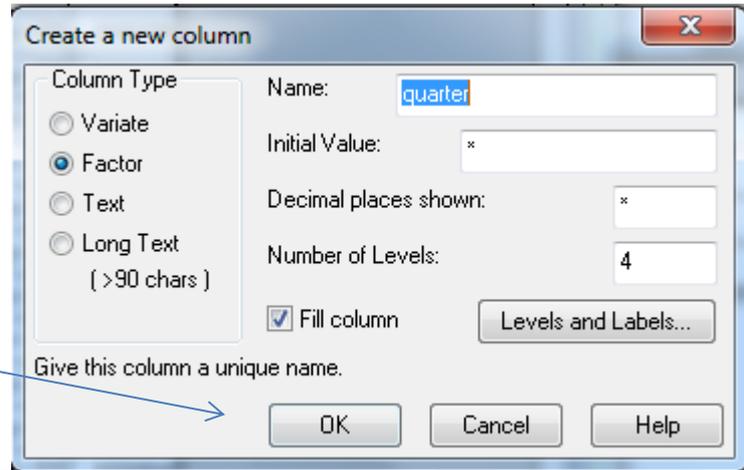


## Genstat Instructions

1. Check you have a quarters/month etc factor column.  
If not,

- a.  insert new column
- b. Obviously if you have monthly data you will need 12 levels not 4
- c. Click on Levels and Labels to put names in.
- d. Fill in as shown



**Create a new column**

Column Type:  Variate  Factor  Text  Long Text (>90 chars)

Name:

Initial Value:

Decimal places shown:

Number of Levels:

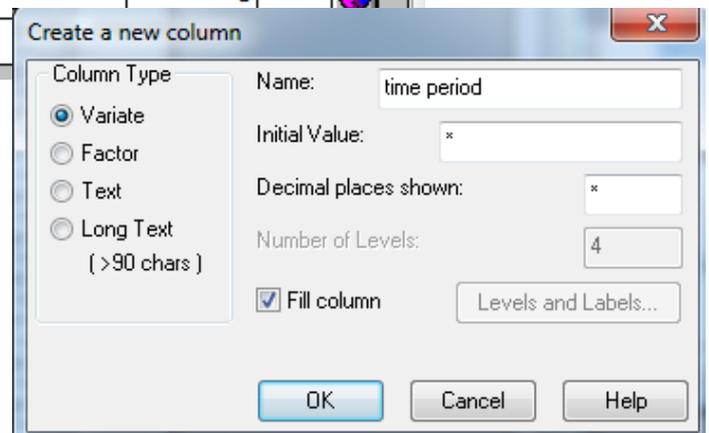
Fill column

Give this column a unique name.

Ordinals	Levels	Labels	Counts	Colour
1	1	Mar	0	
2	2	Jun	0	
3	3	Sep	0	
4	4	Dec		

2. Check you have a time period column. If not,

- a.  insert new column
- b. Fill in as shown



**Create a new column**

Column Type:  Variate  Factor  Text  Long Text (>90 chars)

Name:

Initial Value:

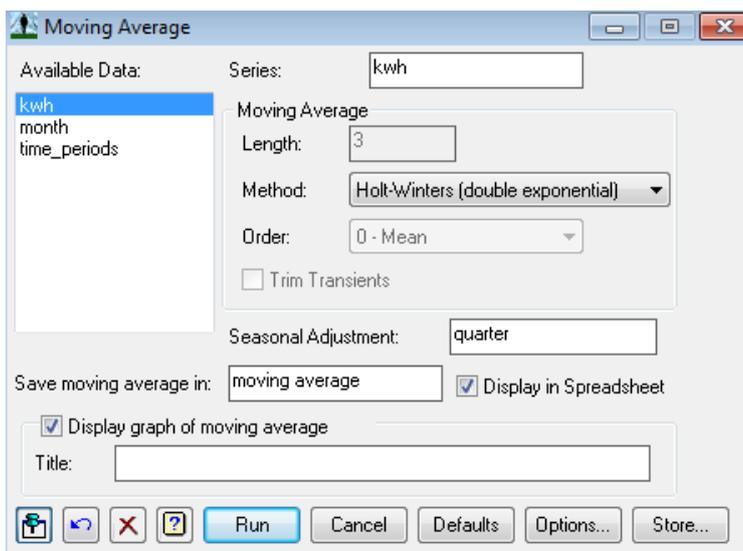
Decimal places shown:

Number of Levels:

Fill column

3. To smooth the data go to **Stats/Time Series/ Moving Average**

4. Fill in as shown **and**



**Moving Average**

Available Data:

Series:

Moving Average Length:

Method:

Order:

Trim Transients

Seasonal Adjustment:

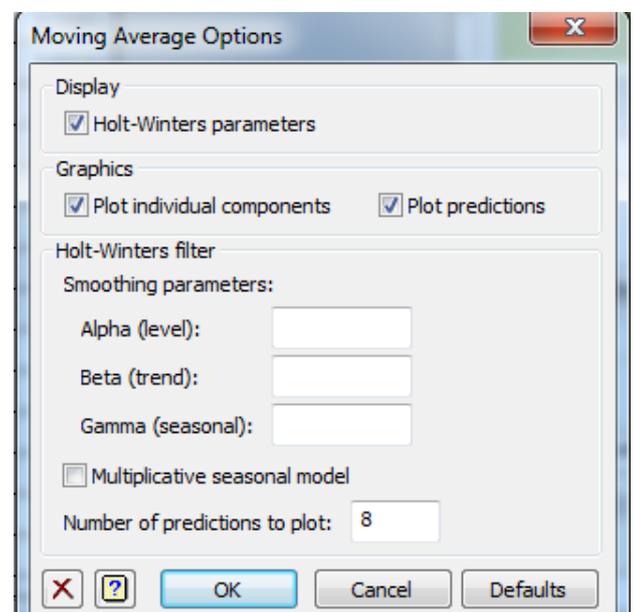
Save moving average in:   Display in Spreadsheet

Display graph of moving average

Title:

5. Click on **Options**

- a. Fill in as shown
- b. Click **OK**



**Moving Average Options**

Display:  Holt-Winters parameters

Graphics:  Plot individual components  Plot predictions

Holt-Winters filter

Smoothing parameters:

Alpha (level):

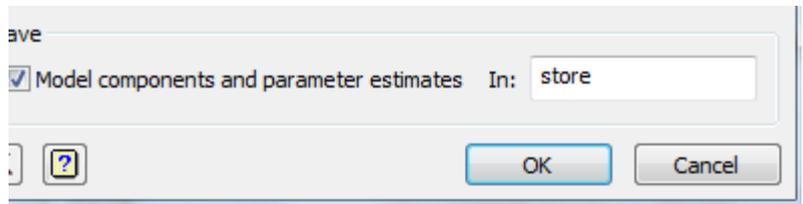
Beta (trend):

Gamma (seasonal):

Multiplicative seasonal model

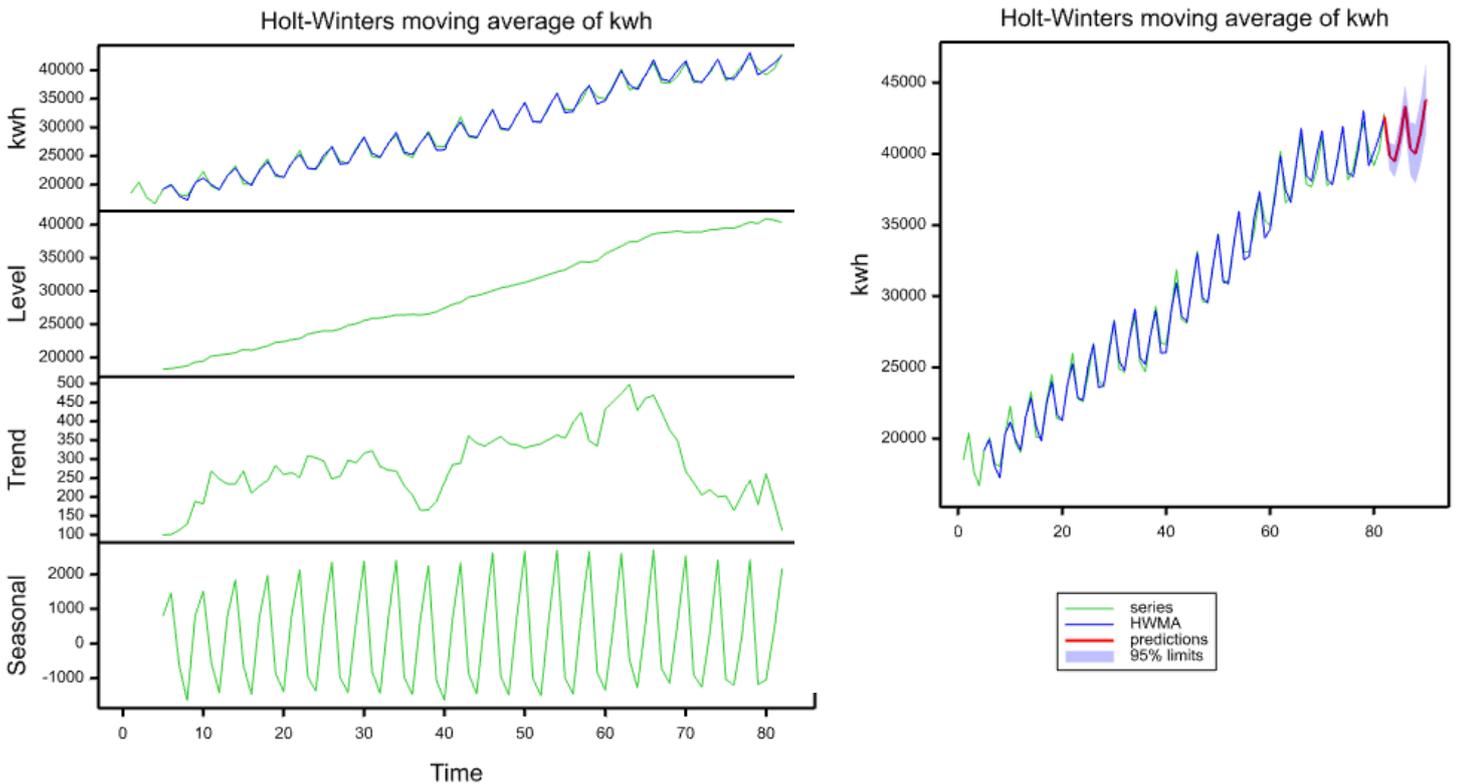
Number of predictions to plot:

6. Click on **Store** in the **Moving Average window**



7. Click Run

8. You should get the following graphs:



9. Your spreadsheet should look like this

time_periods	quarter	month	kwh	moving_average	store['Level']	store['Trend']	store['Season']
1	1	Mar-74	18515	*	*	*	*
2	2	Jun-74	20377	*	*	*	*
3	3	Sep-74	17681	*	*	*	*
4	4	Dec-74	16692	*	*	*	*
5	1	Mar-75	19184	19168.4	18263	99.5	805.875
6	2	Jan-75	20078	19932.7	18370.9	100.707	1461.13
7	3	Sep-75	18260	18045.4	18549.3	111.936	-615.875
8	4	Dec-75	18023	17253.5	18776.1	128.52	-1651.13
9	1	Mar-76	20234	20315.1	19316.5	187.983	810.567
10	2	Jun-76	22272	21147.6	19461.1	181.719	1504.75
11	3	Sep-76	19684	19961.8	20244.7	268.613	-551.441
12	4	Dec-76	19031	19191.6	20364.6	247.143	-1420.09
13	1	Mar-77	21545	21546.7	20525.7	234.73	786.229

10. There should be another sheet that looks like this

This sheet contains the predictions and the lower and upper limits of your confidence interval for predictions

Row	store['Prediction']	store['Lower']	store['Upper']
1	39832	38864.6	40799.4
2	39491.9	38357.4	40626.3
3	41020.6	39704.5	42336.8
4	43334.4	41823.5	44845.3
5	40353.9	38480.7	42227.1

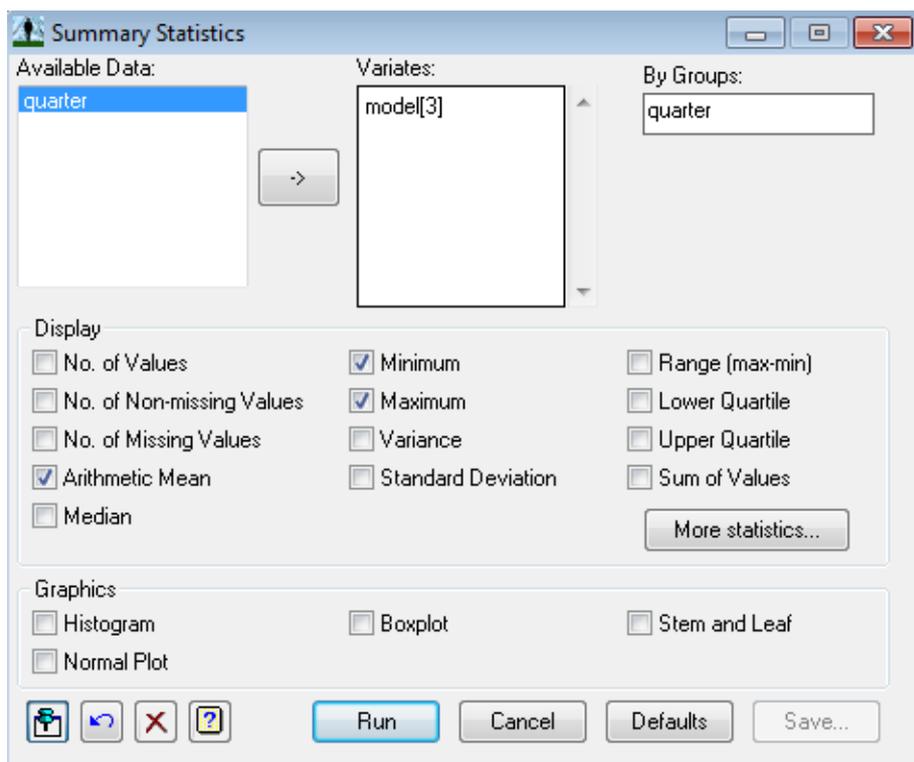
## Summary Stats

If you want to investigate the variation in seasonal data

Use **Summary Statistics** from the **Stats** menu

Fill in as shown

You will get the following in the **Output** (look in the **Window** menu)



### Summary statistics for model['Season']: quarter mar

Mean = 654.1  
Minimum = 214.7  
Maximum = 840.7

### Summary statistics for model['Season']: quarter jun

Mean = 2307  
Minimum = 1461  
Maximum = 2704

### Summary statistics for model['Season']: quarter sep

Mean = -861.8  
Minimum = -1179  
Maximum = -453.0

### Summary statistics for model['Season']: quarter dec

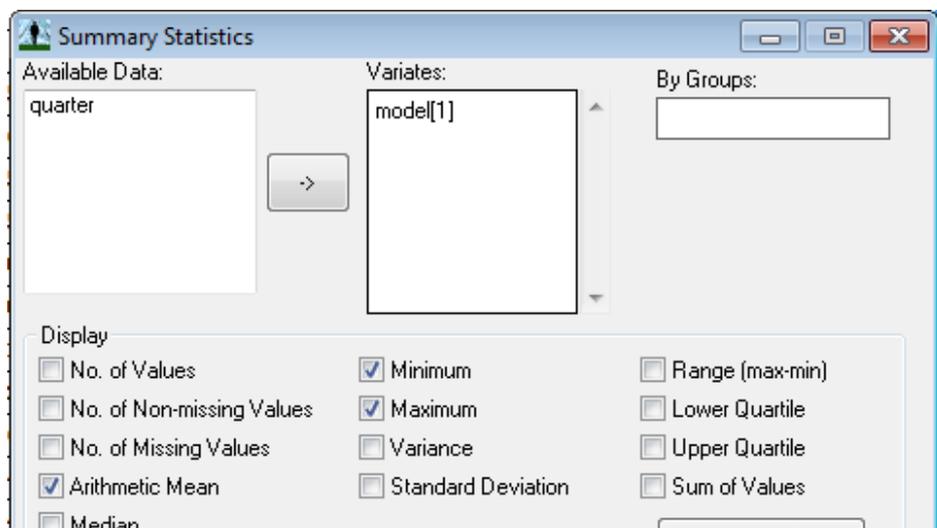
Mean = -1392  
Minimum = -1651  
Maximum = -

1048

To investigate the long term trend: repeat but fill in box

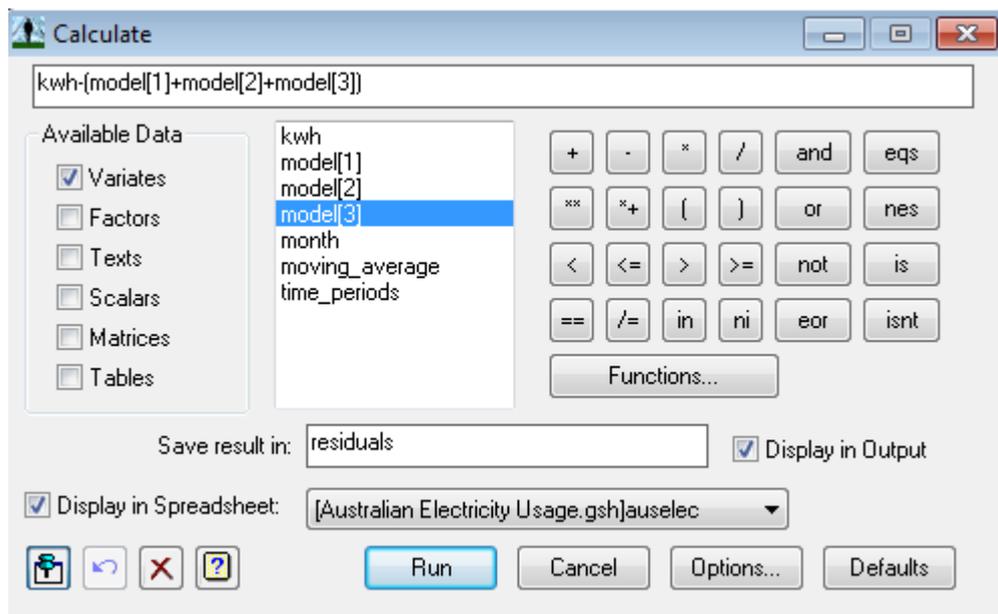
### Summary statistics for model['Level']

Mean = 29754  
Minimum = 18263  
Maximum = 40910



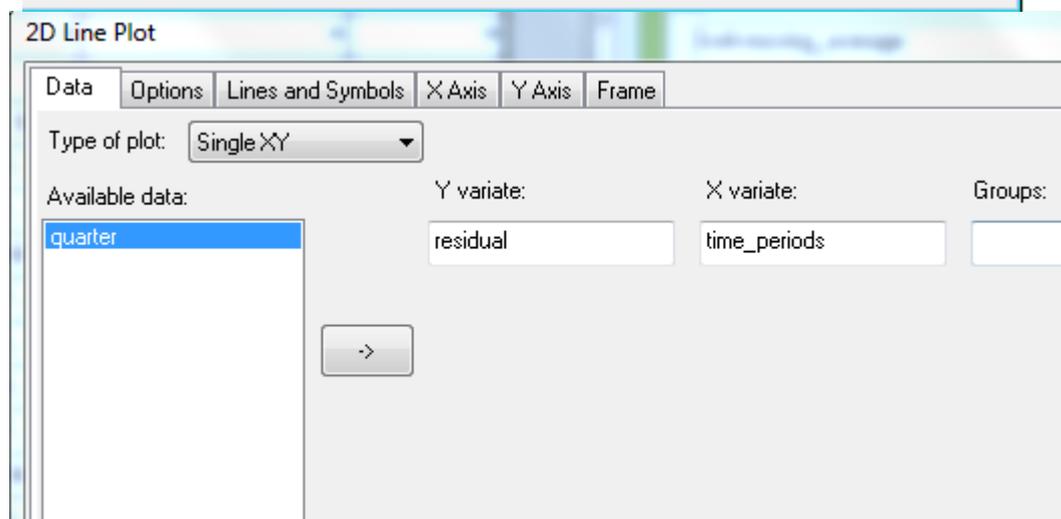
## Residuals

To calculate the residuals, use the calculator  and fill in as shown



They will be displayed in the spreadsheet

el['Season']	residuals
*	*
*	*
*	*
*	*
805.875	-382.375
1461.13	-358.233
-615.875	-457.023
-1651.13	-130.174
810.567	-1584.92
1504.75	-511.052
-551.441	-2963.96
-1420.09	-2879.19
786.229	-2818.46
1842.37	-2616.31
-634.862	-4505.76
-1468.32	-2898.47



You can also graph these on a line graph  
...

This will allow you to look at times when the actual data series was much more or less than the model predicts.

