

**Experiment title:**

High-resolution microprobe analysis of trace metals in fluid inclusions within quartz crystals from xenoliths in basaltic lavas of Boa Vista Island, Cape Verde

**Experiment number:**

C H - 548

**Beamline:**

ID - 22

**Date of experiment:**

from: 14/09/98 (15h) to: 18/09/98 (07h)

**Date of report:**

25/01/99

**Shifts:**

6

**Local contact(s):**

A. Simionovici

Received at ESRF:

24 FEB. 1999

**Names and affiliations of applicants (\* indicates experimentalists):**

- \* M. O. Figueiredo , CENIMAT / New University of Lisbon, Lisbon
- \* M. T. Ramos , Atomic Physics Center, University of Lisbon, Lisbon
- \* Z. Melo , INETI / Inst. Nac. Eng. Tech. Indt., Lisboa

**Report:**

We studied the trace element chemistry (heavy elements) of *low salinity geofluids* hosted by *quartz and fluorite crystals* associated to *carbonate rock xenoliths in basaltic lava flows* from Boa Vista Island, Cape Verde. The chemical constitution of the host minerals was also studied, both for comparison purposes and for clarifying the origin of the host carbonate rock - sedimentary or magmatic/carbonatitic.

The analysed samples were: 1) a large *quartz* crystal, about 5 mm thick, containing large fluid inclusions with the form of negative crystals; 2) a thick quartz lamella cut from a crystal with the same type of inclusions, first glued on a glass plate for observation under the electron micropobe, later unglued and analysed separately; 3) a thin lamella of a *fluorite* crystal with small fluid inclusions; 4) a fragment of *carbonate rock xenolith*.

The low salinity of the studied fluid inclusions (SILVA & CORREIA, 1979) was confirmed by the SRXRF analyses. Indeed, quartz samples are free from trace metal components, either in the bulk or within fluid inclusions (fig. 1).

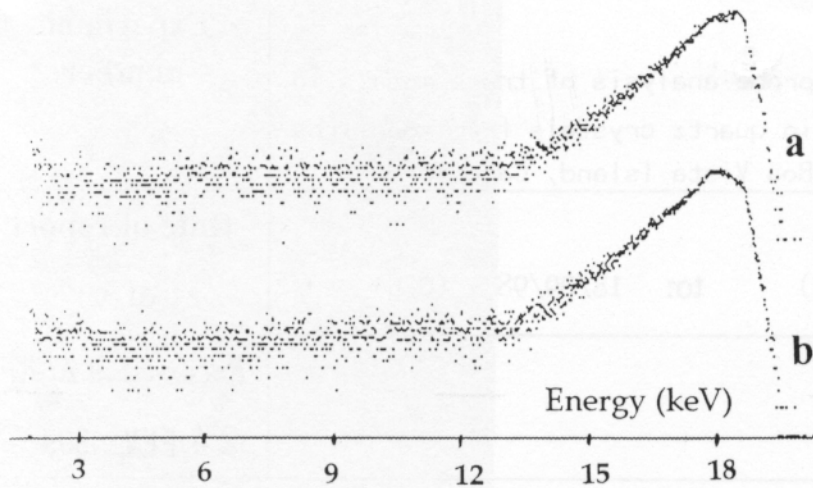


Fig. 1 - SRXRF spectra of a quartz crystal: (a) bulk, (b) over a large fluid inclusion.

A high resolution camera detecting the transmitted radiation allowed for the visualization of fluid inclusions (the so-called negative crystals) within the quartz lamella (fig. 2).

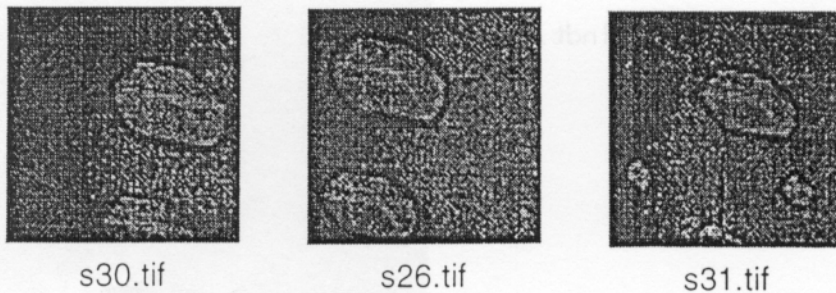


Fig. 2 - Sequence of images taken from a cluster of fluid inclusions.

The trace elements detected in fluorite crystals (Ge, Sr, Zr, Y, REEs) and in the carbonate xenolith (Sr, Rb, Zr, Y) point towards a magmatic origin (carbonatite) for the analysed samples. The presence of iron oxide nodules in the carbonatite fragment was checked by scanning the sample for three elements - Ca, Fe and Sr, as illustrated in fig. 3.

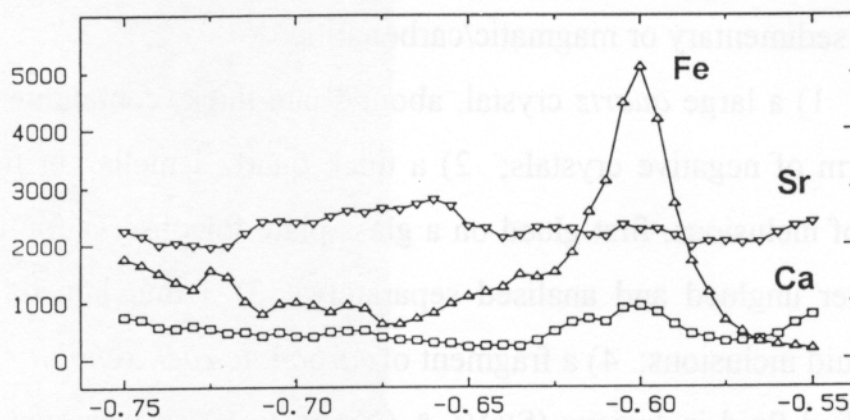


Fig. 3

SILVA, L.C. & CORREIA, M.M. (1979). On the genesis of quartz and fluorite crystals associated to xenoliths of carbonate rocks in basaltic lava flows from Boa Vista Island, Cape Verde. *Communications Portuguese Geological Survey*, **LXIV**, 269-284.