

# Climate Predictability Tool (CPT)



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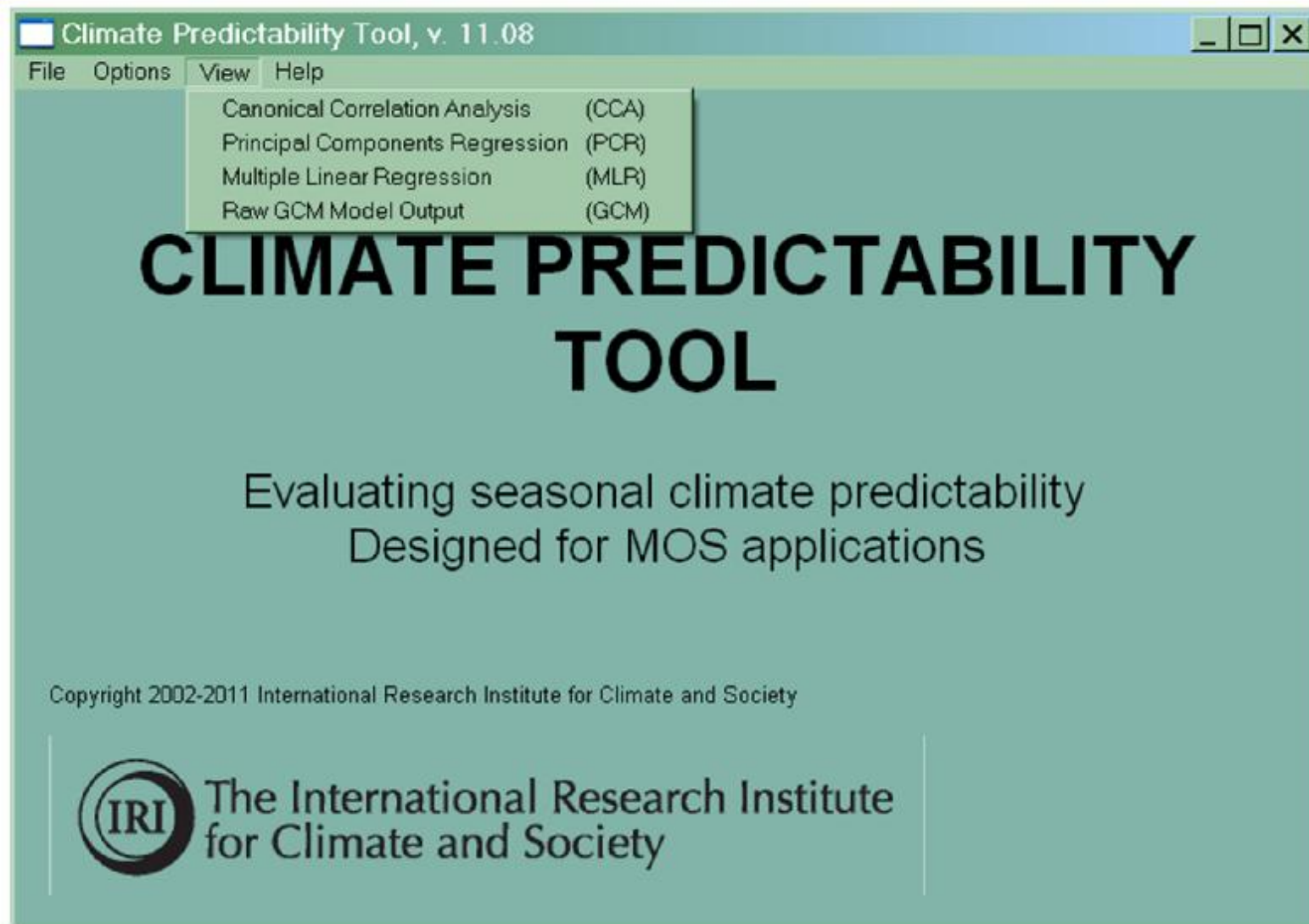


# OVERVIEW

- The Climate Predictability Tool (CPT) provides a Windows package for :
  - seasonal climate forecasting
  - model validation
  - actual forecasts given updated data
- Uses ASCII input files
- Options :
  - Principal Components Regression (PCR)
  - Canonical Correlation Analysis (CCA)
  - Multi Linear Regression (MLR)
  - Global Model Output (GCM)
- Help Pages on a range of topics in HTML format
- Options to save outputs in ASCII format and graphics as JPEG
- Program source code is available for those using other systems (e.g., UNIX)



# SELECTING THE ANALYSIS



Choose the analysis to perform: PCR, CCA, MLR, or GCM



# INPUT DATASETS

Climate Predictability Tool, v. 11.08 - Principal Components Regression

File Edit Actions Tools Options View Help

**Explanatory (X) Variables**

browse

File name:

First data: N/A

Last data: N/A

Start at: 1

Number of fields: 0

Number of lags: 0

Number of variables: 0

Number used: 0

**Response (Y) Variables**

browse

File name:

First data: N/A

Last data: N/A

Start at: 1

Number of fields: 0

Number of lags: 0

Number of variables: 0

Number used: 0

**Forecast Variables**

browse

File name:

First data: N/A

Last data: N/A

Start at: 1

Number of fields: 0

Number of lags: 0

Number of variables: 0

Number used: 0

**Training data**

Length of training period: 0

Length of cross-validation window: 5

Number of forecasts: 1

Progress: 0%

Actions:

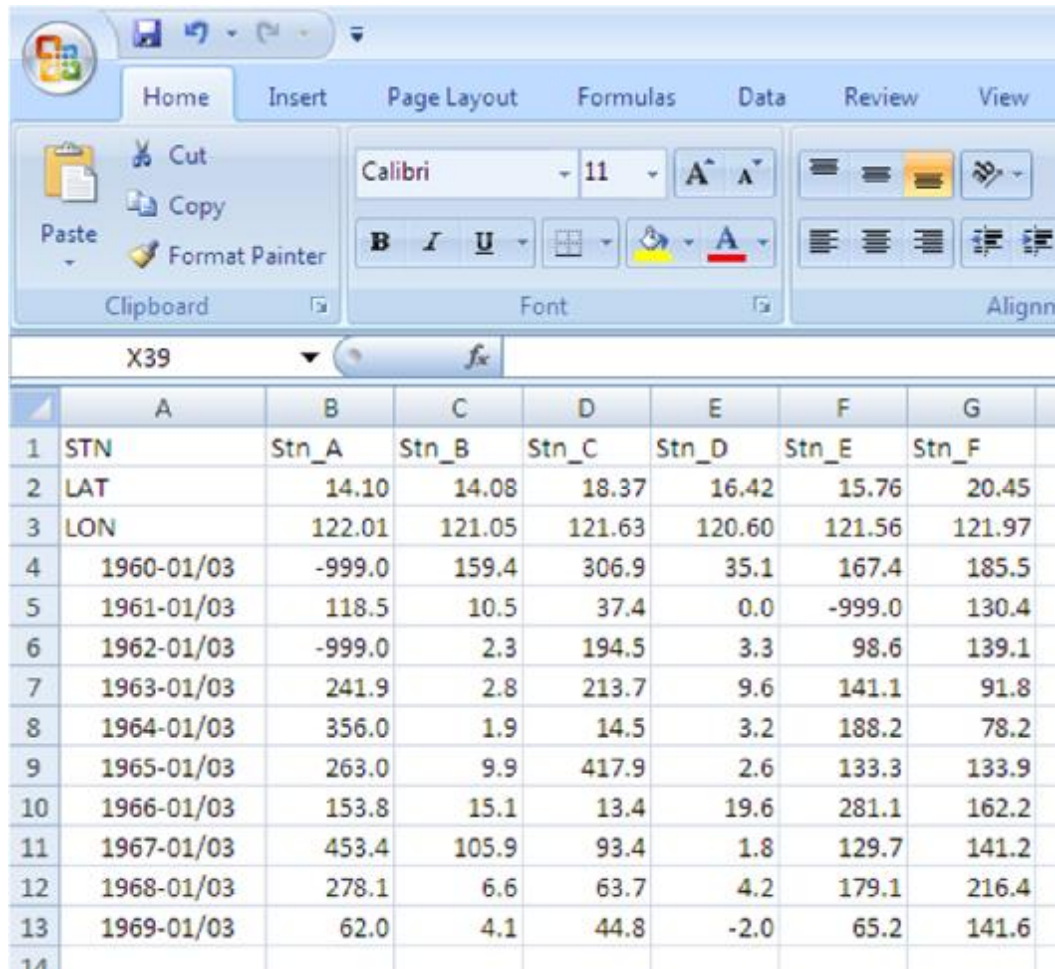
All analysis methods require two datasets:

- “X variables” or “Predictors” dataset;
- “Y variables” or “Predictands” dataset.



# CPT INPUT FILE FORMATS

## 1. STATION files



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G
1	STN	Stn_A	Stn_B	Stn_C	Stn_D	Stn_E	Stn_F
2	LAT	14.10	14.08	18.37	16.42	15.76	20.45
3	LON	122.01	121.05	121.63	120.60	121.56	121.97
4	1960-01/03	-999.0	159.4	306.9	35.1	167.4	185.5
5	1961-01/03	118.5	10.5	37.4	0.0	-999.0	130.4
6	1962-01/03	-999.0	2.3	194.5	3.3	98.6	139.1
7	1963-01/03	241.9	2.8	213.7	9.6	141.1	91.8
8	1964-01/03	356.0	1.9	14.5	3.2	188.2	78.2
9	1965-01/03	263.0	9.9	417.9	2.6	133.3	133.9
10	1966-01/03	153.8	15.1	13.4	19.6	281.1	162.2
11	1967-01/03	453.4	105.9	93.4	1.8	129.7	141.2
12	1968-01/03	278.1	6.6	63.7	4.2	179.1	216.4
13	1969-01/03	62.0	4.1	44.8	-2.0	65.2	141.6
14							

This file-type contains :

**Station\_name** (without spaces;  $\leq 16$  characters)

**Latitude** (south negative)

**Longitude** (west negative)

**Year-season** (in the first column)

**Data** (missing values should be filled with the same value, -999.0 for example)

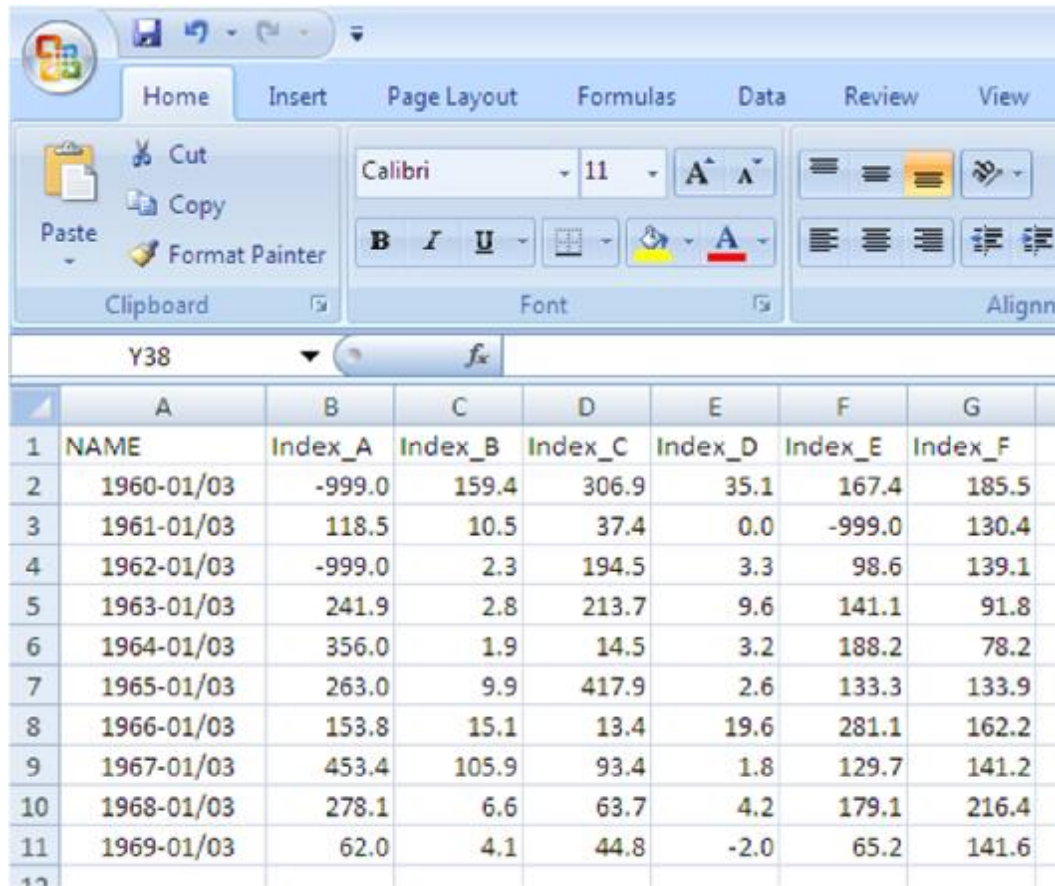
**Keywords:**

STN, LAT, LON



# CPT INPUT FILE FORMATS

## 2. UNREFERENCED or INDEX files



	A	B	C	D	E	F	G
1	NAME	Index_A	Index_B	Index_C	Index_D	Index_E	Index_F
2	1960-01/03	-999.0	159.4	306.9	35.1	167.4	185.5
3	1961-01/03	118.5	10.5	37.4	0.0	-999.0	130.4
4	1962-01/03	-999.0	2.3	194.5	3.3	98.6	139.1
5	1963-01/03	241.9	2.8	213.7	9.6	141.1	91.8
6	1964-01/03	356.0	1.9	14.5	3.2	188.2	78.2
7	1965-01/03	263.0	9.9	417.9	2.6	133.3	133.9
8	1966-01/03	153.8	15.1	13.4	19.6	281.1	162.2
9	1967-01/03	453.4	105.9	93.4	1.8	129.7	141.2
10	1968-01/03	278.1	6.6	63.7	4.2	179.1	216.4
11	1969-01/03	62.0	4.1	44.8	-2.0	65.2	141.6

This file-type contains :

**Index\_name** (without spaces;  
≤16 characters)

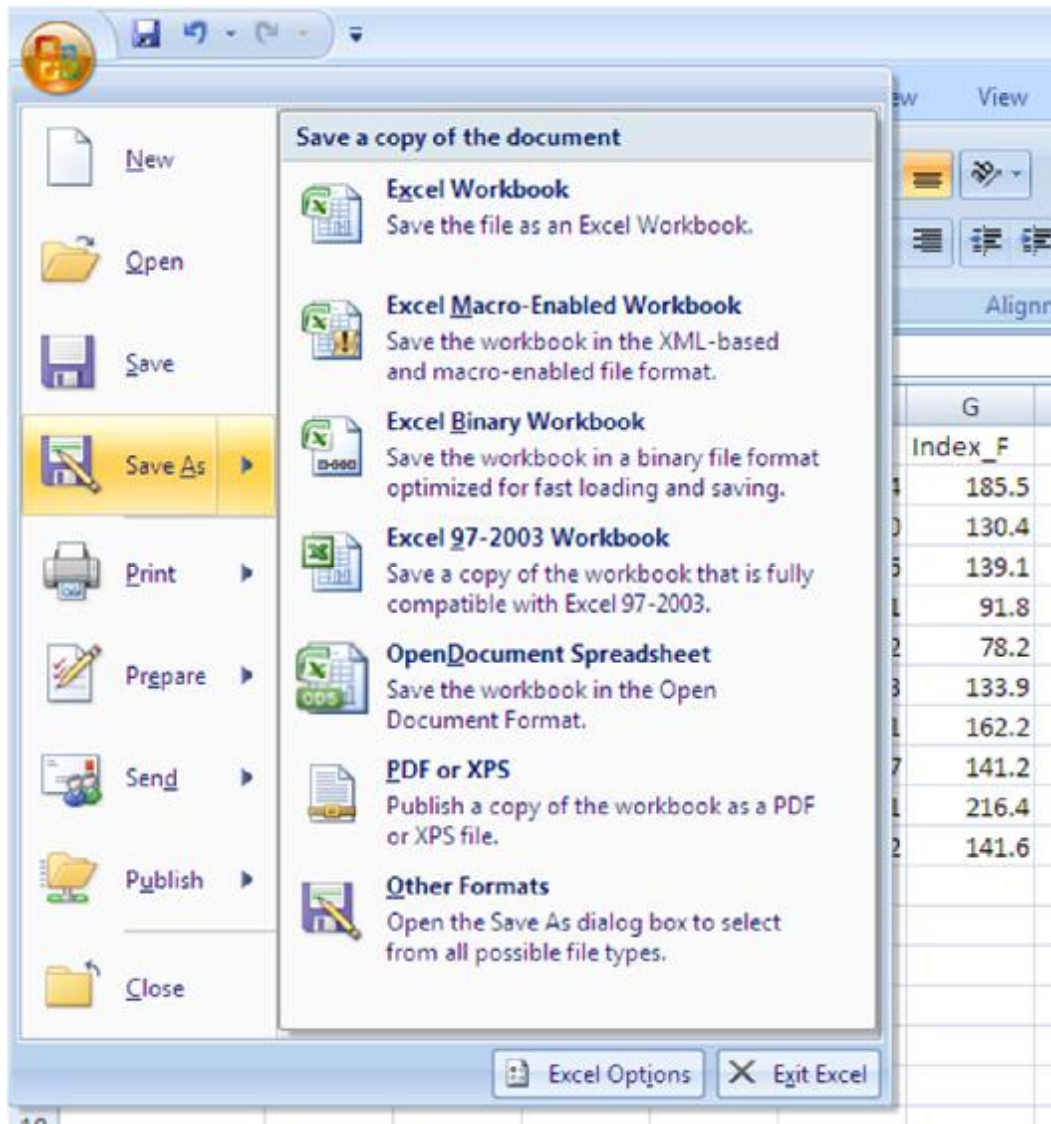
**Year-season** (in the first  
column)

**Data** (missing values should  
be filled with the same value,  
-999.0 for example)

**Keywords:**  
NAME or YEAR



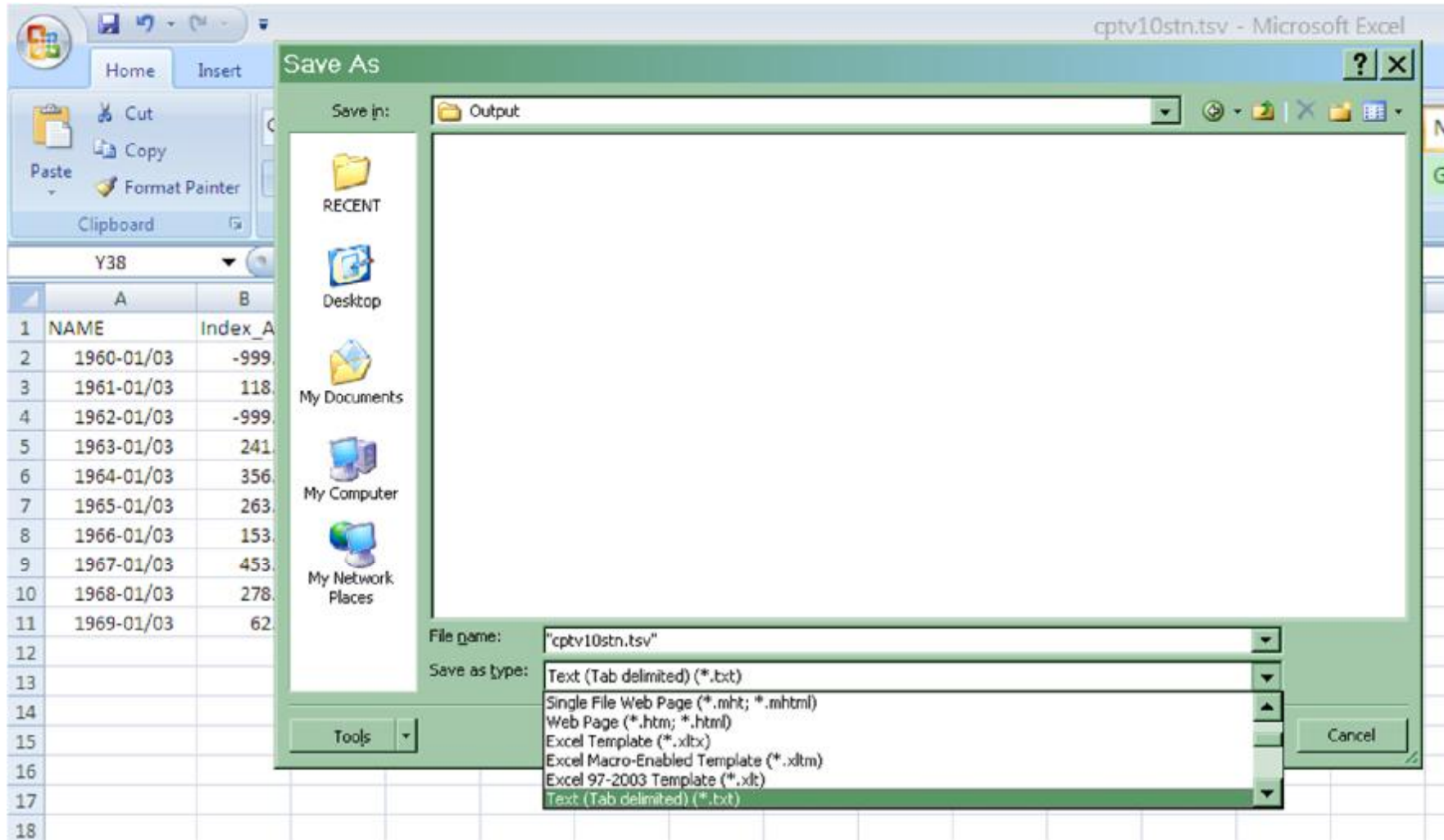
# CPT INPUT FILE FORMATS



The input files could be easily made using a spreadsheet such as Excel



# CPT INPUT FILE FORMATS



In Excel the file should be saved as:  
“Text (Tab delimited) (\*.txt)”





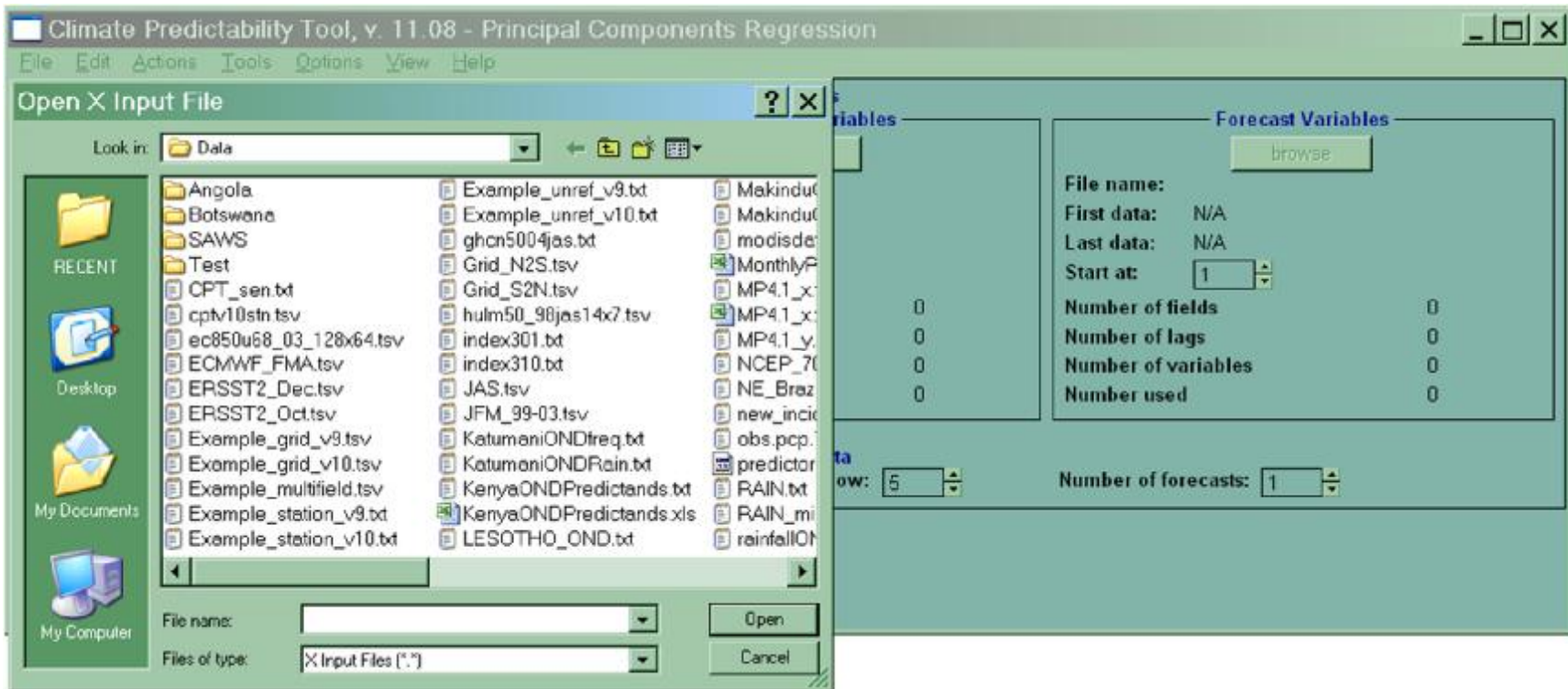
# SELECTING INPUT FILES

The screenshot shows the 'Climate Predictability Tool, v. 11.08 - Principal Components Regression' window. It features three main sections for file selection: 'Explanatory (X) Variables', 'Response (Y) Variables', and 'Forecast Variables'. Each section includes a 'browse' button, a 'File name:' field, 'First data:' and 'Last data:' fields (both set to 'N/A'), and a 'Start at:' spinner box (set to '1'). Below these are four rows of status indicators: 'Number of fields', 'Number of lags', 'Number of variables', and 'Number used', all currently set to '0'. At the bottom, there are three more spinner boxes: 'Length of training period' (set to '0'), 'Length of cross-validation window' (set to '5'), and 'Number of forecasts' (set to '1'). A 'Progress:' bar shows '0%' and an 'Actions:' section is visible at the very bottom.

To select input files just click on **browse**.



# SELECTING INPUT FILES



CPT opens a browser, which by default looks for data in:  
**C:\Documents and Settings\user\Application Data\CPT\Data\**  
or the directory specified during installation.  
You can search for data from any other directory.



# SELECTING INPUT FILES

Please specify domain limits:  
(Approximate data limits in brackets)

X Domain:  
(Southern latitudes and western longitudes negatives)

Northernmost latitude (88):	90
Southernmost latitude (-88):	-90
Westernmost longitude (0):	0
Easternmost longitude (358):	360

The domain can be set by:

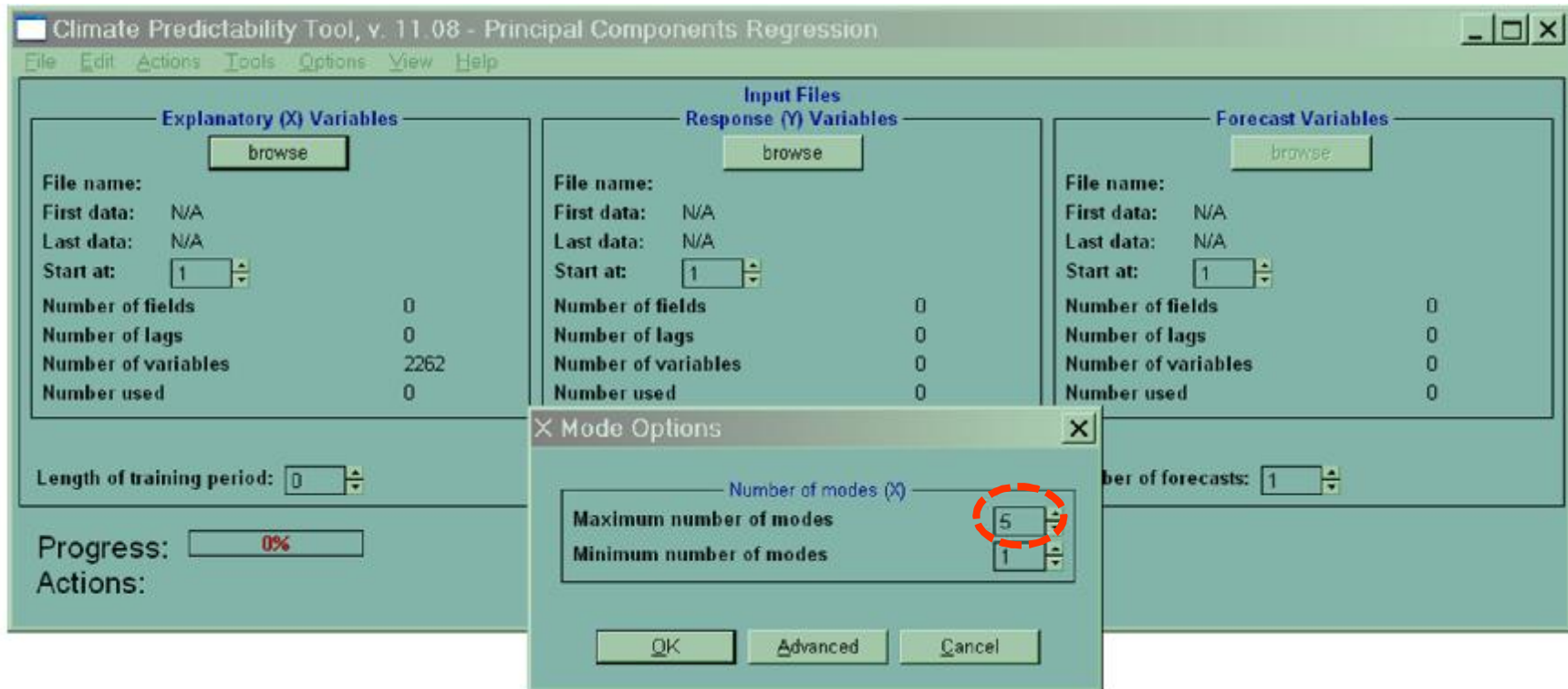
- typing in the domain limits
- or using the arrows,

The domain can also be selected by drawing a rectangle over the map.

For gridded and station datasets, CPT lets you choose the spatial domain over which you want to perform your analysis. For the X file you should choose a domain from where the predictors are known to affect climate over the region to be predicted.



# SETTING ANALYSIS OPTIONS



For PCR and CCA, you have to choose the number of EOFs for the predictor fields used to fit the model. If you set the minimum to be less than the maximum, CPT will find the optimum number of modes between the two numbers. If you set the minimum equal to the maximum, then CPT will use that number of modes.



# SELECTING INPUT FILES

The screenshot shows the 'Climate Predictability Tool, v. 11.08 - Principal Components Regression' window. It features a menu bar (File, Edit, Actions, Tools, Options, View, Help) and three main sections: 'Explanatory (X) Variables', 'Input Files', and 'Forecast Variables'. Each section has a 'browse' button and a table of statistics. The 'Input Files' section is highlighted with a red arrow pointing to its 'browse' button.

Explanatory (X) Variables		Response (Y) Variables		Forecast Variables	
File name:	ERSST3_Jan.tsv	File name:		File name:	ERSST3_Jan.tsv
First data:	Jan 1950	First data:	N/A	First data:	Jan 1950
Last data:	Jan 2011	Last data:	N/A	Last data:	Jan 2011
Start at:	1950	Start at:	1	Start at:	2011
Number of fields	1	Number of fields	0	Number of fields	1
Number of lags	1	Number of lags	0	Number of lags	1
Number of gridpoint	2418	Number of variables	0	Number of gridpoint	2418
Number used	0	Number used	0	Number used	0

Training data: Length of training period: 0, Length of cross-validation window: 5, Number of forecasts: 1

Progress: 0%

Actions:

Proceed in the same way to select your file containing the Y variables (predictands).



# SETTING THE TRAINING PERIOD

Climate Predictability Tool, v. 11.08 - Principal Components Regression

File Edit Actions Tools Options View Help

Explanatory (X) Variables		Response (Y) Variables		Forecast Variables	
File name:	ERSST3_Jan.tsv	File name:	NE_Brazil_v9.txt	File name:	ERSST3_Jan.tsv
First data:	Jan 1950	First data:	FMA 1971	First data:	Jan 1950
Last data:	Jan 2011	Last data:	FMA 1987	Last data:	Jan 2011
Start at:	1950	Start at:	1971	Start at:	2011
Number of fields	1	Number of fields	1	Number of fields	1
Number of lags	1	Number of lags	1	Number of lags	1
Number of gridpoint	2418	Number of stations	71	Number of gridpoint	2418
Number used	0	Number used	0	Number used	0

Length of training period: 27      Length of cross-validation window: 5      Number of forecasts: 1

Progress: 0%

Actions:

By default CPT usually starts the analysis from the first years in the X and Y files; note that these years could be different. You would normally set them equal to the latest of the two first years in the files. (In the example, the start date for the X file would normally be set to 1971.)

If you cross the calendar year while using December predictors, for example, the starting year for the X file will need to be one year earlier than for the Y file. (In this case, 1970.)

If you use a NDJ or DJF season, the year is for the first month.



# SETTING THE TRAINING PERIOD

Climate Predictability Tool, v. 11.08 - Principal Components Regression

File Edit Actions Tools Options View Help

Explanatory (X) Variables		Input Files Response (Y) Variables		Forecast Variables	
File name:	ERSST3_Jan.tsv	File name:	NE_Brazil_v9.txt	File name:	ERSST3_Jan.tsv
First data:	Jan 1950	First data:	FMA 1971	First data:	Jan 1950
Last data:	Jan 2014	Last data:	FMA 1997	Last data:	Jan 2011
Start at:	1971	Start at:	1971	Start at:	2011
Number of fields	1	Number of fields	1	Number of fields	1
Number of lags	1	Number of lags	1	Number of lags	1
Number of gridpoint	2418	Number of stations	71	Number of gridpoint	2418
Number used	0	Number used	0	Number used	0

Length of training period: 27

Length of cross-validation window: 5

Number of forecasts: 1

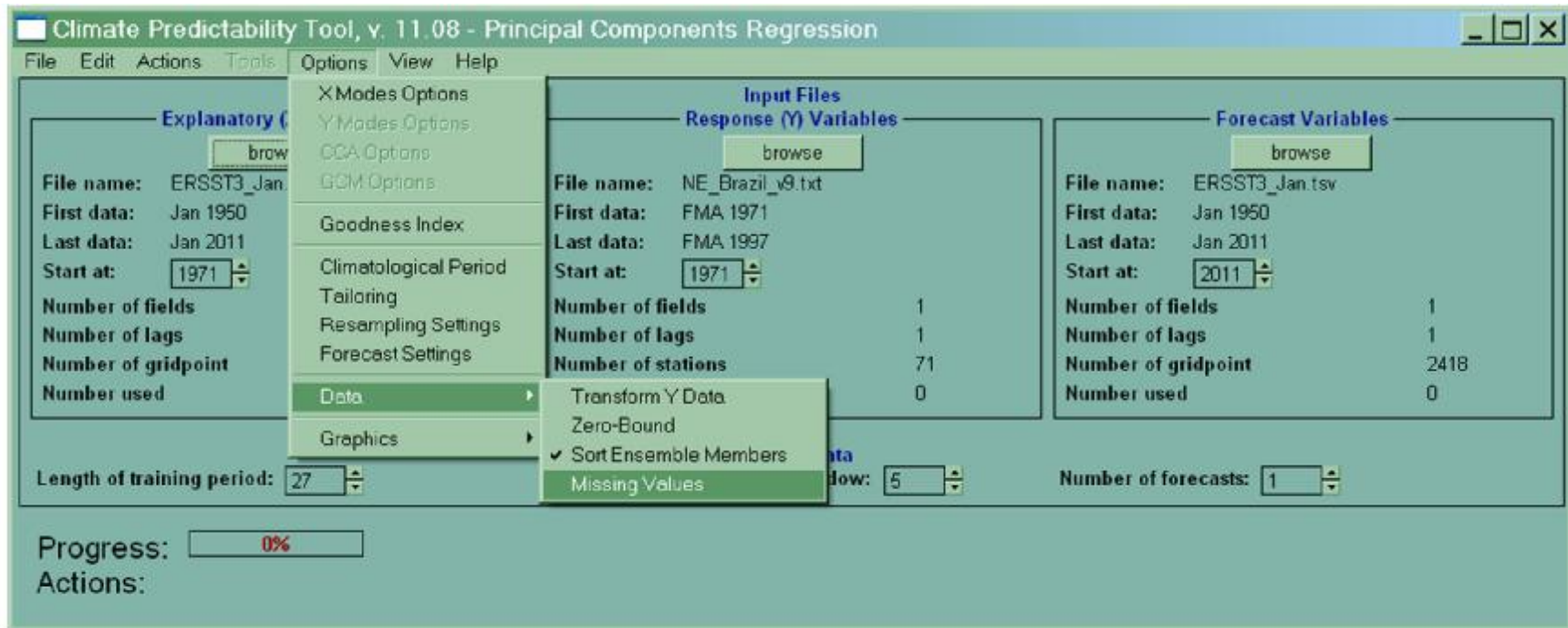
Progress: 0%

Actions:

You have to specify the length of the training period.  
By default, CPT will try to use as many years as are available.



# MISSING VALUES

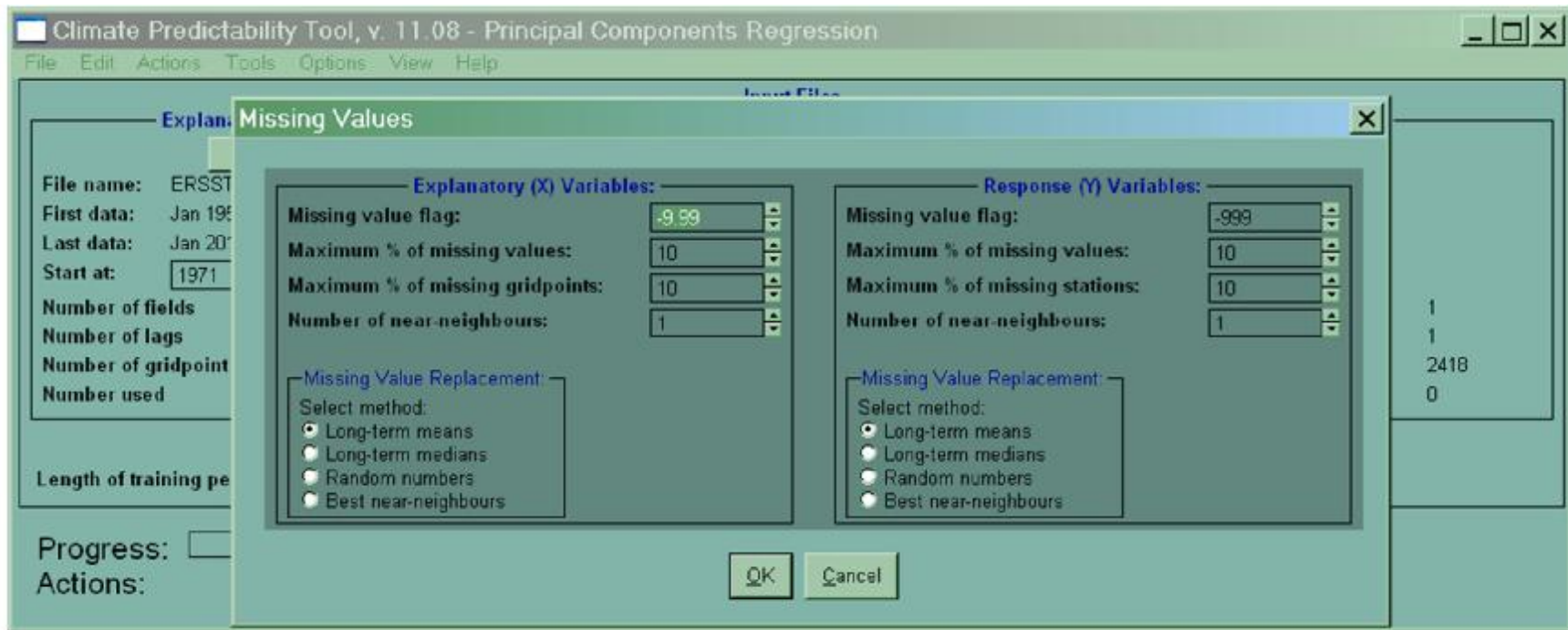


If you have missing values in your dataset, you need to specify what you want CPT to do with them.





# MISSING VALUES



Next to the **Missing value flag** box, you need to specify the number in your dataset that represents a missing value.

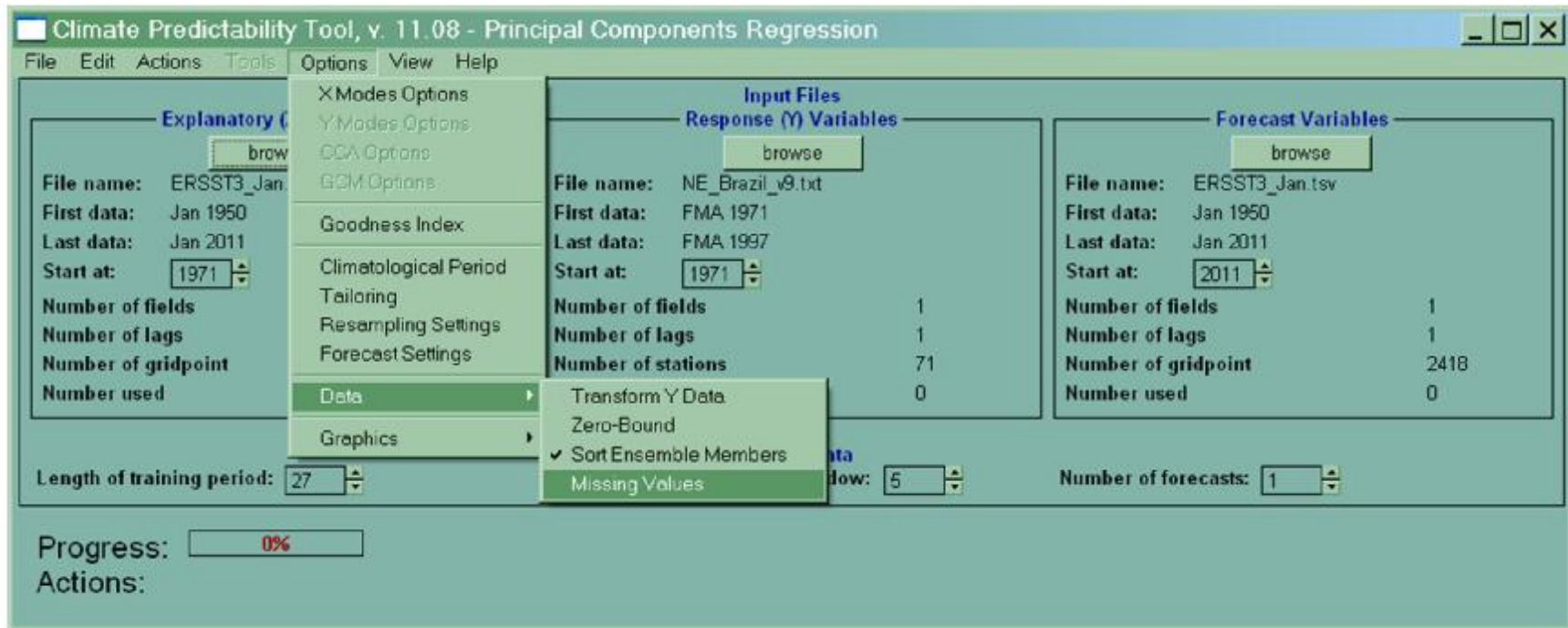
You can choose the **Maximum % of missing values**. If a station has more than that percentage of missing values, CPT will not use that station in its model.

You can choose the **Maximum % of missing stations**. If a year has more than that percentage of missing values, CPT will not use that year in its model.

You can also choose which method you want CPT to use to replace the values. If you choose **Best nearest neighbours** then CPT will use the **Number of near-neighbours** that you specify.



# RAINFALL

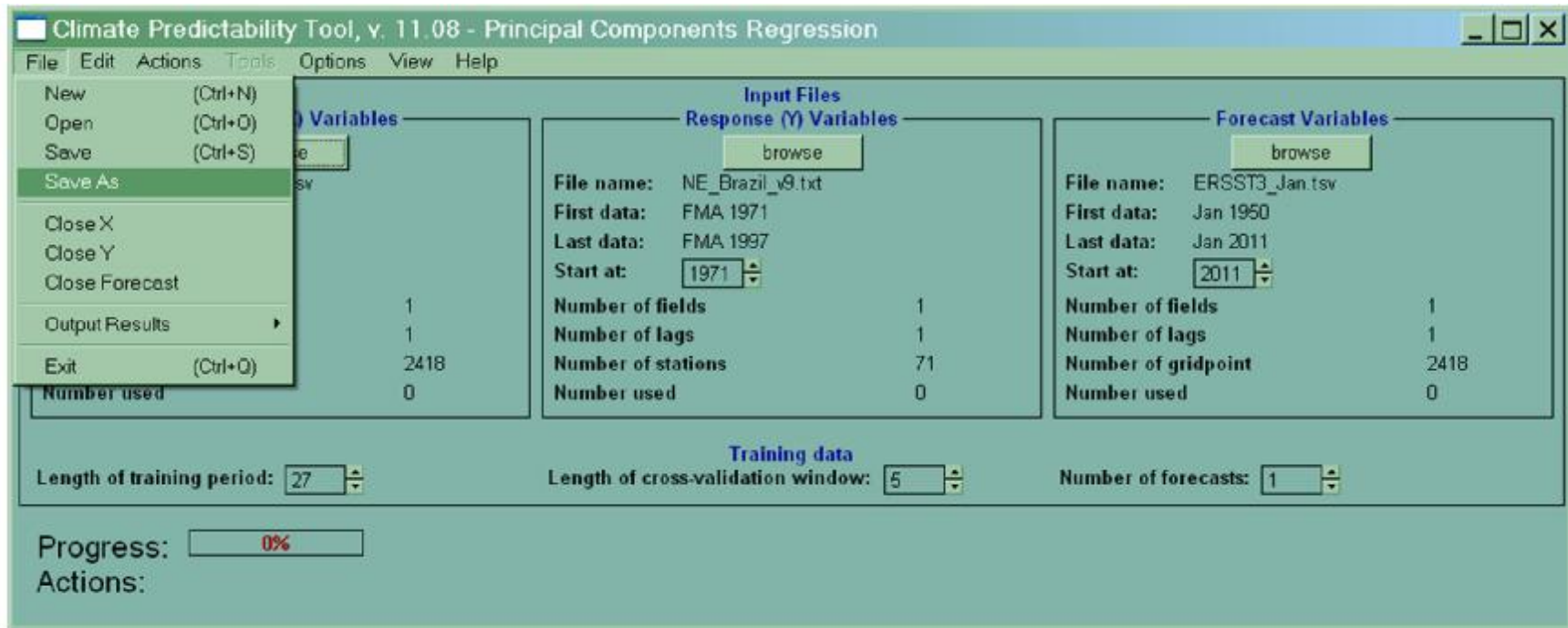


If you are predicting rainfall, you may want to switch on the **Zero-Bound**, which will force CPT never to predict negative values.

If the rainfall data are positively skewed (have occasional very large values), you may also want to switch on **Transform Y Data**, which will help to prevent lowest forecast probabilities on “normal”.



# SAVING PROGRAM SETTINGS



Once you have selected the input files and your settings it is a good idea to save these settings in a project file to recall them later:

**File ~ Save**

By default, CPT saves all the project files in the subdirectory  
**C:\Documents and settings\user\Application Data\CPT\Projects\**



# RUNNING CPT

Climate Predictability Tool, v. 11.08 - Example (PCR)

File Edit **Actions** Tools Options View Help

Calculate **Cross-validated**  
Reset Retroactive

**Input Files**  
Response (Y) Variables Forecast Variables

File name: ERSST3\_Jan.tsv  
First data: Jan 1950  
Last data: Jan 2011  
Start at: 1971

File name: NE\_Brazil\_v9.txt  
First data: FMA 1971  
Last data: FMA 1997  
Start at: 1971

File name: ERSST3\_Jan.tsv  
First data: Jan 1950  
Last data: Jan 2011  
Start at: 2011

Number of fields: 1  
Number of lags: 1  
Number of gridpoint: 2418  
Number used: 0

Number of fields: 1  
Number of lags: 1  
Number of stations: 71  
Number used: 0

Number of fields: 1  
Number of lags: 1  
Number of gridpoint: 2418  
Number used: 0

Length of training period: 27  
Length of cross-validation window: 5  
Number of forecasts: 1

Progress: 0%

Actions:

Then you can run the analysis:  
**Actions ~ Calculate ~ Cross-validated**



# DATA ANALYSIS

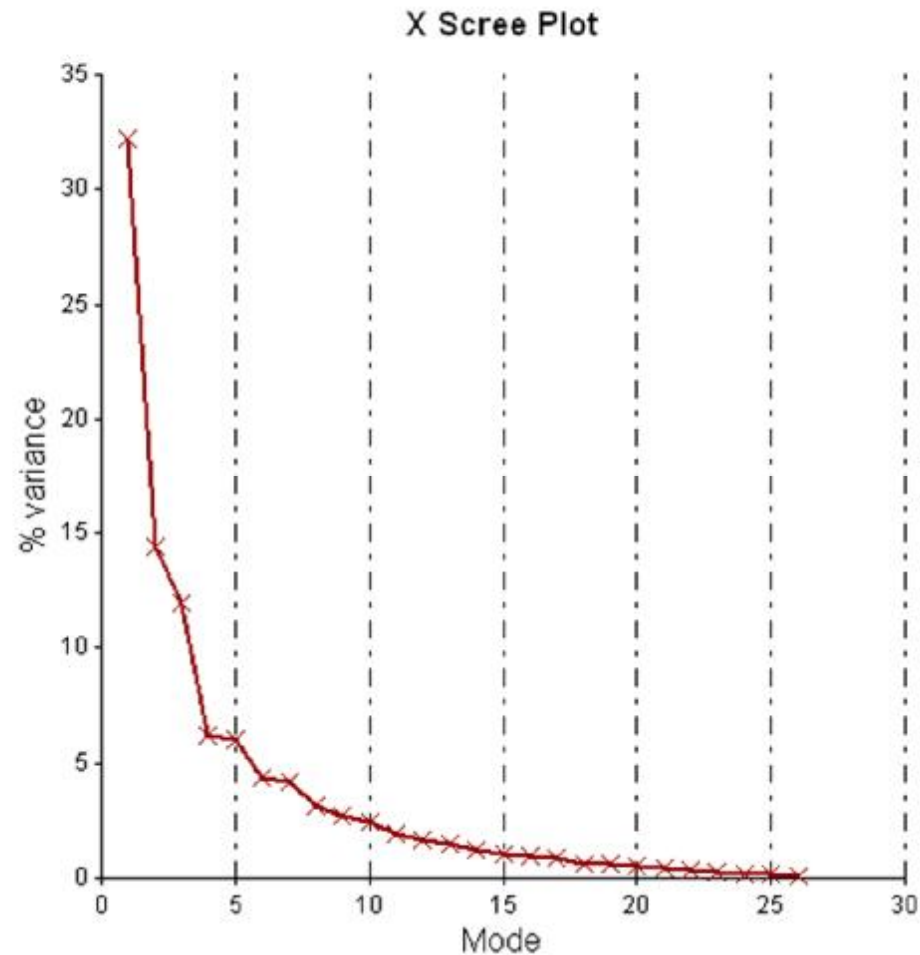
CURRENT		OPTIMUM	
Number of Modes	Goodness Index	Number of Modes	Goodness Index
1	-0.105	1	-0.105
2	0.031	2	0.031
3	0.214	3	0.214
4	0.144	3	0.214
5	0.112	3	0.214

## Optimizing the number of EOF modes:

1. CPT uses EOF #1 to make cross-validated forecasts then calculates a “goodness index” summarizing how good all the forecasts are (the closer to 1.0 the better). Then CPT uses EOF #1 and #2 to remake cross-validated forecasts and calculates a new goodness index for these, and so on until all five EOFs have been used.
2. At each step CPT compares the goodness indices and retains under the column “OPTIMUM” the highest goodness index and the corresponding number of EOFs (in the example above, 3).
3. CPT uses this number of EOFs (i.e., 3) to build the model.



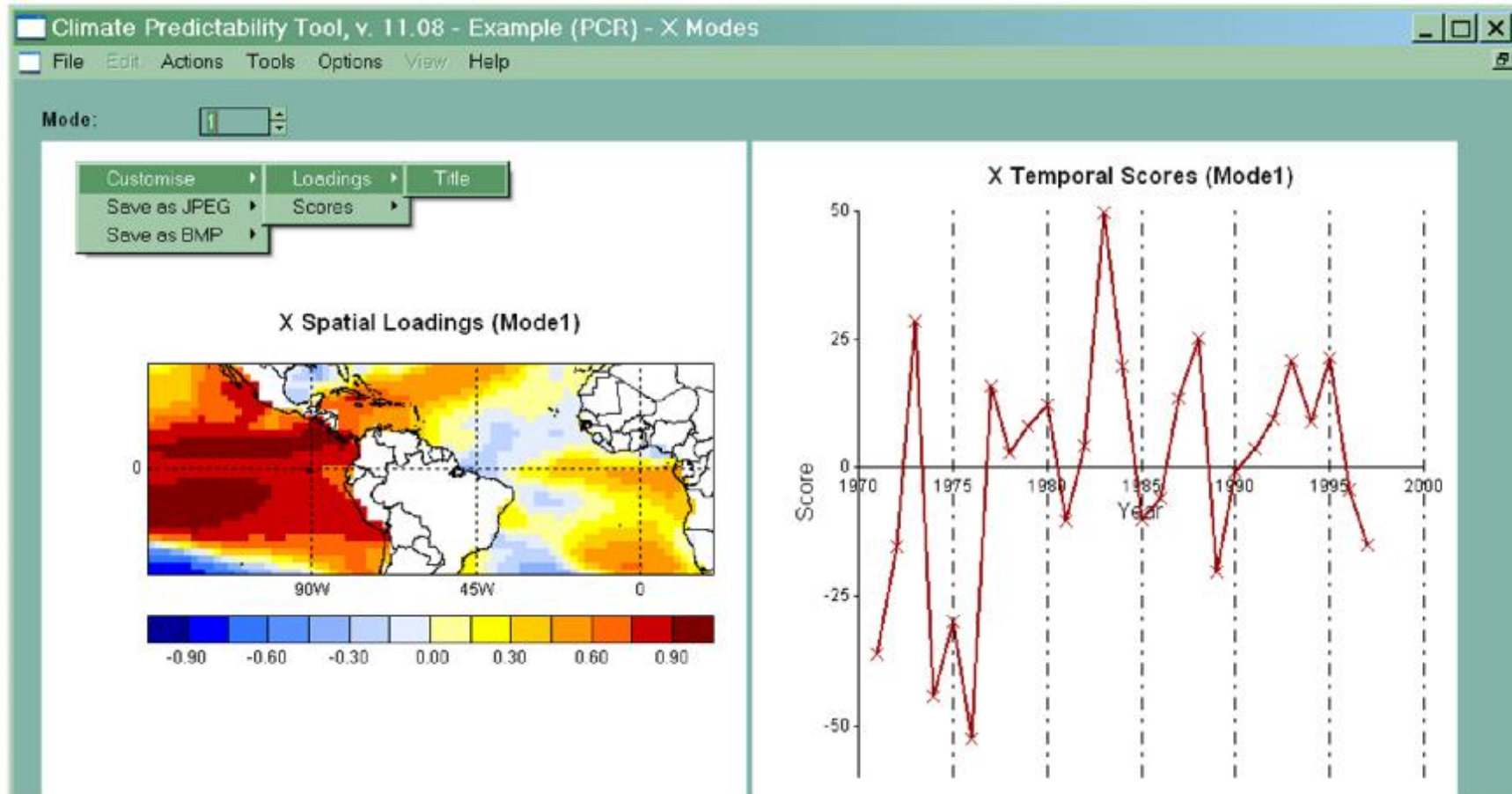
# RESULTS – GRAPHICS



The menu **Tools ~ Modes ~ Scree plots** displays the percentage of variance associated with each EOF plotted.



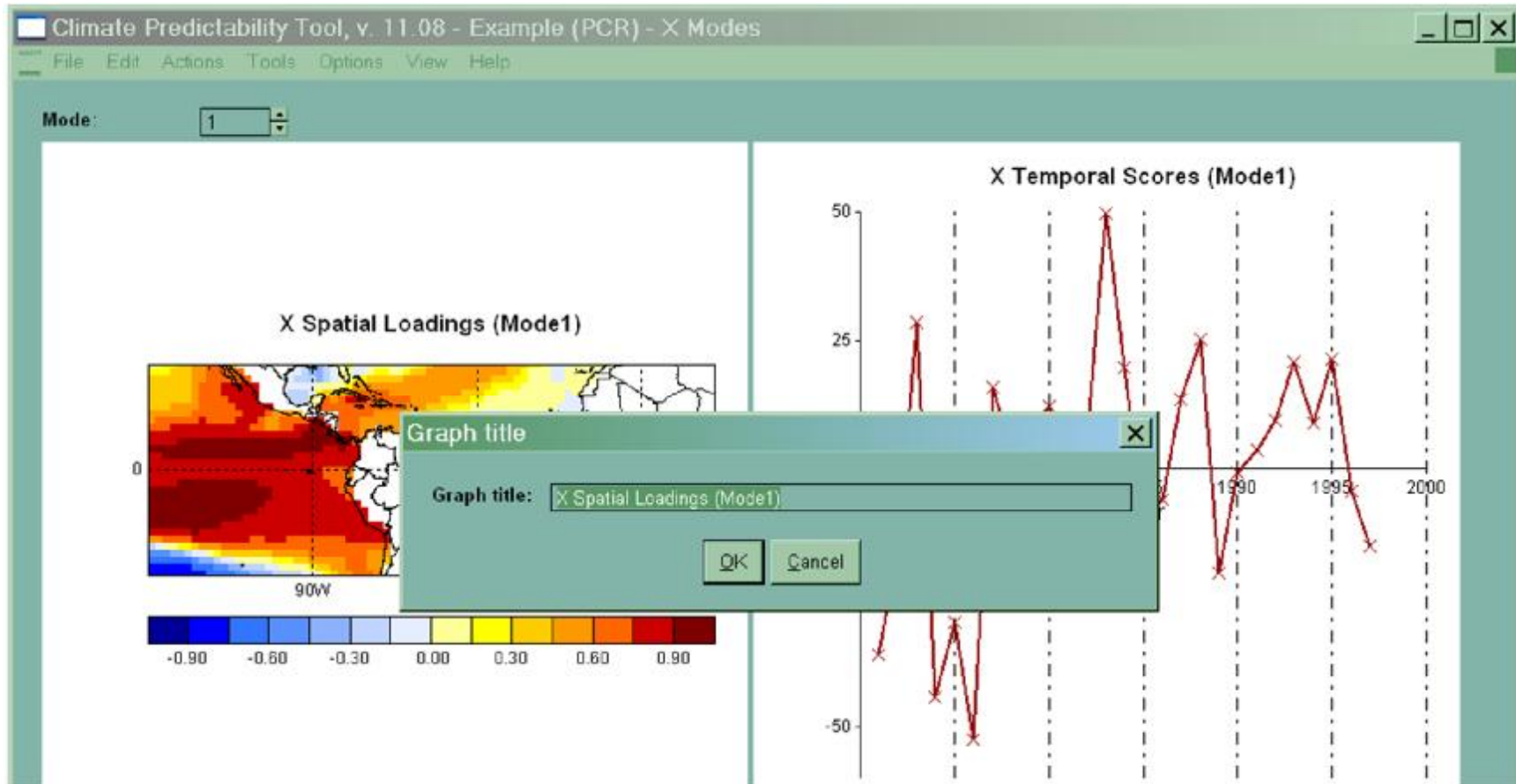
# RESULTS – GRAPHICS



1. The menu **Tools ~ Modes ~ X EOF loadings and scores** displays the loading pattern of each EOF and the temporal series.
2. CPT allows you to customize and save each graphic by:
  - right-clicking on the mouse
  - selecting the graphic to customize / save



# CHANGING THE TITLE



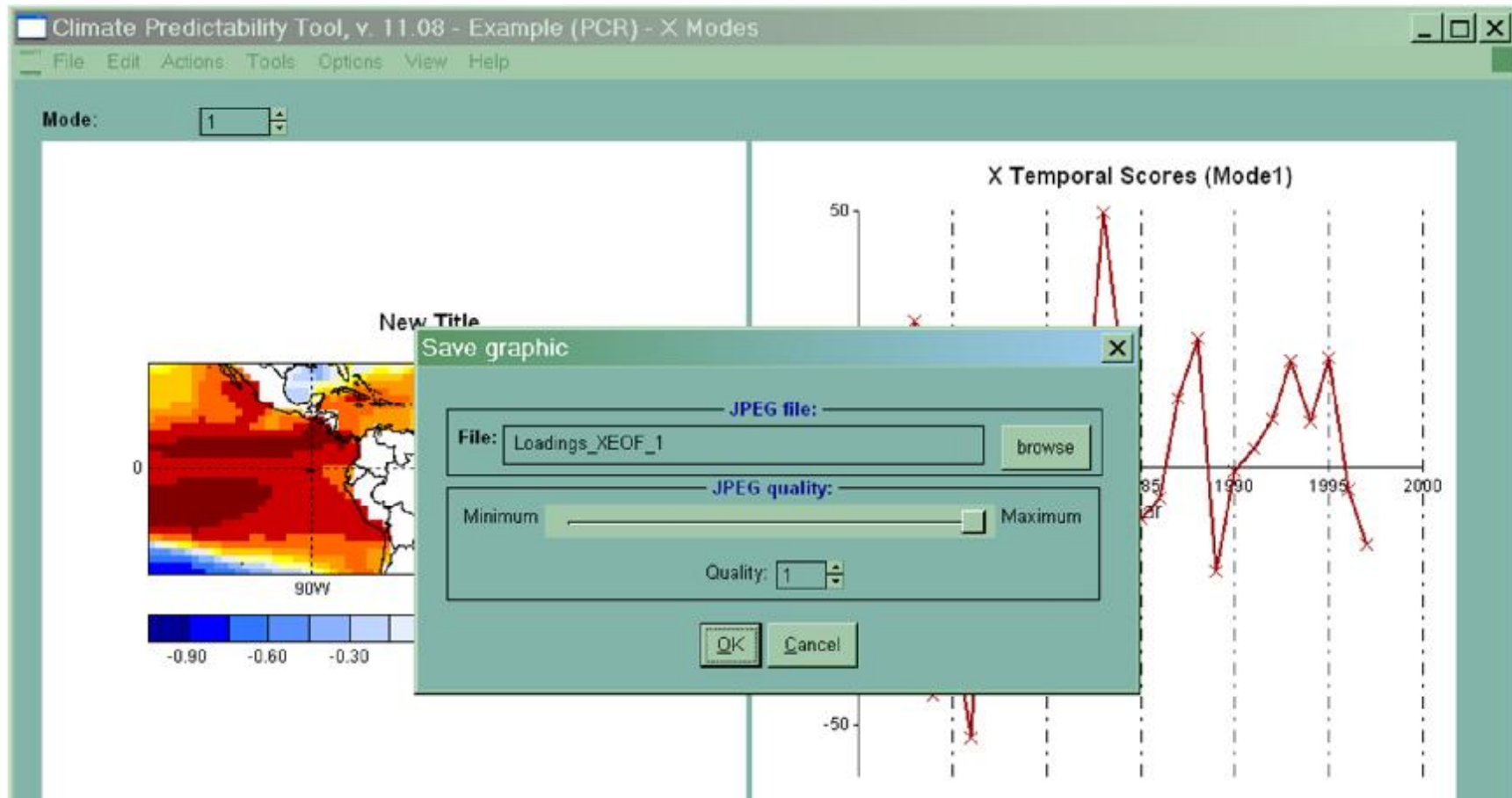
To change the title of the map

1. right-click the mouse
2. go to EOF Loadings
3. click on Title





# SAVING GRAPHICS



You can choose the name of the graphic output file by clicking on browse. You can adjust the quality of the JPEG graphic as well.

All the output files are saved by default under:

<C:\Documents and settings\user\Application Data\CPT\Output\>



# RESULTS

Climate Predictability Tool, v. 11.08 - Example (PCR)

File Edit Actions Tools Options View Help

Validation  
Verification  
Contingency Tables  
Modes  
Climatological Maps  
Forecasts

Cross-validated  
Retroactive

Performance Measures  
Bootstrap  
Skill Maps  
Scatter Plot

Forecast Variables  
browse

File name: ERSST3\_Jan.tsv  
First data: Jan 1960  
Last data: Jan 2011  
Start at: 2011

Number of fields: 1  
Number of lags: 1  
Number of gridpoints: 2418  
Number used: 0

File name: ERSST3\_Jan.tsv  
First data: FMA 1971  
Last data: FMA 1997  
Start at: 1971

Number of fields: 1  
Number of lags: 1  
Number of stations: 71  
Number used: 71

File name: ERSST3\_Jan.tsv  
First data: Jan 1960  
Last data: Jan 2011  
Start at: 1971

Number of fields: 1  
Number of lags: 1  
Number of gridpoints: 2418  
Number used: 1773

Length of training period: 27  
Length of cross-validation window: 5  
Number of forecasts: 1

Progress: 100%

Actions:

To see the results go to the menu “**Tools**”:

**Validation** : shows skill, hindcasts and observed series

**Verification**: shows probabilistic skill information for retroactive forecasts

**Contingency Tables** : shows contingency tables

**Modes** : shows EOF time series, loading patterns and scree plot

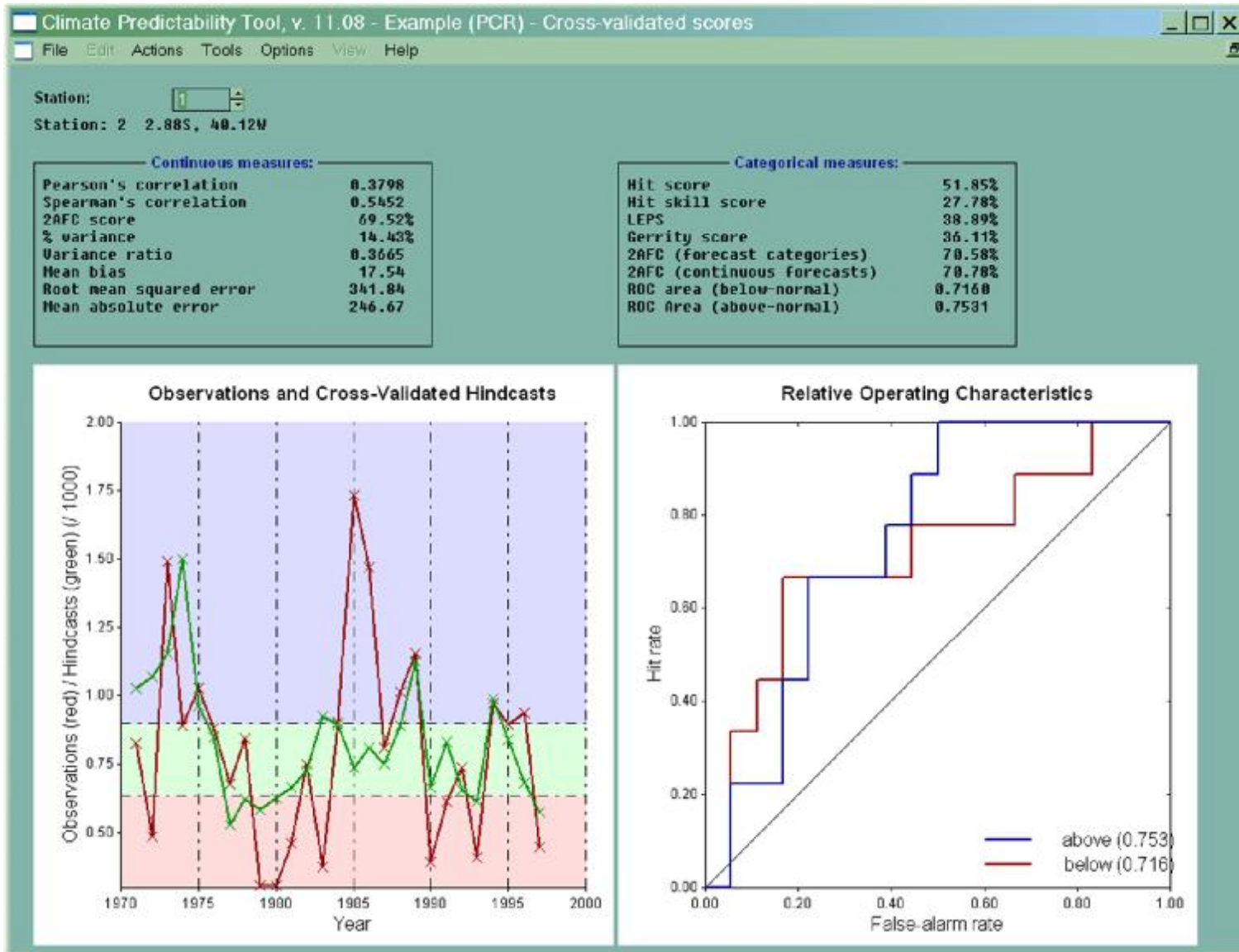
**Climatological Maps**: shows maps of terciles and averages



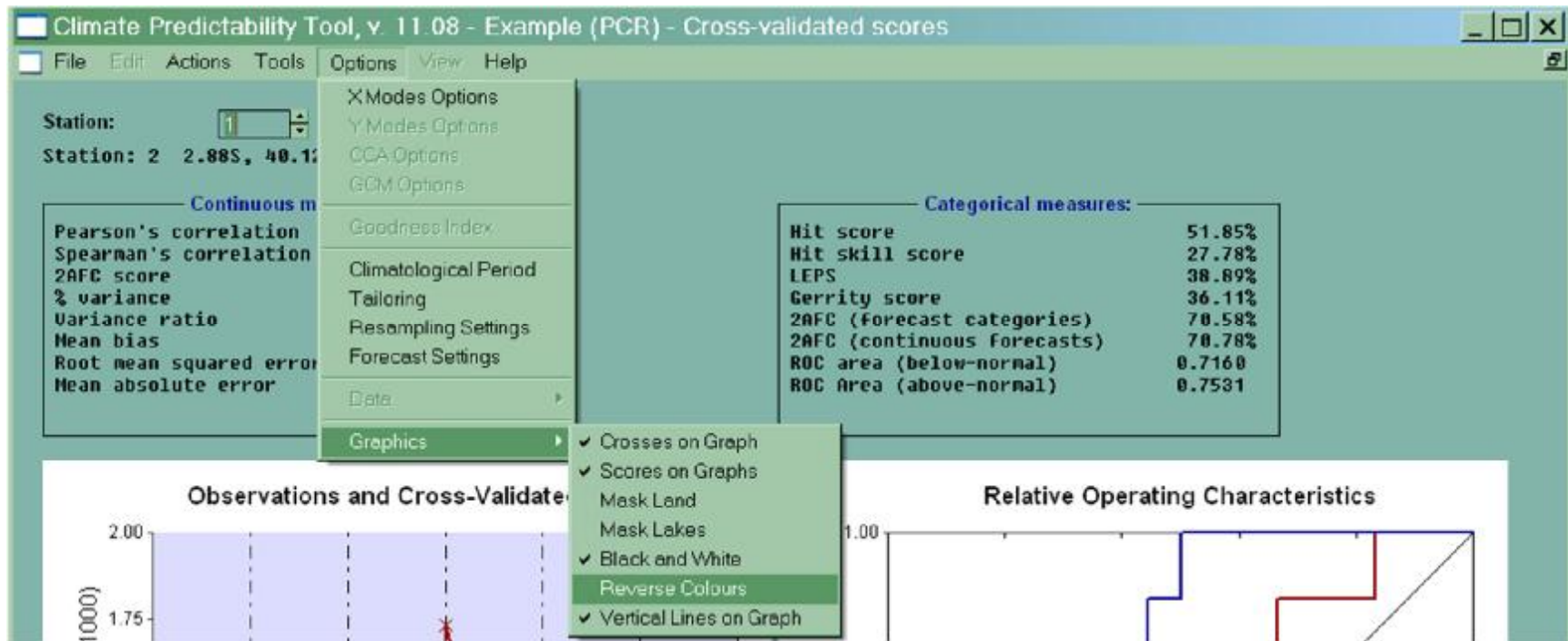
# RESULTS

To see the observations and cross-validated forecasts at each station go to:

**Tools ~ Validation ~ Cross-Validated ~ Performance Measures**



# REVERSING THE COLORS

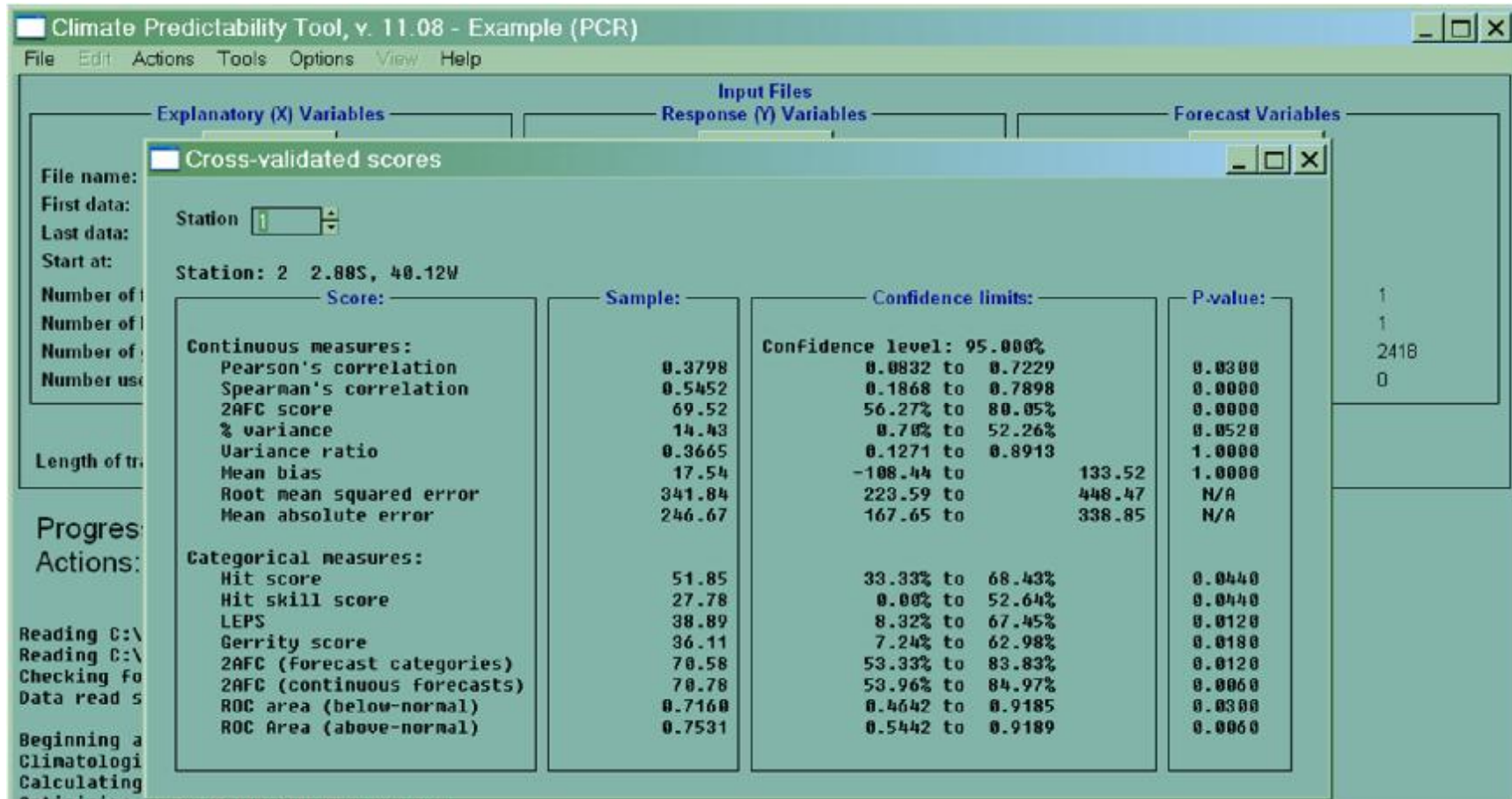


## Options ~ Graphics ~ Reverse Colors

If you are forecasting temperature instead of precipitation, then it would be more intuitive to have red (hot) for above and blue (cold) for below, so you might want to invert the default colors. You might also want black and white images if they are to be included in a report or publication.



# INDICATIONS OF SAMPLING ERRORS



For indications of sampling errors in the performance measures go to:

Tools ~ Validation ~ Cross-Validated ~ Bootstrap



# ADJUSTING THE BOOTSTRAP SETTINGS

The screenshot displays the 'Climate Predictability Tool, v. 11.08 - Example (PCR)' interface. A 'Resampling Settings' dialog box is open, showing the following options:

- Skill maps:**  Calculate p-values
- Permutations:** Number of permutations: 500
- Bootstrapping:** Number of bootstrap samples: 500, Confidence level (%): 95

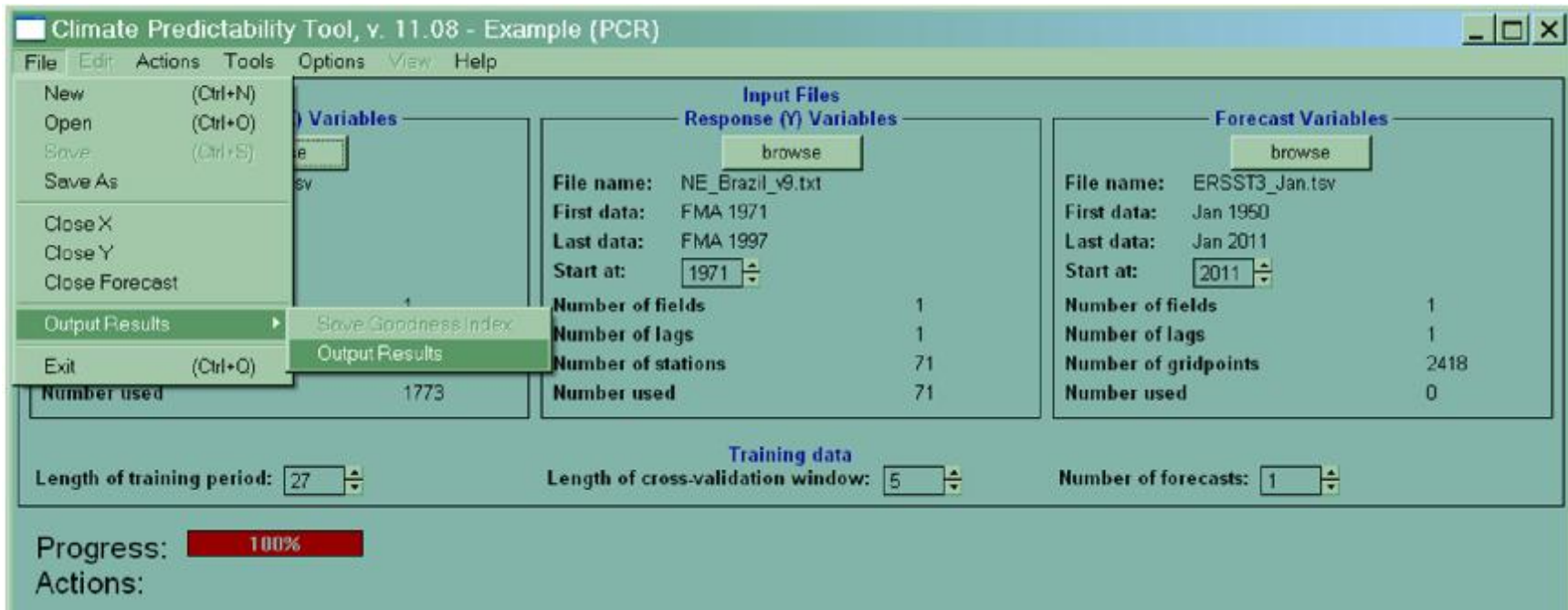
The background window shows 'Cross-validated scores' for Station 1 (2.88S, 40.12W). It lists various measures such as Pearson's correlation, Spearman's correlation, 2AFC score, % variance, Variance ratio, Mean bias, Root mean squared error, Mean absolute error, Hit score, Hit skill score, LEPS, Gerrity score, and ROC area (below-normal and above-normal). The P-value column shows values like 0.0300, 0.0000, 0.0520, 1.0000, 1.0000, N/A, N/A, 0.0440, 0.0440, 0.0120, 0.0180, 0.0120, 0.0060, 0.0300, and 0.0060.

## Options ~ Resampling Settings

CPT allows you to adjust the bootstrap settings.



# RESULTS – DATA FILES

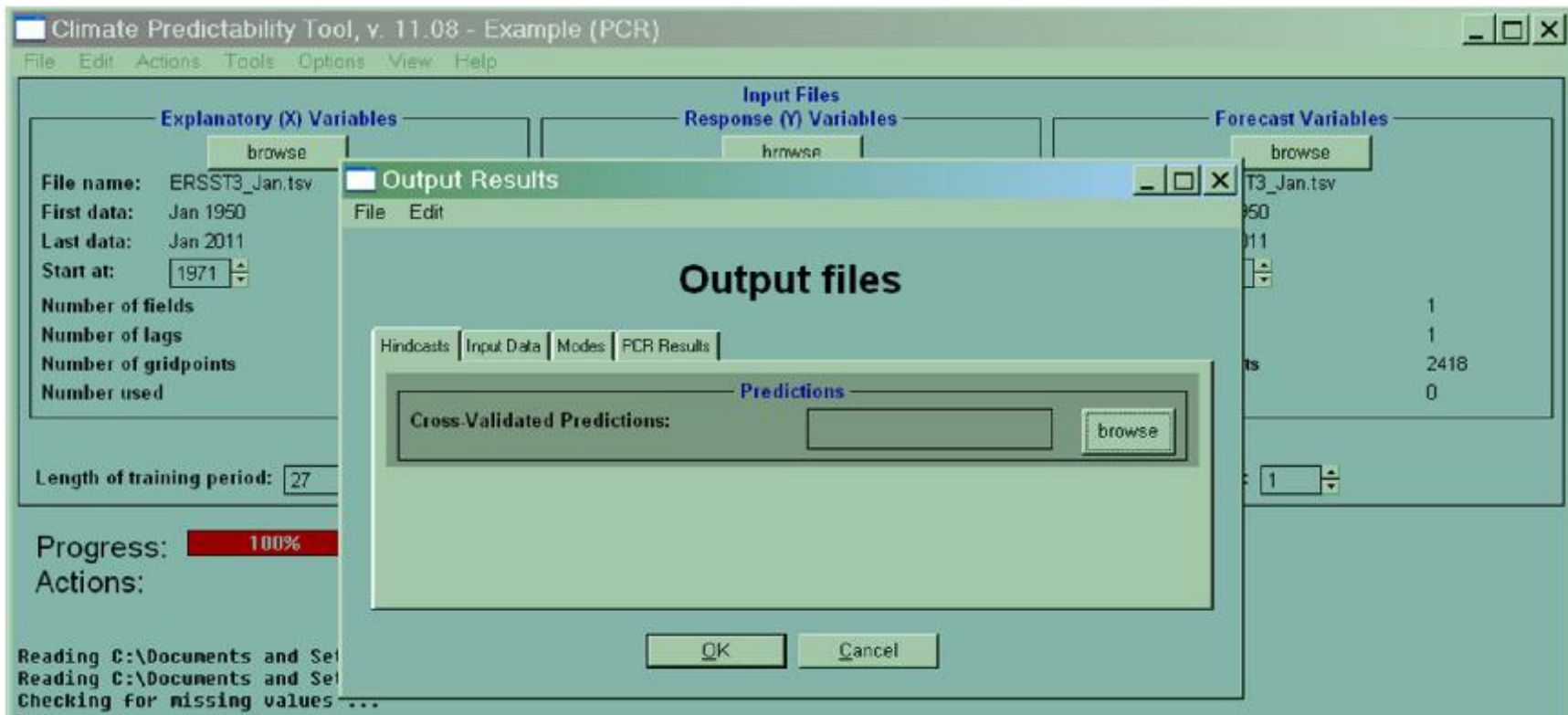


The menu **File ~ Output Results ~ Output Results** allows you to save output data:

1. Cross-validated forecasts
2. The input data (with the missing values filled)
3. EOFs: time series, loading patterns, variance
4. The parameters (coefficients) of the model (example:  $Y = \underline{a}x + \underline{b}$ )



# SAVING OUTPUT FILES



In order to save the outputs you have to specify a file name by clicking on browse. By default CPT saves the output files under: **C:\Documents and settings\user\Application Data\CPT\Output\**





# FORECAST

The screenshot shows the 'Climate Predictability Tool, v. 11.08 - Principal Components Regression' window. It features a menu bar (File, Edit, Actions, Tools, Options, View, Help) and three main configuration panels: 'Explanatory (X) Variables', 'Input Files Response (Y) Variables', and 'Forecast Variables'. The 'Forecast Variables' panel is circled in red. Below these panels are 'Training data' settings and a progress indicator.

Section	File name	First data	Last data	Start at	Number of fields	Number of lags	Number of gridpoint	Number used
Explanatory (X) Variables	ERSST3_Jan.tsv	Jan 1950	Jan 2011	1971	1	1	2418	0
Input Files Response (Y) Variables	NE_Brazil_v9.txt	FMA 1971	FMA 1997	1971	1	1	71	0
Forecast Variables	ERSST3_Jan.tsv	Jan 1950	Jan 2011	2011	1	1	2418	0

Training data: Length of training period: 27, Length of cross-validation window: 5, Number of forecasts: 1

Progress: 0%

Actions:

Once your model is built, you can make a forecast using a forecast file with new records of the X variables stored in a “**forecast file**”. By default CPT selects the same input predictor file as the X file. You can change it by clicking **browse**.



# FORECAST

Climate Predictability Tool, v. 11.08 - Principal Components Regression

File Edit Actions Tools Options View Help

Explanatory (X) Variables		Input Files Response (Y) Variables		Forecast Variables	
File name:	ERSST3_Jan.tsv	File name:	NE_Brazil_v9.txt	File name:	ERSST3_Jan.tsv
First data:	Jan 1950	First data:	FMA 1971	First data:	Jan 1950
Last data:	Jan 2011	Last data:	FMA 1997	Last data:	Jan 2011
Start at:	1971	Start at:	1971	Start at:	2011
Number of fields	1	Number of fields	1	Number of fields	1
Number of lags	1	Number of lags	1	Number of lags	1
Number of gridpoint	2418	Number of stations	71	Number of gridpoint	2418
Number used	0	Number used	0	Number used	0

Length of training period: 27      Length of cross-validation window: 5      Number of forecasts: 1

Progress: 0%

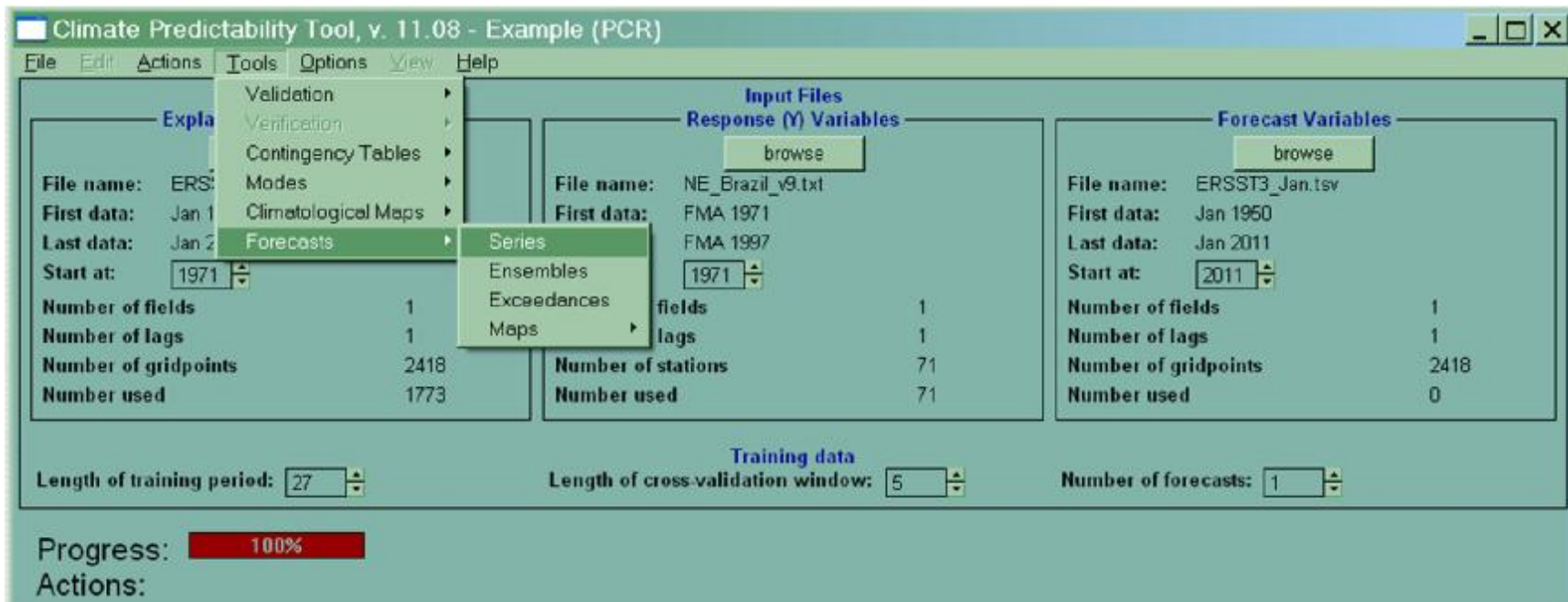
Actions:

You then select:

1. the starting year of the forecasts (the year is for the predictors not the predictand – for example if you are forecasting JFM 2012 from December 2011 SSTs, the year should be 2011).
2. the number of years to forecast



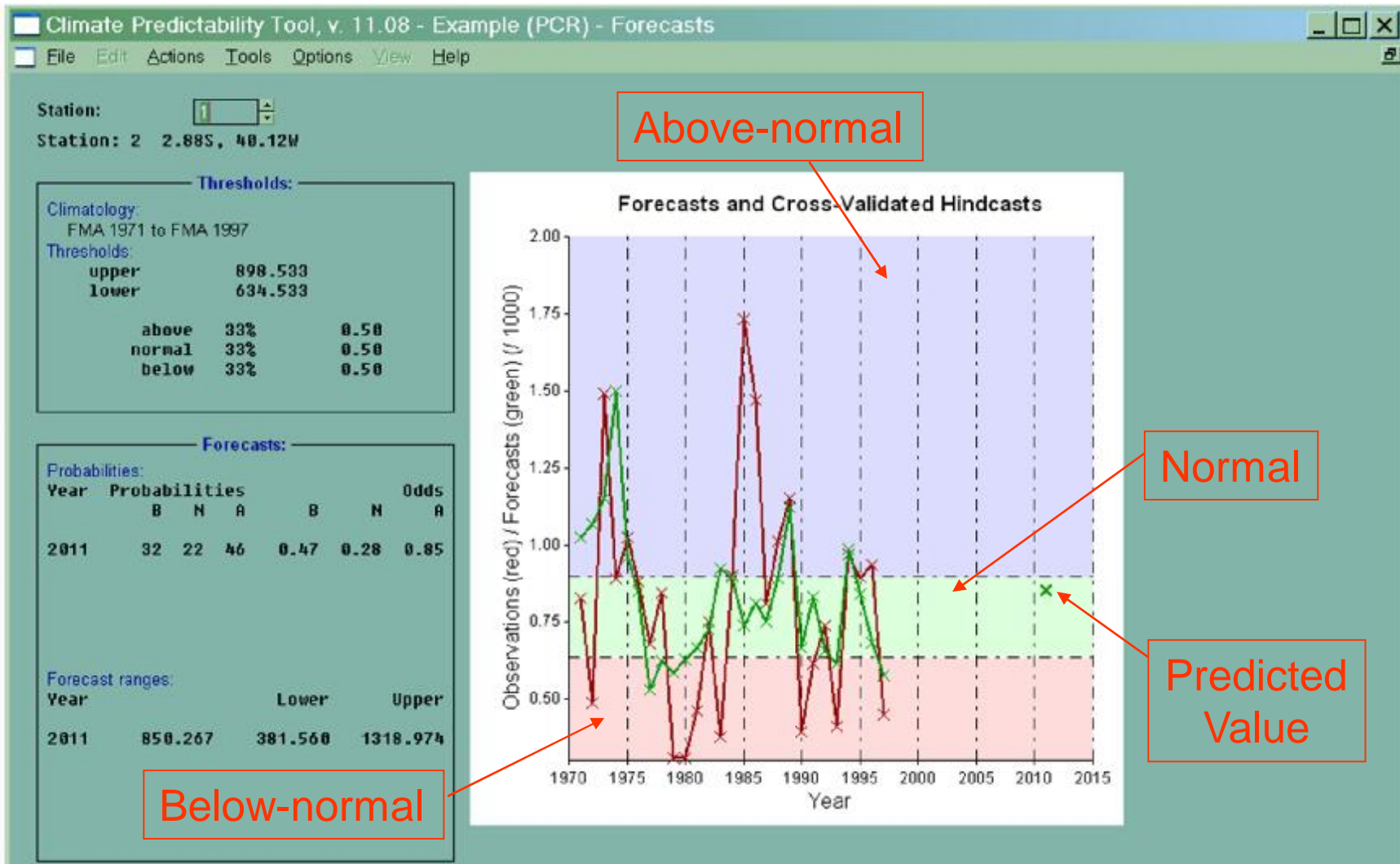
# FORECAST



Once the file is selected and the years to forecast are chosen go to the menu **Tools ~ Forecast ~ Series** or **Maps**.



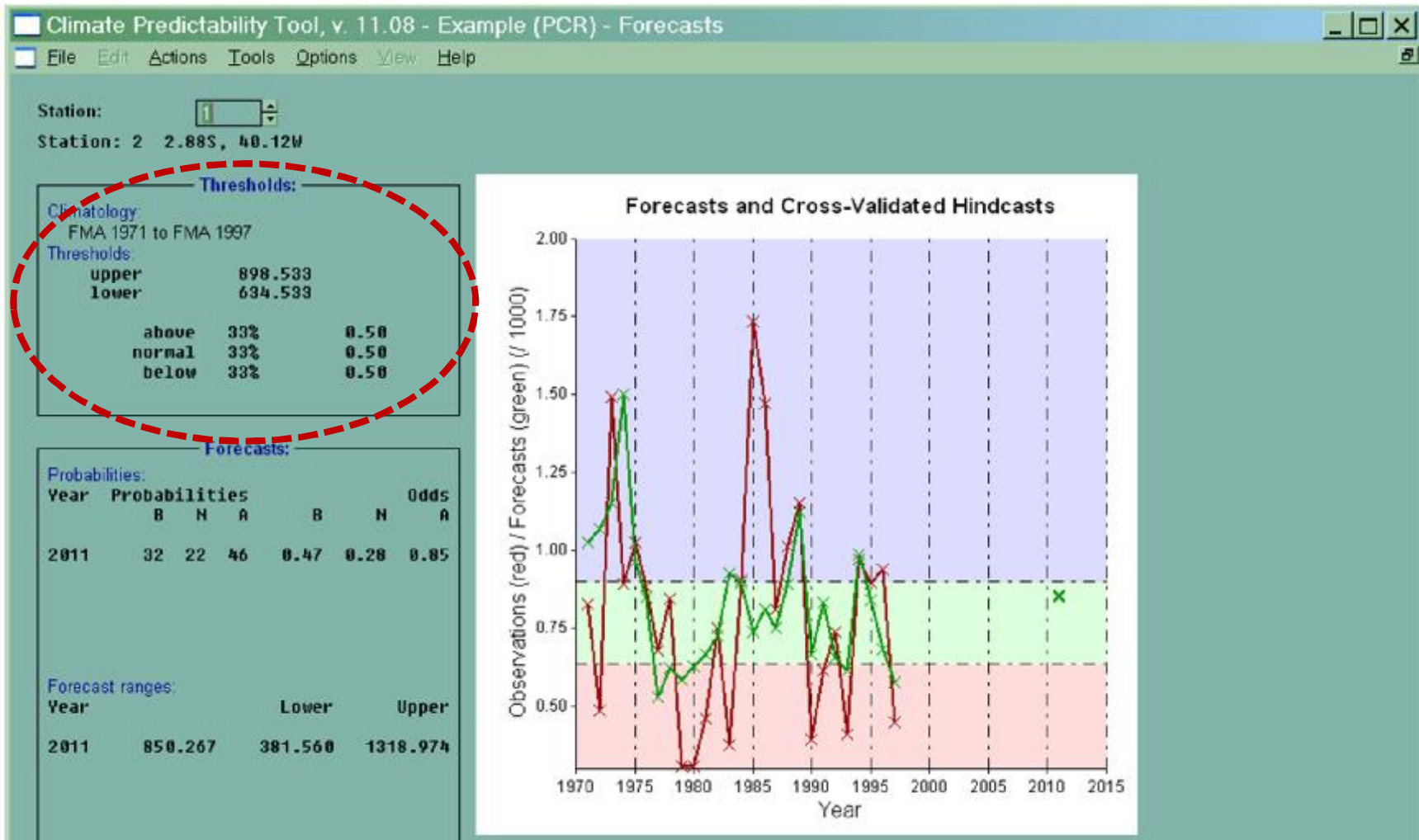
# FORECAST



The option **Series** shows a graph of the cross-validated forecasts (green line) and the prediction (cross) for the current station, as well as detailed information about the forecast.



# FORECAST



The “Thresholds” box indicates the definitions of below- and above-normal (less than the lower threshold and more than the upper threshold, respectively.) The climatological probabilities and odds of each of the three categories are shown.



# CHANGING CATEGORY DEFINITIONS

Climate Predictability Tool, v. 11.08 - Example (PCR) - Forecasts

File Edit Actions Tools Options View Help

Station:  Station: 2 2.88S, 48.12W

**Thresholds:**

Climatology:  
FMA 1971 to FMA 1997

Thresholds:

upper	898.533		
lower	634.533		
above	33%	0.50	
normal	33%	0.50	
below	33%	0.50	

**Forecasts:**

Probabilities:

Year	Probabilities			Odds		
	B	N	A	B	N	A
2011	32	22	46	0.47	0.28	0.85

Forecast ranges:

Year	Lower	Upper
2011	850.267	1318.974

**Tailoring**

**Standardization:**

Select method:

- No standardization
- Anomalies
- Standardized anomalies

**Thresholds:**

**Probabilities:**

Climatological probabilities of outer categories:

above:

below:

**Absolute thresholds:**

Absolute thresholds:

upper:

lower:

**Analogues:**

Analogues:

Analogue 1:

Analogue 2:

OK Cancel

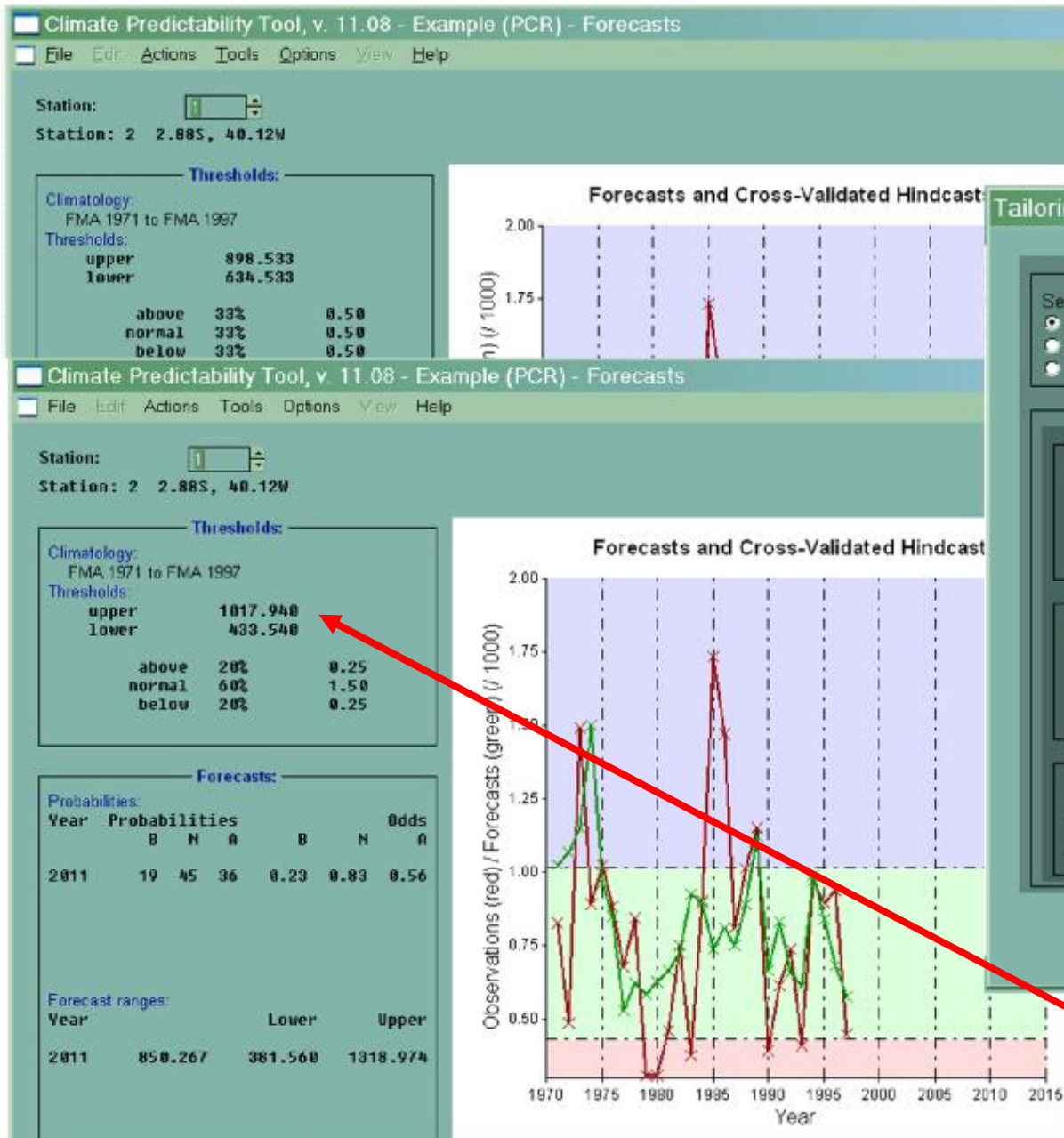
There are three ways to change how the categories are defined.

Options ~ Tailoring



# CHANGING CATEGORY DEFINITIONS

1. Change the climatological probabilities



**Tailoring**

**Standardization:**

Select method:

- No standardization
- Anomalies
- Standardized anomalies

**Thresholds:**

**Probabilities:**

Climatological probabilities of outer categories:

above: 0.2

below: 0.2

**Absolute thresholds:**

Absolute thresholds:

upper: 200

lower: 100

**Analogues:**

Analogues:

Analogue 1: 1971

Analogue 2: 1971

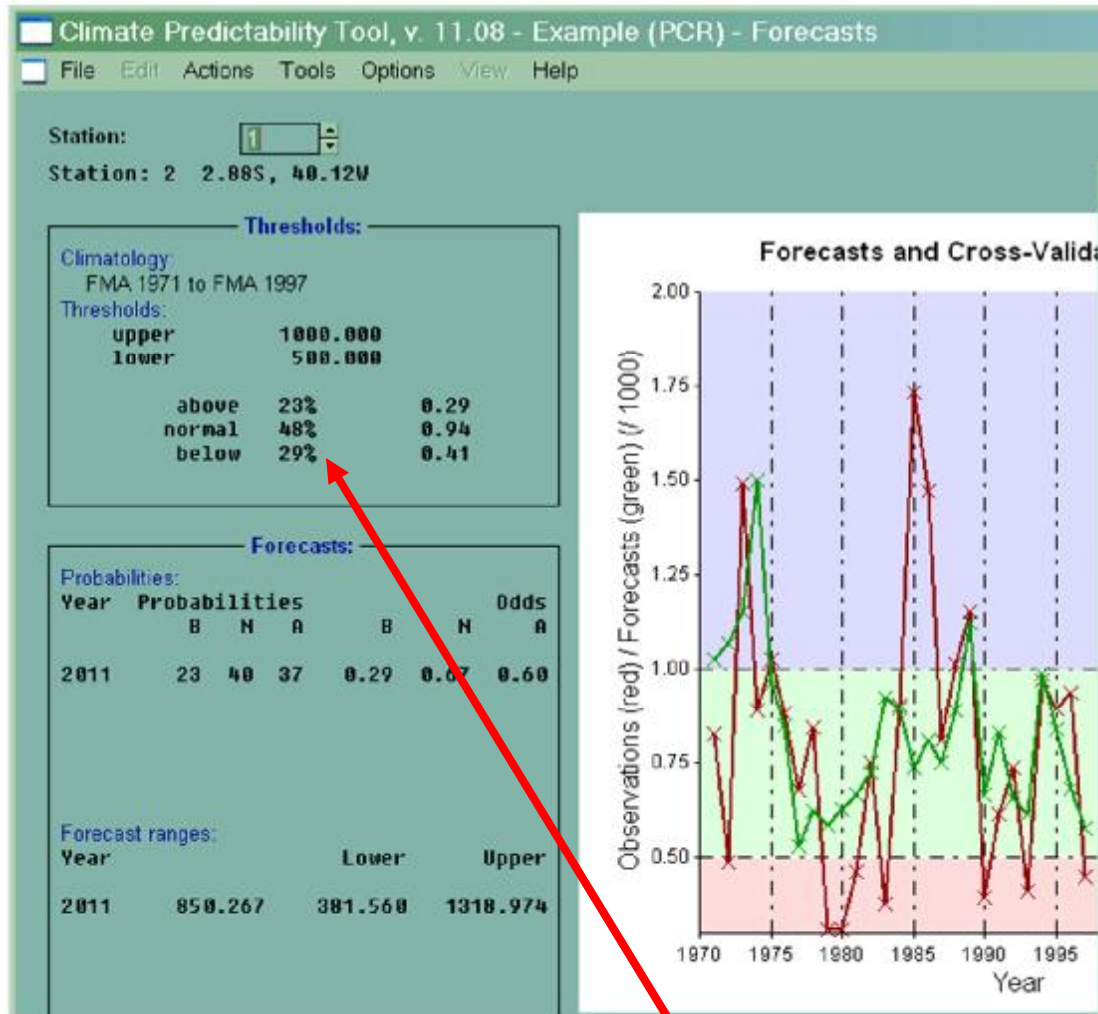
OK Cancel

CPT recalculates the thresholds



# CHANGING CATEGORY DEFINITIONS

2. Define the actual thresholds



Tailoring

**Standardization:**

Select method:

- No standardization
- Anomalies
- Standardized anomalies

**Thresholds:**

**Probabilities:**

Climatological probabilities of outer categories:

above: 0.2  
below: 0.2

**Absolute thresholds:**

Absolute thresholds:

upper: 1000  
lower: 500

**Analogues:**

Analogues:

Analogue 1: 1971  
Analogue 2: 1971

OK Cancel

CPT recalculates the climatological probabilities





# CHANGING CATEGORY DEFINITIONS

## 3. Set analogue years

**Climate Predictability Tool, v. 11.08 - Example (PCR) - Forecasts**

Station: 2 2.88S, 40.12W

**Thresholds:**

Climatology:  
FMA 1971 to FMA 1997

Thresholds:			
upper	1733.500	(1985)	
lower	395.000	(1990)	
above	4%	0.04	
normal	82%	4.60	
below	14%	0.17	

**Forecasts:**

Year	Probabilities			Odds		
	B	N	A	B	N	A
2011	17	80	3	0.20	4.04	0.03

**Forecast ranges:**

Year	Lower	Upper
2011	850.267	1318.974

**Forecasts and Cross-Validation**

Observations (red) / Forecasts (green) (1000)

Year

**Tailoring**

**Standardization:**

Select method:

- No standardization
- Anomalies
- Standardized anomalies

**Thresholds:**

**Probabilities:**

Climatological probabilities of outer categories:

above: 0.2

below: 0.2

**Absolute thresholds:**

Absolute thresholds:

upper: 1000

lower: 500

**Analogues:**

Analogues:

Analogue 1: 1985

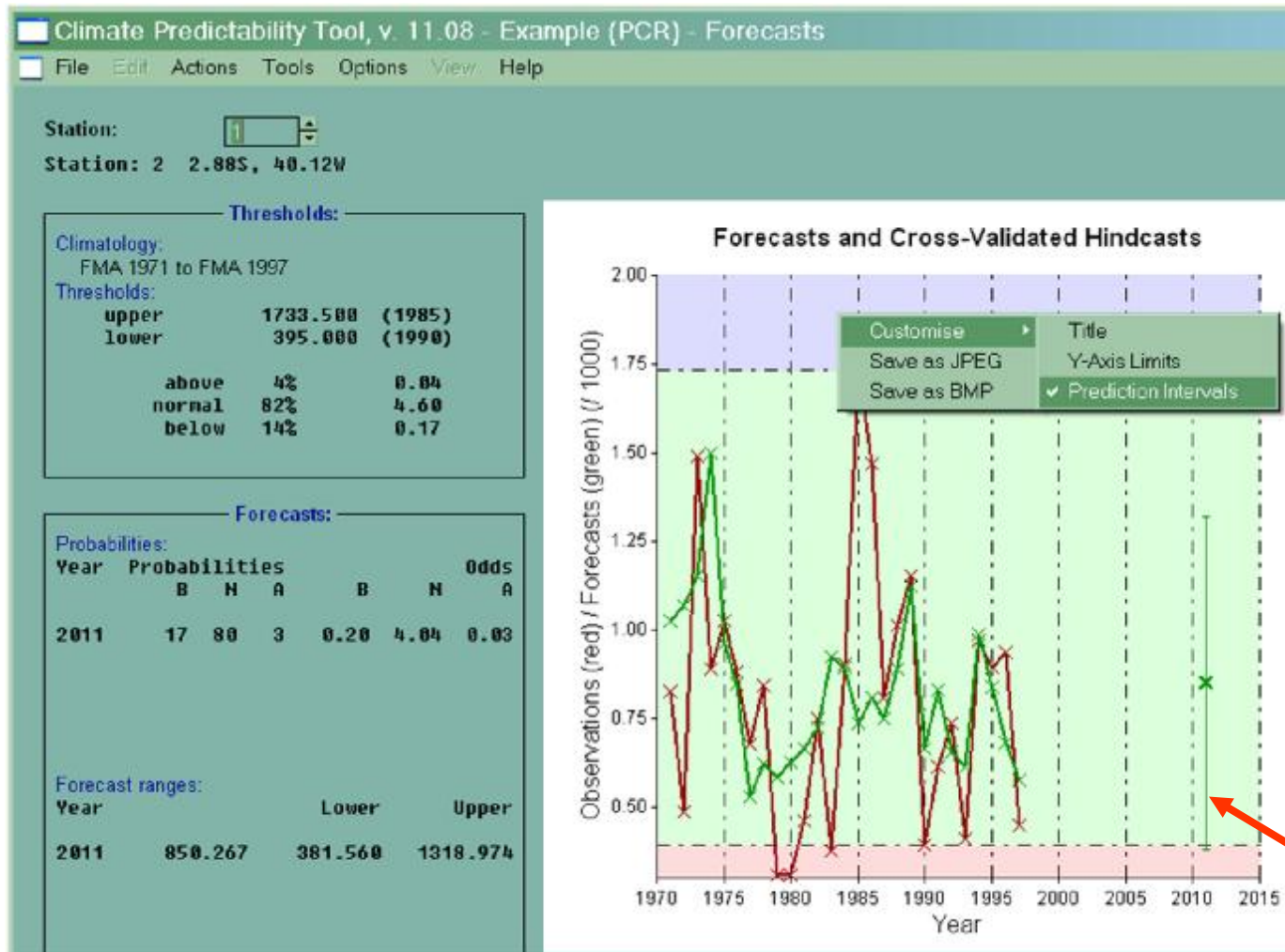
Analogue 2: 1990

OK Cancel

CPT recalculates the thresholds, and the climatological probabilities and odds



# PREDICTION INTERVALS



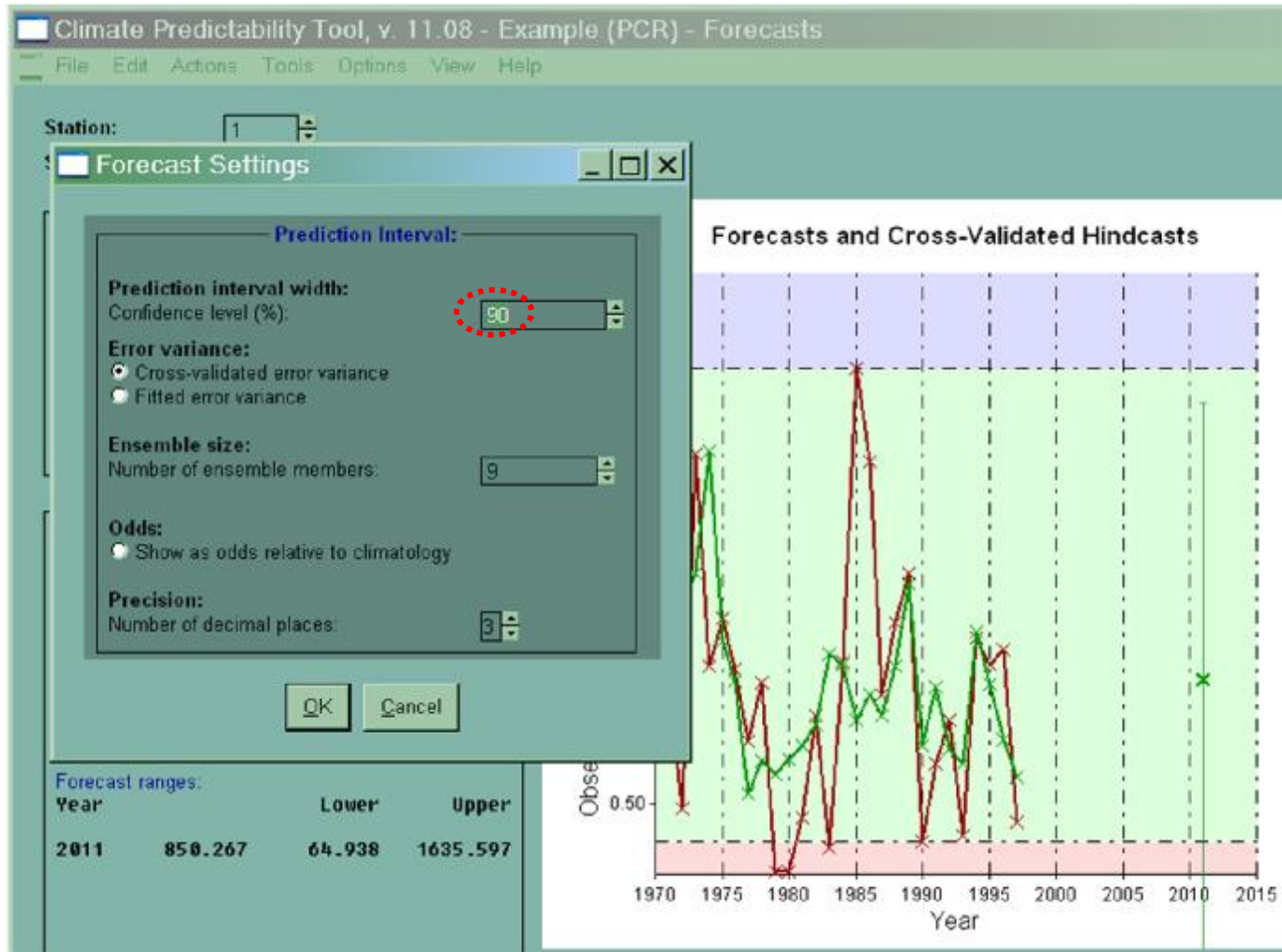
To draw error bars on the forecast, right click on the graph:

Customize ~ Prediction Intervals

An error bar is indicated.



# CHANGING THE PREDICTION INTERVAL



You can also change the width of the prediction interval.  
Options ~ Forecast Settings ~ Prediction interval width  
The default setting of 68.3% gives standard error bars.



# EXPRESSING THE FORECAST AS ANOMALIES

The screenshot shows the 'Climate Predictability Tool, v. 11.08 - Example (PCR) - Forecasts' interface. The main window displays station information, thresholds, and forecast probabilities. A 'Tailoring' dialog box is open, with the 'Standardization' section highlighted by a red dashed circle. In this section, the 'Anomalies' radio button is selected.

**Station:** 1  
**Station: 2** 2.88S, 40.12W

**Thresholds:**  
 Climatology: FMA 1971 to FMA 1997  
 upper: 210.459  
 lower: -373.941  
 above: 20% 0.25  
 normal: 60% 1.50  
 below: 20% 0.25

**Forecasts:**  
 Probabilities:  

Year	Probabilities			Odds		
	B	N	A	B	N	A
2011	19	45	36	0.23	0.83	0.56

 Forecast ranges:  

Year	Lower	Upper
2011	42.786	511.493

**Forecast and Cross** plot: Observations (red) / Forecasts (green) from 1970 to 1995. The plot shows a significant peak in 1982, highlighted by a vertical dashed line and a shaded blue area.

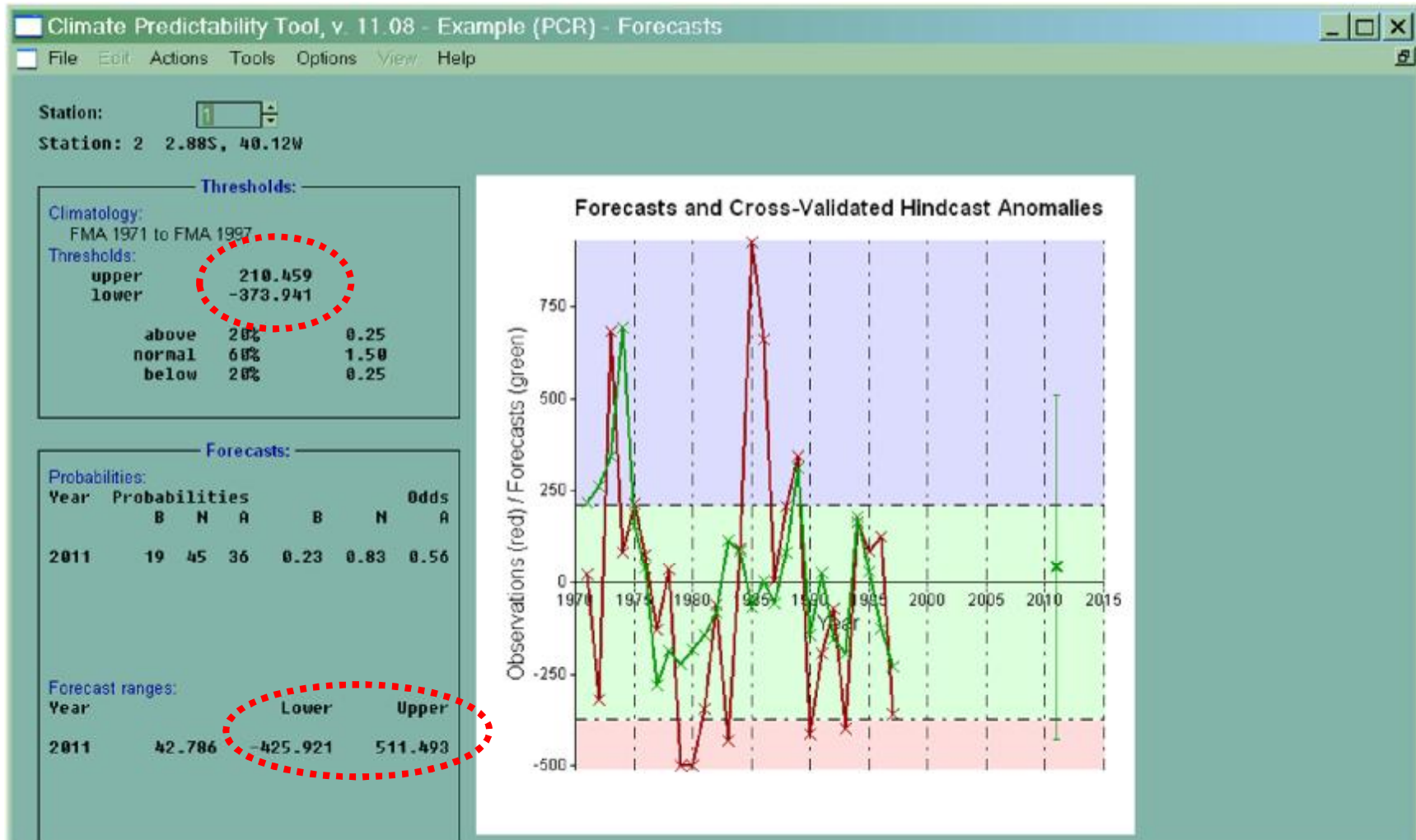
**Tailoring Dialog:**  
 Standardization:  
 No standardization  
 Anomalies  
 Standardized anomalies  
 Probabilities:  
 Climatological probabilities of outer categories:  
 above: 0.2  
 below: 0.2  
 Absolute thresholds:  
 Absolute thresholds:  
 upper: 1000  
 lower: 500  
 Analogues:  
 Analogues:  
 Analogue 1: 1985  
 Analogue 2: 1990

The forecast can be expressed as anomalies,  
 rather than absolute values:

Options ~ Forecast Settings ~ Standardization ~ Anomalies



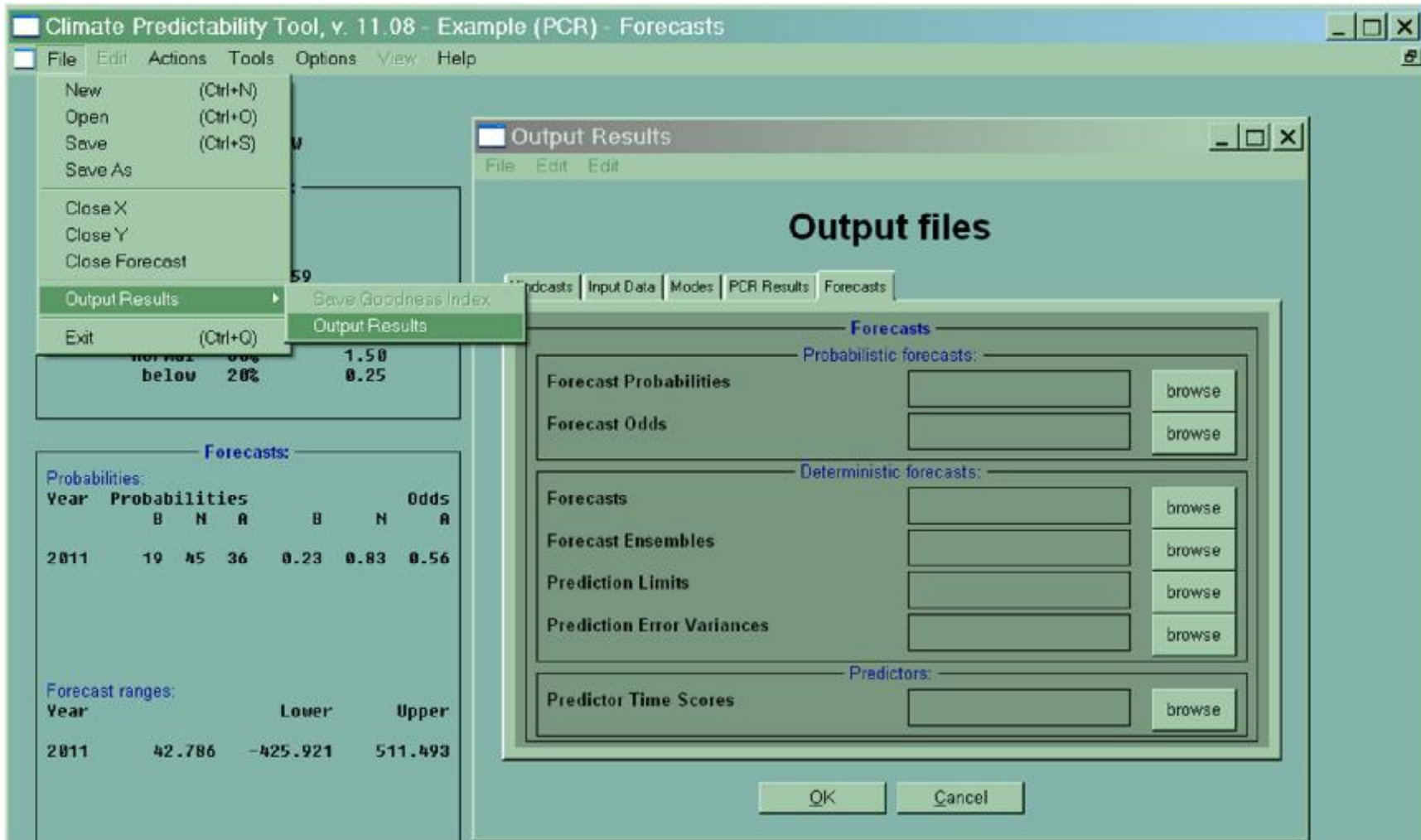
# EXPRESSING THE FORECAST AS ANOMALIES



The thresholds, as well as the forecast ranges, are now defined as anomalies.



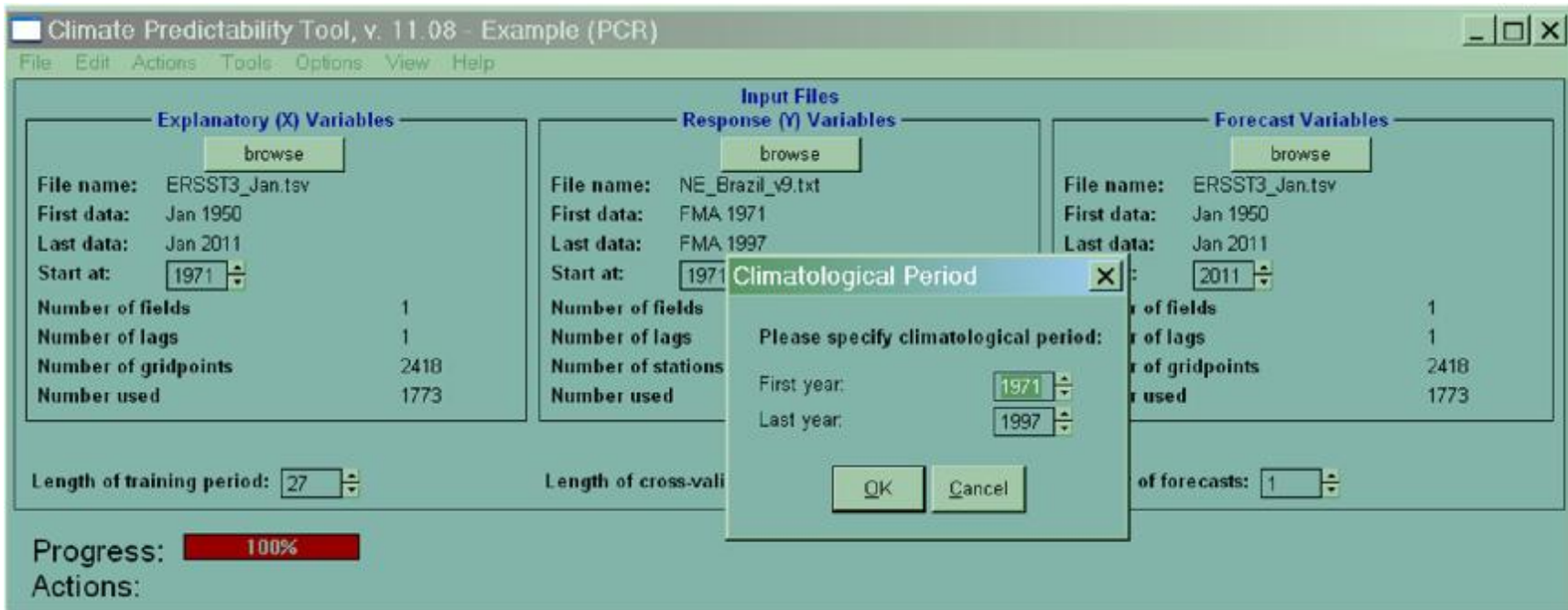
# SAVING FORECASTS



To save the forecasts, go to  
**File ~ Output Results ~ Output Results**  
and on the **Forecasts** tab specify the required output files.



# CHANGING THE CLIMATOLOGICAL PERIOD

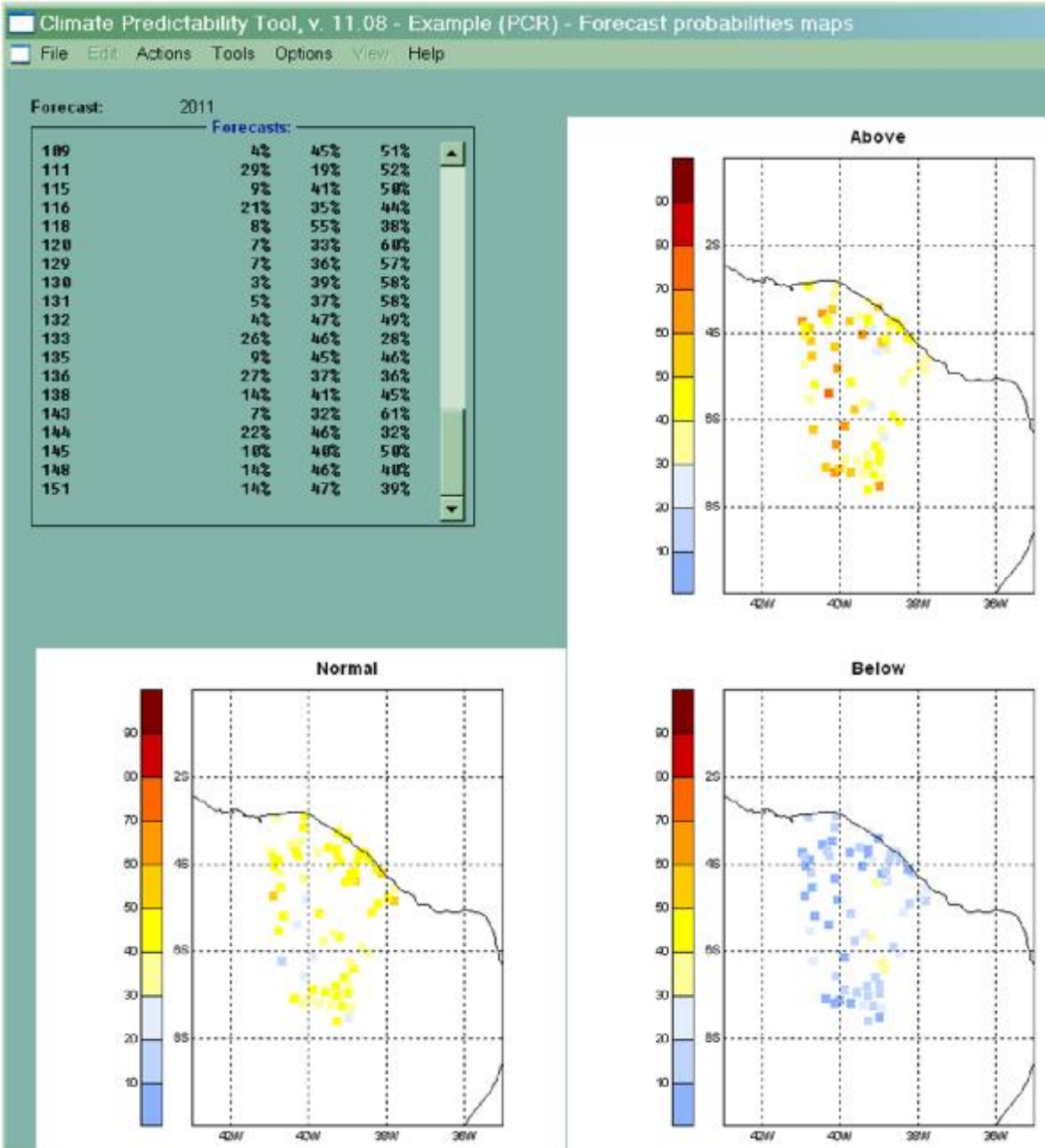


By default, the forecast probabilities are calculated relative to a climatological period that is the same as the training period. To change the climatological period go to:

**Options ~ Climatological Period**



# FORECAST MAPS



## Tools ~ Forecast ~ Maps

The option **Maps** lets you see maps of your forecasts – either maps of the probabilities or maps of the actual forecast values.

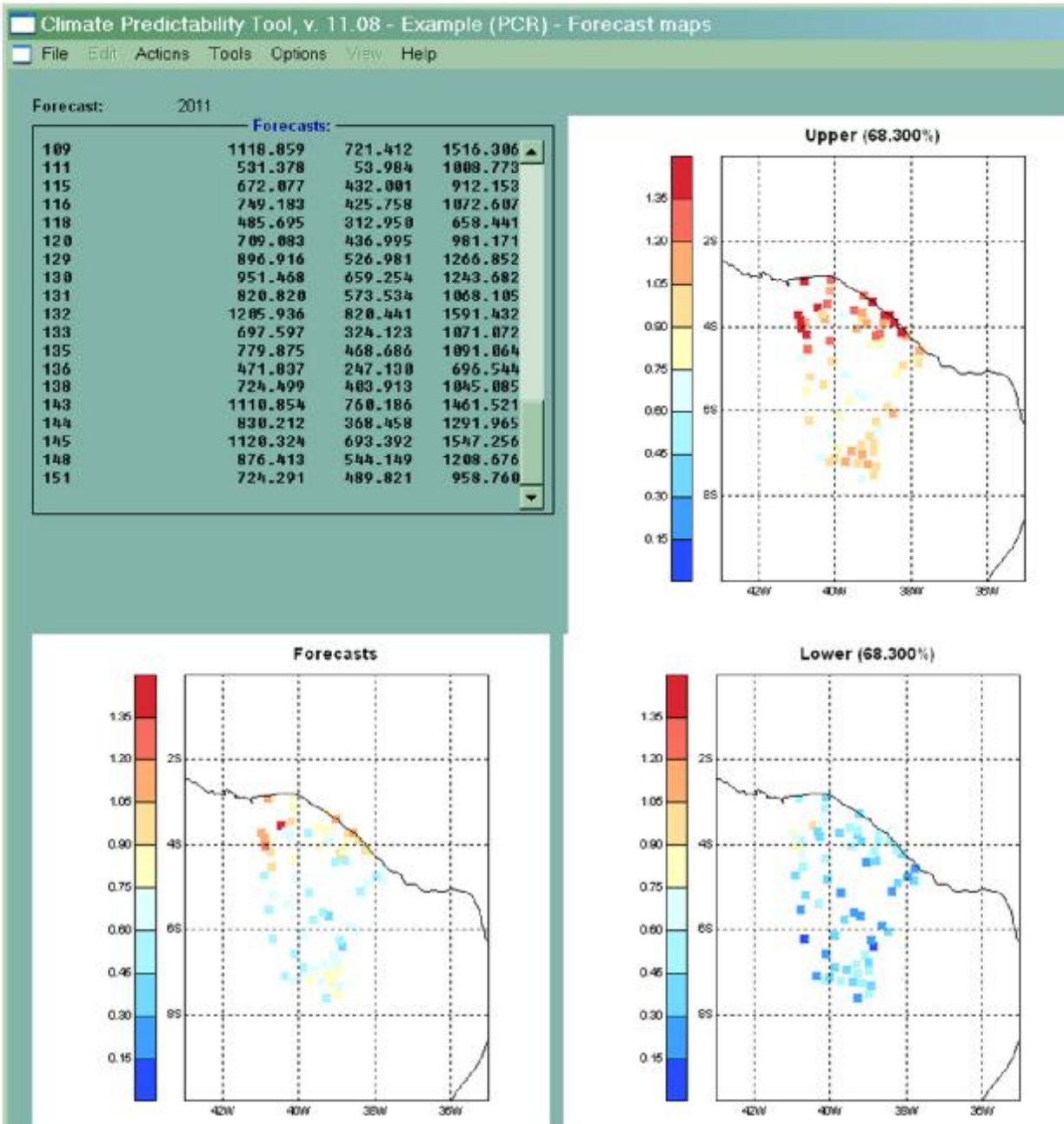
The forecast probabilities map lists the probabilities for each category at each location as well as the spatial distribution of the probabilities.

In this example, the below-normal category has the lowest probability over most of north-east Brazil.





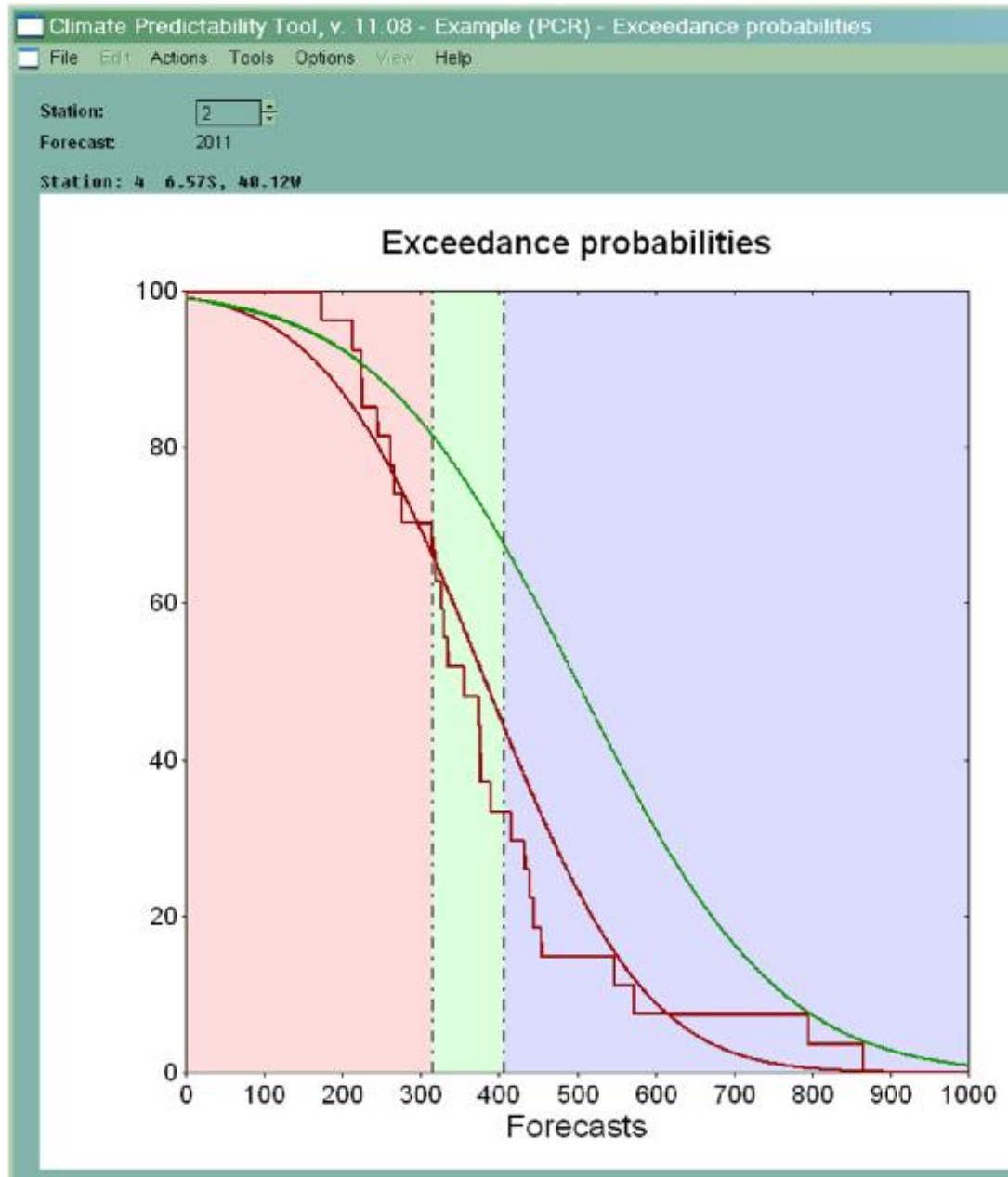
# FORECAST MAPS



The forecast values map lists the actual forecast values for each category at each location as well as the spatial distribution of the values.



# EXCEEDANCE PROBABILITIES



To draw the probabilities of exceedance go to:  
**Tools ~ Forecast ~ Exceedances**



# CONCLUSIONS

- For further details, read the help page of each menu and option.
- Subscribe to the user-list to be advised of updates:  
<http://iri.columbia.edu/climate/tools/CPT/>
- We want to hear from you. Your comments and questions help us to improve the CPT so do not hesitate to write to us at:  
[cpt@iri.columbia.edu](mailto:cpt@iri.columbia.edu)

