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Microstructure in Eclogite; Omphacite Deformation and Mimetic Lattice Preferred Orientation in Retrograde Phases

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Eclogites are formed in subduction and collision zones so in order to understand their dynamics the deformation of these rocks must be understood. Omphacite is the main framework phase in eclogites and accommodates the bulk of strain inflicted upon the rock via various deformation processes. Understanding the mechanisms controlling these processes is essential to understanding high pressure environments. Eclogites from the Zermatt-Saas, and the Sesia-Lanzo, reveal contrasting omphacite morphologies including different subgrain microstructures. The use of EBSD provides an effective way to explore these differences and responsible mechanisms. Sesia-Lanzo omphacite occurs as large grains with elongate, rod like subgrains. Zermatt-Saas omphacite is smaller and irregular in shape, with subgrains displaying no regular form. Compared, they display differing misorientation axes patterns, with those of the Sesia clustered around <001> and the Zermatt-Saas displaying variable maxima. It is possible to suggest dislocation populations based on assumptions such as; subgrain walls are composed of stacked, edge dislocations. Exhumation of eclogites is accompanied by retrogression of high pressure assemblages to lower grade ones. In the Zermatt-Saas, eclogite facies has been partially replaced by amphibolites facies phases. Both omphacite and retrograde minerals have an LPO. An important factor to consider is that retrograde fabrics may be inherited from the pre-existing fabrics. This is investigated using heterophase misorientation, determined by measuring the misorientation of crystal lattice components across two different phases in contact with one another. In the Zermatt-Saas retrograde hornblende bears a similar LPO to that of omphacite. Heterophase misorientation between these two minerals shows a low frequency of low

angle misorientations, suggesting hornblende is not mimetic on omphacite in this case.