

* Spatial statistics

Spatial Statistics

The Spatial Statistics modeltype can be used to calculate the minimum, maximum, average, median, standard deviation of the whole map, for the whole map or in subareas defined by an other map. Furthermore, it is possible to calculate the area of different classes of values, e.g. the habitat suitability between 0 - 0.8 and 0.8 and 1 ([#Statistics using classes](#) on the use of classes).

It is possible to calculate the statistics for:

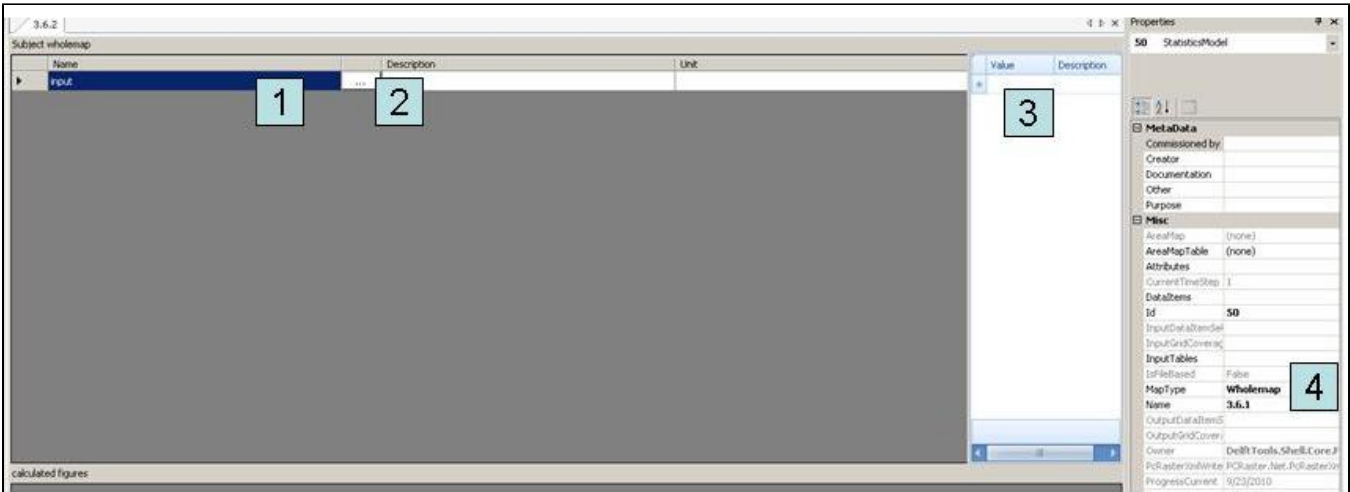
- the [#whole map](#) or
- for different [#subareas](#)

Statistics on the whole map

In case of only a subject map select 'whole map'. This is the default setting. Deepening on the type of the subject map ([nominal](#) which is equal to integers indicating classes; or [scalar](#) which are real values and not integer) the output is calculated according to table 1 or 2. The area is given in m2.

The following steps should be followed to define a spatial statistics using one map as input:

- [add a model](#) with right click at the composite model you want to add the model to in the tree of the Project Explorer and select the Spatial Statistics model from the pull-down menu in the pop-up window. Once you opened the Spatial Statistics window by double clicking in the Project Explorer. The window look like the figure below. The numbers correspond with the steps to implement a Spatial Statistics.
1. Enter a name for the input variable.
 2. Enter the file path for the [input grid](#), by typing or double click at the field and select a map by browsing or by selecting a map from previous models or composite models. You can also use results from previous models by [linking the maps](#) in the Project Explorer. Enter a description and units if you want.
 3. You may add classes which will be used to calculate the statistics for (see example below or [text below](#)).



User interface for Spatial Statistics model. The numbers correspond with the steps to implement a Spatial Statistics.

The figures below present an example of statistics workings area for a model with a nominal subject map, a real subject map and a real subject map with classes.

Subject wholemap			Value	Description
Name	Description	Unit		
NominalMap				
calculated figures				
NominalMap	area			
1	900			
2	900			
3	1200			
4	300			
*				

User interface for statistics with one map and results for an input map with nominal values. The values in the first column represent the values of the existing classes in the input map. The second column gives the amount of area for this class in the map in m2

3.6.2	
Subject wholemap	
Name	Description
RealMap	
Unit	
Value	
Description	
calculated figures	
Real Map	Statistics
area	3300
sum	9.73
minimum	0
maximum	1
average	0.294848
standard deviation	0.365386
median	0.1

User interface for statistics with one map and results for an input map with real values. The first column indicates the statistic parameter and the second the value. opp=total area in m2, som=sum of all values in the map, min=minimum value, max=maximum value, gem=average value, md=median value, sd=standard deviation

3.6.2 3.6.3	
Subject wholemap	
Name	Description
RealMap	
Unit	
Value	
Description	
calculated figures	
Classes	RealMap
area	sum
900	0
minimum	maximum
0	0
average	standard deviation
0.125	0.0452267
median	
0.1	
0.23	
0.5	
1	

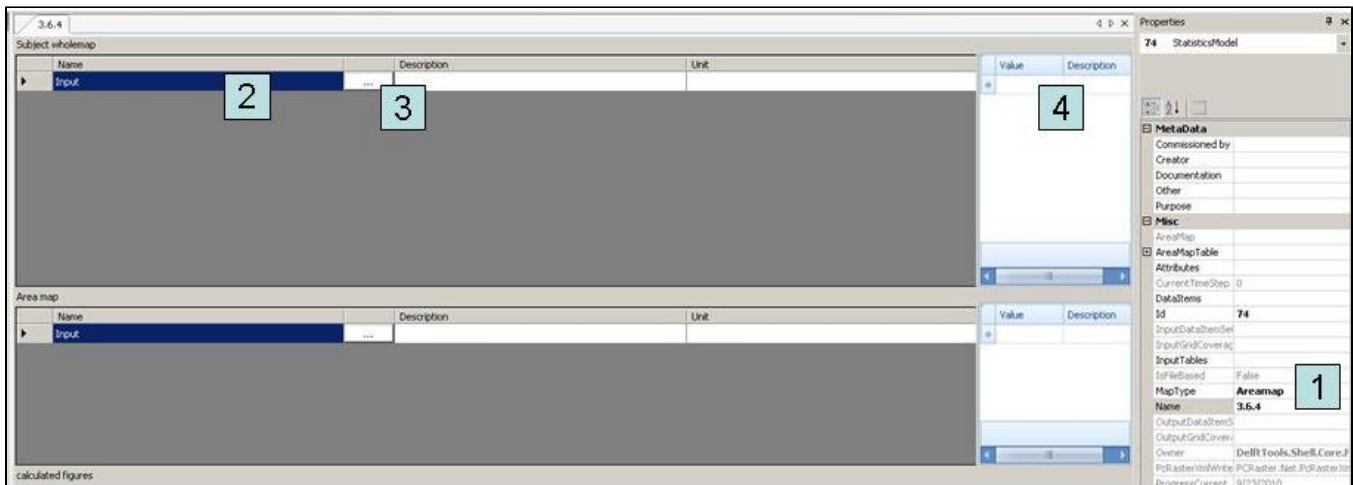
User interface for statistics with one map and results for an input map with real values and classes. In the first column the classes and in the other columns the values of the statistic parameters for these classes. opp=total area in m2, som=sum of all values in the map, min=minimum value, max=maximum value, gem=average value, md=median value, sd=standard deviation

Statistics on subareas

The calculation can also be done for different subareas. For example, in case of different water bodies in a study area. For this purpose, you have to choose 'AreaMap' in the pull down menu from 'MapType' in the properties. The result depends on the type of input maps (nominal or scalar, see examples below).

The following steps should be followed to define a spatial statistics using one map as input:

- [add a model](#) with right click at the composite model you want to add the model to in the tree of the Project Explorer and select the Spatial Statistics model from the pull-down menu in the pop-up window.
1. Select 'Area Map' instead of 'Whole map' as a Map type from the pulldown menu in the MapType properties window. You can only do this when you have selected your model in the project explorer. Once you opened the Spatial Statistics window by double clicking in the Project Explorer. The window look like the figure below. The numbers correspond with the steps to implement a Spatial Statistics.
 2. Enter a name for the input variable.
 3. Enter the file path for the [input grid](#), by typing or double click at the field and select a map by browsing or by selecting a map from previous models or composite models. You can also use results from previous models by [linking the maps](#) in the Project Explorer. Enter a description and units if you want.
 4. You may add classes which will be used to calculate the statistics for (see example below).



User interface for Spatial Statistics model when the option calculation for different subareas is selected. The numbers correspond with the steps to implement a Spatial Statistics.

The figure below presents an example of statistics working area for a statistics with a subject map and nominal subarea map.

3.6.4

Subject wholemap

Name	Description	Unit	Value	Description
Nominal	...			

Area map

Name	Description	Unit	Value	Description
Area	...			

calculated figures

	Area			
Nominal	3	5	6	7
1	0	900	0	0
2	0	0	600	300
3	0	800	0	300
4	300	0	0	0
*				

A nominal subject map and scalar subarea map result in table type kruis2-2. For each value of the subject map the statistics of the subarea map are given. In principle the values of the subject map divide the subarea map into different part for which the statistics is calculated. In case of two scalar maps (for subject and subarea map) a simple statistics for both maps is calculated (table type kruis2-3).

Table type kruis1. Output table with nominal subject map and nominal subarea map.

	File name subject map			
File name subarea map	1	2	3	4
3	0	0	0	30000
5	90000	0	80000	0
6	0	60000	0	0
7	0	30000	30000	0

Table type kruis 2. Output table of scalar subject map en nominal subarea map.

	File name subject map						
File name subarea map	Opp	Som	Min	Max	Gem	Sd	Med
3	30000	0,72	0,20	0,29	0,24	0,0458	0,23
5	180000	0,90	0,00	0,10	0,05	0,05	0,05
6	60000	6,00	1,00	1,00	1,00	0,0000	1,00
7	60000	2,11	0,20	0,50	0,35	0,16	0,36

Table type kruis 2-2. Output table of nominal subject map en scalar subarea map.

	File name subarea map						
File name subject map	Opp	Som	Min	Max	Gem	Sd	Med
1,0	900,0	0.9	0.1	0.1	0.1	0,0	0.1
2,0	900,0	7.5	0.5	1,0	0.8333	0.25	1,0
3,0	1100,0	0.6	0,0	0.2	0.0545	0.09342	0,0
4,0	300,0	0.6	0.2	0.2	0.2	0,0	0.2

Table type kruis 2-3. Output table of scalar subject map en scalar subarea map.

File name	File name subject map	File name subarea map
Opp	330000	330000
Som	9,6	6,6
Min	0	0
Max	1	1
Gem	0,29	0,20
Sd	0,37	0,27
Med	0,10	0,20

Statistics using classes

Classes can be useful to analyse the map values in more detail. For example to answer the question: what is the area with a habitat suitability larger than 0.8? In case of a subject map and classes defined for the subject map, the statistics session results in Table Type kruis-3. In case of a statistics with a subject and subarea map, and classes for one of the input maps, the statistics results in Table type kruis 4 if the class boundaries are defined for the subject map and Table type kruis 4-2 if the boundaries are defined for the subarea map.

Table type kruis 3. Output table of statistics with subject map with classes.

	File name subject map						
Grenzen	Opp	Som	Min	Max	Gem	Sd	Med
[0]	900						
<0,0,2]	1200	1,50	0,1	0,2	0,125	0,04523	0,1
<0,2,0,4]	300						
<0,4,0,6]	300	1,5	0,5	0,5	0,5	0,5	0,5
<0,6,0,8]	0						
<0,8,1]	600	6	1	1	1	1	1

Table type kruis 4. Output table of statistics using a subject map with classes and a subarea map (no classes). In case of table type kruis4-2 the 'File name subject map' en 'File name subarea map' are exchanged.

	File name subarea map						
File name subject map	Opp	Som	Min	Max	Gem	Sd	Med
[0]	0						
<0,0,2]	30000	0,60	0,20	0,20	0,20	0,00	0,20
<0,2,0,4]	0						
<0,4,0,6]	30000	0,00	0,00	0,00	0,00	0,00	0,00
<0,6,0,8]	0						
<0,8,1]	60000	0,00	0,00	0,00	0,00	0,00	0,00

An other option is the calculation of statistics for classes of a subject map for each area from a subarea map. This results in Table Type kruis 5. It is also possible to indicate classes for both the subarea and subject map, resulting in Table Type kruis 6.

Table type kruis 5. Output table for a statistics with a subject map with classes and a subarea map (no classes).

	File name subject map							
File name subarea map	Grenzen	Opp	Som	Min	Max	Gem	Sd	Med
3	[0]	0						
3	<0,0.2]	300	0,60	0,20	0,20	0,20	0,00	0,20
3	<0.2,0.4]	0						
3	<0.4,0.6]	0						
3	<0.6,0.8]	0						
3	<0.8,1]	0						
5	[0]	900	0,00	0,00	0,00	0,00	0,00	0,00
5	<0,0.2]	900	0,90	0,10	0,10	0,10	0,00	0,10
5	<0.2,0.4]	0						
5	<0.4,0.6]	0						

Example of statistics working area for a statistics on a subject map with classes and an area map. The results are shown as well in the lowest part of the window.

Table type kruis 6. Output table of a statistics with user-defined classes for both the subject and subarea map.

File name subarea map	File name subject map							
Boundaries	Boundaries	Opp	Som	Min	Max	Gem	Sd	Med
[0]	[0]	0						
[0]	<0,0.2]	300	0,60	0,20	0,20	0,20	0,00	0,20
[0]	<0.2,0.4]	0						
[0]	<0.4,0.6]	300	1,50	0,50	0,50	0,50	0,00	0,50
[0]	<0.6,0.8]	0						
[0]	<0.8,1]	600	6,00	1,00	1,00	1,00	0,00	1,00
<0,0.5]	[0]	900	0,00	0,00	0,00	0,00	0,00	0,00
<0,0.5]	<0,0.2]	900	0,90	0,10	0,10	0,10	0,00	0,10
<0,0.5]	<0.2,0.4]	0						
<0,0.5]	<0.4,0.6]	0						
<0,0.5]	<0.6,0.8]	0						