroTools results

DENDROTOOLS ON CRAN

https://cran.r-project.org/web/packages/dendroTools/index.html

Downloads:

Reference manual:	dendroTools.pdf
Vignettes:	Compare_different_regression_methods Examples_with_daily_climate_data
Package source:	dendroTools_1.1.3.tar.gz
Windows binaries:	r-devel: dendroTools_1.1.3.zip, r-release: dendroTools_1.1.3.zip, r-oldrel: dendroTools_1.1.3.zip
macOS binaries:	r-release: dendroTools_1.1.3.tgz, r-oldrel: dendroTools_1.1.3.tgz
Old sources:	dendroTools archive

Linking:

Please use the canonical form https://CRAN.R-project.org/package=dendroTools to link to this page.

DENDROTOOLS MANUAL

R topics documented:

dendroTools Installation

```
> # 1 from CRAN
> install.packages("dendroTools") # from CRAN

> # 2 from GitHub current version under development
> library("devtools")
> devtools::install_github("jernejjevsenak/dendroTools")
```

Dendrochronologia 48 (2018) 32–39

Contents lists available at ScienceDirect

Dendrochronologia

journal homepage: www.elsevier.com/locate/dendro

dendroTools: R package for studying linear and nonlinear responses between tree-rings and daily environmental data

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Dendrochronologia 63 (2020) 125753

Contents lists available at ScienceDirect

Dendrochronologia

journal homepage: www.elsevier.com/locate/dendro

TECHNICAL NOTE

New features in the *dendroTools* R package: Bootstrapped and partial correlation coefficients for monthly and daily climate data

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Quaternary Science Reviews 221 (2019) 105868

Contents lists available at ScienceDirect

Quaternary Science Reviews

journal homepage: www.elsevier.com/locate/q

Daily climate data reveal stronger climate-growth relationships for an extended European tree-ring network

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daily_response()

daily_response()

daily_response *daily_response*

Description

Function calculates all possible values of a selected statistical metric between one or more response variables and daily sequences of environmental data. Calculations are based on moving window which is defined with two arguments: window width and a location in a matrix of daily sequences of environmental data. Window width could be fixed (use fixed_width) or variable width (use lower_limit and upper_limit arguments). In this case, all window widths between lower and upper limit will be used. All calculated metrics are stored in a matrix. The location of stored calculated metric in the matrix is indicating a window width (row names) and a location in a matrix of daily sequences of environmental data (column names).

```
daily_response <- function(
response, env_data, method = "lm",  metric = 'r.squared', cor_method
= 'pearson', lower_limit = 30, upper_limit = 90, fixed_width = 0,
previous_year = FALSE, neurons = 1, brnn_smooth = TRUE,
remove_insignificant = TRUE, alpha = .05, row_names_subset = FALSE,
PCA_transformation = FALSE, log_preprocess = TRUE,
components_selection = 'automatic', eigenvalues_threshold = 1,
N_components = 2, aggregate_function = 'mean',
temporal_stability_check = 'sequential', k = 2, k_running_window =
30,cross_validation_type = 'blocked', subset_years = NULL,
plot_specific_window = NULL, ylimits = NULL, seed = NULL,
tidy_env_data = FALSE, reference_window = 'start',  boot = FALSE,
boot_n = 1000, boot_ci_type = "norm", boot_conf_int = 0.95)
```

daily_response()

response
[1 x n]

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

env_data
[366 x n]

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

daily_response()

aggregate_function = 'mean'/'median'/'sum'

window_width = 4

lower_limit
upper_limit

response
[1 x n]

env_data
[366 x n]

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-6.12
2.08
-0.24
-1.5
-3.34
6.78
1.32
-2.52
3.7
-4.46
4.22
-1.42
1.06
1.14
4.42
-2.22
-4.32
0.82
0.22
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi	Temp
2015	1.203	-6.12
2014	1.051	2.08
2013	1.706	-0.24
2012	0.892	-1.5
2011	0.942	-3.34
2010	0.771	6.78
2009	1.436	1.32
2008	0.747	-2.52
2007	0.976	3.7
2006	1.091	-4.46
2005	0.763	4.22
2004	0.732	-1.42
2003	0.675	1.06
2002	0.83	1.14
2001	0.813	4.42
2000	0.746	-2.22
1999	0.671	-4.32
1998	0.861	0.82
1997	1.383	0.22
…	…	…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-6.12
2.08
-0.24
-1.5
-3.34
6.78
1.32
-2.52
3.7
-4.46
4.22
-1.42
1.06
1.14
4.42
-2.22
-4.32
0.82
0.22
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
1.18
-6.42
3.58
-0.92
-1.8
-1.62
6.48
1.18
-2.32
6.32
-4.9
3.34
-2.42
1.54
1.2
3.84
-1.48
-5.06
-0.7
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
1.7
-5.46
5.62
-1.02
-1.96
-0.62
5.52
1.6
-2.86
8.1
-5.2
1.36
-2.82
1.18
1.38
4.76
-0.76
-5.24
-1.08
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
0.72
-4.08
5.38
-0.26
-1.16
-0.5
5.68
0.32
-3.92
6.92
-3.48
0.2
-1.6
1.34
0.36
4.34
1.44
-3.86
-0.44
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-0.32
-2.74
4.66
0.38
-0.18
-0.82
5.64
-0.8
-4.66
6.02
-1.06
-1.5
0.96
1.2
-1.38
3.66
4.08
-1.68
1
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21				

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-1.14
-0.84
3.46
0.66
0.56
-1.24
5.94
-1.48
-5.22
5.12
0.2
-2.5
3.38
0.94
-3.16
3.16
5.84
0.14
2.3
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01				

daily_response()

aggregate_function = 'mean'/'median'/'sum'

window_width = 4

response
[1 x n]

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-1.1
1.04
1.68
0.72
1.24
-1.46
6.44
-2.1
-5.66
2.92
1.4
-2.9
5.94
1
-5.26
2.12
6.9
1.5
3.16
…

env_data
[366 x n]

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11			

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-1.08
2.8
0.24
2.08
1.8
-1
4.86
-3.42
-7.74
2.4
1.14
-3.46
7.7
3.36
-7.48
0.44
6.94
2.68
2.64
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11			

daily_response()

aggregate_function = 'mean'/'median'/'sum'

window_width = 4

response
[1 x n]

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
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2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-0.6
2.92
0.84
3.54
1.34
-0.64
3.4
-3.18
-6.86
3.76
0.74
-3.58
7.1
4.06
-6.82
0.3
6.08
2.38
1.64
…

env_data
[366 x n]

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12		

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 4

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-1.08
2.8
0.24
2.08
1.8
-1
4.86
-3.42
-7.74
2.4
1.14
-3.46
7.7
3.36
-7.48
0.44
6.94
2.68
2.64
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 5

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-0.6
2.92
0.84
3.54
1.34
-0.64
3.4
-3.18
-6.86
3.76
0.74
-3.58
7.1
4.06
-6.82
0.3
6.08
2.38
1.64
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11									

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 5

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
0.35
-6.17
3.38
-0.38
-1.70
-2.63
6.72
1.00
-2.73
4.82
-4.55
3.08
-1.65
1.33
1.22
4.63
-1.73
-4.48
0.57
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17								

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 5

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
1.45
-5.82
4.58
-0.90
-1.65
-1.40
5.75
1.52
-2.53
7.27
-4.65
1.98
-2.32
1.37
1.32
4.67
-1.05
-4.78
-0.48
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05							

daily_response()

aggregate_function = 'mean'/'median'/'sum'

window_width = 5

response
[1 x n]

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
0.88
-4.42
4.52
-0.23
-1.00
-1.05
5.93
0.68
-3.32
6.78
-3.53
1.32
-1.57
1.15
0.40
3.93
0.87
-3.92
-0.45
…

env_data
[366 x n]

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12						

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 5

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-0.10
-3.15
4.30
0.07
-0.55
-0.82
5.77
-0.27
-4.48
6.03
-2.20
-0.10
0.03
1.20
-0.88
3.73
2.93
-2.60
0.28
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12	0.04					

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 5

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-0.62
-1.83
3.87
0.28
-0.13
-0.88
5.87
-1.15
-4.85
5.25
-0.82
-2.02
2.23
1.00
-2.43
3.18
4.73
-0.90
1.67
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12	0.04	0.01				

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 5

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-1.20
2.68
0.52
3.23
1.53
-0.93
3.87
-3.18
-6.93
3.40
1.32
-3.25
7.28
3.47
-6.87
0.37
6.80
2.60
2.02
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12	0.04	0.01	0.18			

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 5

	TRWi	Temp
2015	1.203	-0.6
2014	1.051	2.92
2013	1.706	0.84
2012	0.892	3.54
2011	0.942	1.34
2010	0.771	-0.64
2009	1.436	3.4
2008	0.747	-3.18
2007	0.976	-6.86
2006	1.091	3.76
2005	0.763	0.74
2004	0.732	-3.58
2003	0.675	7.1
2002	0.83	4.06
2001	0.813	-6.82
2000	0.746	0.3
1999	0.671	6.08
1998	0.861	2.38
1997	1.383	1.64
…	…	…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12	0.04	0.01	0.18	0.17		

daily_response()

aggregate_function = 'mean'/'median'/'sum'

window_width = 5

response
[1 x n]

	TRWi	Temp
2015	1.203	0.35
2014	1.051	-6.17
2013	1.706	3.38
2012	0.892	-0.38
2011	0.942	-1.70
2010	0.771	-2.63
2009	1.436	6.72
2008	0.747	1.00
2007	0.976	-2.73
2006	1.091	4.82
2005	0.763	-4.55
2004	0.732	3.08
2003	0.675	-1.65
2002	0.83	1.33
2001	0.813	1.22
2000	0.746	4.63
1999	0.671	-1.73
1998	0.861	-4.48
1997	1.383	0.57
…	…	…

env_data
[366 x n]

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12	0.04	0.01	0.18	0.17	0.21	…

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 6

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-1.20
2.68
0.52
3.23
1.53
-0.93
3.87
-3.18
-6.93
3.40
1.32
-3.25
7.28
3.47
-6.87
0.37
6.80
2.60
2.02
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12	0.04	0.01	0.18	0.17	0.21	…
6	0.15									

daily_response()

aggregate_function = 'mean'/'median'/'sum'

response
[1 x n]

env_data
[366 x n]

window_width = 6

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
1.45
-5.82
4.58
-0.90
-1.65
-1.40
5.75
1.52
-2.53
7.27
-4.65
1.98
-2.32
1.37
1.32
4.67
-1.05
-4.78
-0.48
…

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12	0.04	0.01	0.18	0.17	0.21	…
6	0.15	0.09								

daily_response()

aggregate_function = 'mean'/'median'/'sum'

window_width = 6

response
[1 x n]

	TRWi
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
…	…

Temp
-0.62
-1.83
3.87
0.28
-0.13
-0.88
5.87
-1.15
-4.85
5.25
-0.82
-2.02
2.23
1.00
-2.43
3.18
4.73
-0.90
1.67
…

env_data
[366 x n]

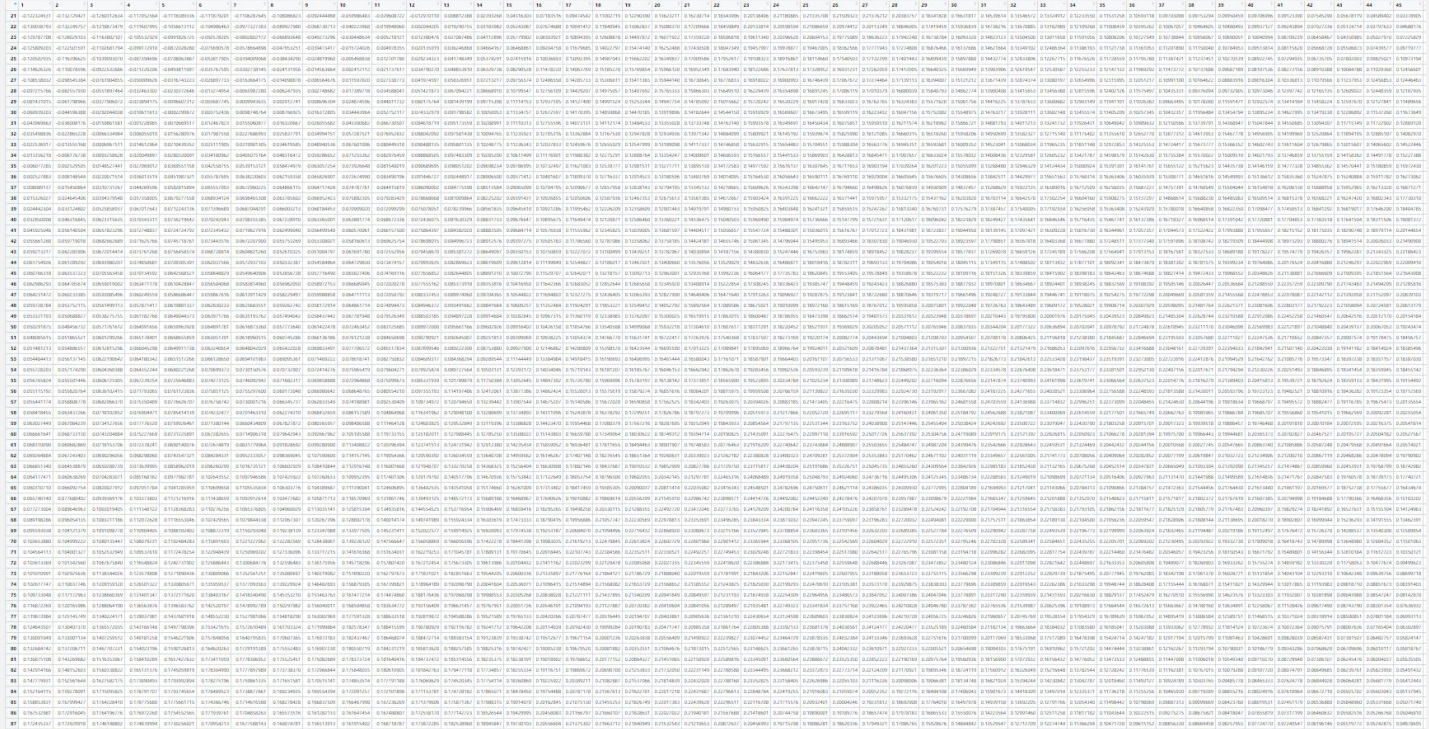
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2015	-3.8	0.2	1.7	1	2	1	2.8	-3.2	-4.2	-2.1	1.2	-0.1	-0.2	-1.8	-4.5	…
2014	-4.9	-7.6	-6.1	-5.2	-6.8	-6.4	-2.8	0.8	1.5	2.7	3	3.4	3.4	2.1	0.8	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

method = 'cor'/'lm'/'brnn'

final output matrix

4	0.10	0.09	-0.12	0.17	0.21	0.01	0.11	0.12	0.17	…
5	0.11	0.17	-0.05	0.12	0.04	0.01	0.18	0.17	0.21	…
6	0.15	0.09	0.05							

daily_response()



daily_response()

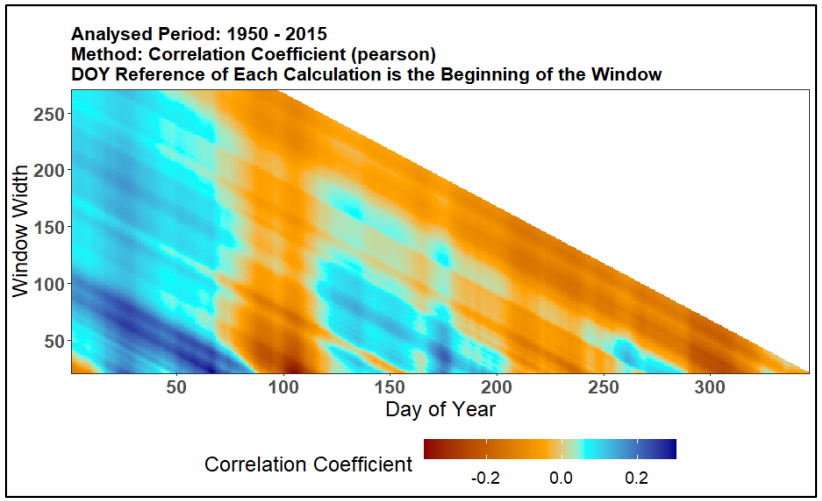
	1	2	3	4	5	6	7	8	9	10
21	-0.122324531	-0.132729421	-0.1260312634	-0.117052564	-0.1118389336	-0.111879201	-0.1106287645	-0.108086823	-0.092444488	-0.059986483
22	-0.130038793	-0.132249757	-0.1218873479	-0.111607995	-0.1056613112	-0.104986463	-0.0977327383	-0.089927980	-0.068730713	-0.040223968
23	-0.129787708	-0.128029103	-0.1163802107	-0.105532929	-0.0991826725	-0.092578205	-0.0802802172	-0.066893648	-0.049273296	-0.030448634
24	-0.125809203	-0.122501591	-0.1102681794	-0.099172910	-0.0872028280	-0.075690578	-0.0578664898	-0.047953251	-0.039473417	-0.015724026
25	-0.120502935	-0.116396625	-0.1039093070	-0.087394696	-0.0708063887	-0.053817905	-0.0394009068	-0.038434290	-0.024819960	-0.005468838
26	-0.114626326	-0.110078596	-0.0922532686	-0.071220206	-0.0493811097	-0.035767595	-0.0302738145	-0.024131956	-0.014563664	0.002412112
27	-0.108538032	-0.098545384	-0.0761904855	-0.050009626	-0.0316743223	-0.026897733	-0.0163664175	-0.014098878	-0.006564676	0.011597820
28	-0.097215766	-0.082557930	-0.0551897464	-0.032463302	-0.0230372646	-0.013274954	-0.0065987280	-0.006247935	0.002748682	0.017389718
29	-0.081431015	-0.061798966	-0.0377906072	-0.023894175	-0.0096607312	-0.003687745	0.0009943635	0.002912741	0.008696304	0.024874596
30	-0.060939203	-0.044596388	-0.0292044038	-0.010611613	-0.0002299872	0.003752436	0.0098748764	0.008766925	0.016372805	0.034443964
31	-0.043969663	-0.036008176	-0.0159861581	-0.001228985	0.0070669517	0.012467823	0.0155060877	0.016320667	0.026055682	0.043300682
32	-0.035498836	-0.022865228	-0.0066334984	0.006055010	0.0156280976	0.017987558	0.0227686993	0.025837791	0.034994151	0.057287521
33	-0.022536917	-0.013555168	0.0006967511	0.014612964	0.0210439352	0.025111905	0.0319901305	0.034619585	0.048940536	0.067601006
34	-0.013356218	-0.006176738	0.0093258628	0.020049897	0.0280320091	0.034180962	0.0405075164	0.048316472	0.059286652	0.071255362
35	-0.006077285	0.002529505	0.0148527441	0.027069012	0.0369551158	0.042558755	0.0539153121	0.058474979	0.063057254	0.073926648
36	0.002527883	0.008148544	0.0220071514	0.036013519	0.0451987321	0.055787695	0.0638220603	0.062159358	0.065826901	0.072674990
37	0.008089137	0.015450864	0.0310731267	0.044269596	0.0582815894	0.065557093	0.0672960225	0.064866115	0.064717428	0.074787761
38	0.015326027	0.024645406	0.0394379548	0.057358005	0.0679277558	0.068934124	0.0698465308	0.063785602	0.066952423	0.075882305
39	0.024442304	0.033124802	0.0525858937	0.067017643	0.0712243136	0.071396689	0.0687044291	0.066003213	0.068184453	0.070909020

daily_response()

	1	2	3	4	5	6	7	8	9	10
21	-0.122324531	-0.132729421	-0.1260312634	-0.117052564	-0.1118389336	-0.111879201	-0.1106287645	-0.108086823	-0.092444488	-0.059986483
22	-0.130038793	-0.132249757	-0.1218873479	-0.111607995	-0.1056613112	-0.104986463	-0.0977327383	-0.089927980	-0.068730713	-0.040223968
23	-0.129787708	-0.128029103	-0.1163802107	-0.105532929	-0.0991826725	-0.092578205	-0.0802802172	-0.066893648	-0.049273296	-0.030448634
24	-0.125809203	-0.122501591	-0.1102681794	-0.099172910	-0.0872028280	-0.075690578	-0.0578664898	-0.047953251	-0.039473417	-0.015724026
25	-0.120502935	-0.116396625	-0.1039093070	-0.087394696	-0.0708063887	-0.053817905	-0.0394009068	-0.038434290	-0.024819960	-0.005468838
26	-0.114626326									
27	-0.108538032									
28	-0.097215766									
29	-0.081431015									
30	-0.060939203									
31	-0.043969663									
32	-0.035498836									
33	-0.022536917									
34	-0.013356218									
35	-0.006077285									
36	0.002527883									
37	0.008089137									
38	0.015326027									
39	0.024442304									

Large matrix with all (possible) calculations

- e.g. lower_limit = 21, upper_limit = 270
- 55 375 calculations
- The location in the matrix describes the window used for the calculation



daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit

daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')

daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset

daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset

	TRW
2015	1.203
2014	1.051
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
1996	1.021

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
1996	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1995	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
1994	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…

daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset

	TRW
2015	1.203
2014	1.051
2013	1.706
2012	0.892
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2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
1996	1.021

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
1996	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1995	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
1994	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…

daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset

	TRW
2013	1.706
2012	0.892
2011	0.942
2010	0.771
2009	1.436
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2006	1.091
2005	0.763
2004	0.732
2003	0.675
2002	0.83
2001	0.813
2000	0.746
1999	0.671
1998	0.861
1997	1.383
1996	1.021

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	-0.2	-1	-0.6	-1	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	2.9	-0.7	-1.1	-2.2	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	-4.5	-2.8	-2	-3.8	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	-10.8	-8.8	-2.9	-2.4	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	3.1	6.5	8.4	2.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	-0.5	0.6	2.2	-1.1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	-4.1	-2.4	-2.2	-2.1	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	8.4	3.3	5.2	1.5	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	7.7	5.6	4	6.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	-8.3	-5.4	-3.8	-2.2	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	0.5	-0.3	0	0.9	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	4.8	5.5	6.1	5.4	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	1.2	-0.5	-1.1	-0.1	…
1996	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	3	2.2	2.2	-1.1	…

daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset
- previous_year

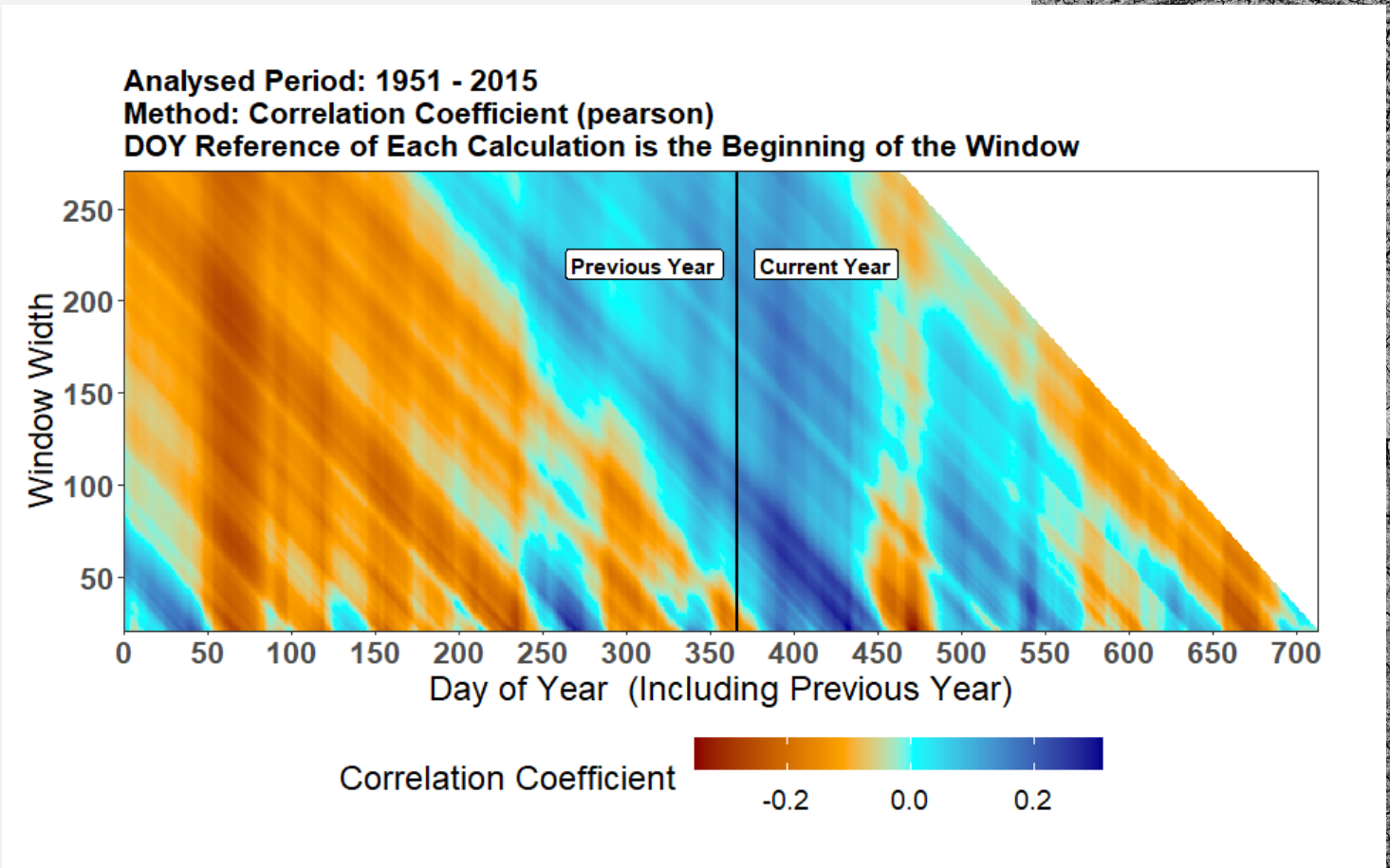
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-2.4	-1.2	-0.2	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	8	6.2	7	8.9	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	-3.9	-3.2	-2.9	-3.7	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	-5.6	-7.3	-5.8	-6	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	4.8	4.2	0.4	1	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	1.1	-1.6	-4.6	-4.6	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	4.7	8.2	8.6	10	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	1	0.5	0	3	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	-4.5	-7.1	-7.7	-8.9	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	-0.2	0.7	0.8	0.5	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	9	10.4	8	6	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	…
1996	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	2.7	3.7	3	1.5	…
1995	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	2.7	3.9	5	3.6	…
1994	-2.7	3.1	6.1	6.1	5.9	10.4	12	0.2	1.6	1.4	-0.6	…

	X1	X2	X3	X4	X5	X6	X7	…
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	…
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	…
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	…
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	…
2009	7.9	6.9	7.2	6.4	5.5	6.4	2.1	…
2008	0.1	1.1	2.5	2.4	0.5	-0.6	3.2	…
2007	-4.8	-0.9	-0.3	-3.6	-3	-3.8	-3.6	…
2006	-2.7	3.1	6.1	6.1	5.9	10.4	12	…
2005	-2.8	-1.9	-3.8	-7.9	-5.9	-5	-3.4	…
2004	1.8	5.1	6.9	6.9	0.4	-2.6	-4.8	…
2003	2.2	0.2	-1.4	-4.6	-3.5	-2.8	-1.8	…
2002	0.3	2.3	0.2	1.2	1.3	2.7	0.5	…
2001	1.3	1	0.6	1.6	1.2	1.6	1.9	…
2000	8.6	4.2	1.9	4.1	3.3	5.7	8.8	…
1999	-3	-2.5	-2	-2.8	-0.8	0.7	1.1	…
1998	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	…
1997	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	…
1996	-1.6	-2.5	-4.2	-7.2	-6.1	-5.3	-3.4	…
1995	6.9	2.5	-0.5	-3.3	-1.5	-0.7	0.6	…

daily_response()

KEY ARGUMENTS

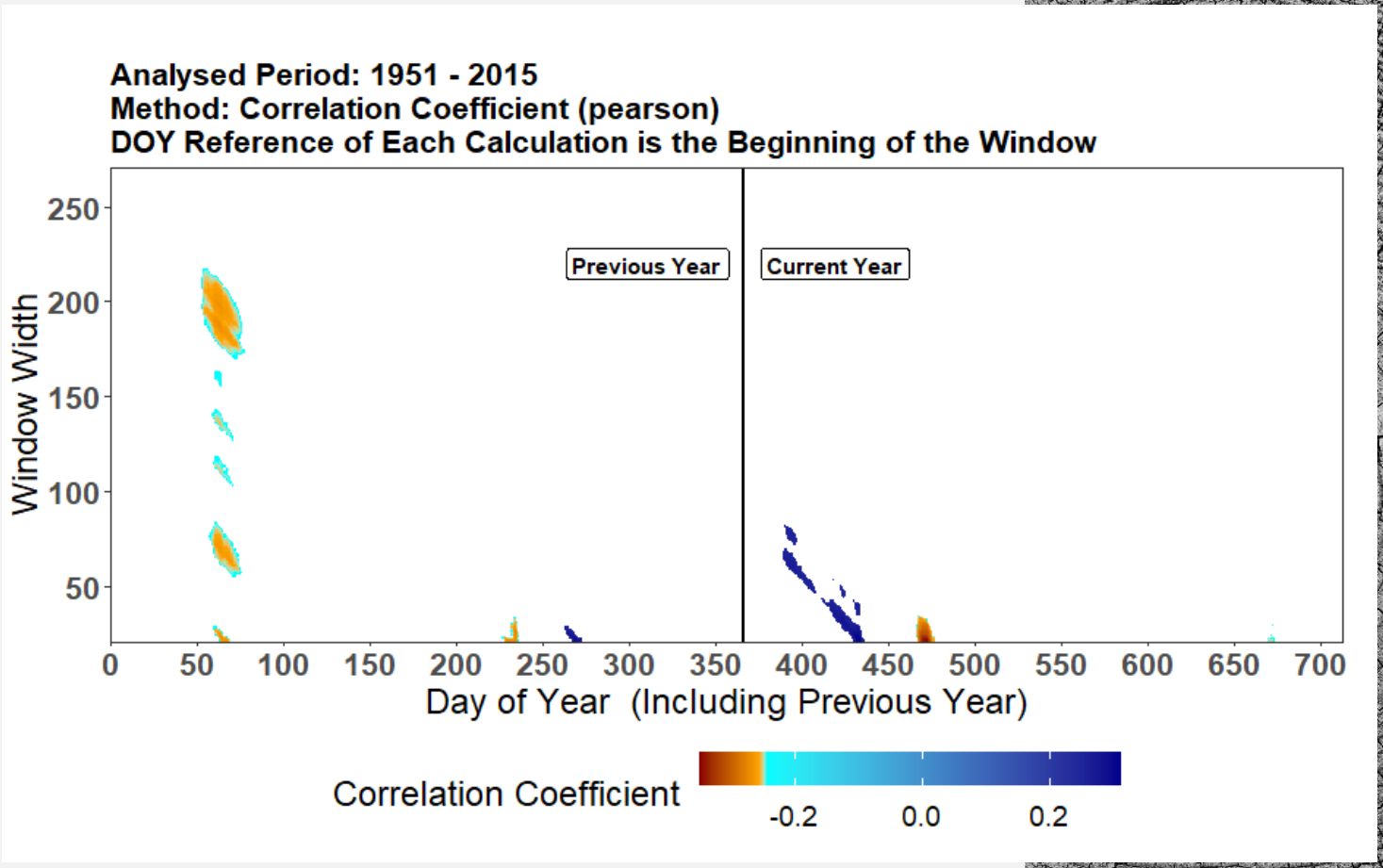
- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset
- previous_year



daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset
- previous_year
- remove_insignificant
- alpha

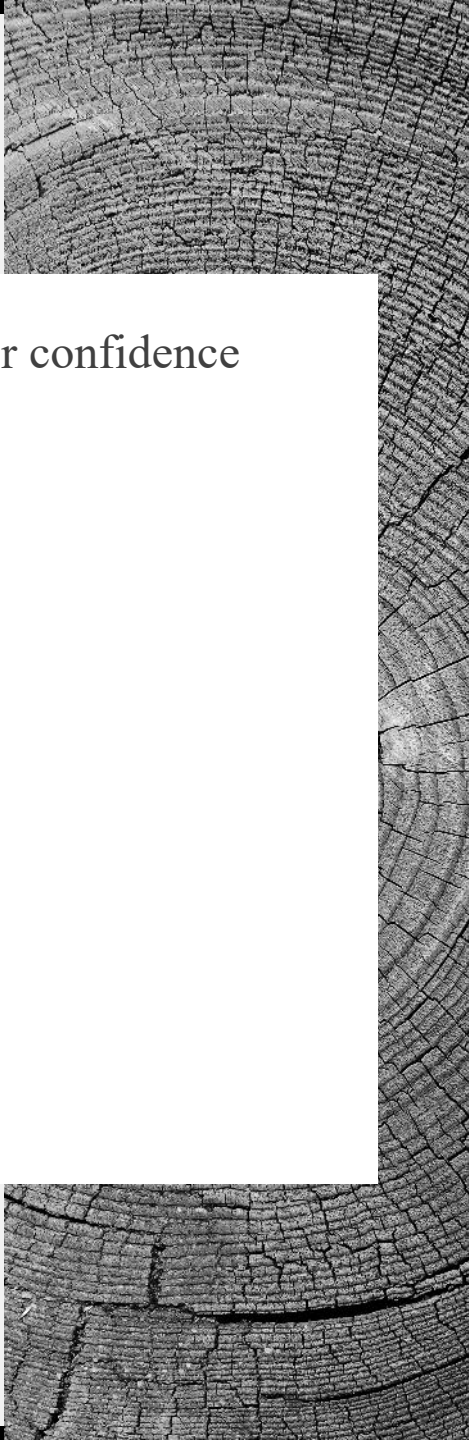


daily_response()

KEY ARGUMENTS

- response (your TRWi chronology)
- env_data (daily climate data)
- method, metric
- aggregate_function
- lower_limit, upper_limit
- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset
- previous_year
- remove_insignificant
- alpha
- boot, boot_n

- each calculation is bootstrapped, and lower and upper confidence intervals are given (examples to follow)



Examples 1 and 2 – climate data preparation and basic run