# spei

**Create a time series of the Standardised Precipitation-Evapotranspiration Index**

## Description

The program calculates a time series of the Standardised Precipitation-Evapotransporation Index (SPEI) at a given time interval from an input data file containing monthly time series of precipitation and mean temperature, plus the geographic coordinates of the observatory.

## Usage

```
spei [timeInterval] [inputFile] [outputFile]
```

## Arguments

timeInterval        A time interval, in months.

inputFile           The name of an input file, with extension.

outputFile          The name of the output file to be produced, with extension.

## Details

The SPEI index is a standardised monthly climatic balance computed as the difference between the cummulative precipitation and the potential evapotranspiration. Details on the index calculation and applications can be found in the references below.

The SPEI can be calculated at the monthly scale with $timeInterval = 1$, or accumulated at more than one month with $timeInterval > 1$. Typical values are 1, 3, 6, 12 and 24 months. If the accumulated index is calculated, the starting date of the resulting SPEI series will be lagged a number of months equal to $timeInterval - 1$.

The input file ($inputFile$) can have any extension, but must be a plain text file (ASCII). The file structure is as follows:

```
tampa
27.96
1900;01
12
110.70;14.30
...
```

The first line contains the name of the observatory, and is only used for identification purposes. The second line is the latitude of the observatory, in degrees. The third line contains the year and month of the first record in the time series, separated by a semi-colon (;). The fourth line contains the seasonality of the time series, and must be set to 12. Finally, from the fifth line the data series of monthly precipitation and mean temperature, separated by a semi-colon (;). The series must be continuous. Gaps and missing-values are not allowed.

The output file (`outputFile`) can have any extension. It will be a plain text (ASCII) file, with the following structure:

```
tampa
27.959999
1900;12
6
1.456516
...
```

The first three lines contain the name of the station, latitude and initial date of the SPEI series. The fourth line contains a value indicating the cummulative parameter used, `timeInterval` (six months in the example). The SPEI time series is given from the fifth line on.

The program is run from the Windows console. The easiest way is to locate the program and the input file(s) in the same directory. If you need to run the program from a different location, it might be necessary to modify the `path` system variable to include the path to the directory where the program was installed.

It is easy to create a batch script for automating the calculation of the SPEI over a large number of observatories or for several accumulated periods.

A hint on the usage of the program is obtained if the spei is invoked with no arguments or with a wrong number of arguments.


## See Also

`spi` program.


## Examples

```
spi 1 tampa.txt tampa_spei_1.txt
spi 12 tampa.txt tampa_spei_12.txt
```

The above lines calculate the monthly SPEI and the 12-months cummulative SPEI time series for Tampa (Florida).

# References

Vicente-Serrano S.M., López-Moreno J.I., Beguería S., 'A multi-scalar drought index sensitive to global warming: The standardized precipitation evapotranspiration index - SPEI' (in prep.)