Impact related and late crystallisation products of Shergotty

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Shergotty is one of the historic (fall in 1865) type meteorites, after which the SNC meteorite group is named. This group is nowadays accepted to be of Martian origin. Shergotty belongs to the basaltic subgroup of SNCs and is predominantly composed of large zoned clinopyroxene crystals intergrown with original plagioclase, which was subsequently converted into maskelynite upon shock compression. The coexistence of fayalite with silica, ilmenite, titano-magnetite and phosphates point to late crystallisation of a highly evolved residual melt fraction that crystallised at relatively high oxygen fugacity. Stöffler *et al*. (1986) concluded all shock features can be produced by a single shock event causing equilibrium shock pressure of 29 ± 1 GPa, whereas local stress and temperatures might have reached 60 – 80 GPa and 1600 – 2000°C resulting in the formation of melt pockets. In our study we investigate fine-grained crystallisation products in order to distinguish whether they are the result of shock metamorphism or a late-stage product of magmatic crystallisation.

Thin sections of Shergotty have been analysed in detail by optical microscopy, scanning electron microscopy and transmission electron microscopy (TEM). In contact to Ti-bearing phases and phosphates, symplectites of fayalite and a SiO_2 polymorph or fayalite and hedenbergite occur with grain sizes ranging typically in the order of a few microns. They are similar to symplectites descibed first by Aramovich *et al*. (2002), who suggested that these symplectites are rather break-down products of former pyroxferroite and ferrosilite than crystallisation products. In interstices between clino-pyroxene and maskelynite we observe several areas composed of a micrometer sized intergrowth of potassium-rich maskelynite, a SiO_2 polymorph, which shows a similar lamellar microstructure than those described by El Goresy *et al*. (2004) as post-stishovite phases, and a residual titanium-rich mafic silicate. TEM analyses indicate that these areas may have originated from shocked quartz-orthoclase symplectites reflecting a very late differentiation product of the magmatic melt.

References

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The floor of the Western Krušné hory/Erzgebirge granite pluton (Czech Republic) as viewed from the gravity data

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We interpreted the shape of the Western Krušné hory/Erzgebirge (KHE) granite pluton in NE-SW section from gravity data. The profile intersects eastern hidden contact and the adjoining Jáchymov-Gera lineament. The granite body can be viewed in Fig. 1 as a harpolith with the mean density of 2620 kg/m^3. The deepest floor of the thick tabular body (aspect ratio 0.71) is 14 km at SW, the thinnest part in the middle at 10 km. Geological interpretation of the Jáchymov-Gera lineament as a possible granite magma path is supported by occurrences of Tertiary mafic volcanics.

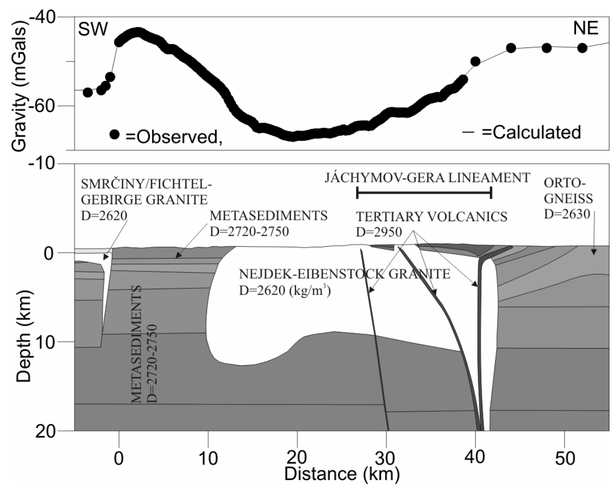

Figure 1: Density section across the Western KHE granite pluton (Nejdek-Eibenstock massif), Czech Republic.

The 2.75-D model of the granite body sufficiently explains the largest negative gravity anomaly in the Bohemian massif comparable with that of the Cornubian batholith of SW England. The pluton was emplaced as a vertical succession of two main granitic intrusive complexes (average 69 and 74 wt % SiO_2 respectively) of which the younger one intruded to the top towards the W and NW along the Jáchymov–Gera lineament.