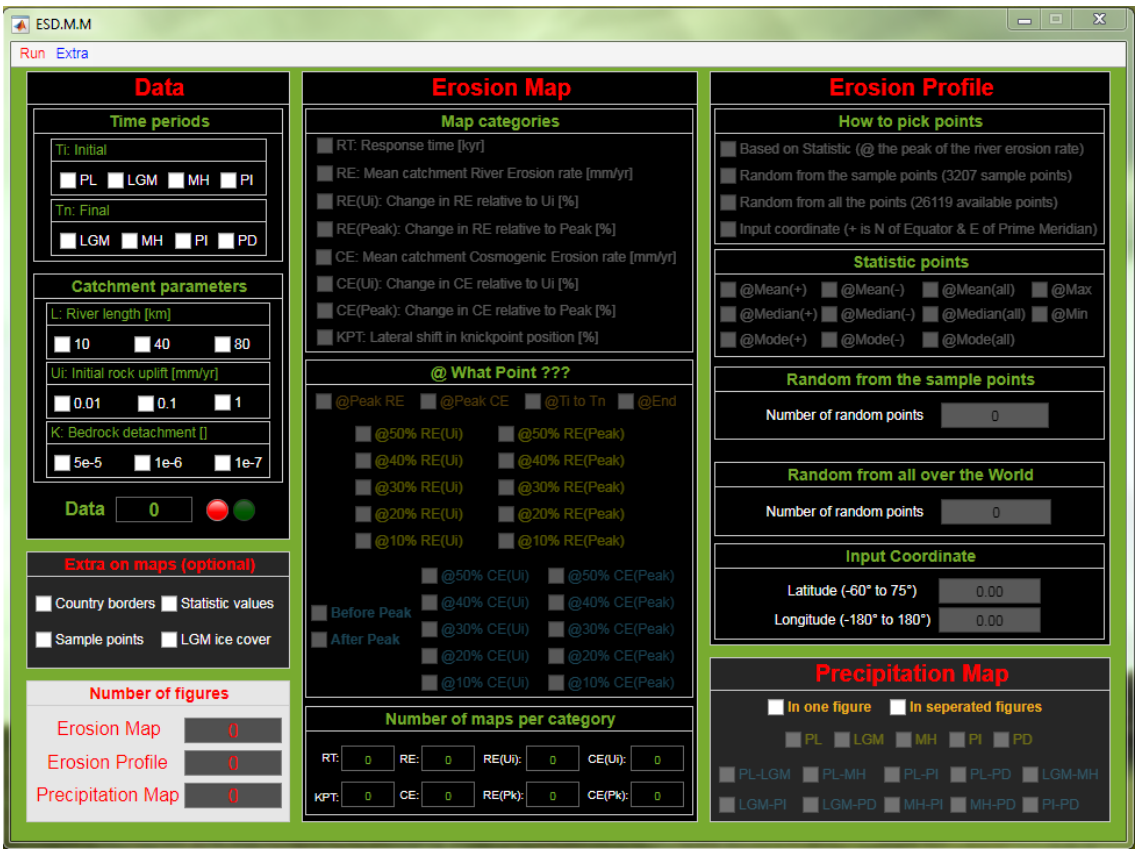
Welcome to ESD.M.M



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Special thanks to:

Dr. Byron Adams (River erosion part)

Dr. Mirjiam Schaller (Cosmogenic erosion part)

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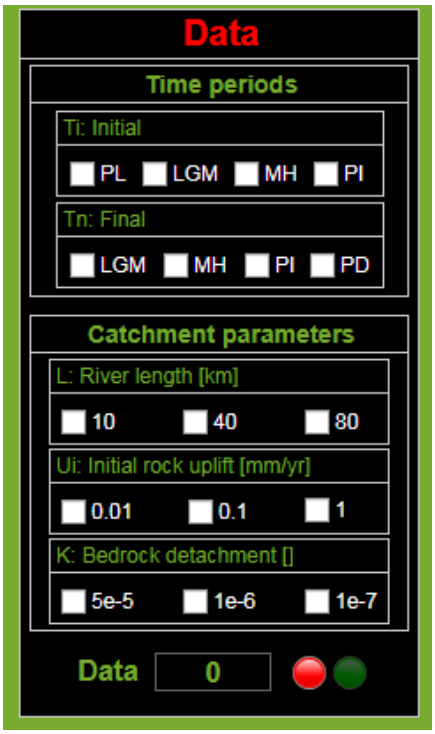
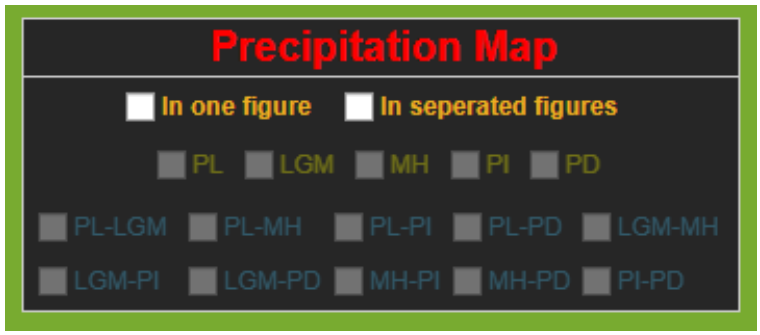
ESD
Earth System
Dynamics Research Group



DATA:

Here you can choose the time period and the catchment parameters of your model. This panel only is important for erosion map panel and erosion profile panel (for the precipitation map you don't need to choose anything in this panel).

As soon as the program find any data match to at least one of the input condition, you can see the number of the data box will change and the light turns to green. This means you can now go to the next step. When you have at least one available data, then it is possible to plot different type of erosion maps or stream profiles.



Precipitation maps:

Here you can generate precipitation and precipitation difference maps.

Precipitation maps only show the mean annual precipitation of each time period. You can choose any of the yellow time periods to see the precipitation maps of them. You can plot them all in one figure or plot them separately.

Precipitation difference maps (blue check boxes) show the difference of mean annual precipitation between two time periods. Here also you can combine them in one figure or plot them separately.

Note that you can not plot precipitation maps and difference precipitation maps in one figure. When you check "in one figure" the program plots all the precipitation maps in one figure and all the difference precipitation maps in another figure.

Note that you don't need to use "DATA" panel to be able to plot any of these precipitation maps. Just simply choose one or several check boxes in "Precipitation Map" panel and plot them.

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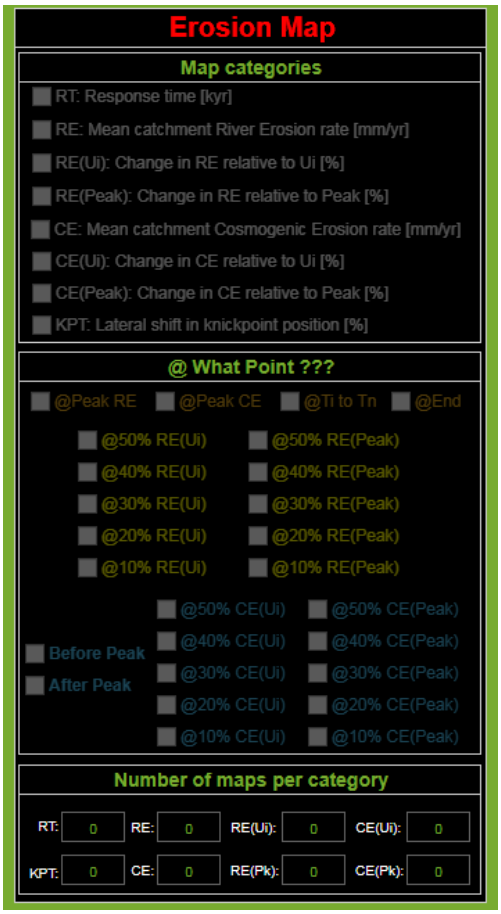
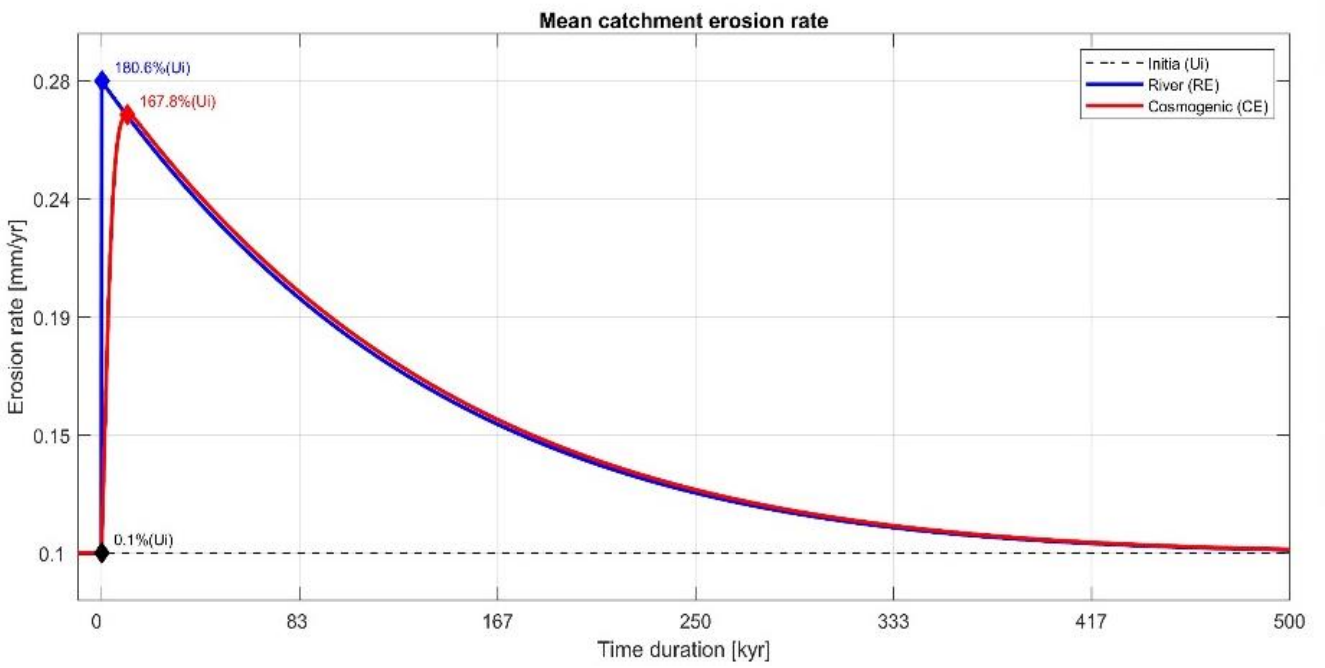


Erosion Map:

Here you can generate different type of erosion maps. At the top panel choose the type of the map and in the middle panel choose at which specific point you want to plot the map. The bottom panel shows how many map you are plotting in each category.

Map categories are parameters at the specific chosen points. For example:
when you choose response time maps (RT) at peak of river erosion rate (@Peak RE) or at peak of cosmogenic erosion rate (@Peak CE), it will plot a world map and calculate at each point how long it takes that the river erosion rate reaches to its peak or cosmogenic erosion rate reaches to its peak. This peaks can be negative or positive. In the figure below you see how the river erosion rate (blue) and cosmogenic erosion rate (red) are changing by time in a positive point (when there is a jump and decay). It can be also a negative point (when there is a drop and growth). The black dashed line is the initial rock uplift rate (Ui).



This figure clearly shows what is the response time @Peak RE or @Peak CE. Now instead of response time we can look for the absolute value of the river erosion rate (RE) or cosmogenic erosion rate (CE) or even the change in river erosion rate relative to initial rock uplift rate (RE(Ui)) and etc. Next page shows what are each specific points and their corresponding response time but you can also plot a map of any of these points not only for response time but also for absolute erosion rate value, change in erosion rate values and lateral shift in knickpoint position.

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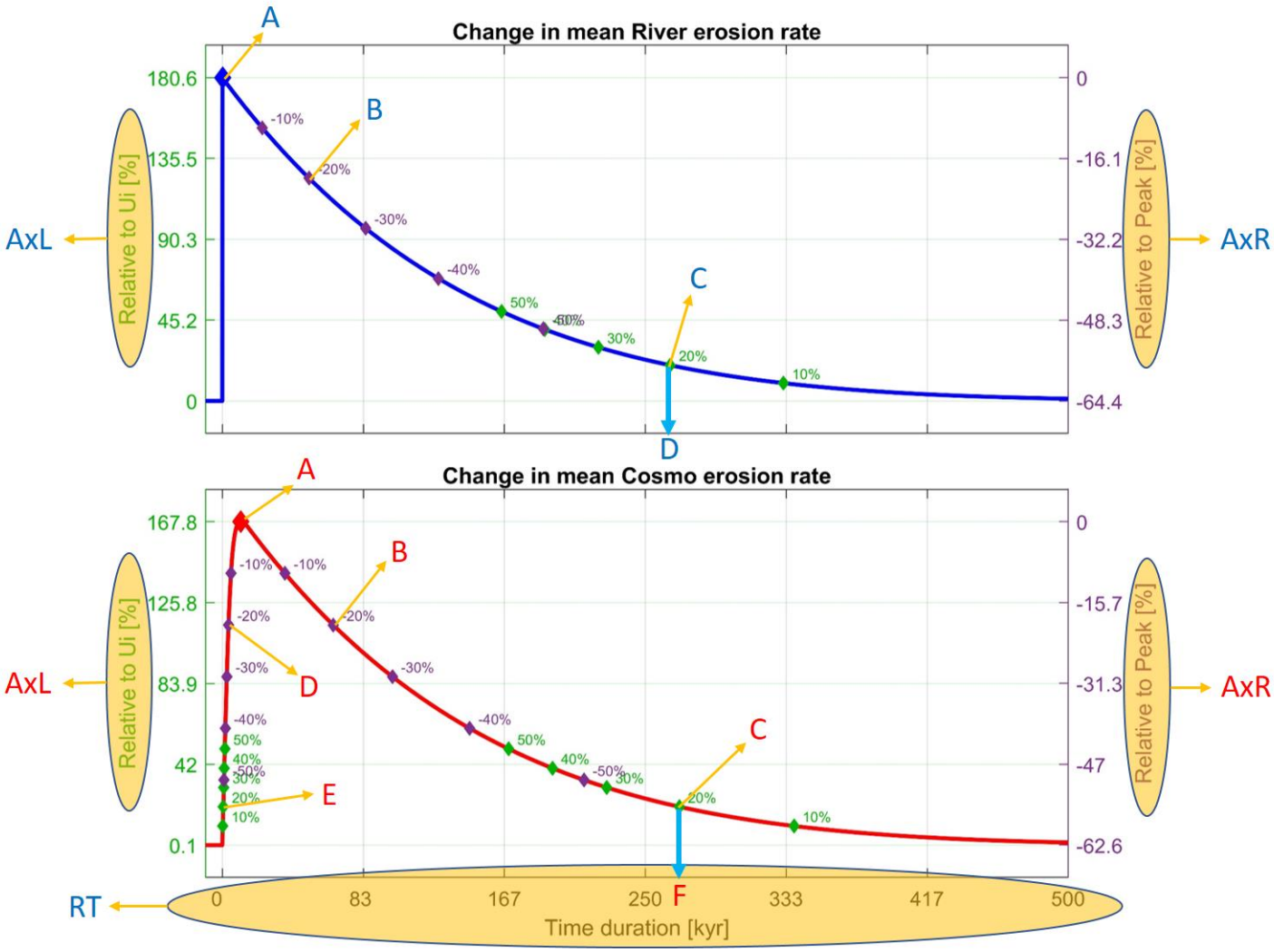

Categories and specific points in Erosion Map:

These figure show the amount of change in river erosion rate (blue) and cosmogenic erosion rate (red) relative to initial rock uplift rate (left ax) and to their own peak (right ax) and their corresponding response time (RT).

A: Peak of the change in river erosion rate relative to initial rock uplift rate
B: When the river erosion rate is at 20% of its own peak (after the peak)
C: When the river erosion rate is at 20% of initial rock uplift rate (after the peak)
D: Response time of “C”
AxL: Change in river erosion rate relative to initial rock uplift rate [%]
AxR: Change in river erosion rate relative to its own peak [%]

A: Peak of the change in cosmogenic erosion rate relative to initial rock uplift rate
B: When the cosmogenic erosion rate is at 20% of its own peak (after the peak)
C: When the cosmogenic erosion rate is at 20% of initial rock uplift rate (after the peak)
D: When the cosmogenic erosion rate is at 20% of its own peak (before the peak)
E: When the cosmogenic erosion rate is at 20% of initial rock uplift rate (before the peak)
F: Response time of “C”
AxL: Change in cosmogenic erosion rate relative to initial rock uplift rate [%]
AxR: Change in cosmogenic erosion rate relative to its own peak [%]

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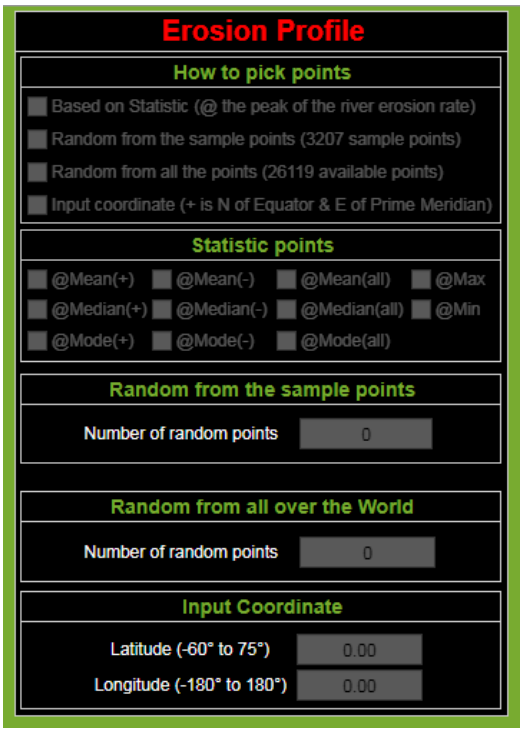


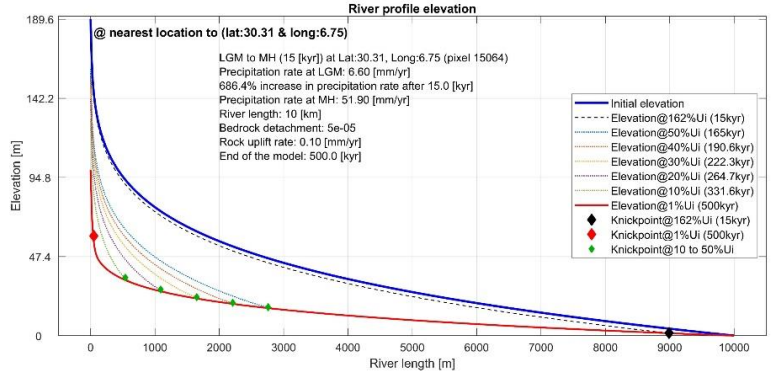
Erosion Profile:

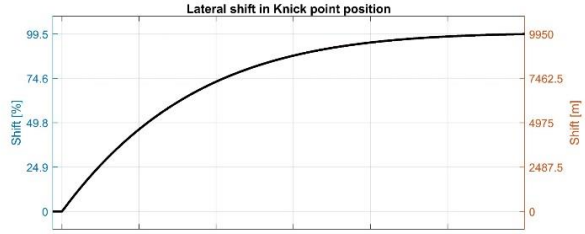
Here you can generate a stream profile with many useful information just for one or several specific locations. You pick these location based on different methods. You can pick them statistically or randomly or by given coordinate.

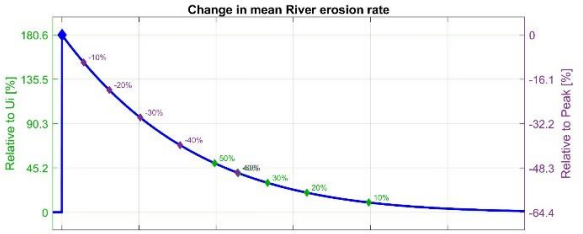
Below you can see an example of an erosion profile.
At top left you see how the elevation changes during the time and some of the knickpoints. At the below left you see how the river and cosmogenic erosion rates are changing during the time. In the right side from top to bottom you see lateral shift in knickpoint positions, change in river erosion rate relative to Ui and Peak (blue) and change in cosmogenic erosion rate relative to Ui and Peak (red).

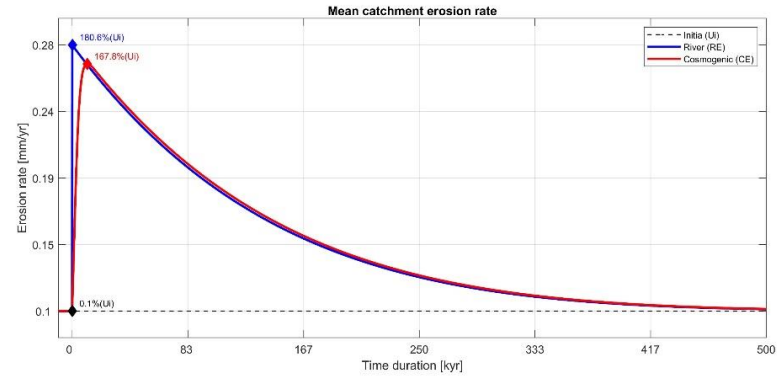
The statistic parameters are based on the values at the peak of the river erosion rates. That means the program looks for the peaks (positive or negative) of all the available points around the world. Then it finds the closest location to the mean, median, mode, max and min of them.

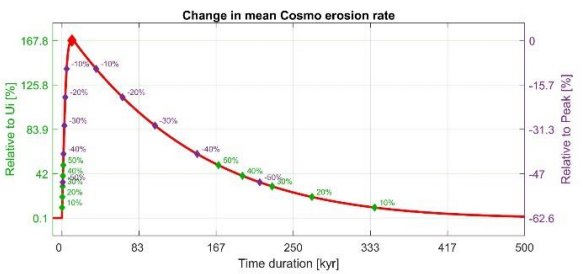
Below you can see an example of a positive erosion profile.
At top left you see how the elevation changes during the time and some of the knickpoints. At the below left you see how the river and cosmogenic erosion rates are changing during the time. In the right side from top to bottom you see lateral shift in knickpoint positions, change in river erosion rate relative to Ui and Peak (blue) and change in cosmogenic erosion rate relative to Ui and Peak (red).











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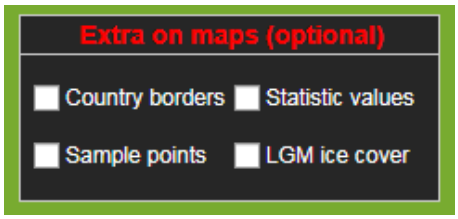


Extra on the maps (optional):

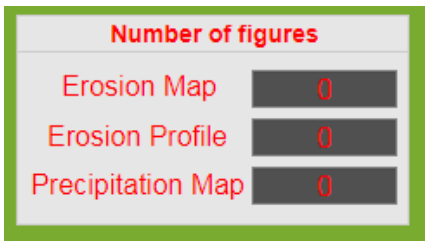
If You want to plot a map (not a profile) you can add some extra information on it.

1- Country borders adds the border of the countries but it might be a bit slow.

2- Statistic values shows some useful statistic information about your map.

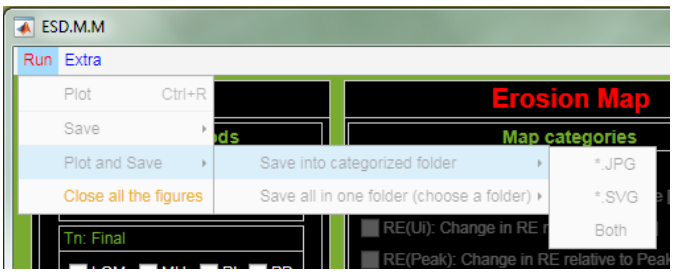
3- There are around 3000 sample points which you can include on top of your map.

4- You can also see the LGM ice cover locations on top of your map.



Number of figures:

As soon as one of these numbers turn to something higher than zero you can start to plot or save your figure or figures. Note the plot and save options are located in the menu bar (RUN) and you can only use them when at least one of the numbers in this panel turns to something higher than zero.



Run menu bar:

When you chose at least one map or profile you have three options to run the program.

1- Plot: This option plot the chosen figures (the figures will pop up but not saved)

2- Save: Here you can save the chosen figures (save without pupping up)

3- Plot and save: Here you can save the plot and see it at the same time

* In option 2 and 3 when you want to save something you have some choices:

a- You can save the figures into a categorized folder based on time periods and catchment parameters and figure types.

b- You can choose a folder and save all the chosen figures on it.

* Name of the figures are always generate by the program

a- For profile : Profile@..._(coordinate)_(time period)_(catchment parameters)

b- For maps : type@..._(coordinate)_(time period)_(catchment parameters)

* You can save your figures in two different format: jpg and svg (Scalable Vector Graphics)

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