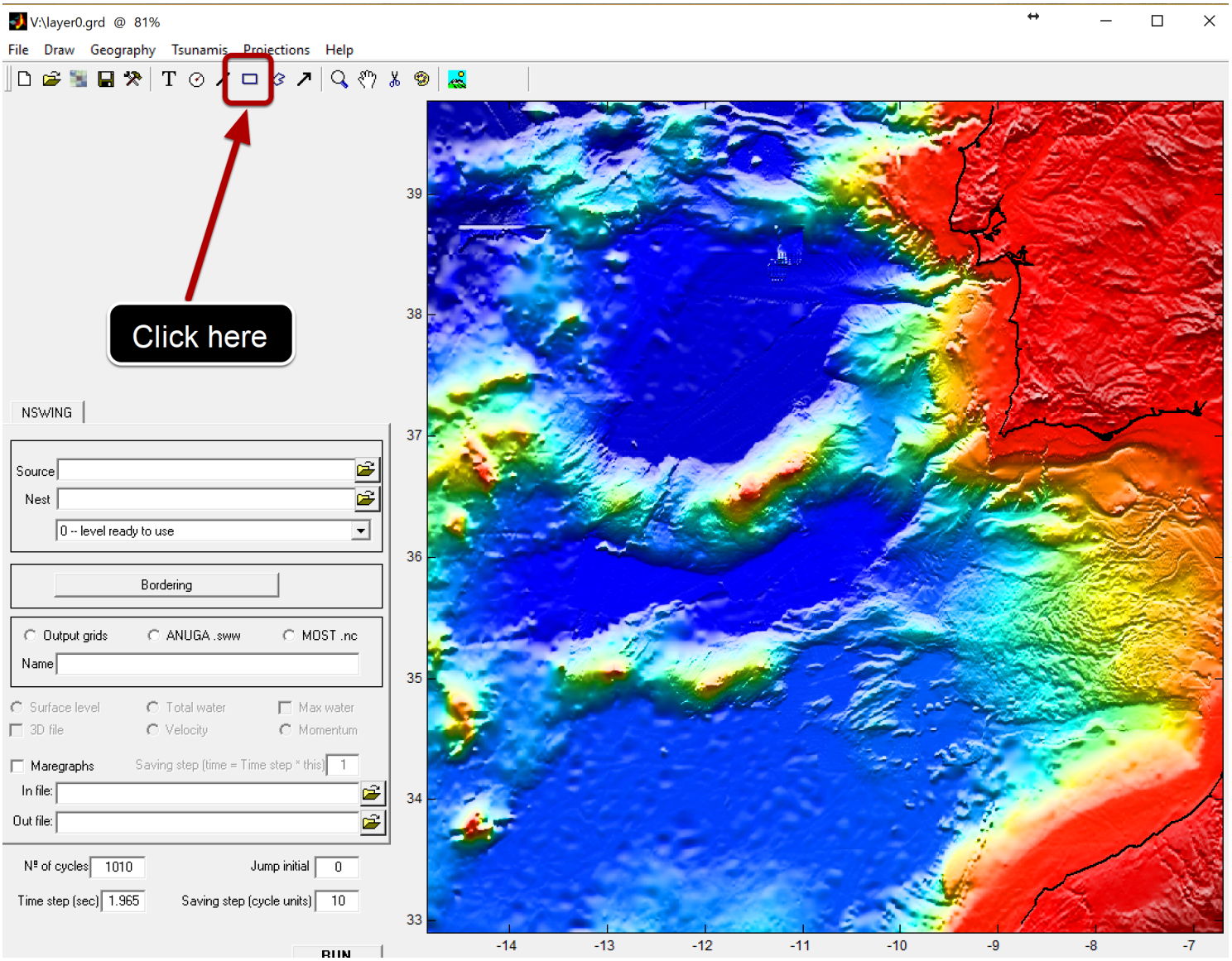
A nested grids approach

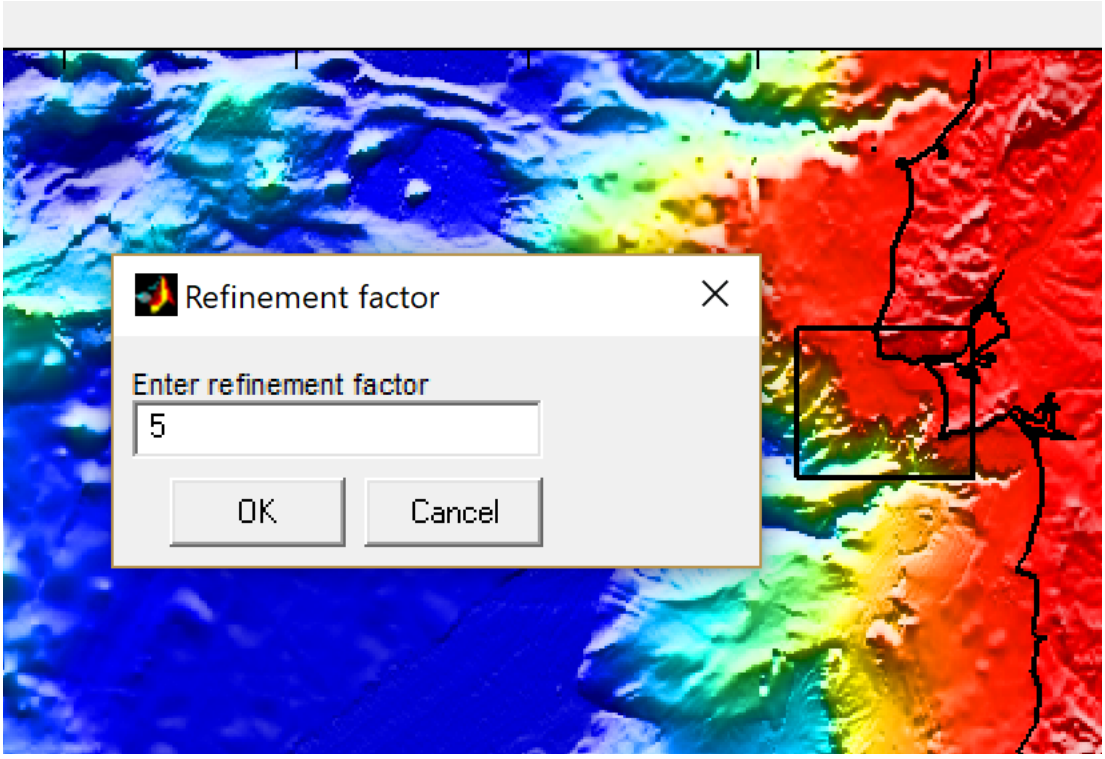
In this tutorial we will learn how to create a set of nested grids that is a necessary condition to perform inundation studies. Note that nested grids dimensions and grid steps must obey to strict rules that are beyond the scope of this tutorial to explain. That is what makes their creation a delicate step. On the other hand it is also crucial to have available batymetric and topographic data able to sustain resolutions of the order of the 10ths of meters. This is even more difficult or impossible for many places.

Start in TINTOL mode



Let us start at the TINTOL mode using the same example ans in the previous tutorial. But now we will start drawing rectangles that will delimit our nested grids family. By clicking on the rectangle button the mouse pointer turns into a cross and we can draw a rectangle anywhere we want.

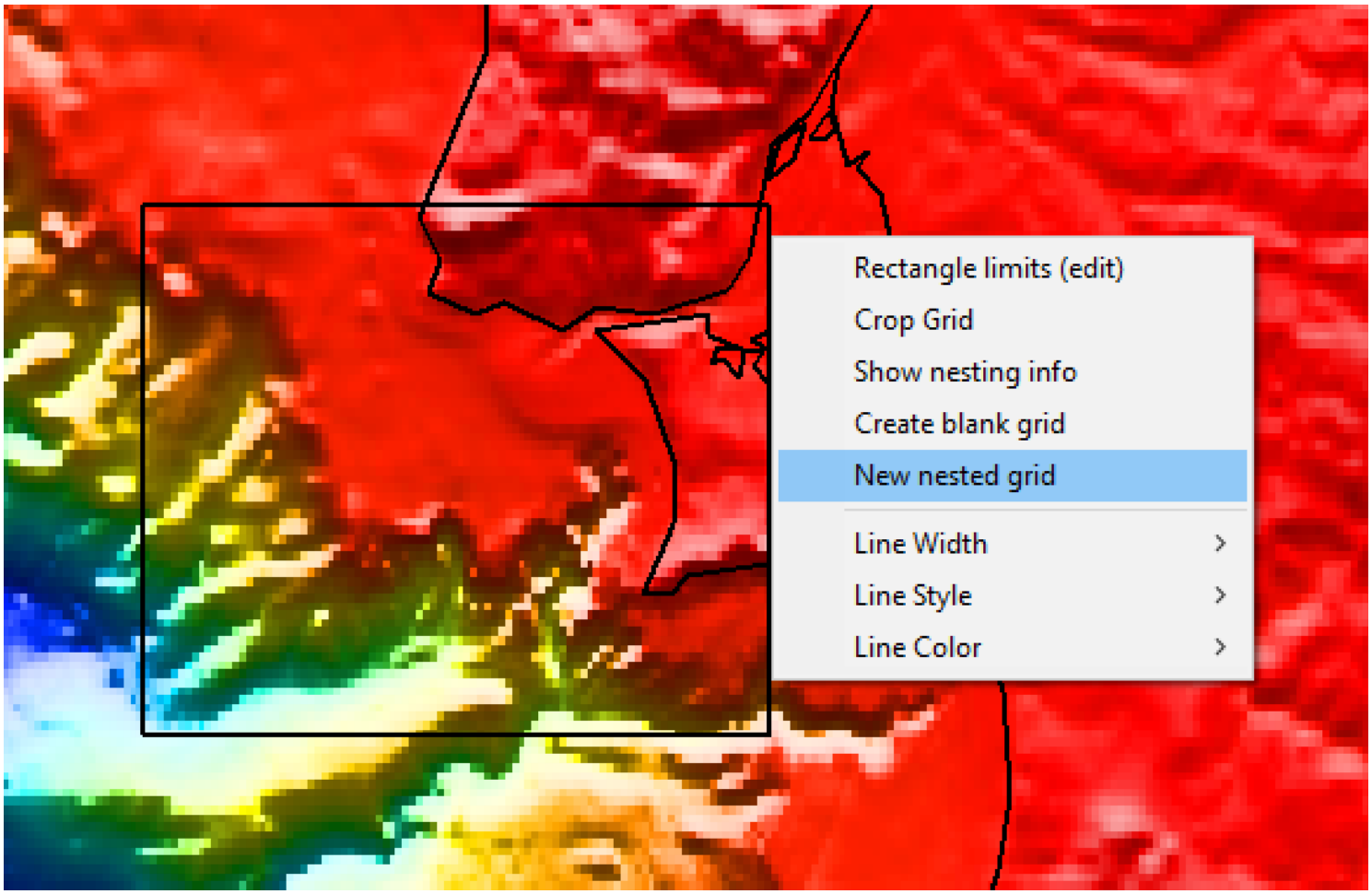
Getting to level 1



We can see the first nesting level already drawn and the window that asks about the refinement factor. Accepting the factor of 5 means that this level will have a grid spacing that is 5 times smaller than its parent grid (the layer 0).

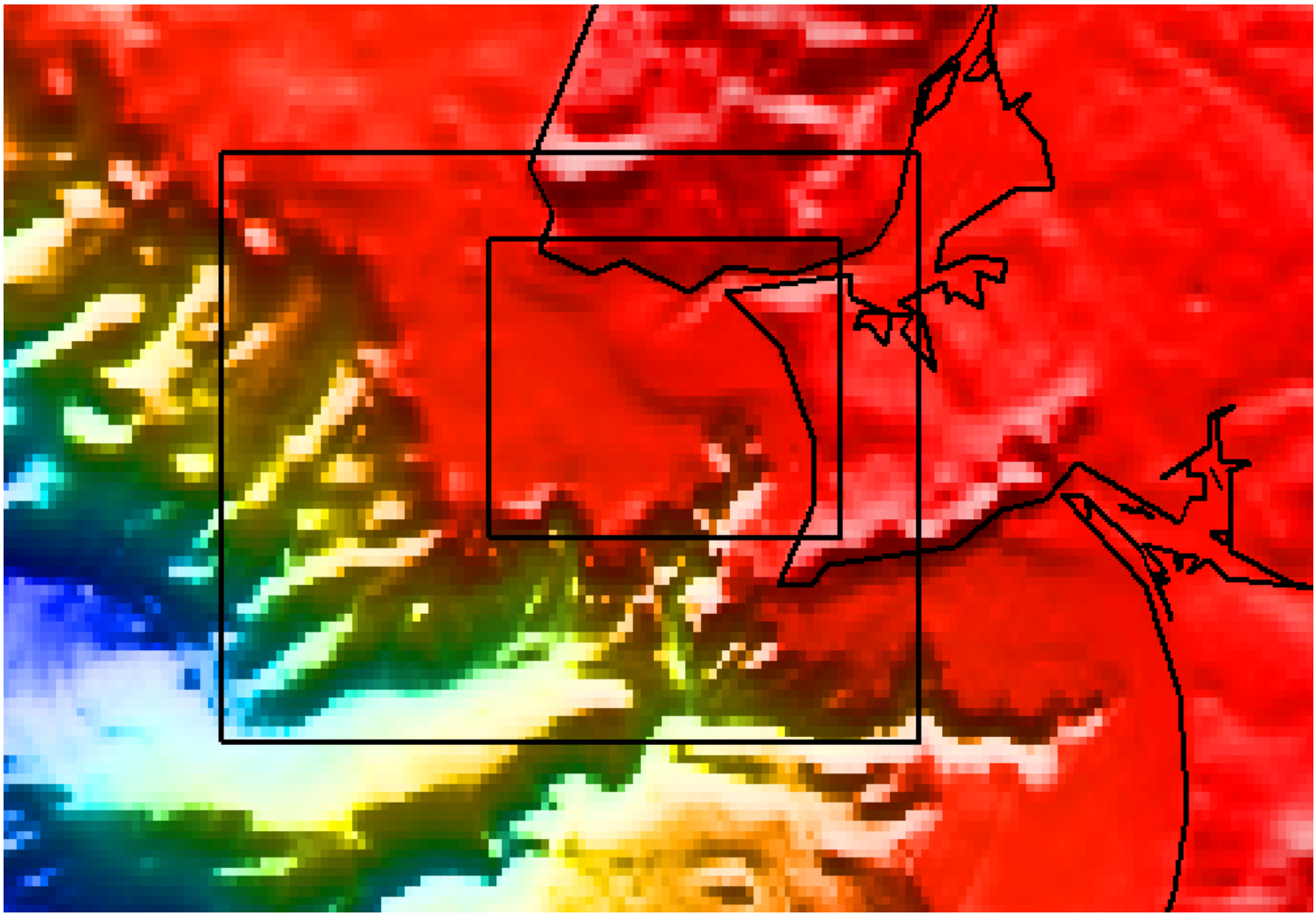
Next we will create the level 2. See next figure.

Getting to level 2



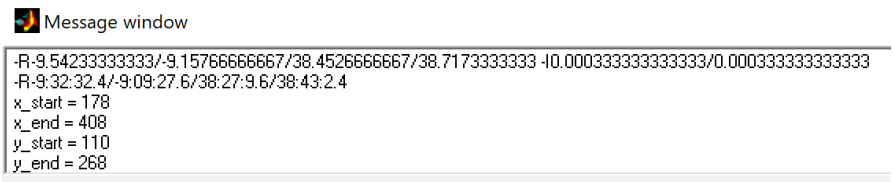
Zooming in and right-clicking on the rectangle line brings if the menu shown above. Select the "New nested grid" and, after setting/accepting this level refinement factor, a new rectangle will automatically be added centered on its parent. You can now edit the rectangle size and position with the normal Mirone line editing functionality (double-click, drag, etc).

Level 1 and Level 2



We could continue this process for more levels but (right-cliking on the inner rectangle and ask for one more level, adapting its position) but no need for more for the sake of simplicity.Mind you that the level 2 rectangle is meant to have a resolution that is 25 time higher (5 * 5) than level 0. So either you have data to fulfill this reality or you can give up here. Assuming we have, it's time to create those bathymetry grids. Repeating, nested grids MUST obey to strict rules. By right-clicking on a rectangle you can ask for "Show Nesting info" and, for the case of the inner rectangle you would get something like the next figure.

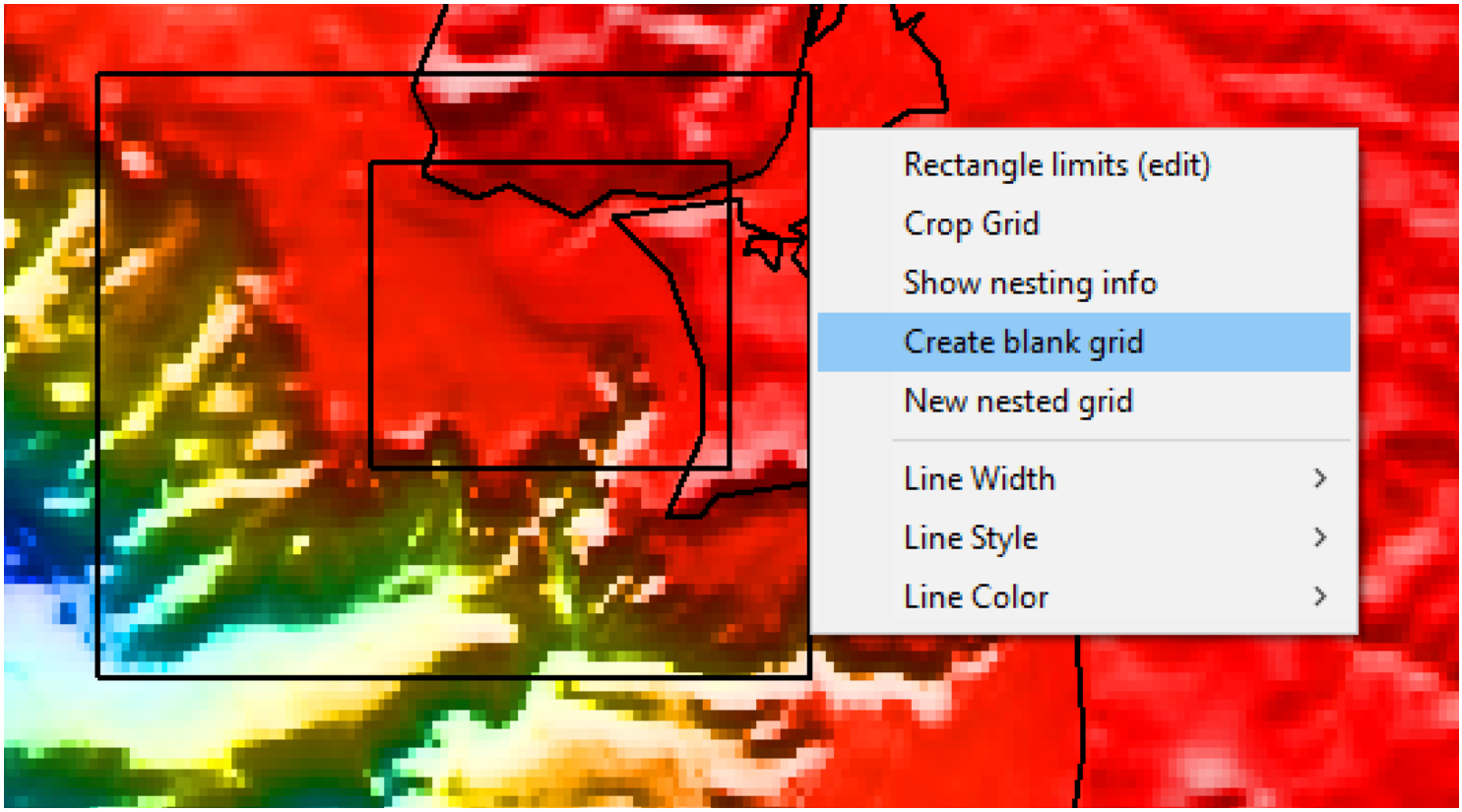
Nesting grid info of the inner rectangle



It means that your layer 2 grid must have these exact limits and grid spacing. It is up to you to create those grids if you want to proceed with this exercise. I cannot do it for because it's your data and I have no data to provide you so PLEASE don't ask me that. But I can show you how to create

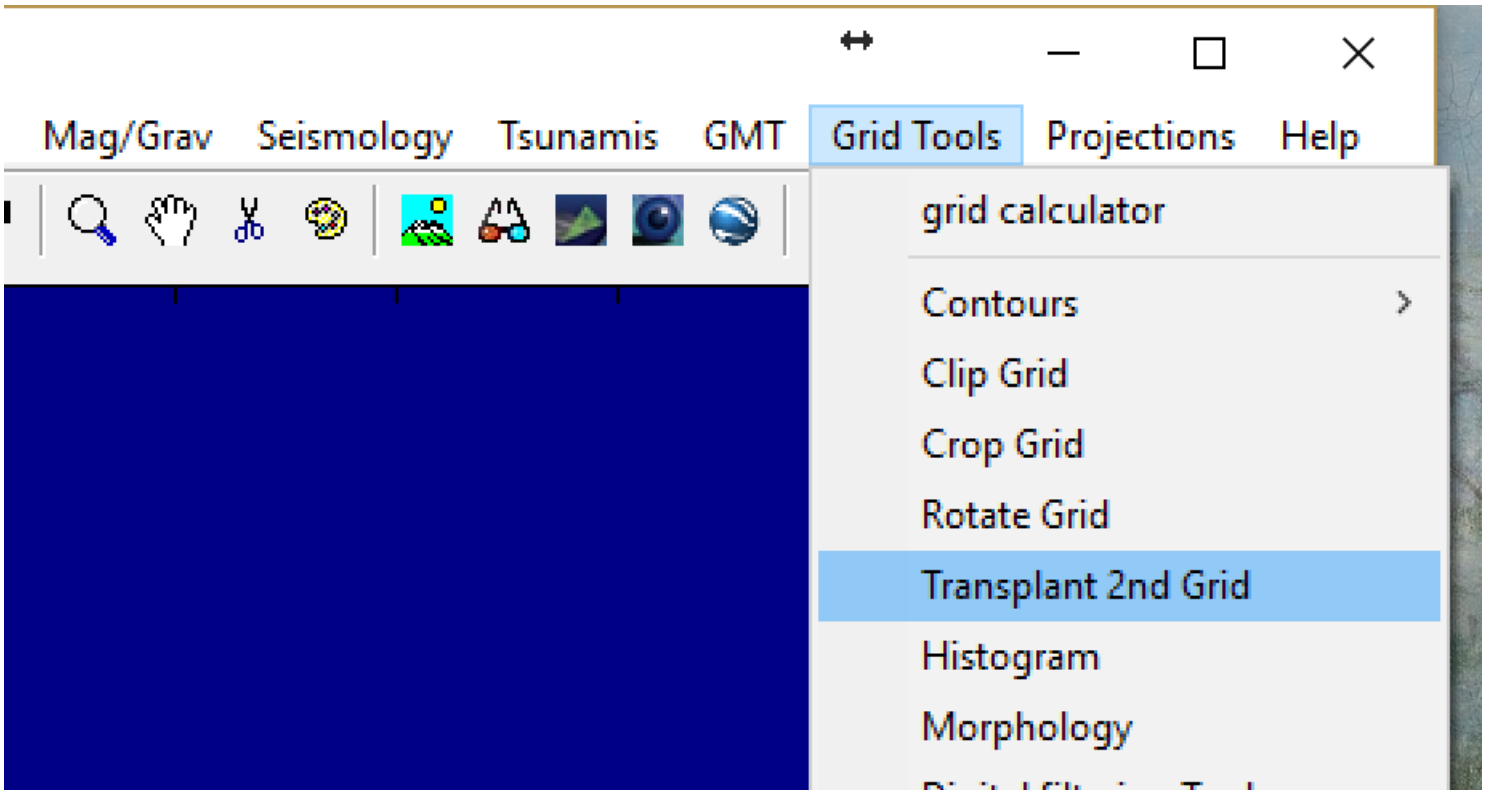
the layer 1 using the layer 0 grid. While this is ofc a bit of cheating it's not that bad because we are still at a relatively large grid step (for an inundation study point of view) and will serve as an example of what you will have to do, with other data, for higher levels.

Create a template grid



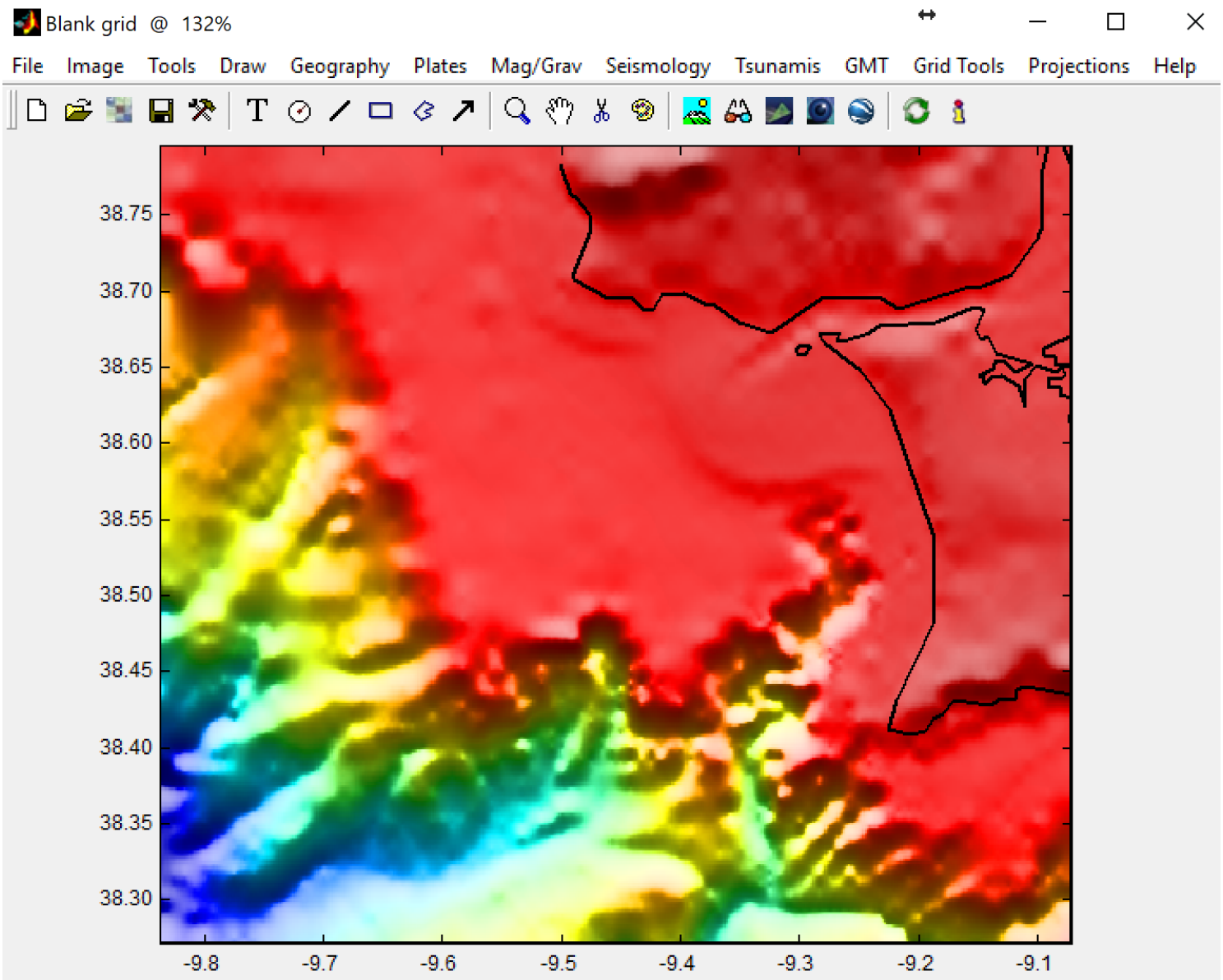
Going back to menu obtained with a right-click on the level 1 rectangle select this time the "Create blank grid" option. You will be presented with a blue figure that contains just the template grid but filled only with zeros. In that window do as shown in next figure.

"Transplant" grids



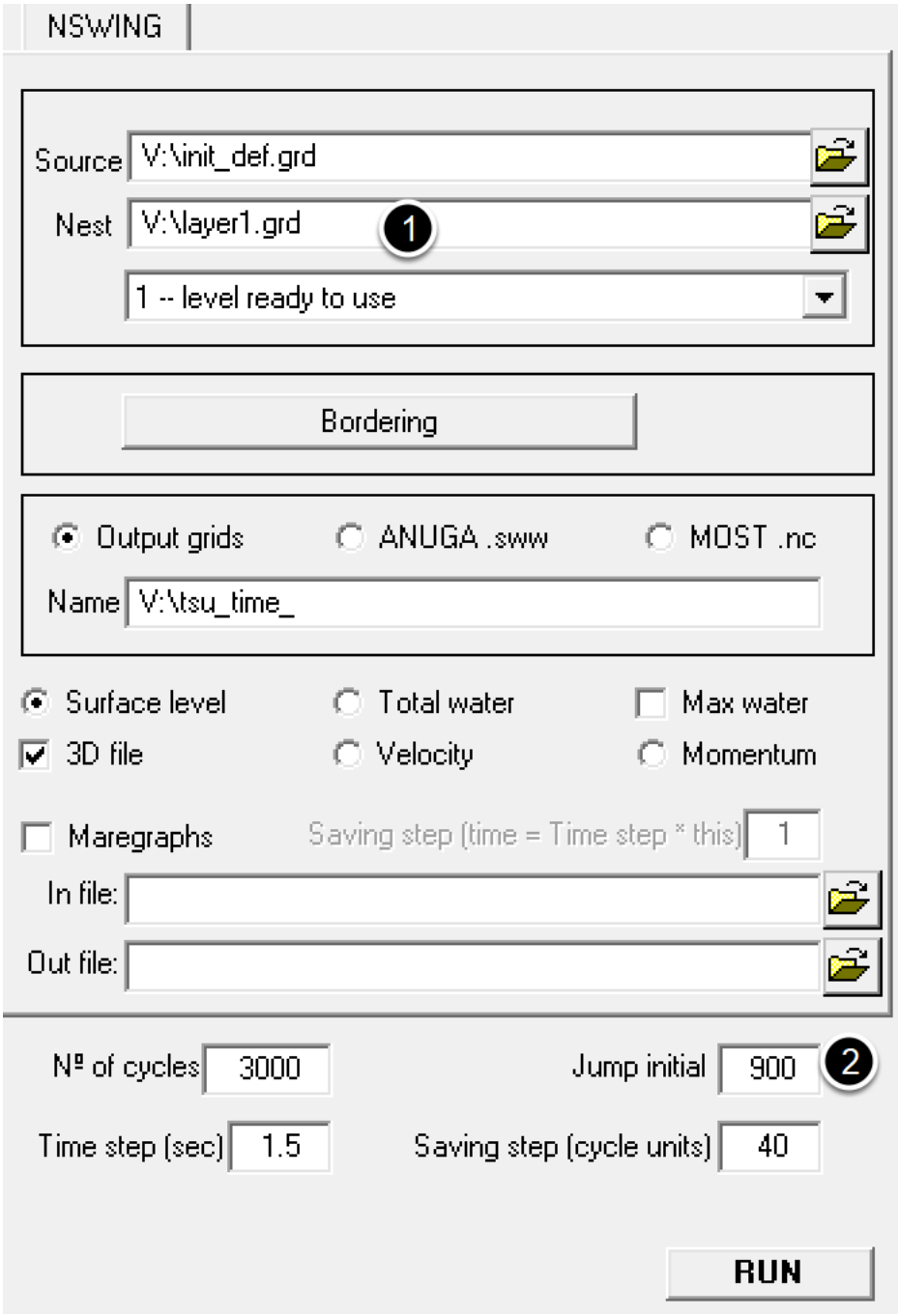
The "Transplant 2nd grid" option let you take another grid and insert it partially or totally inside the container grid (our blank grid) but reinterpolate it to fit the exact specifications of the container grid. The result, after indicating the layer0.grd as the transplanting grid, is shown next

The level 1 grid



Save this gris as the level 1. Next levels must be constructed either in a similar manner, but using a higher resolution data set, or constructed in any other way that is usual to create grid (I'm thinking on grid interpolation from x y z points. The fundamental thing is that those higher level grids fulfill EXACTLY what is specified in the nested grid info for that level.

In possession of all levels that our working case posses we go back to the parameters section of the TINTOL window.



The parameters are close to what we have seen in the "Asimple example" tutorial, but we now have also filled the "Nest" pop-down menu (1) and used a non zero value for the "Jump initial" (2). We do this last step, that means 'do not save any step during the first 900 seconds of simulation' because during that time the wave is still propagating in the level 0 region and have not yet reached the level 1 domain. So no point to save useless data because all we will see is the part of the wave inside level 1 (or in level 2 if we had a level 2, and so on).

So here ends this tutorial. It might be a little disappointing to many people but things here are no longer trivial. If you have no data to play this game, you don't play it.