

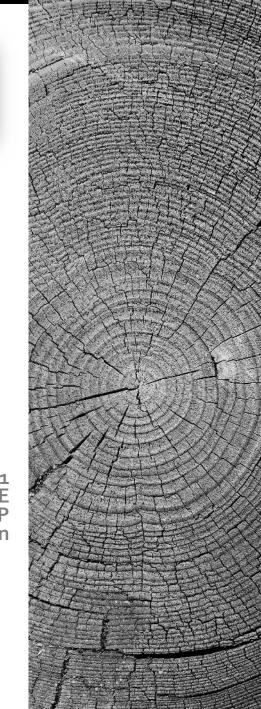


DENDROTOOLS R PACKAGE: DENDROCLIMATOLOGICAL ANALYSIS USING DAILY CLIMATE DATA AND SIMPLE NONLINEAR MACHINE LEARNING METHODS

TRACE 2021 PRE-CONFERENCE ONLINEWORKSHOP Lund, Sweden

Dr. Jernej Jevšenak jernej jevsenak (a) gozdis si

Slovenian Forestry Institute June 15, 2021



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



GREAT BUT THERE IS Select a daily time series NO DAILY CLIMATE **DATA, RIGHT?**

KNMI Climate Explorer - daily fields and daily observations

https://climexp.knmi.nl/sel ectdailyfield2.cgi?id=some one@somewhere

Historical observations

GHCN-D	pure ECA&D	blended ECA&D	HCDN I
Oprecipitation Oprecip+GTS	Oprecipitation	Oprecipitation	OUS runoff
Oaverage temperature	Omean temperature	Omean temperature	
Ominimum temperature	Ominimum temperature	Ominimum temperature	
Omaximum temperature	Omaximum temperature	Omaximum temperature	
Osnowfall	Opressure	Opressure	
Osnow depth	Osnow depth	Osnow depth	
	Ocloud cover	Ocloud cover	
	Oglobal radiation	Oglobal radiation	
(full lists)	wind Ospeed Ogust Odirection	wind Ospeed Ogust Odirection	
Select			i
• stations with a name co	ntaining		
• 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

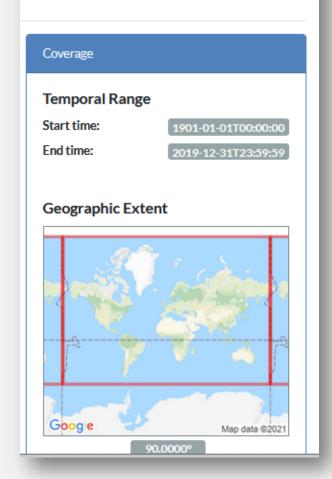
Version	Release date	Period covered	Modification
23.1e	March 2021	1950-01-01 - 2020-12-31	E-OBS v23.1e has been extended with relative humidity fields (abbreviation HU, starting 1980-01-01). Global radiation is now available from 1950-01-01 onwards. The full ensemble (100 members for temperature, precipitation, 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: Status: Online Status: Publication State: Publication Date: Download Stats: Not Planned Completed ONLINE Published 2020-11-26 last 12 months



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: $R (\geq 3.4)$

Imports: $ggplot2 (\ge 2.2.0)$, $\underline{brnn} (\ge 0.6)$, $\underline{reshape2} (\ge 1.4.2)$, $\underline{scales} (\ge 0.4.1)$, \underline{stats} , $\underline{oce} (\ge 1.2-0)$, $\underline{MLmetrics} (\ge 1.1.1)$, $\underline{dplyr} (\ge 0.7.0)$,

gridExtra ($\geq 2.2.1$), knitr (≥ 1.19), magrittr (≥ 1.5), plotly ($\geq 4.7.1$), randomForest ($\geq 4.6-14$), Cubist ($\geq 0.2.2$), lubridate ($\geq 1.7.4$),

<u>psych</u> (≥ 1.8.3.3), <u>boot</u> (≥ 1.3-22), <u>viridis</u> (≥ 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: <u>GPL-3</u>

URL: https://github.com/jernejjevsenak/dendroTools

NeedsCompilation: no

Citation: dendroTools citation info

Materials: NEWS

CRAN checks: dendroTools results

Downloads:

Reference manual: dendroTools.pdf

Vignettes: Compare different regression methods

Examples with daily climate data

Package source: <u>dendroTools 1.1.3.tar.gz</u>

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:

DENDROTOOLS ON CRAN

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



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

DENDROTOOLS MANUAL

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dendroTools Installation

```
> # 1 from CRAN
```

- > install.packages("dendroTools") # from CRAN
- > # 2 from GitHub current version under development
- > library("devtools")
- > devtools::install_github("jernejjevsenak/dendroTools")



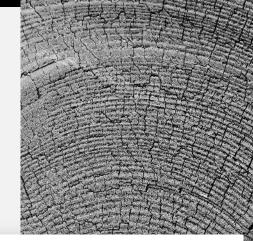


Contents lists available at ScienceDirect

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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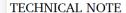


Quaternary Science Reviews 221 (2019) 105868

Contents lists available at ScienceDirect

Quaternary Science Reviews

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



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

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



Jernej Jevšenak

Slovenian Forestry Institute, Department of Forest Yield and Silviculture, Večna Pot 2, 1000, Ljubljana, Slovenia





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(</pre>

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)

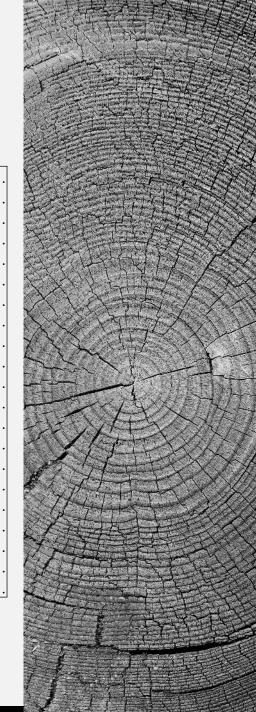


response $[1 \times n]$

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 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 3.4 2.1 0.8 ... 2013 2.4 -0.6 0.2 2.5 5.9 9.9 9.6 -1 -1.1 -0.1 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 6.8 ... 3.1 2011 -1.2 -0.1 -0.2 -2.4 -3.6 -2.7 -0.9 3.8 2.5 0.1 0.7 2.5 0.2 -1.6 ... 3.2 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 ... -0.7 -1.1 -2.2 ... 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 -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 0.6 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 3.3 5.2 1.5 ... 0.5 5.6 0.51.9 -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 0.9 ... 1999 -3 -2.5 -2 -2.8 -0.8 0.7 1.1 5.5 6.1 5.4 ... 1998 -1.6 -2.5 -4.2 -7.2 -6.1 -5.3 -3.4 2.7 2.2 2.2 -1.1 ... 1997 6.9 2.5 -0.5 -3.3 -1.5 -0.7 0.6 2.7 -0.5 -1.1 -0.1 ...



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

response $[1 \times n]$

env_data [366 x n]

window_width = 4



lower_limit
upper_limit

	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
_															

window_width = 4

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

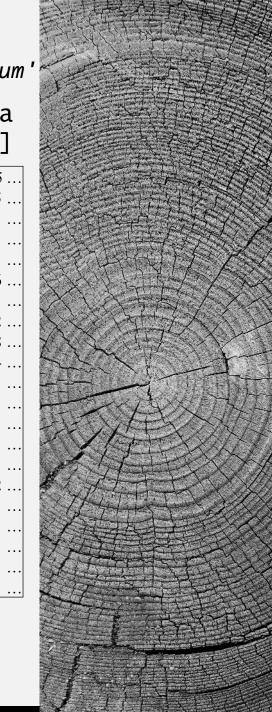
response $[1 \times n]$

env_data $[366 \times n]$

TRWi Temp 2015 1.203 -6.12 2014 1.051 2.08 2013 1.706 -0.242012 0.892 2011 0.942 -3.34 2010 0.771 6.78 2009 1.436 1.32 2008 0.747 -2.522007 0.976 3.7 2006 1.091 -4.462005 0.763 4.22 2004 0.732 -1.422003 0.675 1.06 2002 0.83 1.14 2001 0.813 4.42 2000 0.746 -2.221999 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 ... 2.8 -3.2 -4.2 -2.1 1.2 2014 -4.9 -7.6 -6.1 -5.2 -6.8 -6.4 -2.8 0.8 2013 2.4 -0.6 0.2 2.5 5.9 9.9 9.6 -1 -1.1 -0.1 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 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 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 -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 2005 -2.8 -1.9 -3.8 -7.9 -5.9 -5 -3.4 4.8 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 4.1 3.3 1999 -3 -2.5 -2 -2.8 -0.8 0.7 5.5 6.1 5.4 ... 2.2 2.2 -1.1 .. 1998 -1.6 -2.5 -4.2 -7.2 -6.1 -5.3 -3.4 2.7 1.2 -0.5 -1.1 -0.1 ... 1997 6.9 2.5 -0.5 -3.3 -1.5 -0.7 0.6 2.7

method = 'cor'/'Lm'/'brnn'



window_width = 4

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

response $[1 \times n]$

env_data $[366 \times n]$

TRWi Temp 2015 1.203 -6.12 2014 1.051 2013 1.706 -0.242012 0.892 2011 0.942 -3.342010 0.771 6.78 2009 1.436 1.32 2008 0.747 -2.522007 0.976 2006 1.091 -4.462005 0.763 4.22 2004 0.732 -1.422003 0.675 1.06 2002 0.83 1.14 2001 0.813 2000 0.746 -2.221999 0.671 -4.321998 0.861 0.82 1997 1.383 0.22

X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15. 2.8 -3.2 -4.2 -2.1 1.2 2014 -4.9 -7.6 -6.1 -5.2 -6.8 -6.4 -2.8 0.8 2013 2.4 -0.6 0.2 2.5 5.9 9.9 9.6 -1 -1.1 -0.1 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 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 2.1 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 2005 -2.8 -1.9 -3.8 -7.9 -5.9 -5 2004 1.8 5.1 6.9 6.9 0.4 -2.6 -4.8 1.1 -1.6 -4.6 -4.6 8.2 5.5 6.1 5.4 ... 1998 -1.6 -2.5 -4.2 -7.2 -6.1 -5.3 -3.4 2.7 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 3.6

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

4 0.10

window_width = 4

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

response $[1 \times n]$

TRWi Temp 2015 1.203 1.18 2014 1.051 -6.42 2013 1.706 3.58 2012 0.892 -0.92 2011 0.942 -1.8 2010 0.771 -1.62 2009 1.436 6.48 2008 0.747 1.18 2007 0.976 -2.32 2006 1.091 6.32 2005 0.763 -4.9 2004 0.732 3.34 2003 0.675 -2.42 2002 0.83 1.54 2001 0.813 1.2 2000 0.746 3.84 1999 0.671 -1.48 1998 0.861 -5.06 1997 1.383 -0.7

env_data $[366 \times n]$

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'

0.10 0.09

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

response $[1 \times n]$

TRWi

1999 0.671

1998 0.861

1997 1.383

env_data $[366 \times n]$

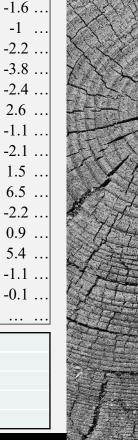
 $window_width = 4$ 2015 1.203 2014 1.051 2013 1.706 2012 0.892 2011 0.942 2010 0.771 2009 1.436 2008 0.747 2007 0.976 2006 1.091 2005 0.763 2004 0.732 2003 0.675 2002 0.83 2001 0.813 2000 0.746

Temp 1.7 5.62 -1.02-1.96-0.625.52 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... 1 2.8 -3.2 -4.2 -2.1 1.2 2014 -4.9 -7.6 -6.1 -5.2 -6.8 -6.4 -2.8 0.8 2013 2.4 -0.6 0.2 2.5 5.9 9.9 9.6 -1 -1.1 -0.1 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 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 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 -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 2005 -2.8 -1.9 -3.8 -7.9 -5.9 -5 -3.4 4.8 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 2.7 0.5 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 1999 -3 -2.5 -2 -2.8 -0.8 0.7 1.1 5.5 6.1 5.4 ... 1998 -1.6 -2.5 -4.2 -7.2 -6.1 -5.3 -3.4 2.7 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 3.6

0.10 0.09 -0.12

method = 'cor'/'Lm'/'brnn'



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

response

 $[1 \times n]$

window_width = 4

	TRWi	Temp
2015	1.203	0.72
2014	1.051	-4.08
2013	1.706	5.38
2012	0.892	-0.26
2011	0.942	-1.16
2010	0.771	-0.5
2009	1.436	5.68
2008	0.747	0.32
2007	0.976	-3.92
2006	1.091	6.92
2005	0.763	-3.48
2004	0.732	0.2
2003	0.675	-1.6
2002	0.83	1.34
2001	0.813	0.36
2000	0.746	4.34
1999	0.671	1.44
1998	0.861	-3.86
1997	1.383	-0.44
	•••	

env_data $[366 \times n]$

	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		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'

0.10 0.09 -0.12 0.17 final output matrix

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

response $[1 \times n]$

window_width = 4

	TRWi	Temp
2015	1.203	-0.32
2014	1.051	-2.74
2013	1.706	4.66
2012	0.892	0.38
2011	0.942	-0.18
2010	0.771	-0.82
2009	1.436	5.64
2008	0.747	-0.8
2007	0.976	-4.66
2006	1.091	6.02
2005	0.763	-1.06
2004	0.732	-1.5
2003	0.675	0.96
2002	0.83	1.2
2001	0.813	-1.38
2000	0.746	3.66
1999	0.671	4.08
1998	0.861	-1.68
1997	1.383	1

env_data $[366 \times n]$

	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'

0.10 0.09 -0.12 0.17 0.21

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

env_data

5.5 6.1 5.4 ...

2.2 2.2 -1.1 ..

 $[366 \times n]$

response $[1 \times n]$

 $window_width = 4$

TRWi Temp 2015 1.203 -1.14 2014 1.051 2013 1.706 3.46 2012 0.892 0.66 2011 0.942 0.56 2010 0.771 -1.242009 1.436 5.94 2008 0.747 -1.482007 0.976 -5.22 2006 1.091 5.12 2005 0.763 2004 0.732 -2.52003 0.675 3.38 2002 0.83 0.94 2001 0.813 -3.162000 0.746 3.16 1999 0.671 5.84 1998 0.861 0.14 1997 1.383

X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 .. 2.8 -3.2 -4.2 -2.1 1.2 2014 -4.9 -7.6 -6.1 -5.2 -6.8 -6.4 -2.8 0.8 1.5 2.7 2013 2.4 -0.6 0.2 2.5 5.9 9.9 9.6 -1 -1.1 -0.1 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 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 -0.2 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 -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 2005 -2.8 -1.9 -3.8 -7.9 -5.9 -5 -3.4 4.8 4.2 0.4 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 0.5 1.6 1.9 -4.5 -7.1 -7.7 -8.9 -8.3 -5.4 -3.8 -2.2 ... 4.1 3.3 5.7 8.8 -0.2 0.7 0.8 0.5

method = 'cor'/'Lm'/'brnn'

0.10 0.09 -0.12 0.17 0.21 0.01

10.4

final output matrix

1999 -3 -2.5 -2 -2.8 -0.8 0.7

1998 -1.6 -2.5 -4.2 -7.2 -6.1 -5.3 -3.4 2.7

1997 6.9 2.5 -0.5 -3.3 -1.5 -0.7 0.6 2.7 3.9 5 3.6

window_width = 4

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

response $[1 \times n]$

	TRWi	Temp
2015	1.203	-1.1
2014	1.051	1.04
2013	1.706	1.68
2012	0.892	0.72
2011	0.942	1.24
2010	0.771	-1.46
2009	1.436	6.44
2008	0.747	-2.1
2007	0.976	-5.66
2006	1.091	2.92
2005	0.763	1.4
2004	0.732	-2.9
2003	0.675	5.94
2002	0.83	1
2001	0.813	-5.26
2000	0.746	2.12
1999	0.671	6.9
1998	0.861	1.5
1997	1.383	3.16

env_data $[366 \times n]$

	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		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'

0.10 0.09 -0.12 0.17 0.21 0.01 0.11

window_width = 4

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

response

 $[1 \times n]$

TRWi Temp 2015 1.203 -1.08 2014 1.051 2.8 2013 1.706 0.24 2012 0.892 2.08 2011 0.942 1.8 2010 0.771 2009 1.436 4.86 2008 0.747 -3.42 2007 0.976 -7.74 2006 1.091 2.4 2005 0.763 1.14 2004 0.732 -3.46 2003 0.675 7.7 2002 0.83 3.36 2001 0.813 -7.48 2000 0.746 0.44 1999 0.671 6.94 1998 0.861 2.68 1997 1.383 2.64

env_data $[366 \times n]$

	X1	X2	X3	X4		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'

0.10 0.09 -0.12 0.17 0.21 0.01 0.11

window_width = 4

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

response $[1 \times n]$

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 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

env_data $[366 \times n]$

	X1	X2	Х3	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'

0.10 0.09 -0.12 0.17 0.21 0.01 0.11 0.12

window_width = 4

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

env_data

 $[366 \times n]$

response $[1 \times n]$

TRWi

Temp

2.64

2015 1.203 -1.08 2014 1.051 2013 1.706 0.24 2012 0.892 2.08 2011 0.942 2010 0.771 2009 1.436 2008 0.747 -3.422007 0.976 -7.74 2006 1.091 2005 0.763 1.14 2004 0.732 -3.462003 0.675 7.7 2002 0.83 3.36 2001 0.813 -7.48 2000 0.746 0.44

1999 0.671

1998 0.861

1997 1.383

X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 .. 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 2013 2.4 -0.6 0.2 2.5 5.9 0.6 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 -0.2 6.4 5.5 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 -3.4 4.8 4.2 0.4 -2.6 -4.8 1.1 -1.6 -4.6 -4.6 -1.4 -4.6 -3.5 -2.8 -1.8 4.7 8.2 8.6 10 0.5 1.9 -4.5 -7.1 -7.7 -8.9 -8.3 -5.4 -3.8 -2.2 8.8 -0.2 0.7 0.8 0.5 5.5 6.1 5.4 ... 1998 -1.6 -2.5 -4.2 -7.2 -6.1 -5.3 -3.4 2.7 2.2 | 2.2 -1.1 .. 5 3.6 1.2 -0.5 -1.1 -0.1 ... 1997 6.9 2.5 -0.5 -3.3 -1.5 -0.7 0.6 2.7 3.9

method = 'cor'/'Lm'/'brnn'

0.10 0.09 -0.12 0.17 0.21 0.01 0.11 0.12 0.17 ...

window_width = 5

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

response [1 x n]

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 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

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'

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

window_width = 5

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

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	Х3	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		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

window_width = 5

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

response $[1 \times n]$

TRWi Temp 2015 1.203 1.45 2014 1.051 -5.82 2013 1.706 4.58 2012 0.892 -0.90 2011 0.942 -1.65 2010 0.771 -1.40 2009 1.436 5.75 2008 0.747 1.52 2007 0.976 -2.53 2006 1.091 7.27 2005 0.763 -4.65 2004 0.732 1.98 2003 0.675 -2.32 2002 0.83 1.37 2001 0.813 1.32 2000 0.746 4.67 1999 0.671 -1.05 1998 0.861 -4.78 1997 1.383 -0.48

env_data $[366 \times n]$

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'

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

window_width = 5

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

response $[1 \times n]$

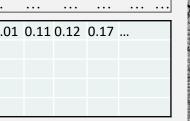
env_data $[366 \times n]$

TRWi Temp 2015 1.203 0.88 2014 1.051 -4.422013 1.706 4.52 2012 0.892 -0.232011 0.942 -1.002010 0.771 -1.052009 1.436 5.93 2008 0.747 0.68 2007 0.976 -3.32 2006 1.091 6.78 2005 0.763 -3.53 2004 0.732 1.32 2003 0.675 -1.57 2002 0.83 1.15 2001 0.813 0.40 2000 0.746 3.93 1999 0.671 0.87 1998 0.861 -3.92 1997 1.383 -0.45

X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 ... 2015 -3.8 0.2 1.7 1 2.8 -3.2 -4.2 -2.1 1.2 2014 -4.9 -7.6 -6.1 -5.2 -6.8 -6.4 -2.8 0.8 1.5 2.7 2013 2.4 -0.6 0.2 2.5 5.9 9.9 9.6 -1 -1.1 -0.1 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 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 -0.2 2009 7.9 6.9 7.2 6.4 5.5 2.1 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 2005 -2.8 -1.9 -3.8 -7.9 -5.9 -5 -3.4 4.8 4.2 0.4 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 0.5 8.8 -0.2 0.7 0.8 0.5 1999 -3 -2.5 -2 -2.8 -0.8 0.7 5.5 6.1 5.4 ... 1998 -1.6 -2.5 -4.2 -7.2 -6.1 -5.3 -3.4 2.7 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

method = 'cor'/'Lm'/'brnn'

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



window_width = 5

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

response $[1 \times n]$

TRWi Temp 2015 1.203 -0.10 2014 1.051 -3.15 2013 1.706 4.30 2012 0.892 0.07 2011 0.942 -0.55 2010 0.771 -0.82 2009 1.436 5.77 2008 0.747 -0.272007 0.976 -4.48 2006 1.091 6.03 2005 0.763 -2.20 2004 0.732 -0.10 2003 0.675 0.03 2002 0.83 1.20 2001 0.813 -0.88 2000 0.746 3.73 1999 0.671 2.93 1998 0.861 -2.60 1997 1.383 0.28

env_data $[366 \times n]$

	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		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'

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

window_width = 5

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

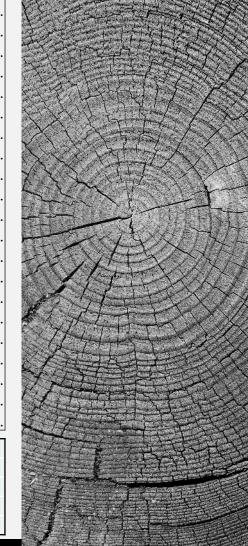
response $[1 \times n]$

TRWi Temp 2015 1.203 -0.62 2014 1.051 -1.83 2013 1.706 3.87 2012 0.892 0.28 2011 0.942 -0.13 2010 0.771 -0.88 2009 1.436 5.87 2008 0.747 -1.152007 0.976 -4.85 2006 1.091 5.25 2005 0.763 -0.82 2004 0.732 -2.02 2003 0.675 2.23 2002 0.83 1.00 2001 0.813 -2.43 2000 0.746 3.18 1999 0.671 4.73 1998 0.861 -0.90 1997 1.383 1.67

env_data $[366 \times n]$

	X1	X2	Х3	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'



^{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

window_width = 5

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

response $[1 \times n]$

TRWi Temp 2015 1.203 -1.20 2014 1.051 2.68 2013 1.706 0.52 2012 0.892 3.23 2011 0.942 1.53 2010 0.771 -0.93 2009 1.436 3.87 2008 0.747 -3.182007 0.976 -6.93 2006 1.091 3.40 2005 0.763 1.32 2004 0.732 -3.25 2003 0.675 7.28 2002 0.83 3.47 2001 0.813 -6.87 2000 0.746 0.37 1999 0.671 6.80 1998 0.861 2.60 1997 1.383 2.02

env_data $[366 \times n]$

	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'



^{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

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

response $[1 \times n]$

window_width = 5

TRW	i 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

env_data $[366 \times n]$

	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'

^{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

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

response $[1 \times n]$

window_width = 5

	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 $[366 \times n]$

	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		-6.4	-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'

^{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 ...}

window_width = 6

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

response [1 x n]

TRWi Temp 2015 1.203 -1.20 2014 1.051 2.68 2013 1.706 0.52 2012 0.892 3.23 2011 0.942 1.53 2010 0.771 -0.93 2009 1.436 3.87 2008 0.747 -3.182007 0.976 -6.93 2006 1.091 3.40 2005 0.763 1.32 2004 0.732 -3.25 2003 0.675 7.28 2002 0.83 3.47 2001 0.813 -6.87 2000 0.746 0.37 1999 0.671 6.80 1998 0.861 2.60 1997 1.383 2.02

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		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'

^{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}

window_width = 6

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

response $[1 \times n]$

LT X

TRWi Temp 2015 1.203 1.45 2014 1.051 -5.82 2013 1.706 4.58 2012 0.892 -0.90 2011 0.942 -1.65 2010 0.771 -1.402009 1.436 5.75 2008 0.747 1.52 2007 0.976 -2.53 2006 1.091 7.27 2005 0.763 -4.65 2004 0.732 1.98 2003 0.675 -2.32 2002 0.83 1.37 2001 0.813 1.32 2000 0.746 4.67 1999 0.671 -1.05 1998 0.861 -4.78 1997 1.383 -0.48

env_data [366 x n]

	X1	X2	X3	X4	X5		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		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

2.4 ... 2.1 ... 2.5 ... 2.2 ... 2.9 ... 3.4 ... 1.1 ... 2.1 ...

^{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}

window_width = 6

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

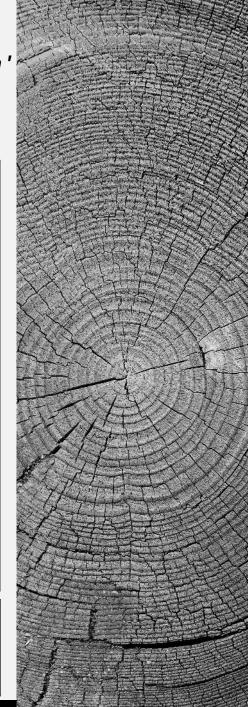
response $[1 \times n]$

TRWi Temp 2015 1.203 -0.62 2014 1.051 -1.83 2013 1.706 3.87 2012 0.892 0.28 2011 0.942 -0.13 2010 0.771 -0.88 2009 1.436 5.87 2008 0.747 -1.152007 0.976 -4.85 2006 1.091 5.25 2005 0.763 -0.82 2004 0.732 -2.02 2003 0.675 2.23 2002 0.83 1.00 2001 0.813 -2.43 2000 0.746 3.18 1999 0.671 4.73 1998 0.861 -0.90 1997 1.383 1.67

env_data $[366 \times n]$

	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'



^{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}



-0.0091808725 -0.000578205 -0.0005 -0.0077070780 -0.077800576 -0.0578 -0.0708065887 -0.0518777005 -0.0504 -0.0918811007 -0.0517877005 -0.0505	127181 - GEREZ/RED - GURZ/RIT13 - GEREZ/REH - GUTS/RESAL BEZITZ - GURREZ/RED - GURREZ/REG - GURREZ/REG - GURREZ/REG BEGEREZ/REG - GURREZ/REG - GURREZ/REG - GURREZ/REG BEGEREZ/REG - GURREZ/REG - GURREZ/REG - GURREZ/REG ZERTAS - GURREZ/REG - GURREZ/REG - GURREZ/REG - GURZ/REZ/REG	2003094379 0071370375 00713799 05043199 05094988 0 201333999 040709490 0441399 05047990 04882977 0 202373977 05044998 04444739 0444980 05064937 0 2023739477 04114559 0454477 0444974 05049980 0 2024738327 04455399 0465477 04659199 04149600 0 2024738327 04655399 0465779 04659199 04149510 0	100H015 3.1588818 8.1489762 8.9697622 3.7598228 0.1866838 1787985 3.1402279 0.15474340 8.9635408 0.11439308 0.1509754 13902385 3.140249 0.15662202 8.9638827 0.1703936 0.179241 13902385 3.1588228 0.1159884 8.15986328 0.1503248 0.1168296	DUPLIER OUDORIDO DURBANO DURBANO DUPLIER	13880005 2747460 23100022 2347223 23127205 23137	BE D1099066 3.0000206 0.10727249 3.10730844 0.10906067 64 0.11309155 0.11327728 0.11305065 0.11301890 0.11150040 15 0.11670636 0.11728500 0.1195180 0.11301424 0.11224651 67 0.1275623 0.12874727 0.17080290 0.11472777 0.10727888	0.000/000000 0.000/000000 0.000/00000 0.000/00000 0.0000/00000 0.0000/00000 0.0000/00000 0.0000/00000 0.00000000	// 2002258225 27 0.08679277 201 0.10923194 MIC 0.12468600		
-0.023064 -0.032064 -0.030215 -0.031064 0.075629	1 ÷	2	3 [‡]	4	5 ‡	6 ‡	7	8	9	10
00/104/ 00/2000 00/2000 00/2000 00/2000	-0.122324531	-0.132729421	-0.1260312634	-0.117052564	-0.1118389336	-0.111879201	-0.1106287645	-0.108086823	-0.092444488	-0
000/02/4 007/02/4 007/02/4 007/04/3	-0.130038793	-0.132249757	-0.1218873479	-0.111607995	-0.1056613112	-0.104986463	-0.0977327383	-0.089927980	-0.068730713	-0
0.074671 0.074641 0.074682 0.004238	-0.129787708	-0.128029103	-0.1163802107	-0.105532929	-0.0991826725	-0.092578205	-0.0802802172	-0.066893648	-0.049273296	-0
005104 005104 005106 005106	-0.125809203	-0.122501591	-0.1102681794	-0.099172910	-0.0872028280	-0.075690578	-0.0578664898	-0.047953251	-0.039473417	-0
0.004001 0.004001 0.005151 0.006002	-0.120502935	-0.116396625	-0.1039093070	-0.087394696	-0.0708063887	-0.053817905	-0.0394009068	-0.038434290	-0.024819960	-0
00/4113 00/463 00/864 00/864	-0.114626326	-0.110078596	-0.0922532686	-0.071220206	-0.0493811097	-0.035767595	-0.0302738145	-0.024131956	-0.014563664	0
0.07/17/2 0.07/07/4 0.07/07/4 0.07/07/4	-0.108538032	-0.098545384	-0.0761904855	-0.050009626	-0.0316743223	-0.026897733	-0.0163664175	-0.014098878	-0.006564676	0
0297708 0304128 0112121 0112008 0317000	-0.097215766	-0.082557930	-0.0551897464	-0.032463302	-0.0230372646	-0.013274954	-0.0065987280	-0.006247935	0.002748682	0
0.138810 0.110248 0.117241 0.174271	-0.081431015	-0.061798966	-0.0377906072	-0.023894175	-0.0096607312	-0.003687745	0.0009943635	0.002912741	0.008696304	(
12000 13021 10000 14000	-0.060939203	-0.044596388	-0.0292044038	-0.010611613	-0.0002299872	0.003752436	0.0098748764	0.008766925	0.016372805	(
154075 154027 155052 31	-0.043969663	-0.036008176	-0.0159861581	-0.001228985	0.0070669517	0.012467823	0.0155060877	0.016320667	0.026055682	(
017600 017600 017600 017600 017600	-0.035498836	-0.022865228	-0.0066334984	0.006055010	0.0156280976	0.017987558	0.0227686993	0.025837791	0.034994151	(
017/001	-0.022536917	-0.013555168	0.0006967511	0.014612964	0.0210439352	0.025111905	0.0319901305	0.034619585	0.048940536	(
34	-0.013356218	-0.006176738	0.0093258628	0.020049897	0.0280320091	0.034180962	0.0405075164	0.048316472	0.059286652	0
35	-0.006077285	0.002529505	0.0148527441	0.027069012	0.0369551158	0.042558755	0.0539153121	0.058474979	0.063057254	0
36	0.002527883	0.008148544	0.0220071514	0.036013519	0.0451987321	0.055787695	0.0638220603	0.062159358	0.065826901	0
37	0.008089137	0.015450864	0.0310731267	0.044269596	0.0582815894	0.065557093	0.0672960225	0.064866115	0.064717428	0
38	0.015326027	0.024645406	0.0394379548	0.057358005	0.0679277558	0.068934124	0.0698465308	0.063785602	0.066952423	(
39	0.024442304	0.033124802	0.0525858937	0.067017643	0.0712243136	0.071396689	0.0687044291	0.066003213	0.068184453	0



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

0.002527883

0.008089137

0.015326027

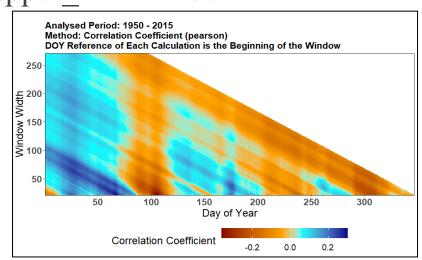
0.024442304

75 0.04178996 0.0277996072 -0.02399175 0.029966 00 0.044994398 0.0275994009 0.027091913 0.003025 63 0.02903976 0.0759891581 0.007029980 0.007098 00 0.022995228 0.0096534984 0.009055018 0.025628	•	1	2	3 [‡]	4	\$ [‡]	6 [‡]	7	8	9	10
CONTINUE COMMUNITY CONTINUE COLUMN	21	-0.122324531	-0.132729421	-0.1260312634	-0.117052564	-0.1118389336	-0.111879201	-0.1106287645	-0.108086823	-0.092444488	-0.05998648
0.00449-060 0.0034379-960 0.00730000 0.0073021 0.0031249 0.0031249 0.0073249 0.004315490 0.0073249 0.004315490 0.0043154	22	-0.130038793	-0.132249757	-0.1218873479	-0.111607995	-0.1056613112	-0.104986463	-0.0977327383	-0.089927980	-0.068730713	-0.040223968
01997/9018 008268/3999 0079525/96 00745/7 1992/201906 009/2014414 0037/91388 007468 0091/00920 0091/900297 00148/3980 007408 0091/90129020 0091/901900 0094/38 1094/90544 009909000 003747773 009104	23	-0.129787708	-0.128029103	-0.1163802107	-0.105532929	-0.0991826725	-0.092578205	-0.0802802172	-0.066893648	-0.049273296	-0.030448634
SCELIES CONSESSION O CONSESSION C	24	-0.125809203	-0.122501591	-0.1102681794	-0.099172910	-0.0872028280	-0.075690578	-0.0578664898	-0.047953251	-0.039473417	-0.015724026
255865-27 C000129206 C0051 0907 D36885 254886537 C001291206 C00000429 C004991 25051275 C00227866 C00418342 C005101 25051275 C00227866 C00418342 C005101 2506274670 C00007990 C00427855 C002266	25	-0.120502935	-0.116396625	-0.1039093070	-0.087394696	-0.0708063887	-0.053817905	-0.0394009068	-0.038434290	-0.024819960	-0.005468838
0355620744 0003932415 001719305 005911 0355620744 0003932415 001719305 005911 035808778 0060396110 0015150487 007561 0366417364 007393282 001609477 007561	26	-0.114626326									

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





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



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



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- row_names_subset



- response (your TRWi chronology)
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- 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

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	TRW
2015	1.203
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2010	0.771
2009	1.436
2008	0.747
2007	0.976
2006	1.091
	0.763
2004	
2003	0.675
2002	0.83
2001	0.00
	0.746
	0.671
1,,,,	0.861
	1.383
	1.021
1990	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

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	TRW
2013	1.706
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2001	0.813
2000	0.746
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1998	0.861
1997	1.383
1996	1.021

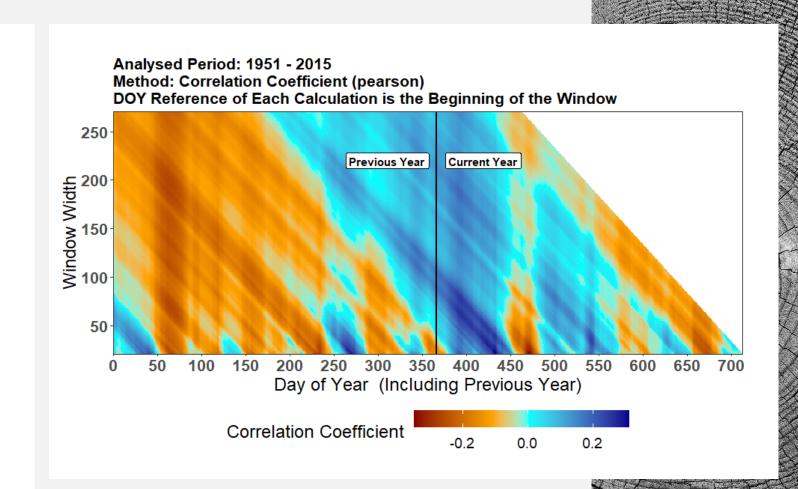
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15
2013	2.4	-0.6	0.2	2.5	5.9	9.9	9.6	-1	-1.1	-0.1	1	0.6	0.8	1.9	0.7
2012	2.3	-0.3	-0.1	-1.5	-1.6	-1.1	-0.8	3.7	1.7	-0.2	-0.8	3.1	6.6	9	6.8
2011	-1.2	-0.1	-0.2	-2.4	-3.6	-2.7	-0.9	3.8	2.5	0.1	0.7	3.2	2.5	0.2	-1.6
2010	-7.7	-5.3	-3.8	-0.8	0.9	0.9	-0.3	-3.2	-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

- response (your TRWi chronology)
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- method, metric
- aggregate_function
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- row_names_subset
- previous_year

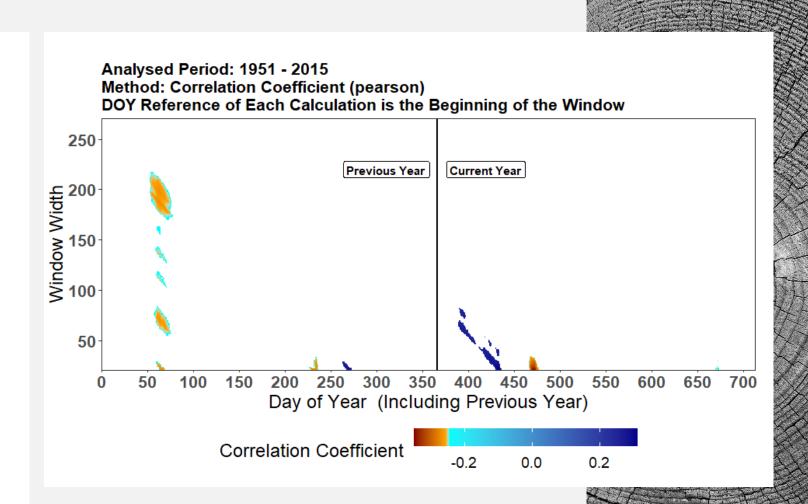
X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 2012 2.3 -0.3 -0.1 -1.5 -1.6 -1.1 -0.8 3.7 1.7 -0.2 -0.8 2011 -1.2 -0.1 -0.2 -2.4 -3.6 -2.7 -0.9 3.8 2.5 0.1 0.7 2010 -7.7 -5.3 -3.8 -0.8 0.9 0.9 -0.3 -3.2 -2.4 -1.2 -0.2 2009 7.9 6.9 7.2 6.4 5.5 6.4 2.1 8 6.2 7 8.9 2008 0.1 1.1 2.5 2.4 0.5 -0.6 3.2 -3.9 -3.2 -2.9 -3.7 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
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. 1996 -1.6 -2.5 -4	.2 -7.2 -6.1 -5.3 -3.4
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- 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



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- env_data (daily climate data)
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- cor_method ('pearson', 'spearman', 'kendall')
- row_names_subset
- previous_year
- remove_insignificant
- alpha



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

