

# Appendix A

## Sample descriptions

**Internal growth, doming and rapid erosion on an ocean island: The Miocene evolution of Maio (Cabo Verde)**

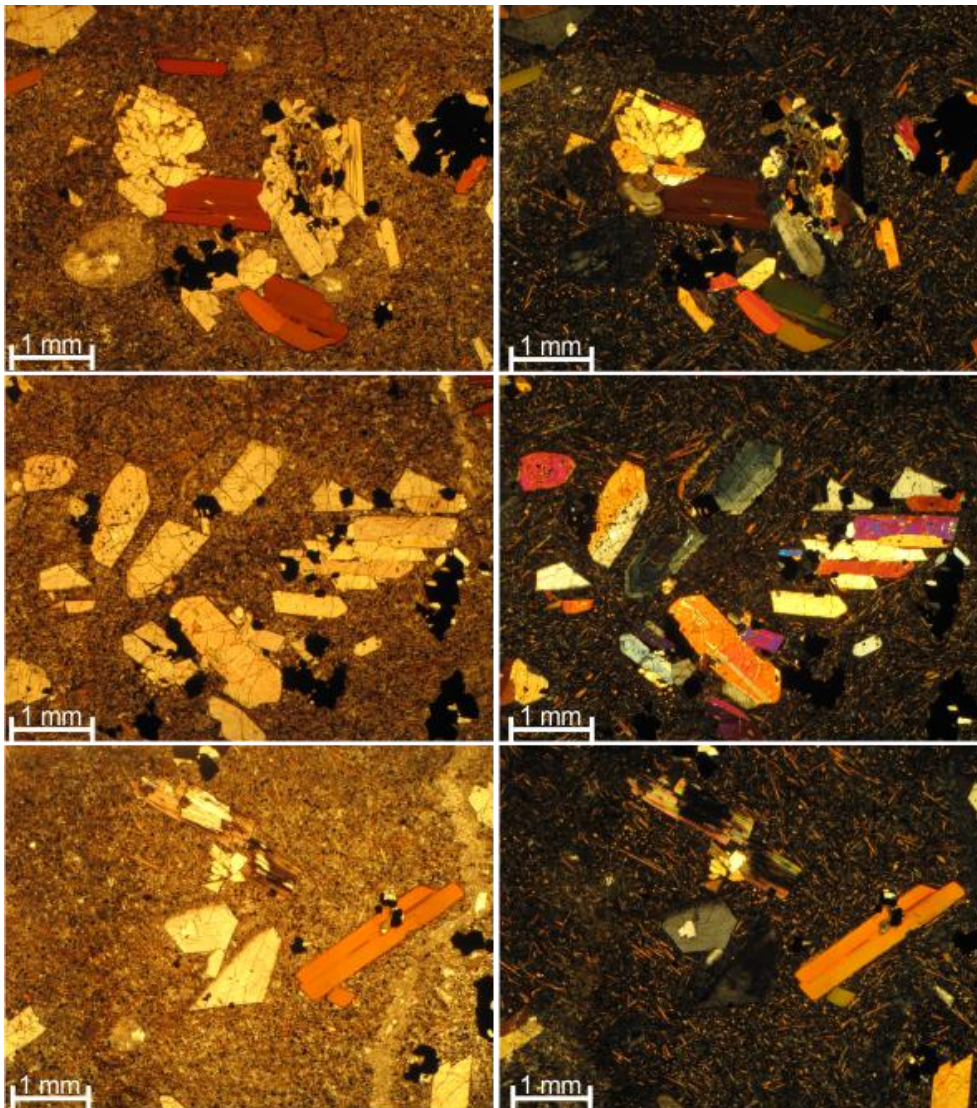
in

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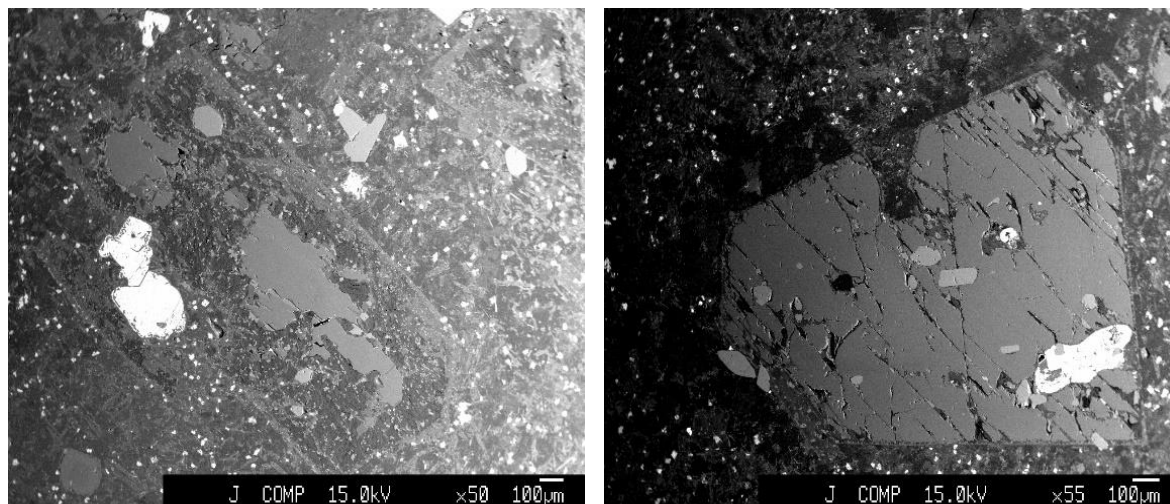
\*corresponding author: lsamrock@geomar.de

**Sample 17-16/3:** Lat/Long: 15.200262, -23.123276

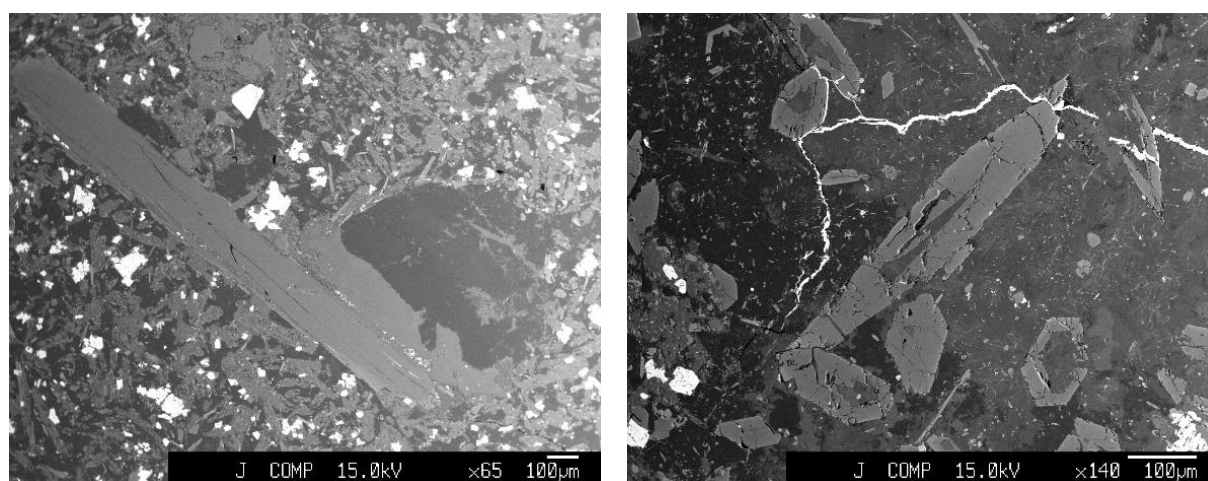


Sample 17-16/3 was collected from a dyke that intruded the Morro Formation limestones on the SW flank of Mte Branco. This nosean-nephelinite sample is fresh and glassy and contains macrocrysts of clinopyroxene, phlogopite and Fe-Ti oxides, and to lesser extents nepheline, nosean and apatite. Crystals make up ~30% of the rock volume and are up to 3 mm in size. Crystals are idiomorphic to hypidiomorphic, and some crystals form glomerocrysts. Clinopyroxenes are optically zoned and contain mineral inclusions (biotite, Fe-Ti oxides and feldspathoids). The glassy groundmass comprises abundant phlogopite microphenocrysts. Veins are unfilled. The images shown above are thin section photographs in plain (left) and crossed (right) polarized light.

**Sample 17-73:** Lat/Long:15.202839, -23.117849



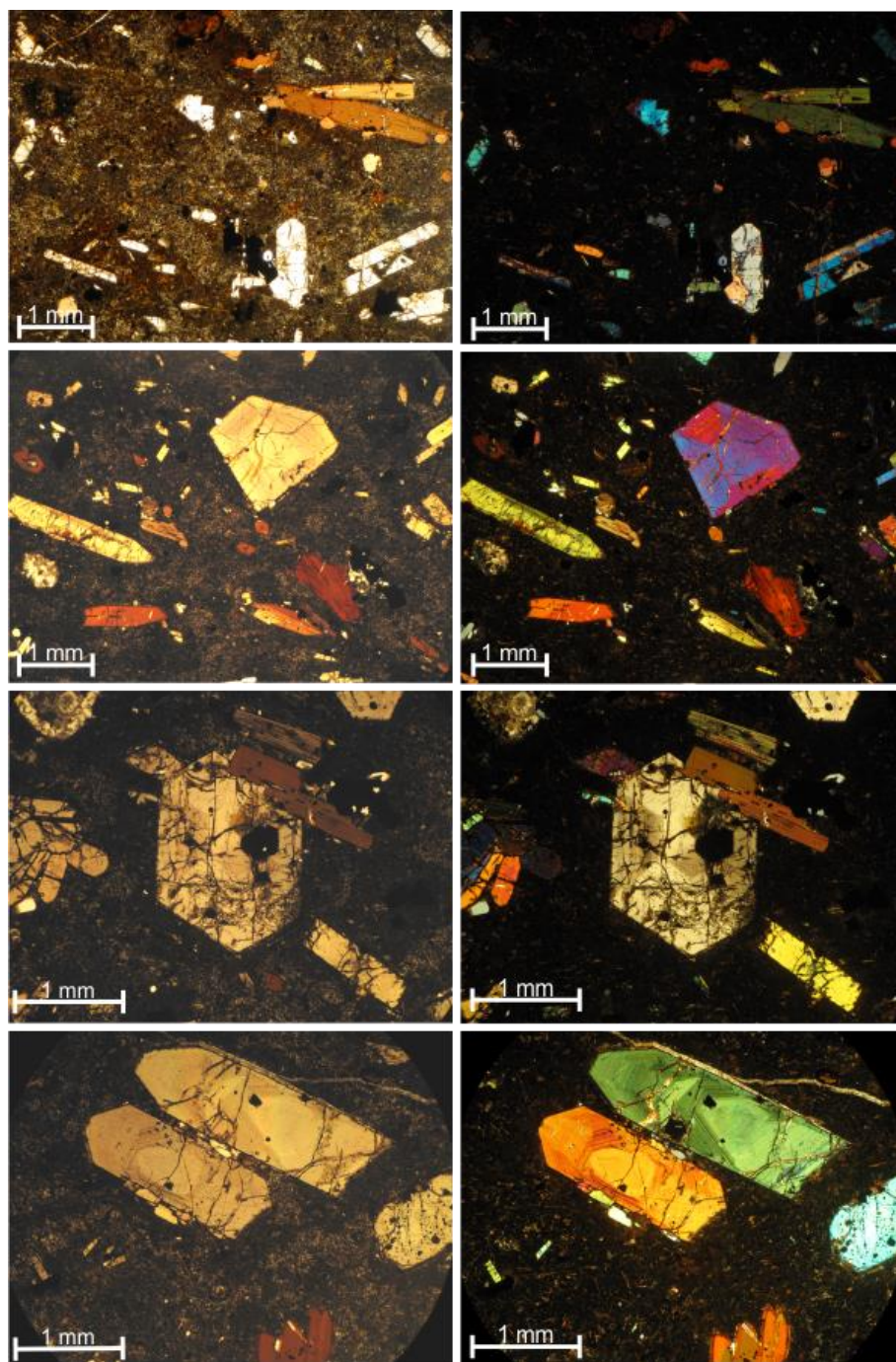
This sample is a nephelinite dyke that intruded the Batalha Formation pillow lavas below the Mte Branco Thrust. The sample is moderately altered, and comprises partly fresh phlogopite and clinopyroxene and lesser amphibole and Fe-Ti oxides as macrocrysts (macrocrysts ca. 7%), and minor nephelinie and titanite. Crystals are up to 2 mm in size, and are idiomorphic to xenomorphic in shape. Clinopyroxenes are mainly replaced by zeolite and chlorite, and form pseudomorphs that only preserve former clinopyroxene cores (see left Secondary Electron Microscope – Backscattered Electron (SEM-BSE) image above). Biotite crystals are often skeletal and contain inclusions (feldspathoids, Fe-Ti oxides, titanite and apatite; see right SEM-BSE image above). The sample further contains several sizeable, rounded and polymineralic glomerocrysts, which comprise minerals optically similar to the macrocryst minerals. Glomerocryst minerals comprise phlogopite, amphibole, clinopyroxene, titanite, Fe-Ti oxides and trace apatite. The groundmass comprises calcium carbonate fillings in vesicles and minor cracks.



**Sample 17-74:** Lat/Long: 15.203719, -23.118145

This sample is a NE-SW striking nephelinite dyke that intrude pillow lavas of the Batalha Formation. The sample is moderately altered, and macrocrysts (about 1% and up to 4 mm in diameter) comprise partly fresh phlogopite and clinopyroxene, some Fe-Ti oxides, and minor nepheline. Former clinopyroxene crystals were replaced by zeolite and calcite pseudomorphs, and only a few remnants of clinopyroxene were found. The comparatively coarse groundmass contains abundant phlogopite and nepheline, and comprises calcium carbonate fillings in vesicles.

Sample 18-32: Lat/Long: 15.224898, -23.134683



This sample is a moderately altered nosean-nephelinite conglomerate clast from the base of Mte Penoso. The main macrocysts (about 10%) are clinopyroxene, phlogopite and Fe-Ti oxides, lesser nepheline, and minor nosean and apatite. The brown microcrystalline groundmass contains abundant phlogopite and Fe-Ti oxides, and comprises calcium-carbonate fillings in vesicles and minor cracks. The groundmass shows signs of alteration in some places. Crystals are idiomorphic to hypidiomorphic and up to 3 mm in size. Phlogopite crystals re up to 2 mm in diameter and dominantly idiomorphic, but some are rounded. Some phlogopites include groundmass minerals and pyrite. Some phlogopites, especially

rounded crystals, are surrounded by reaction rims with groundmass minerals. Clinopyroxenes are optically zoned (e.g., hourglass zoning) and contained mineral inclusions of Fe-Ti oxides. Some show signs of alteration along cracks. Glomerocrysts of clinopyroxene, phlogopite, Fe-Ti oxides and minor apatite also occur. The images above show thin section images in plain (left) and crossed (right) polarized light.