



HAL
open science

Mechanical and microstructural effect of partial melting of continental crust

Julien Fauconnier, Claudio Rosenberg, Loïc Labrousse, Holger Stünitz,
Laurent Jolivet

► **To cite this version:**

Julien Fauconnier, Claudio Rosenberg, Loïc Labrousse, Holger Stünitz, Laurent Jolivet. Mechanical and microstructural effect of partial melting of continental crust. 19th EGU General Assembly, 2017, Vienne, Austria. pp.14929. hal-03552749

HAL Id: hal-03552749

<https://hal.science/hal-03552749v1>

Submitted on 3 Feb 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

Mechanical and microstructural effect of partial melting of continental crust

Julien Fauconnier (1), Claudio Rosenberg (2), Loïc Labrousse (2), Holger Stüinitz (3), and Laurent Jolivet (4)
(1) ENS, Paris, France, (2) UPMC, Paris, France, (3) University of Tromsø, Norway, (4) ISTO, Orléans, France

We present a set of experiments done in order to investigate the effect of melt on the strength and the microstructures of crustal rocks. Experiments were conducted in a Griggs-type apparatus with a mixture of 90 vol. % quartz and 10 vol. % biotite at 1 GPa confining pressure and a temperature between 700 and 900 °C. In some experiments, 5 vol. % or 10 vol. % of haplogranitic glass (HPG) powder was added to generate melt in the sample. Above the glass temperature transition (GTT), which occurs at 780 °C, HPG viscosity is 4 orders of magnitude lower than that of quartz and thus the sample strength and microstructures should be similar to those of partially molten sample. We performed a comparative study, in which samples were deformed without melt and without HPG, with HPG, but below the GTT, with HPG above the GTT, and finally with melt generated from biotite breakdown reactions. Samples with HPG above GTT and melt from biotite breakdown have the same microstructures and strength. Our data show that melt has two major consequences on the deformation of quartz-biotite aggregates : (1) while deformation is localized through a network of shear bands in experiments without melt and quartz is deformed by dislocation creep, there is no localization of the deformation with HPG or melt and the sample deformed by melt enhanced grain boundary sliding (2) melt reduces the strength of the sample but this weakening is lower than previously suggested if the long term resistance of the samples ($\gamma > 2.5$) instead of peak resistance is taken into account.