out that the granites feeding zones were deep which favours the idea of a high structural level emplacement. The dominant paramagnetic behaviour of the Variscan granites reflects the presence of ilmenite as the main iron oxide. This feature points out the reduced conditions in magma genesis in Variscan orogeny.

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Petrophysical characterization of the late-Variscan Santa Eulália Plutonic Complex (Ossa Morena Zone)

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The Santa Eulália Plutonic Complex (SEPC) is a calc-alkaline granitic body that occupies an area of 400 km^2 and is located in the northern part of the Ossa Morena Zone of the Variscan Iberian sector, near the limit of the Central Iberian Zone. SEPC is considered as late-Variscan because it cross-cuts the regional variscan structures. The host rocks of the complex are composed by metamorphic formations from Proterozoic to Lower Paleozoic. The SEPC has two main facies which present different compositions and textures. From the rim to the core, there is a medium- to coarse-grained pinkish granite (G0) involving large masses of mafic to intermediate rocks and a central gray monzonitic granite (G1). The central facies can be divided into a porphyritic facies (G1A) and a central medium-grained facies (G1B). Petrography, mineralogy and whole-rock chemistry reveal clear differences between pinkish facies closer to I-type granites, and central gray facies similar to S-type granites. A preliminary study of the Anisotropy of Magnetic Susceptibility (AMS) was conducted to acquire a petrophysical characterization of these granitoids. This study was based on 50 sampling sites where 8 specimens per station were available. The measurements were made in Porto using a KLY-4S Kappabridge susceptometer (AGICO). A sequence of 3 susceptibility measurements along different orientations of each specimen allowed us to compute the orientation and magnitude of the three main axes $k1 \geq k2 \geq k3$ of the AMS ellipsoid. For each site, the AGICO software enabled us to calculate the mean susceptibility Km and the intensities and orientations of the three axes $K1 \geq K2 \geq K3$, which are its tensorial means. K1, the long axis of the mean ellipsoid, is the magnetic lineation of the site and K3, the short axis, is the normal to the magnetic foliation. P%, the magnetic anisotropy, corresponds to (K1/K3-1)*100 and T, expressed by (2 ln (K2/K3)/ln(K1/K3))-1 is the shape parameter of the AMS ellipsoid. The Km values range between 55.09 and 7343.67 x 10^{-6} SI. Two major groups can be established: facies G0, with Km > 10^{-3} SI which supports the presence of magnetite, and the central facies (G1A, G1B) with Km< 10^{-4} SI. In the central facies the paramagnetic behaviour is due to ferromagnesian minerals, such as biotite, and ilmenite. P% ranges between 2.2 and 18.2% being in mean >5% in facies G0 and <4% in the central facies (G1A, G1B). The high P% in G0 facies may be caused by the fact that the magnetite, which has a high susceptibility, is the bearer of the magnetic signal. Therefore a weak alignment of magnetite grains leads to a higher anisotropy of the rock. Nevertheless, microscope observations show signs of a post-magmatic deformation in G0. T ranges between -0.015 and 0.600 with the strongest oblate AMS ellipsoids in central facies and the slightly oblate in G0. The magnetic foliations are subvertical E-W-striking in G0 and G1A granites and NE-SW-striking with moderated SE dips in G1B. Magnetic lineations are subvertical in G0 and plunge moderated to the SW in G1A and to the South in G1B. These preliminary data support that the facies G0 and the central facies (G1A, G1B) have a distinct magnetic behaviour which may suggest different redox conditions in magma genesis. The magnetic fabric patterns may reflect different emplacement mechanisms.

The extraction of melt in migmatites: information from leucosomes in diatexite and metatexite migmatites from the aureole of the Duluth Igneous Complex

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Metapelitic rocks of the Virginia Formation were partially melted in the contact aureole of the Duluth Igneous Complex (DIC), Minnesota. Contact metamorphism of subgreenschist facies rocks produced Bte + Cord and Cord +Kfs zones in the outer part of the aureole; aluminosilicate is rare because of the early disappearance of Ms. The beginning of melting is indicated by the appearance of small leucosomes and metatexite migmatites but no new minerals, thus melting may have occurred because of the presence of an H_2O fluid. Diatexite migmatites developed in the inner aureole; some have a strong magmatic flow fabric, but many do not. The appearance of orthopyroxene is followed by the disappearance of biotite and then of quartz in some bulk compositions. Orthopyroxene becomes unstable in the highest grade rocks which contained Crd + Pl + Kfs + Liq. Crystallization of the melt in these rocks yields quartz, K-feldspar, biotite and, locally, muscovite. Comparing the sequence of minerals with appropriate pseudosections, indicates that melting started at about 700 ºC and the highest temperature was at least 870 ºC. Comparison of the whole rock compositions of the migmatites with that of lower-grade, non-melted metapelites indicates that the diatexite migmatites have not lost, or gained, significant amounts of anatectic melt. In contrast, the metatexite migmatites have lost melt; the highest proportion of melt extracted (60%) was from enclaves within the DIC. Although the diatexite migmatites have not lost melt, short-range (mm-scale) segregation of the melt occurred widely in them. In some diatexites this occurred repeatedly, and successive segregations were transposed by local flow of the diatexite to produce a finely banded migmatite. Many isotropic diatexites also show evidence for widespread, late-stage segregation of melt into low-aspect ratio, mm-sized patches that contain oikocrysts of quartz and K-feldspar which have inclusions of cordierite and plagioclase around their edges. Segregation of melt in the foliated diatexites also occurred after flow ceased, but these are morphologically different, and form high-aspect ratio microleucosomes (1 to 2 mm wide, 10 to 15 mm long) with oikocrysts of quartz and K-feldspar. These segregations are interpreted to be in pull-apart structures that grew when solidification was advanced and sucked interstitial melt from the adjacent matrix. Melt-depleted metatexite migmatites also contain small leucosomes (1 to 4 mm wide), but these have another type of microstructure. They have a larger grain size than their melt-depleted host rocks and contain large, aligned, tabular crystals of plagioclase, cordierite and orthopyroxene and a much lower proportion of oikiocrystic quartz and K-feldspar.