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69-10 - REVISITING EXCEPTIONALLY PRESERVED S-FORMS, STRIAE, AND FRACTURES FROM LATE PALEOZOIC SUBGLACIAL SURFACES IN PALEOFJORDS, NW NAMIBIA

Monday, 10 October 2022

10:35 AM - 10:50 AM

Colorado Convention Center - Mile High Ballroom 4D

Abstract

Determining the ice dynamics of deep-time glaciations is limited by the scarcity of well-preserved subglacial erosional features and their irregular distribution. In particular, small-scale erosional features known as s-forms that are subglacially sculpted in bedrock by water and/or ice are rarely preserved from the pre-Cenozoic record. A detailed re-examination of two late Paleozoic (late Carboniferous – early Permian) glacially-polished, surfaces within paleofjords located in the Kaokoveld region of NW Namibia reveals a diverse range of erosional features that includes: complex, multi-directional striae that crosscut each other and ornament s-forms, crescentic markings, chattermark trails, rat tails, Nye channels, linear and sinuous furrows, transverse troughs, comma forms, sichelwannen, muschelbrüche, cavettos, and a pothole. The first study location consists of s-forms, striae, and fractures on a polished granite bedrock surface located on the paleovalley floor. Striae, crescentic markings, and chattermark trails indicate ice movement to the NW (mean azimuth of ~280°). The second location is located on a multi-storied, resistant, quartzite bedrock ridge or sill close to or on the valley wall. This location contains numerous s-forms, Nye channels, striae, rat-tails, and fractures, as well as onlapping glaciogenic sediments and diamictite that has been plastered within a pothole. Some of these features are superimposed on a whaleback. These erosional features were likely formed by a combination of pressurized subglacial meltwater and glacial abrasion underneath a glacier as it flowed over and around a resistant bedrock escarpment. Orientations of striae and chattermark trails indicate a primary direction of ice movement to the NW (modal azimuth of ~275°), a very minor secondary movement to the SW (~220°), and abundant third-order striae indicating ice flow around bedrock obstacles. The complex relationships between striae, fractures, and s-forms at this location suggests that a combination of pressure melting, abundant subglacial meltwater, debris-rich basal ice, and variable ice flow paths around resistant obstacles was required to form these features. These combined results imply the study locations were overridden by relatively thick (>210 m) warm-based to polythermal glaciers that were confined to a network of fjords as ice receded and stagnated. The glaciers flowed northwest into present-day Brazil during the late Paleozoic and may have overtopped the paleovalley walls during times of ice maxima.

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Author

F

Nicholas Fedorchuk
Southern Connecticut State University

Authors

I

John Isbell
University of Wisconsin - Milwaukee

M

Eduardo Menozzo da Rosa
University of Wisconsin-Milwaukee

S

Roger Swart

M

Natalie Mcnall
University of Wisconsin - Milwaukee

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