Fabric Development in a Late-Hercynian Magmatic Shear Zone in Southern Corsica: Indications of Melt-Supported Large-Scale Deformation Localization

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The calc-alkaline granitoids of the Hercynian Corsica Batholith exhibit a large-scale magmatic flow pattern. The steep magmatic foliation is generally N-S in the north, swings towards an E-W orientation in the central part of the Batholith and back again to a ca. N-S orientation in the southern part. This pattern is intensified by large-scale magmatic layering, mainly kilometer long lenses and layers of mafic intrusions into the granitoids. On the meso-scale, magma mingling and mixing are present and reflect the complex intrusion history and the compositional variability of the Corsica Batholith on different scales. Around the Golf of Valinco, a steep, sinistral magmatic shear zone is developed. It is represented by an E-W trending magmatic layering in mingled dioritic, tonalitic, and granitoid magmas (previously misleadingly interpreted as migmatites) and by a magmatic flow foliation marked by the alignment of platy feldspars as well as amphiboles. Characteristic features are multiple thin layering, boudinage, monoclinic folding, and melt-injected micro shear zones. The intensity of alignment roughly correlates with the thickness of layers. It is weak in thick and short boudins and strong in cm-thin and cm-m long layers. The monoclinic folds refold the magmatic layering but, locally, show alignment of the flat faces of amphiboles to the axial plane of the folds. Feldspars are locally recrystallized to few up to 1 mm large polygonal grains and quartz frequently shows chessboard subgrain patterns. No further indications of solid-state deformation are present. Field observations as well as pattern quantification on variably oriented rock surfaces indicate variations of crystal alignment and fabric anisotropy in cm- to more than 100m-wide bands parallel to the E-W oriented layering. These variations are interpreted as variations of flow intensity. The observations on the macro- as well as micro-scale point to multiple injection of felsic to mafic magma and its crystallization during a regional stress field. The resulting km-scale sinistral strike-slip synmagmatic shear zone reflects large-scale movements during late-Hercynian reorganization of continental crust and represents an excellent example of localization of deformation into magma-enriched parts of the continental crust.

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