Flow of felsic lower/midle crust in a continental accretionnary wedge: a microstructural, textural, and petrological study

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Flow of felsic rocks in Paleozoic continental accretionnary wedge in the eastern margin of the Bohemian Massif offers a possibility to examine in details rheology of granite protoliths deformed at eclogites and granulite facies conditions. Combined structural, petrological and microstructural studies of porphyritic orthogneisses reveal three major deformation events that affect the polyphase deformed rocks as a function of their position in the wedge structure and variations of thermal regime across orogen. The first event $D1_e$ is related to sub-horizontal influx of material into deep corner of the wedge (20kbar ~ 60km depth) leading to the development of a layered crustal fabric. The second episode of deformation D2 is contemporaneous with major process of exhumation and important reworking of early fabrics in two adjacent huge crustale scale steep cusp-like antiforms. These structures are associated with exhumation of eclogites ($D2_e$) and HP granulites ($D2_g$) respectively. The evolution from low strain domain (augen gneiss) to high strain domain (mylonite/migmatite) of each deformation episode have been studies using petrology and quantitative microstructural analysis (EBSD & PolyLX). The increasing strain is associated with a progressive mixing of all phases, with growing of intersiticial phases in aggragates (i.e. pure albite) in particular in $D2_g$ fabric where syn-deformational heterogeneous nucleation, grain boundary migration and grain grow are intense. Theses textures reflect presence of silicate melt during deformation. The **$D1_e$** fabric shows activity of *basal <a> + rhomb <a+c>* active slip system in quartz at low strains and lack of crystalline plasticity at high strains due to activity of fluid enhanced diffusion creep. K-feldspar shows only weak activity of *(010)* & *(100)[001]* slip system whereas no crystal plasticity is revealed by entirely recrystallized plagioclase. These textures, associated whith presence of small and dispersed garnet with high Ca content ($Grs_{44.8}Alm_{51.4}Sps_{2.0}Prp_{1.8}$) and high Si content (until 3.4 a.p.f.u) of phengite suggesting HP conditions of gneiss deformation surrounding eclogites bodies. **$D2_e$** fabrics shows an increase of quartz crystalline plasticity, and activation of classical slip systems in both feldspar at low and high strains. Lack of garnet and more dispersed and lower Si content in phengite are compatible with deformation at a lower pressure conditions during exhumation stage of eclogites. Closer to the buttress, **$D2_g$** fabrics shows evolution from *prism <a>* & *<c>* to *prism <c>* active slip systems in quartz, and progressive evolution from feldspar crystal plastic deformation of both feldspar marked by exceptionally intense activity of *(100)[001]* slip system to diffuse textures characteristic for diffusion creep and grain boundary sliding dominated flow. Theses textures correlate with growth of Fe rich atol garnet ($Grs_{10.0}Alm_{70.1}Sps_{17.2}Prp_{2.7}$) indicating high temperature deformation processes at presence of silicate melt close to granulitic facies. We discuss significance of two contrasting thermal gradients in continental accretionary wedges with respect to current models of continental tectonics.