	Experiment title: Lattice preferred orientation of omphacite in eclogite samples from the Western Alps (Voltri Massif, Italy)	**Experiment number:** HS3969
Beamline: ID13	**Date of experiment:** from: 14 Dec 09 to 15 Dec 09	**Date of Report:** 07/11/2011
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Name and affiliation of applicants
Federico L., Carbone C., Crispini L., Capponi G.,
DIP.TE.RIS. University of Genoa, Italy

Report

Lattice preferred orientations (LPOs or textures) of minerals are often used to infer details on the slip systems active in a given mineral during deformation, finite strain and strain rate and ultimately, on temperature of deformation. Eclogites are made up largely of Na-clinopyroxene omphacite and garnet, but their rheological behaviour is largely controlled by omphacite [1].

Texture analyses are usually carried out by electron microscopy (ESBD technique; [e.g. 2, 3]). Application of synchrotron radiation to texture analyses of rock samples is quite rare; for instance, [4] investigated experimentally deformed albite. To our knowledge, our experiment represents the first attempt to analyse texture patterns of natural eclogites by synchrotron radiation.

Here, we report preliminary results obtained using synchrotron X-ray diffraction on thin sections, performed at beamline ID13 at ESRF (Grenoble).

The studied samples are mafic eclogites from the Voltri Massif (Ligurian Western Alps, Italy) with tectonitic to mylonitic structure. We have analyzed two perpendicular cuts (XY and XZ) of a single sample. Samples for the experiments have been prepared in two different ways: one set was composed of classical 30-μm -thick thin sections, sticked on glass; the other set was made up of thin (about 80 microns) sections self-supported. Since the allocated shifts were 3, we chose to analyse the XY section sticked on glass and the XZ section self-supported (Fig. 1a and b) to have better insights into sample preparation techniques.

Samples are almost bimineralic omphacite-garnet eclogites, with minor rutile, ores and amphibole, but study areas have been selected to include only (at resolution of optical microscopy) omphacite, with grainsize ranging from 5 to 50 μm.

Preliminary results evidence that the diffraction patterns of section sticked on glass show well-defined reflection spots originated by omphacite crystals and a central

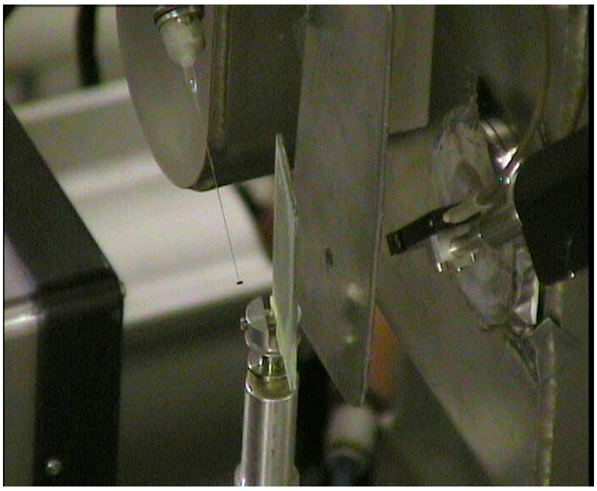

Fig. 1a: experimental setup for the XY section (sticked on glass)

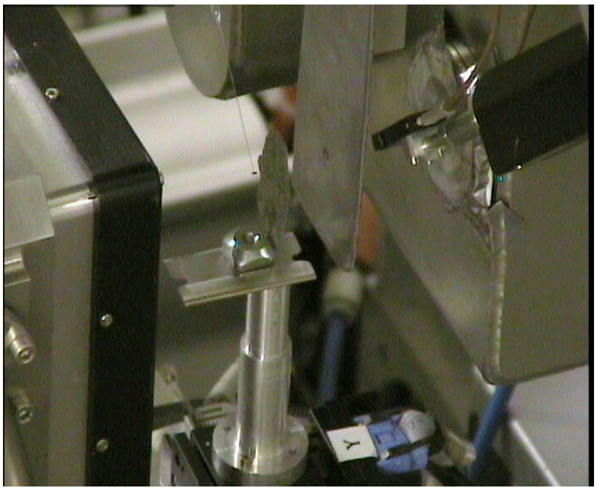

Fig. 1b: experimental setup for the XZ section (self-supported)

halo due to amorphous glass (Fig 2a). The images of section self-supported (Fig 2b) show many reflection spots, probably due to the presence of different crystals (omphacite and amphiboles) superposed in the 80 microns-thick section.

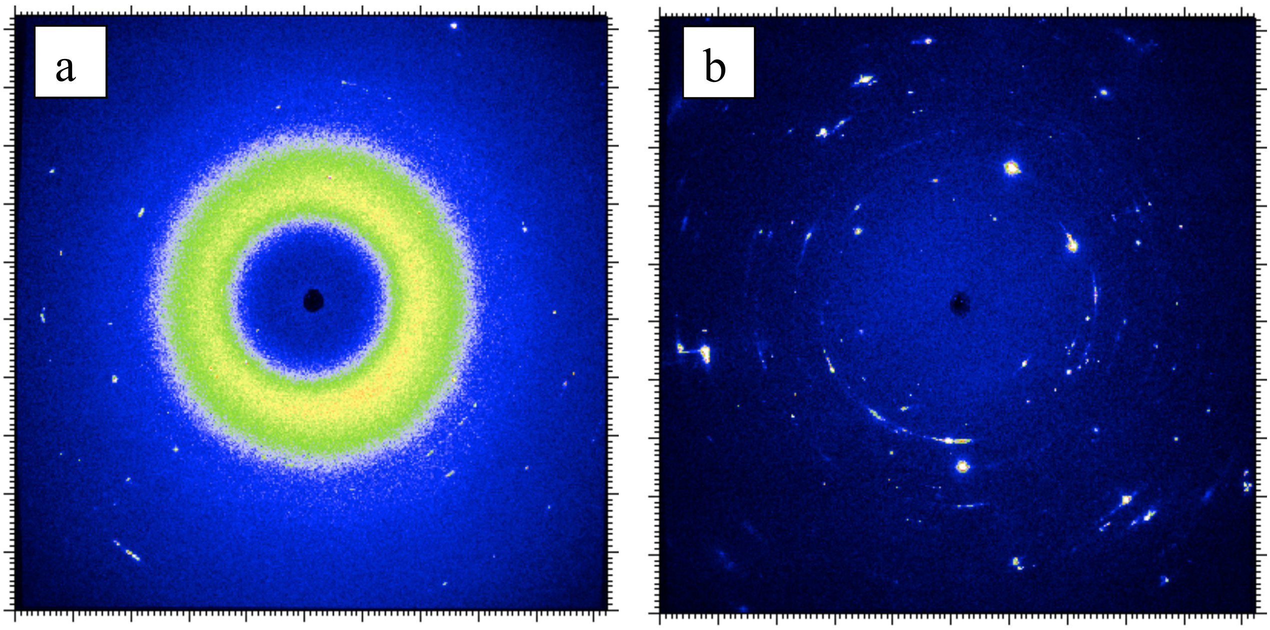

Fig. 2: Diffraction pattern of section sticked on glass (a) and of section self-supported (b).

Since grain size of omphacite crystals ranges from 5 to 50 μm, the better results are obtained analysing the thinner glass-supported thin section. Results were treated using Fit2D software, in order to convert the .edf files of FRELON camera into .esg files. This operation has been necessary to obtain pole figures through the software MAUD [5].

Further integrations are necessary to complete the treatment of the data using both Fit2D and MAUD softwares.

References

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