

IS “FRICTIONAL PSEUDOTACHYLITE” AN OXYMORON? PSEUDOTACHYLITE FROM THE MANICOUAGAN IMPACT STRUCTURE REVEALS THE TERM’S PROPER MEANING.

M. B. Biren¹ and J. G. Spray², ¹School of Earth and Space Exploration, Arizona State University, Tempe, Arizona 85287, USA (mbiren@asu.edu), ²Planetary and Space Science Centre, University of New Brunswick, Fredericton, NB E3B 5A3, Canada.

Introduction: *Bona fide* pseudotachylites are melt rocks created by frictional heating along slip planes [1; 2] (Fig. 1). Pseudotachylites are well understood from studies in seismogenic fault systems [3], but they have also been documented at terrestrial impact structures including Vredefort, Sudbury, and Manicouagan [2; 4]. Use of the term pseudotachylite has been problematic since Shand first introduced it in 1916 to describe rocks observed at the Vredefort impact Structure [1]. The term was meant to reduce confusion (i.e., tachylite = glassy basalt), but after a century its use remains inconsistent, with some applying it descriptively and others referring to the rock’s mode of formation.

Proper identification of pseudotachylite requires microscopic examination to confirm the presence of a vein’s once molten matrix (whether now preserved as glass or micro-igneous texture). Moreover, geochemical evidence can demonstrate the relationship between the melt vein and the host rock to rule out fractures intruded by shock-generated (impact) melt [4] (Fig. 2). This study presents field, microtextural and geochemical evidence from the Manicouagan impact structure to illustrate the challenges in identifying pseudotachylite and to argue why the term pseudotachylite should only be applied to melt-bearing rocks generated via frictional melting [4].

References: [1] Reimold W. U. (1995) *Earth Science Reviews* 39:247-265. [2] Spray J. G. (2010) *Annual Review of Earth and Planetary Sciences* 38:221-254. [3] Sibson R. H. (1975) *Geophysics Journal of the Royal Astronomical Society* 43:775–94. [4] Spray J. G. and Biren M. B. (2021) *Geological Society of America Special Paper* 550:147–70.

