# Read me

The warping feature in Ulysses is composed of 4 main steps:

> #1: Source deconvolution
> #2: First time instant selection
> #3: Mode selection in the warped plan
> #4: Mode inversion

In order to work efficiently, it is sometime necessary to skip some of these steps and use parameters we already calculated. That's the first choice you have to make when you hit the warping button in Ulysses:
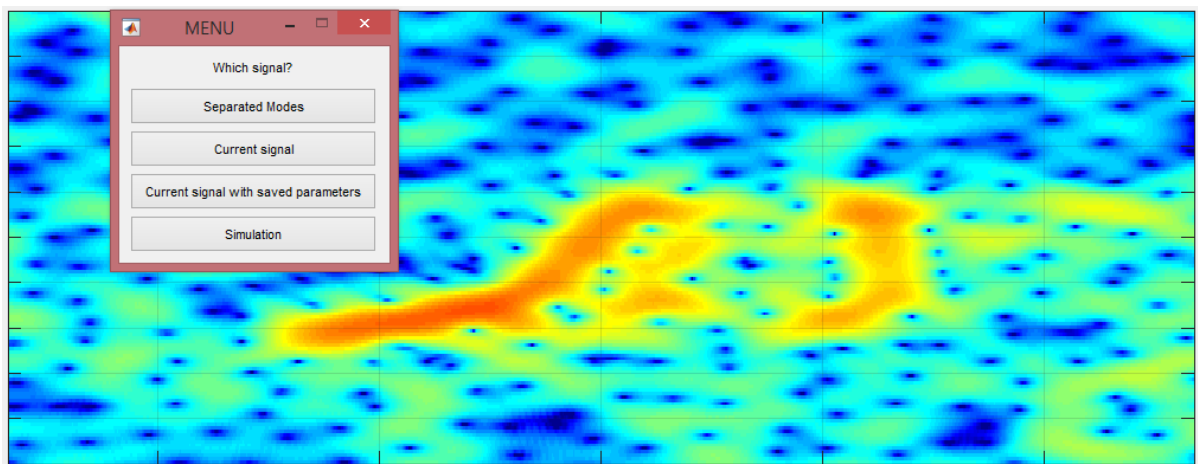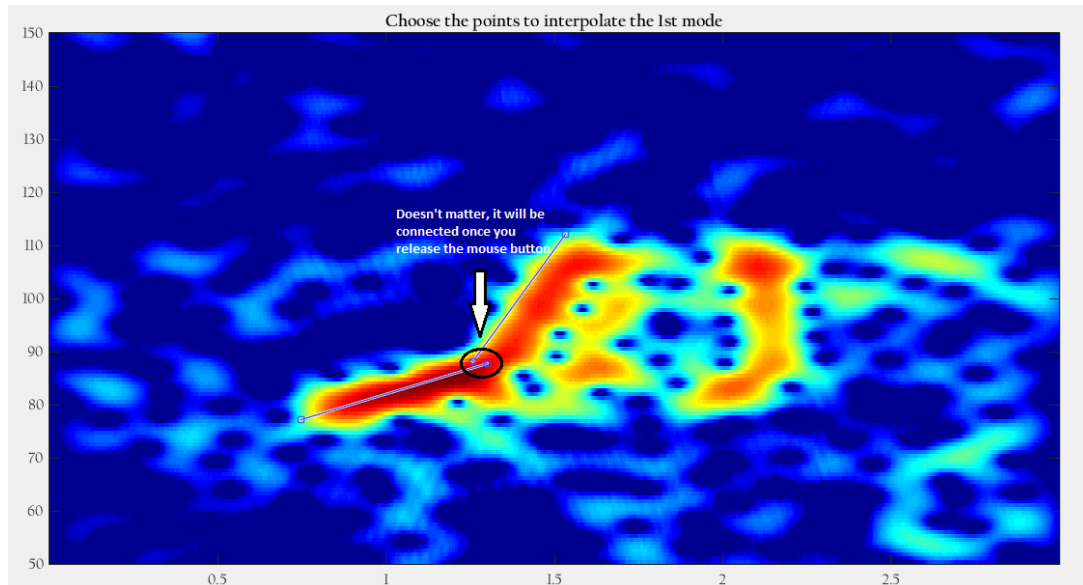

- **Current signal**: you choose this option if you want to process this signal from scratch:
  - First, select the parameters in the next window that opens:
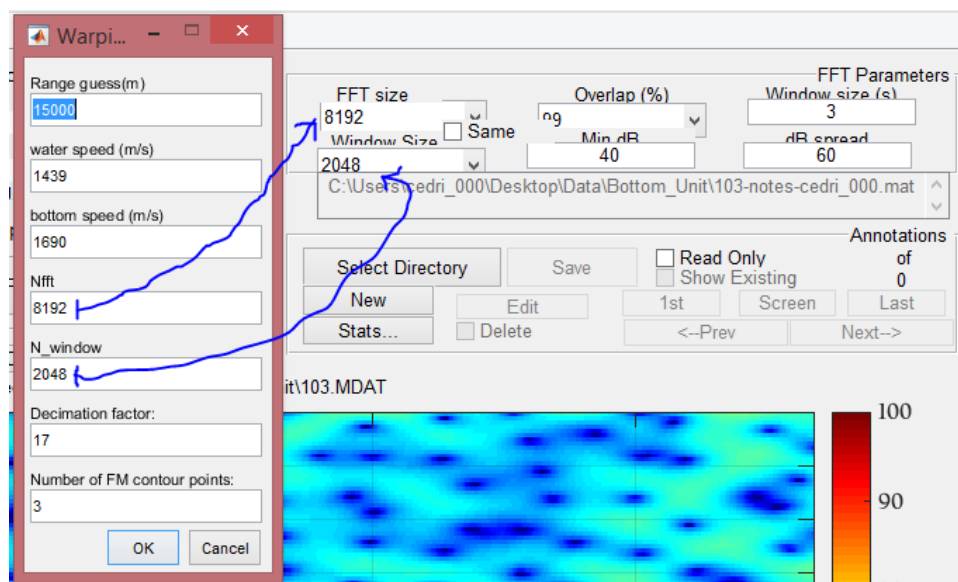
Some of the parameters are just the one you took to select the signal before warping

- Then, you have to deconvolve the signal to make it impulsive. If you selected 3 points for the FM contour (just in the previous step), you will have to click and drag twice to create 2 lines (=3 points). You can adjust the points afterward


Choose the points to interpolate the 1st mode

Doesn't matter, it will be connected once you release the mouse button

- Once you're done, press a key to go on. At this point, you're at the 2nd step of the algorithm. If you look at the workspace, you can choose to save the points you used to deconvolve. It will be helpful if you want to skip this step (explained later).



```
Command Window
3.000031e+03 second offset from file start
Offset  3660.8909 s into 103.MDAT
Acoustic calibration executed
Logged depth of channel 1 is  14.49 m
2.992198e+03 second offset from file start
Offset  2992.1978 s into 103.MDAT
Acoustic calibration executed
3.660891e+03 second offset from file start
Offset  3660.8909 s into 103.MDAT
Acoustic calibration executed
Logged depth of channel 1 is  14.49 m
Logged depth of channel 2 is  17.43 m
Logged depth of channel 3 is  20.48 m
Logged depth of channel 4 is  23.65 m
Logged depth of channel 5 is  26.77 m
Logged depth of channel 6 is  28.12 m
Logged depth of channel 7 is  29.47 m
Logged depth of channel 8 is  30.84 m
Logged depth of channel 9 is  32.36 m
Logged depth of channel 10 is  33.96 m
Logged depth of channel 11 is  36.86 m
Logged depth of channel 12 is  39.83 m
Logged depth of channel 13 is  42.87 m
Logged depth of channel 14 is  45.91 m
Logged depth of channel 15 is  48.91 m
Beginning source deconvolution
End of source deconvolution
fx Do you want to save the deconvolution ?  (y/n) y
```
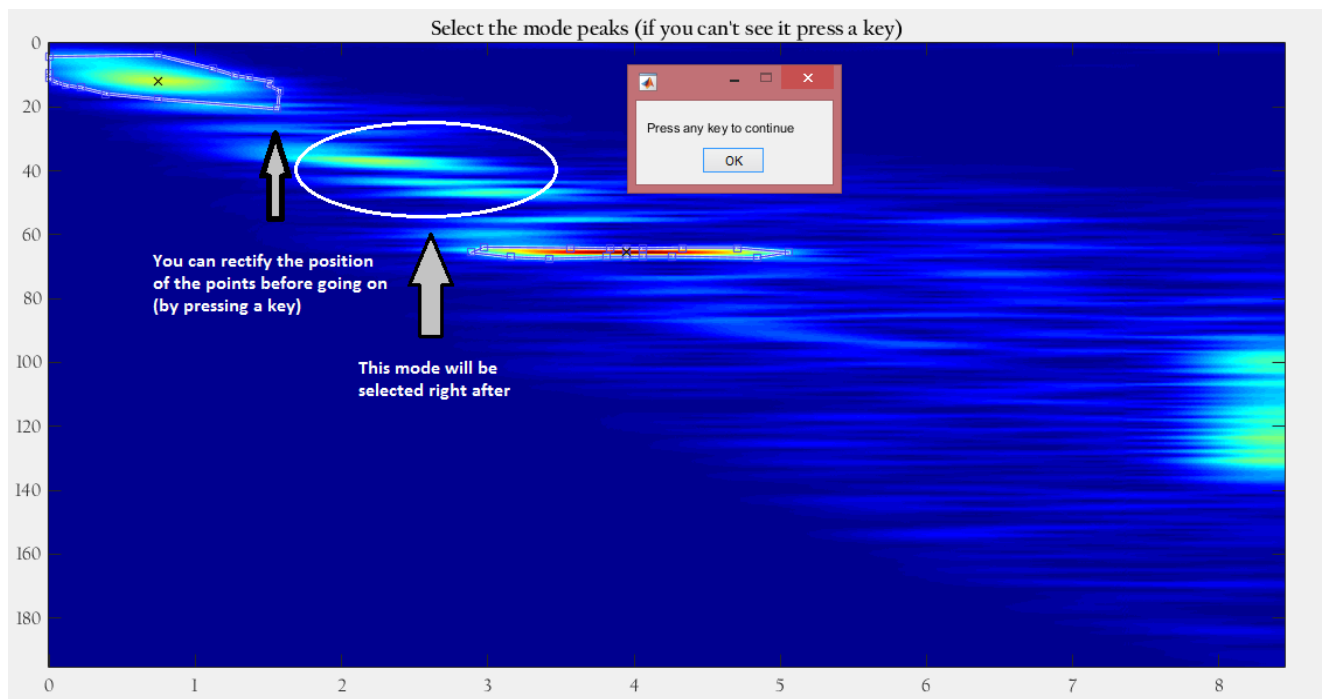
- A figure appears: select your guess for the first time instant of the signal (just click anywhere at the right time instant). The program will then show the result for different time instant around the selected points.
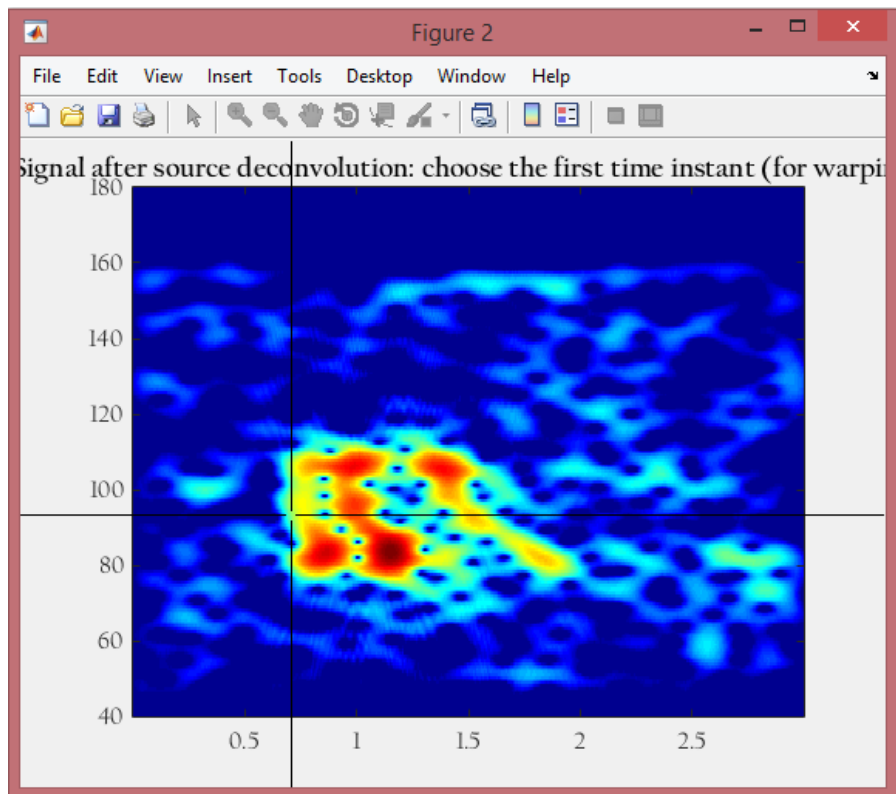
- In the command window, you can choose to replay and/or save the movie (which is the evolution of the warping with the first time instant choice). Once you've decided, enter your best guess for the first time instant (for each warping result, the time instant is displayed on the title of the figure). The time instant that's displayed is relative to the selected one.
- All these steps are then applied to each hydrophone, and the result is displayed as warping figures. At this point, you can choose to go back to the source deconvolution or to the first time instant guess if you're not satisfied of the result. Just follow the instruction in the workspace.
- Choose a number of mode
- Mode selection: in this example, the warping is shown in the figure below. For a given mode, if the result is good, click approximately once on the energy peak of the mode. If the mode is a bit too erratic press a key: you will take care of it later
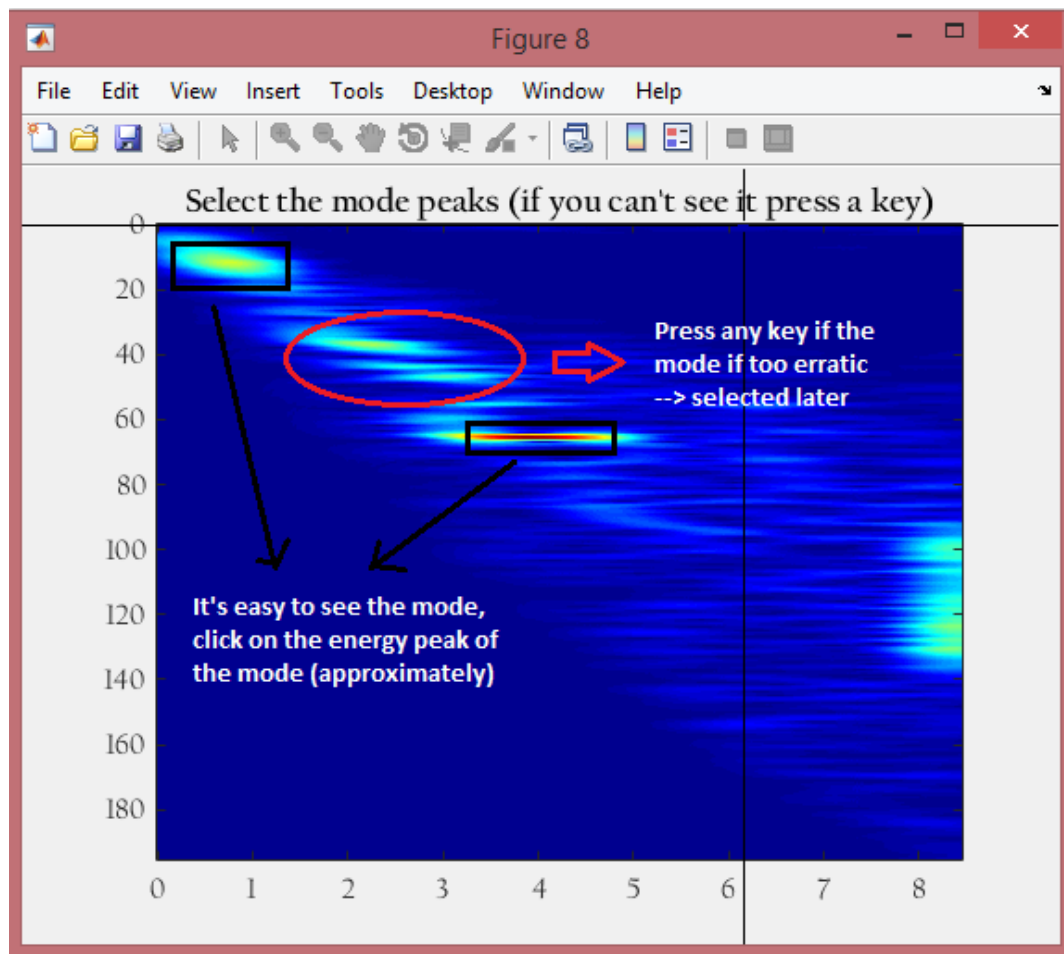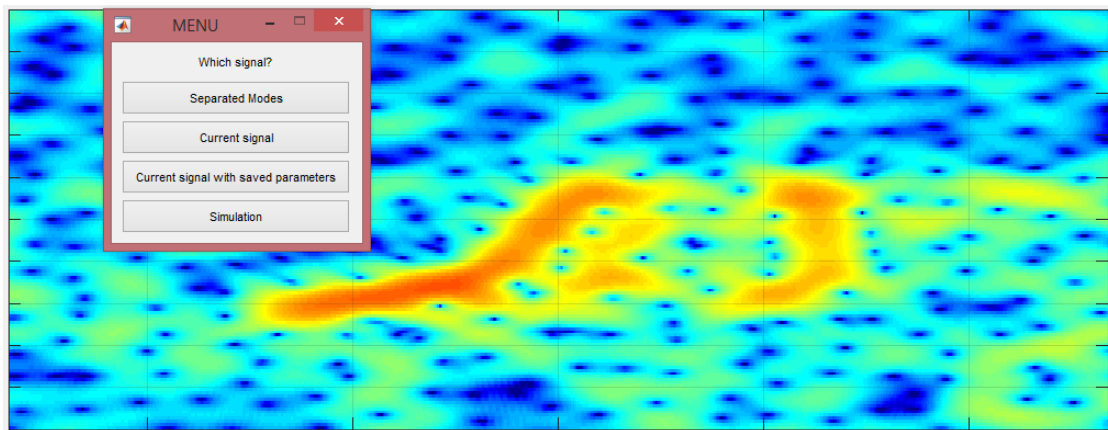
The mode for which you clicked are then automatically selected according a given threshold. You can adjust the points before pressing a key and go on.


Select the last mode by drawing a polygon around it.

- Once you've done these steps, your role is pretty much over. Some plots are shown, and you can choose to save the separated modes (to skip all these steps in the future).

Once you enter 3 or 4 (to continue), the modes, tilt and phases are extracted and displayed.

Back in the menu at the beginning:

- **Current signal with saved parameters**: you will need the deconvolution file that was saved during the steps you went through for the "current signal" option. If you saved the deconvolution, you should have a file called "param_deconv.mat".
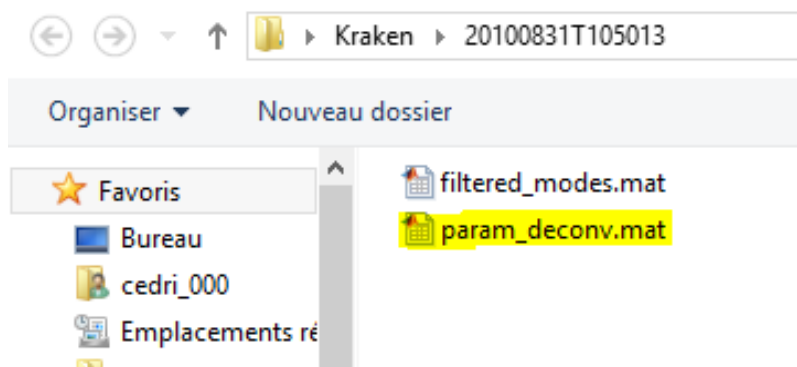
The algorithm then continues at step 2 (first time instant selection). The following is explained in the "current signal" part.

- **Separated modes**: you will need the separated modes file that was saved during the steps you went through for the "current signal" option, or if you simulated separated modes with the "create_signal.m" script. If you did it, you should have a file called "filtered_modes.mat".
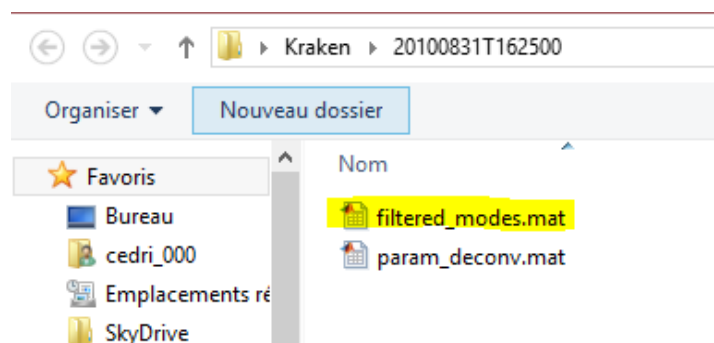
The modes are then extracted, as well as the tilt and the phase.

- **Simulation**: Use this option if you want to process to all the "current signal steps" with a signal that has been simulated with "create_signal.m". Careful: you still have to load a VLA or DASAR file to do it.