CRYS...A. METEORITE: IMPLICATIONS FOR
CONDITIONS AT CRYSTALLIZATION L. V. Forman¹, G. K. Benedix², K. J. Orr¹, and L. Daly¹,². ¹Space
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no apparent alignment in the long crystallographic axis of the plagioclase laths (<001>) indicating the alignment of <010> was not generated by flow, which typically results in a lineation of the longest axis of the grains [e.g. 7]. The weak alignment of <010> in the large plagioclase laths is, however, consistent with a compressive or settling texture. <010> is the shortest axis of the plagioclase grains, therefore the grains are stacked perpendicular to the shortest axis, which is likely parallel to the line of the compressive force, for example gravity or impact [e.g. 5]. The low abundance of maskelynite observed within NWA 8159 [1, 4] and size of the aligned laths imply that impact is unlikely to be the driver of this alignment. NWA 8159 remains relatively unshocked compared to other shergottites [1, 4] and impact events rarely align such large grains, particularly in crystalline rocks. We therefore consider this alignment to be the result of gravity-induced settling.

The cumulate texture of the plagioclase phenocrysts 3600is consistent with final crystallization in a shallow or short sill (potentially with interrupted flow to account for the lack of a lineation), or in a shallow lava pool. In both of these proposed scenarios, the finer-grained groundmass would crystallize quickly, but the large phenocrysts- that had likely formed earlier- would be able to settle under gravity. These suggestions are also loosely in agreement with previous studies, where the grain size of the groundmass of NWA 8159 was used to infer a surface lava flow or shallow sill origin [1].

Conclusions and future work: Future work will include analysis targeting the fine-grained groundmass. Although there is a weak alignment, it’s possible the large phenocrysts examined here may be too large to be re-oriented by flow. Examination of the finer groundmass will enable a direct comparison with the textures presented here, and an evaluation of any size-dependent alignments. Collectively, this will help us to better understand the final-stage crystallization environment of NWA 8159.