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# Crystal mush flow in a small concentrically expanded pluton (Castle Crags pluton; Klamath Mountains, CA, USA)

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By means of an example of small concentrically-zoned Castle Crags pluton in the Klamath Mountains (USA), we decipher origin of granite rock fabrics, emplacement mode, and evolution of internal architecture of the pluton, which have been mostly in the crystal mush state during fabric development and solidification. Through the detailed microstructural and magnetic study we discuss the pluton fabric formation and emplacement. The study combines the field-based structural measurements, anisotropy of magnetic susceptibility analyses, and rock magnetic properties with detailed quantitative and qualitative microstructural analysis.
The pluton structure with the marginal strain gradient is interpreted as a result of compaction, melt segregation and cumulate formation in the granodiorite caused by the intrusion of the throndhjemite magma to the core of the already emplaced granodiorite. The lateral flow of the magma from the central region formed lobe, the existence of which aphiliates the Castle Crags pluton to concentrically expanded plutons, which grew in at least two increments.
The AMS results put forward the presence of anomalously high intensive magnetic fabric, (high P values, P > 1.2) and evolution of the T parameter through the pluton. We interpret the high P values as a result of variable microstructural position and crystal plastic deformation of a part of the magnetite crystals due to magma flow in submagmatic state. The AMS ellipsoid shape evolution is explained by fabric intensification in earlier magma pulses due to the intrusion of the throndhjemite magma to the core of the evolving pluton.