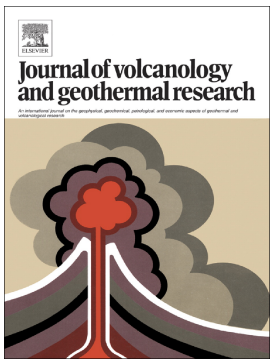

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Igneous rocks formed by hypervelocity impact

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ABSTRACT

Igneous rocks are the primary building blocks of planetary crusts. Most igneous rocks originate via decompression melting and/or wet melting of protolith lithologies within planetary interiors and their classification and compositional, petrographic, and textural characteristics, are well-studied. As our exploration of the Solar System continues, so too does the inventory of intrusive and extrusive igneous rocks, settings, and processes. The results of planetary exploration have also clearly demonstrated that impact cratering is a ubiquitous geological process that has affected, and will continue to affect, all planetary objects with a solid surface, whether that be rock or ice. It is now recognized that the production of igneous rocks is a fundamental outcome of hypervelocity impact. The goal of this review is to provide an up-to-date synthesis of our knowledge and understanding of igneous rocks formed by hypervelocity impact. Following a brief overview of the basics of the impact process, we describe how and why melts are generated during impact events and how impact melting differs from endogenic igneous processes. While the process may differ, we show that the products of hypervelocity impact can share close similarities with volcanic and shallow intrusive igneous rocks of endogenic origin. Such impact

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