Supplementary 2: ESM\_1. SAMPLES DESCRIPTION

Sample SK09/4b. The xenolith contains numerous completely recrystallized relicts of

clinopyroxene and plagioclase phenocrysts up to 2–3 mm in diameter. For all plagioclase crystals, fingerprint textures are fixed. Small pyroxene crystals are characterized by rounded bay-like boundaries. Phenocryst relics contain rare partially oxidized sulfides. The granoblastic association (up to 500 µm) is composed of pyroxenes, plagioclase, magnetite, sulfides, and apatite. Glass is distributed inhomogeneously - from rare interstices to areas with newly formed minerals are immersed in glass.

Sample SK09/4d. The xenolith contains numerous completely recrystallized relicts of clinopyroxene phenocrysts up to 3–4 mm long and smaller plagioclase with fingerprint structure. Clinopyroxene is encrusted with veinlets of anorthite-amphibole a few microns thick. The rims of the phenocrysts are completely recrystallized. The granoblastic association is unevenly distributed: in the central part of the sample, individual micrograins of plagioclase, magnetite, and apatite are fixed; in the marginal (rim about 1 mm thick) there is a granoblastic pyroxene-plagioclase aggregate (100–200 µm) with numerous Ti-magnetite grains up to 100 µm in diameter.

Sample VK12/17. In the xenolith, there are numerous euhedral amphibole crystals up to 3 mm long, which have been replaced by two-pyroxene-plagioclase-magnetite-ilmenite aggregates, plagioclases of similar size, and magnetite-ilmenite intergrowths. Phenocryst relics contain zircon inclusions. Relatively large (up to 200–300 µm) tabular plagioclase crystals have a sharp reverse zoning. The microgranoblastic association is represented by homogeneous plagioclase, pyroxenes, Ti-magnetite, and apatite. Ti-magnetite forms thin veinlets (up to 10–50 µm).

Sample VK12/21a. The xenolith is completely recrystallized and contains separate pegmatoid zones with crystal size reaches 0.5 mm. Other zones are composed of tabular and wide- prismatic crystals: plagioclase, two pyroxenes, Ti-magnetite, apatite. Plagioclase is often skeletal, with a significant amount of glass in the rock. Sample contain sulfide globules.

Sample VK12/12. The xenolith contains plagioclase relics up to 2 mm in size with fingerprint structure, and numerous prismatic pyroxene crystals up to 200 µm long with rounded outlines. Glass is found in separate interstices. The xenolith contains grains of partially oxidized sulfides, often intergrown with Ti-magnetite. The sample is cut by a Fe-wollastonite-hedenbergite veinlet up to 0.5 mm thick.

Sample VK12/16. The xenolith is similar to VK12/12, but its marginal part also contains several relics of olivine (not found in other samples). Fe-wollastonite-hedenbergite segregations

do not exceed 200–300 µm in diameter.

Sample VK12/22f. The xenolith is similar to VK12/12, but here the orthopyroxene relics

contain single inclusions of biotite, and ilmenite occurs together with Ti-magnetite. Fe- wollastonite-hedenbergite nests also contain titanite and apatite.

Sample VK12/23dThe xenolith contains plagioclase relics up to 2 mm in size with fingerprint structure, and numerous prismatic pyroxene crystals up to 200 µm long with rounded outlines, on which plagioclase and Ti-magnetite from microgranoblastic paragenesis develop. Large grains of magnetite can intergrow with sulfides.

Sample VK18/4b. The xenolith does not contain large relics of magmatic minerals. Separate are preserved, along which plagioclase develops from microgranoblastic paragenesis. The composition of prismatic, with rounded outlines, pyroxene crystals up to 200 µm long is similar to that of newly formed pyroxenes. The microgranoblastic association is composed of clino- and orthopyroxene, anorthite plagioclase, Ti-Mag, and sulfides; glass is also present. The sample is broken up by a network of channels (combined pores) with numerous large (up to 0.5 mm) quartz grains. Rarely, grains of quartz are also found in the microgranoblastic mass, often in intergrown with pyroxenes and plagioclase or in direct contact with glass. Individual grains contain inclusions of clinopyroxene, magnetite, and sulfides. In basaltic andesite at its boundary with xenolith, in a zone about 1 mm thick, the content of SiO2 in glass increases to 73.5 wt %. % and large (up to 0.5 mm) quartz grains appear. At a distance from the xenolith, quartz disappears, and the SiO2 content returns to 68 wt %.

Sample SK2109b. The xenolith contains non-recrystallized phenocrysts of clino- and orthopyroxene, and amphibole with symplectite pyroxene-plagioclase-magnetite rims. Small crystals of pyroxenes have rounded outlines, bay-like boundaries, and are partially recrystallized. The microgranoblastic association is represented by dominant plagioclase, Ti-magnetite, sulfides, and very rare pyroxenes. Relatively large grains of newly formed plagioclase (up to a few hundreds of microns) have a sharp chemical zoning, with An40–60 rims, and anorthite-rich cores up to An90. In the plagioclase rims and in the interstices between the grains, the SiO2 phase is found, which is too tine for quantitative analysis. Glass with a placer of submicron ore mineral are in interstices.

Sample SK2107c. The xenolith contains relics of amphibole surrounded by two-pyroxene rims, and completely recrystallized pyroxene and plagioclase crystals up to 2 mm in diameter. The appearance of the rock is given by a microgranoblastic two-pyroxene-plagioclase-Ti-magnetite- apatite aggregate. The sample is cut by a zone up to 400 µm thick and several mm long; amphibole- pyroxene aggregates are fixed in its central part, and plagioclase is found along the edges.

Sample SK2109c. The xenolith contains elongated pyroxene crystals up to 0.5 mm long,

with rounded outlines and bay-like boundaries. They are partially replaced by minerals of the

microgranoblastic association. The microgranoblastic association is represented by plagioclase

with sharp reverse zoning, two pyroxenes, Ti-magnetite with traces of decomposition, sulfides, and apatite. The sample contains a significant amount of glass, in some areas "stuffed" with ore dust.

Sample SK2109g. The xenolith contains individual relics of small (up to 0.5 mm) orthopyroxene crystals, amphibole-two-pyroxene intergrowths, and plagioclase with fingerprint structure. All these crystals have rounded outlines and bay-like boundaries with surrounding grains. The microgranoblastic association is represented by plagioclase, two pyroxenes, Ti- magnetite, and apatite. There are separate pegmatoid zones with prismatic pyroxene crystals in the glass.

Sample SK2109h. In the central part, the xenolith contains a zone about 1 mm in size, in which relics of biotite, partially replaced by spinel-pyroxene-plagioclase association, and amphibole are preserved. A microgranoblastic aggregates with pegmatoid plagioclase-pyroxene zones are composed the remaining sample. The newly formed minerals are represented by two pyroxenes, plagioclase, Ti-magnetite, and apatite. Interstitial glass appears in the marginal zones, and the minerals acquire weak reverse zoning. At the contact with the host rock, there is a zone about 0.5 mm thick, sharply enriched in magnetite.

Sample SK2109i. The xenolith does not contain relics of igneous minerals. The appearance of the rock is defined by sharply dominant grains of clinopyroxene (500–300 µm, from granular to, rarely, euhedral prismatic), Ti-magnetite, and sulfides; grains of orthopyroxene, tabular plagioclase crystals with fingerprint structure, and accessory apatite are less common. Clinopyroxene grains have weak reverse zoning and often contain melt inclusions whose composition does not correspond to that of interstitial glass. There are single relics of the microgranoblastic 2Px-Mag-Ilm association.

Sample SK2109k (probable protolith are plateau basalts of the basement of the KGV). The xenolith contains large zoned clinopyroxene phenocrysts up to 5–7 mm in diameter, recrystallized along the edge and cracks, and relicts of tabular plagioclase crystals up to 2 mm in size, replaced by a microgranoblastic aggregate of newly formed anorthite plagioclase. The groundmass is completely recrystallized, mainly into a plagioclase-clinopyroxene microgranoblastic aggregate. The sample is inhomogeneous. One part of it contains poikilocrystals of Ti-magnetite. In another part of the thin section, large (up to 100 µm) grains of newly formed Cpx retain single inclusions of grossular-andradite garnet, titanite is present as an accessory mineral, and anhydrite crystals up to 1 mm long are fixed in the pores. Closer to the edge of the xenolith, interstices with glass appear,

and the plagioclase rims acquire weak normal zoning.

Sample SK2109n. The xenolith contains a single zone approximately 1–1.5 mm in

diameter, in which homogeneous plagioclase, magnetite, and pyroxenes occur together with ~100

µm biotite crystals, which, according to (Nachit et al., 2005), are primary igneous. Biotite is overgrown with two pyroxenes along the edge. The rest of the sample contains prismatic orthopyroxene crystals up to 200–300 µm long with bay-like boundaries. The appearance of the rock is given by plagioclase relics, recrystallized into a microgranoblastic plagioclase aggregate, and zones with numerous small orthopyroxene poikilocrysts, granular plagioclase, Ti-magnetite and apatite, as well as glass. There are numerous Ti-magnetite-sulfide and Ti-magnetite-apatite veinlets with a thickness of a few hundreds of microns.

Sample SK2109l. This xenolith looks like SK2109n, but it doesn't contain biotite. It is sharply inhomogeneous and contain a single destroyed diopside-hedenbergite-wollastonite-sulfide segregation ~400 µm in diameter.

Sample SK2109o. The xenolith contains almost entirely recrystallized clino- and orthopyroxene phenocrysts of up to three millimeters in diameter, as well as plagioclase relics of up to one or two millimeters in diameter, which have been replaced by microgranoblastic aggregates. Amphibole relics may also exist. Numerous prismatic pyroxene crystals are present in the sample, with rounded outlines and bay-like boundaries with other minerals. These pyroxenes are partially replaced by the plagioclase from the microgranoblastic association. The microgranoblastic association is composed of dominant plagioclase with sharp normal zoning, two pyroxenes, Ti-magnetite, and accessory apatite. The glass is distributed inhomogeneously: in some parts glass is present in rare interstices, in others the newly formed plagioclase is embedded in glass.

Sample SK2109p. The xenolith contains numerous relics of magmatic minerals (clinopyroxene, plagioclase, Ti-magnetite), which have recrystallized to different degrees. In large clinopyroxene phenocrysts with diameters of up to 7 mm, the central parts remain predominantly unchanged; amphibole-biotite inclusions are fixed in them. The fingerprint structure is fixed for all plagioclase crystals (tens of m - 2 mm). In small crystals of pyroxene, the boundaries have a

baylike pattern. The xenolith contains many submicron grains of Ti-magnetite and apatite.