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GPR-DERIVED CHARACTERIZATION OF PYROCLASTIC FLOWS DEPOSITS, LASCAR VOLCANO, CHILE

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ABSTRACT

We draw evidence from the 1993 pyroclastic flow deposits at lascar volcano, Chile, for composite pyroclastic deposit fans having been emplaced by granular flows that exhibited inertial instabilities on their flow surfaces. The instabilities played an integral role in flow emplacement, generating unsteadiness and the development of successive waves, which in the final stages of runout, emplaced discrete onlapping units now identifiable within the deposit lobes. Visualization of these features is aided by the unique perspective provided by ground-penetrating radar (GPR), a tool that we believe has remarkable potential in unraveling transport processes of geophysical mass flows. Surface wave instabilities are already known from other types of natural and experimental granular flows, and on a theoretical basis are anticipated within the context of volcanic granular avalanches. Their existence is relevant to a series of on-going debates including the significance of flow units, interpretation of source-versus flow-derived current unsteadiness, and the nature of density profiles through pyroclastic density currents. This work will use the convincing evidence from Lascar to 1) present a case for considering the role surface wave instabilities may have played during deposition at other sites, and 2) strongly advocate using geophysical tools, such as GPR, for advancing our understanding of deposit-wide as well as detailed field relationships.