The Geological and Cultural Significance of Impact Melt Nodules from Lake Mistastin in Northern Labrador

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Background

After a meteorite collides with the ground, intense shock waves and extremely high temperatures are produced, resulting in the melting of the target rock. Lake Mistasin in Northern Labrador is a meteorite impact site and a significant location for the native Innu. Before the impact, the rocks at this location were anorthosites and granodiorites. The impact melt from this site is an obsidian-like, black, shiny material, which looks very similar to the lithic raw material that have been found in several parts of North America. Our goal is to characterize the impact melt in order to determine if recovered stone tools originate from the Mistastin region. The ability to determine an artifact’s origin can provide valuable insight into cultural exchange and trading practices.

Methodology

- Among multiple specimens, we chose two for analysis.
- Cut each rock in half, then cut a 30 micron thin section from each sample. The remainder of the rock was polished to make a thick section.
- Used a FEI Nova NanoSEM 600 (with <5% deadtime and a 15 KV electron beam) to take backscattered electron images (BSE) and perform energy dispersive spectroscopy (EDS) elemental analysis.
- Used Noran System Six software to process the images and data.

Discussion/Implications

For over 8000 years, Innu living in Labrador used a variety of different stones from which they shaped the tools necessary for their survival. The discovery, identification and interpretation of the impact melt from Lake Mistasin sheds new light on the on the events of a meteorite impact ~38 million years ago and documents a unique lithic raw material that was sought by Innu ancestors to fashion the tools they needed for survival.

By "fingerprinting" the Mistasin impact melt it will be possible to distinguish it from other look alike raw materials (especially obsidians from the western U.S.) and contribute to a better understanding of the ancient systems of trade/interaction that linked ancient peoples across North America. Knowing the origin of the stone that was used to make tools provides clues to former settlement as well as economic and exchange systems.

References: