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The Transformation History of the Tso Morari dome, Ladakh

Anna Bidgood (1), Dave Waters (1), Mike Searle (1), Nick Roberts (2), and Talat Ahmad (3)

(1) Oxford University, Department of Earth Sciences, United Kingdom (anna.bidgood@univ.ox.ac.uk), (2) NERC Isotope Geoscience Lab, British Geological Survey, (3) Jamia Millia Islamia, New Delhi

The Tso Morari dome in Ladakh, Himalaya consists of continental material that has been subducted to pressures of around 27 kbar. The dominant felsic gneisses (Puga Gneiss) contain boudins of metabasic eclogite, in which coesite has been found as inclusions in garnet rims1. The Puga Gneiss and associated metasediments in the Tso Morari dome preserve Barrovian metamorphism2. However, we report earlier eclogite facies metamorphism in undeformed granite in the centre of the dome, in the form of garnet coronas around igneous biotites, similar to those observed in the Sesia zone of the Alps3.

Garnet-bearing Puga Gneiss shows prograde compositional zoning in garnets, which culminate in pyrope-rich rims, and whose overall pattern is remarkably similar to that observed in garnets of the mafic eclogites, suggesting that both felsic and mafic rocks record the same prograde metamorphic history. Therefore, the Puga Gneiss provides additional insight, using a different bulk composition, into the subduction history of the Tso Morari dome.

Preliminary petrological observations and thermodynamic modelling give insights into the fluid conditions during continental subduction. Fluid interaction can catalyse metamorphic reactions at different stages, and alter the bulk composition and strength of the crust. The recorded P-T conditions may reflect fluid-promoted reactions and/or deformation episodes, rather than a simple prograde to peak evolution.

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