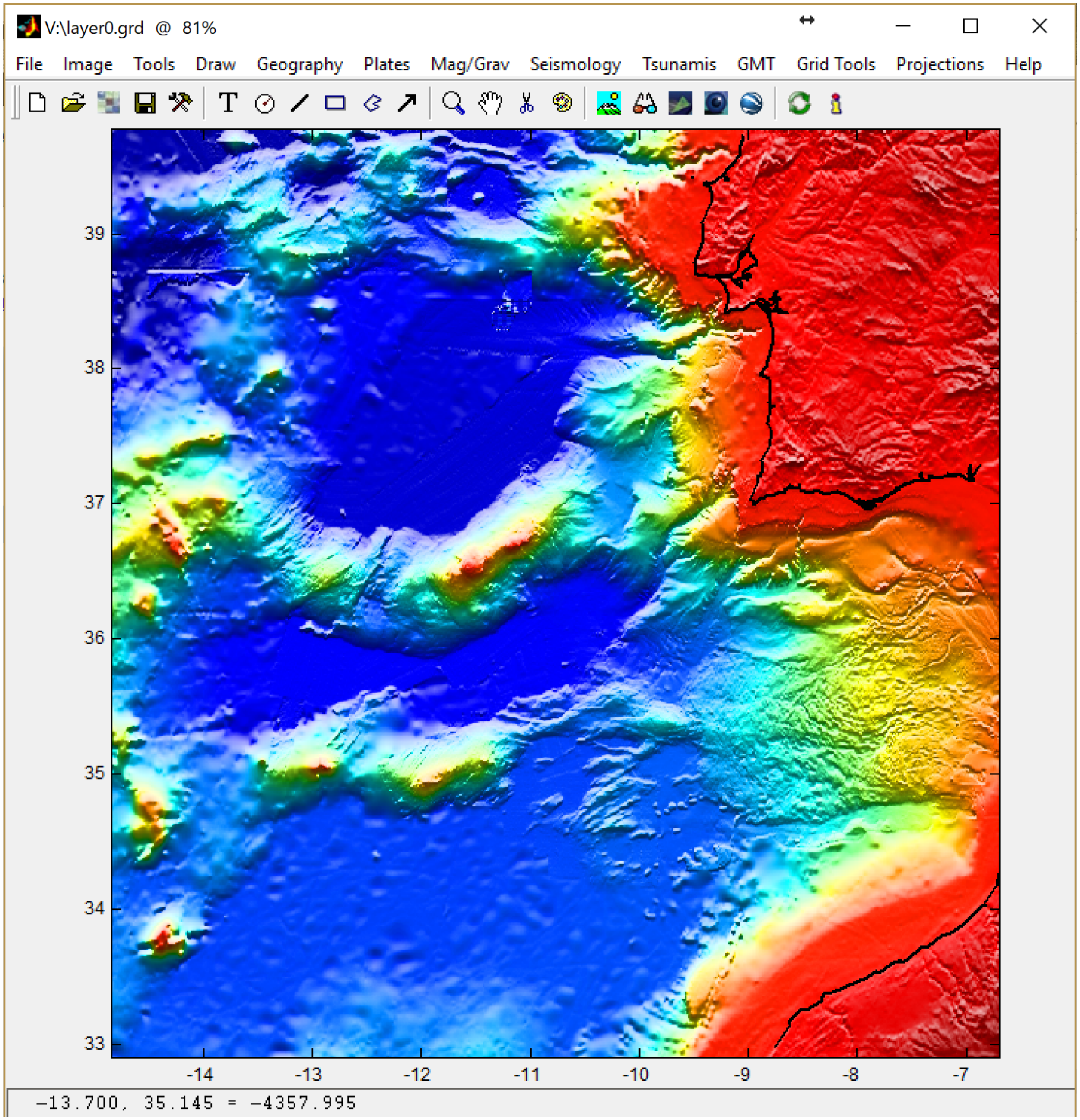
A simple tsunami propagation example

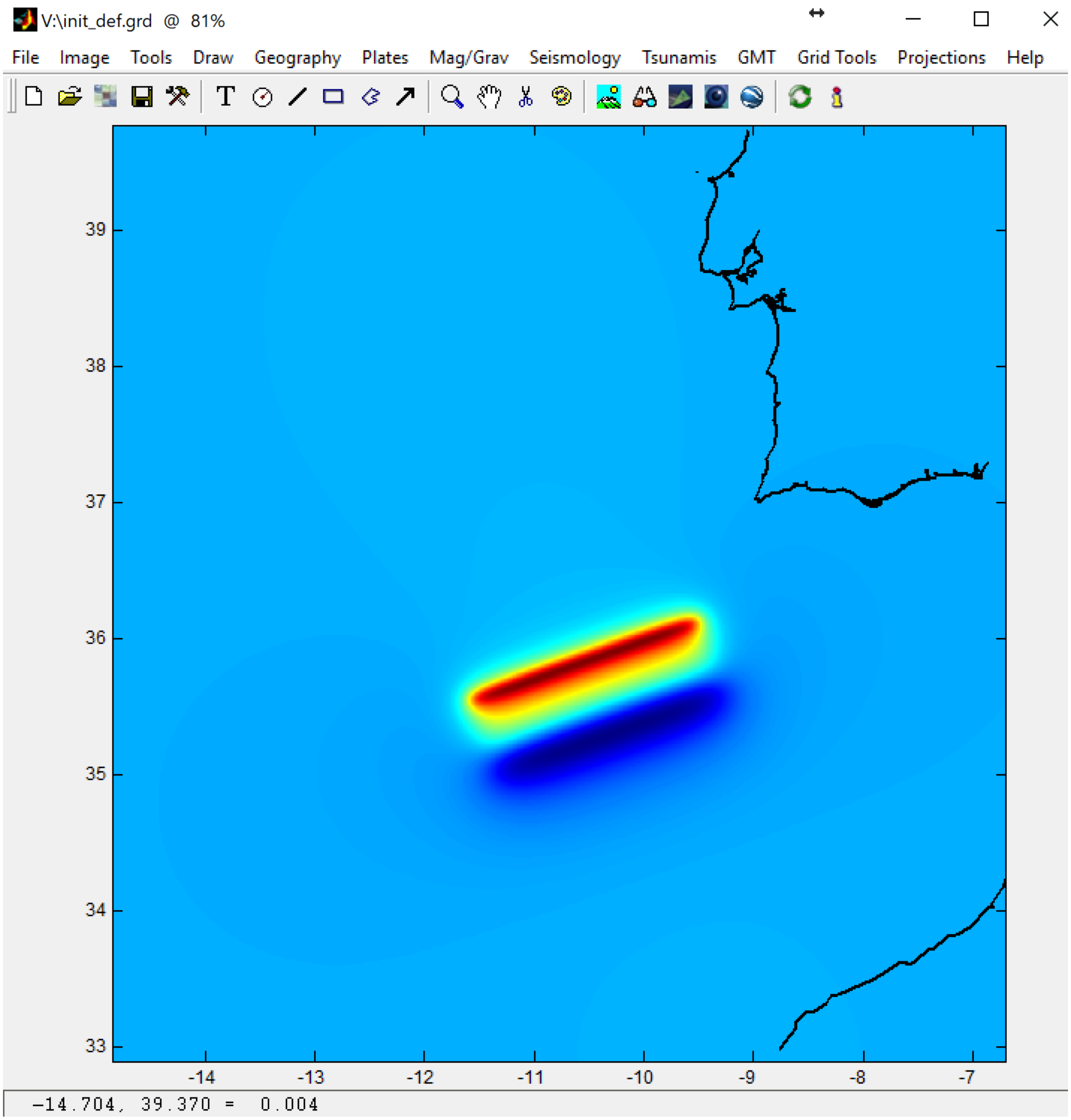
For modeling tsunami wave the propagation we only need one bathymetry grid and the initial condition of water displacement. This initial condition is normally calculated after the seismic parameters os a certain seismic event. Please refer to the tutorials on "How to compute seismic elastic deformation" or "Compute seismic deformation and interferogram of a multi-patch solution"

Open the grid with the bathymetry



Not strictly necessary but to help visualize we added the coastlines and shaded illuminated the grid. Note also that the bathymetry must be in meters with the z axis positive up (i.i. depths are negative).

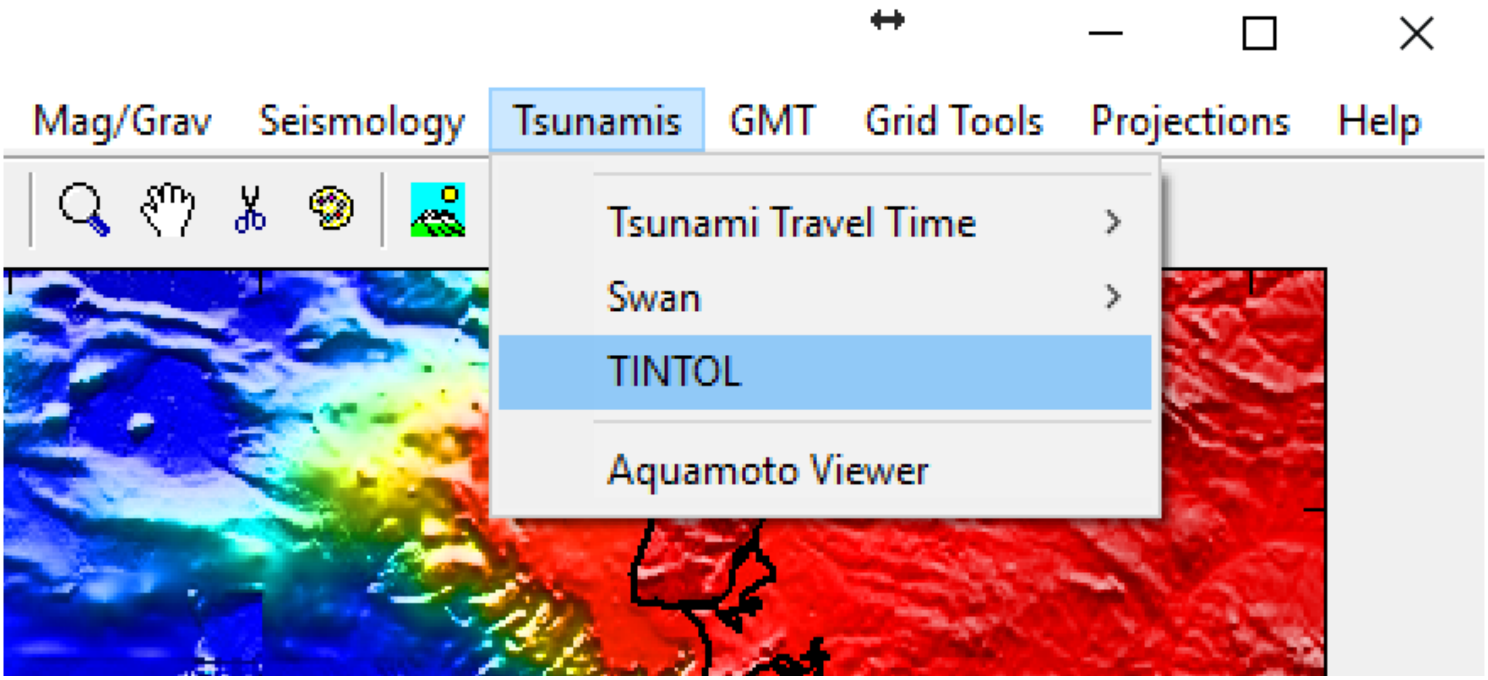
To confirm that you have the things you need, open also the initial deformation grid



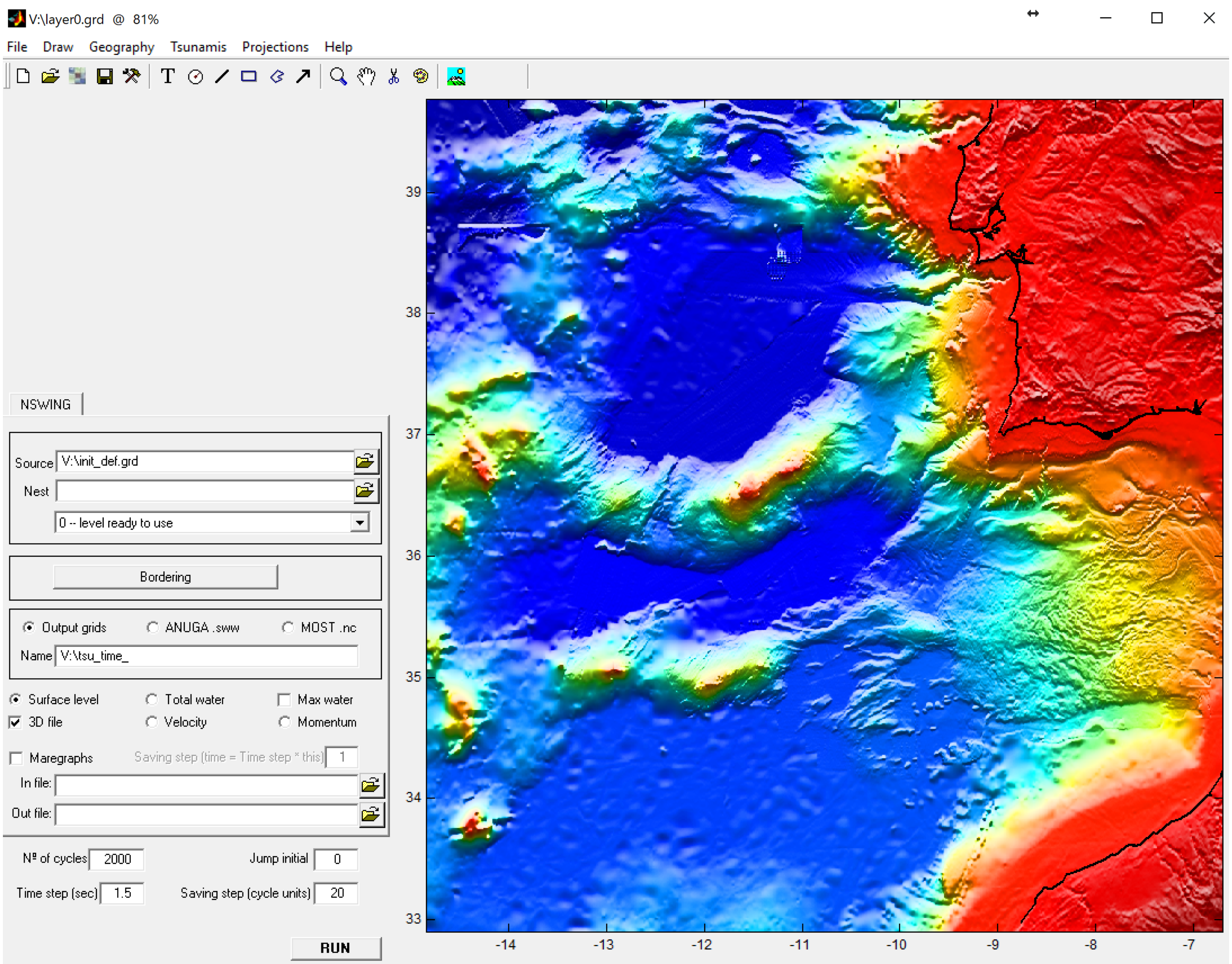
This an example on an initial deformation computed as described in the links above. It is absolutely crucial that both the bathymetry and deformation grids have exactly the same grid steps and cover exactly the same region.

Next we are going to transform the Mirone standard figure into the TINTOL mode.

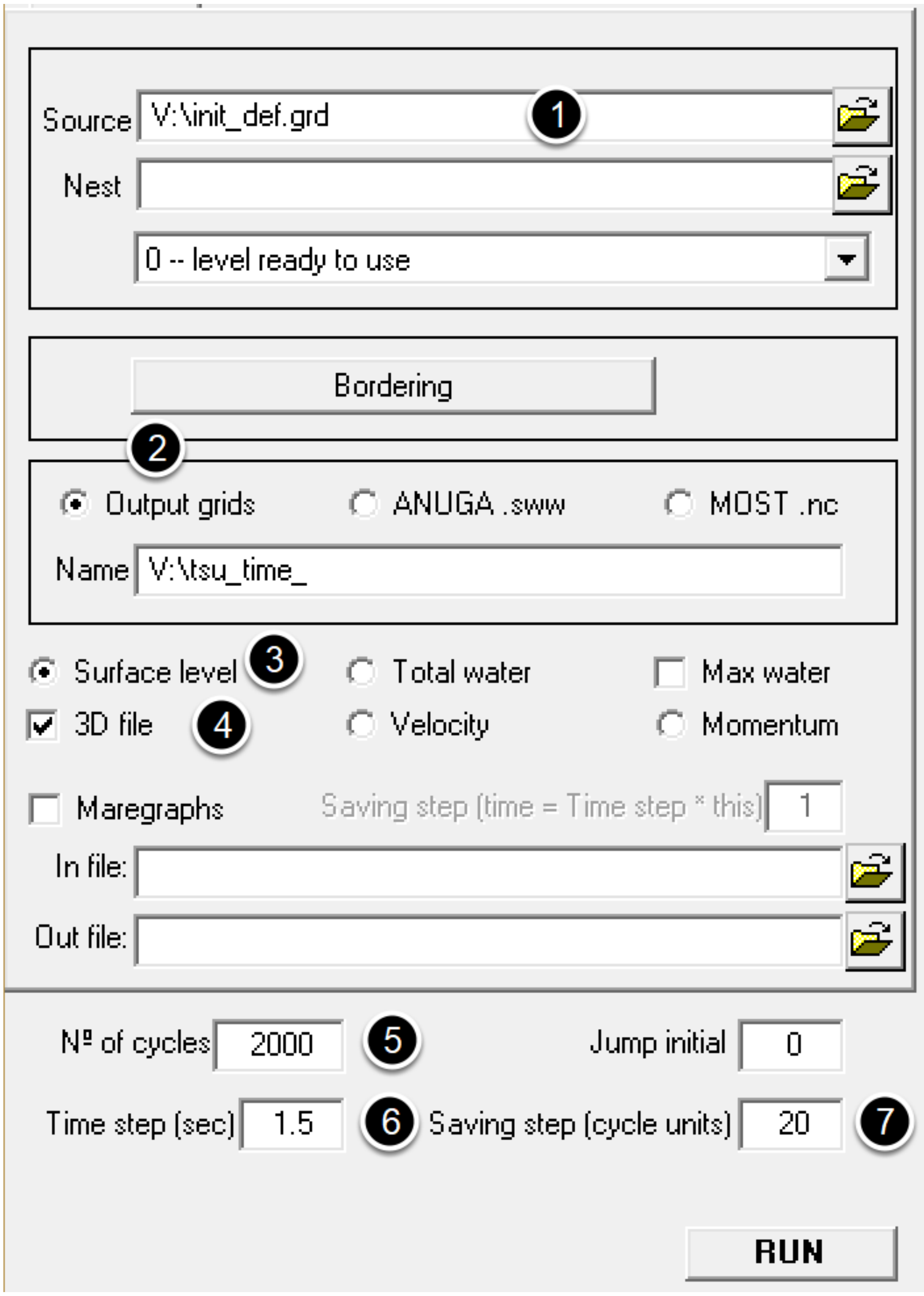
Move to the TINTOL mode



Just do like in the above and land ...


V:\layer0.grd @ 81%
File
Draw
Geography
Tsunamis
Projections
Help
NSWING
Source
V:\init_def.grd
Nest
0 -- level ready to use
Bordering
Output grids
ANUGA .sww
MOST .nc
Name
V:\tsu_time_
Surface level
Total water
Max water
3D file
Velocity
Momentum
Maregraphs
Saving step (time = Time step * this)
1
In file:
Out file:
Nº of cycles
2000
Jump initial
0
Time step (sec)
1.5
Saving step (cycle units)
20
RUN
39
38
37
36
35
34
33
-14
-13
-12
-11
-10
-9
-8
-7

The Parameters section



Here is where the user must take some decisions (make choices). In (1) we gave the file name of the initial deformation grid. (2) tells the name of the output file. In (3) we selected to compute the water surface level and in (4) we said that we want a single 3D netCDF grid with all the steps. In (5) we decided how many run steps this simulation will run. (6) indicates the time step (in seconds) increment for this simulation. The program proposes one based on the so called CFL condition but user should round it to a more convenient figure (but NOT very different from what was proposed). Steps (5) and (6) determine to total time of the simulation. In this case 2000 * 1.5 = 3000 seconds. Finally (7) tels the program what is the saving step of the disk file. 20 means saving a step every 30 s of simulation (20 * 1.5 = 30).

And that's it, just hit RUN, wait a little (nothing special, it took about one minute and 15 seconds to run in my 2014 laptop) and when it finishes open the output file in Mirone that will take you to the Aquamoto tool where you can slide trough all saved time steps, as in ...

A view of the tsunami simulation for the time 1530 sec