



The University of Texas at San Antonio™

DATE:
Thursday,
October 28, 2021

TIME:
3:00-4:00pm CDT

LOCATION:
BSE 2.102



NASA MIRO CAMEE

CENTER FOR ADVANCED MEASUREMENTS IN EXTREME ENVIRONMENTS

PRESENTS:

Dr. Alan Whittington, Professor in the Department of Earth and Planetary Sciences at the University of Texas at San Antonio. Dr. Whittington is also a CAMEE Co-PI.

Title: *Calorimetry for Extreme Environments: Spontaneous Reheating of Lava and Other Case Studies*

Abstract:

Calorimetry is the measurement of heat content. This takes two forms: heat capacity is the amount of “sensible” heat energy required to heat an object. In addition, phase transformations such as melting or boiling require hidden or “latent” heat to be supplied, even as the temperature of the system remains constant. Here I discuss two case studies of the use of calorimetry.

Case 1: We show that recalescence, or spontaneous reheating of a cooling material due to rapid release of latent heat, can occur during disequilibrium crystallization of lava [1]. This can only happen at fast cooling rates, where the melt becomes undercooled by tens to hundreds of degrees before crystallization begins. Recalescence may be a widespread process in the solar system, particularly in lava fountains on Jupiter’s moon Io.

Case 2: In order to optimize production of construction materials from lunar regolith, we conducted heating experiments on a series of lunar simulants. The total energy required to achieve melting is systematically lower for glassier starting materials. The tendency for finer grained lunar regolith to also be glassier raises the possibility that physical sorting by size can also sort for composition and crystallinity, facilitating brick production in locations where the bulk regolith is less suitable.

[1] Alan Whittington & Alex Sehlke; Spontaneous reheating of crystallizing lava. *Geology* 2021; <https://doi.org/10.1130.G49148.1>

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