Report after beam time at ESRF on beamline ID19

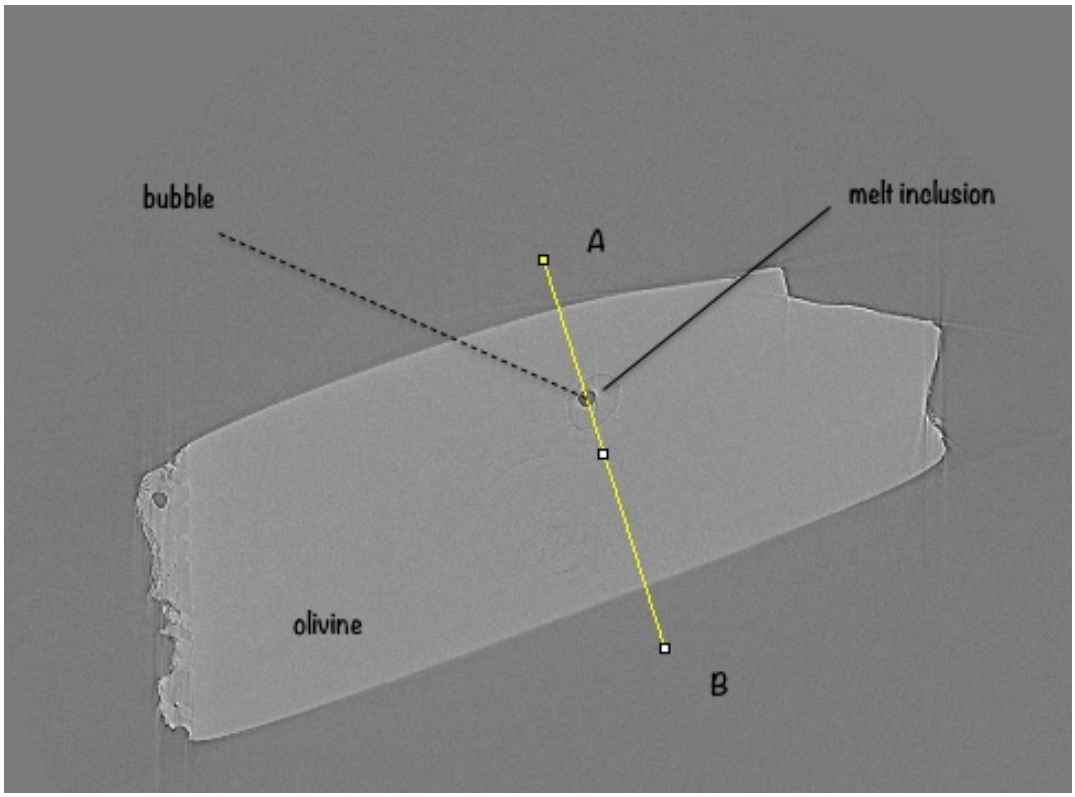
In situ density of olivine-hosted melt inclusions

Experiment # ES-38

We were attributed 2 days of beam time and 1 additionnal day for setting up the experiment. Prior to the "D-day" we came twice to ESRF to evaluate the possibilities and the alternatives for our set-up. Elodie Boller, Hugo Vitoux, Bernard Gorges, Jean-Paul Valade and Anne Bonnin were all of great help coming up with innovative ideas to make things happen.
To measure density in natural olivine-hosted melt inclusions is an alternative to calculate the pressure of melt entrapment and determine the H2O concentration of the undegassed magma.

The challenge: was both technical and analytical.
We acquired a density spectra of the olivine hosted melt inclusion at room temperature and for selected melt inclusion that we heated, we acquired spectra at temperatures of 500, 750, 1250ºC and after the quench. We expect to see and quantify the effect of "water loss" from the inclusion on the density.
The data treatment is in process but we have had a positive feedback already with the few data that we treated live during the experiment (illustration on the Figure a and b below).

(a)



(b)

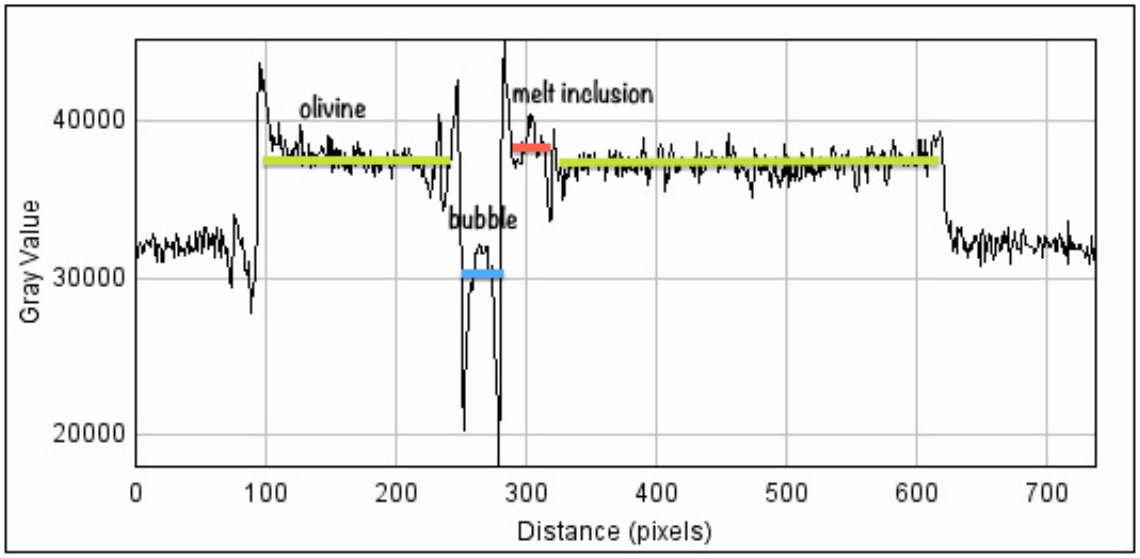


Figure : (b) density variation (in gray values) along a profile A-B through the olivine crystal, the melt inclusion and the bubble. The difference between the red and green curve is the effect of water on the density.