

Northeastern Section - 44th Annual Meeting (22–24 March 2009)

Paper No. 9-7

Presentation Time: 8:00 AM-12:00 PM

RELATIONSHIP BETWEEN EXFOLIATION DOME GEOMETRY AND TOPOGRAPHY ON CADILLAC MOUNTAIN, MOUNT DESERT ISLAND, MAINE

[VOLLMER, Frederick W.](#), Geology, SUNY New Paltz, New Paltz, NY 12561, vollmerf@newpaltz.edu

Exfoliation joints are generally associated with topographic domes, and there appears to be a direct mechanical relationship between topography and exfoliation joint formation. One question that has been raised is what is the age of the topography that the joints are related to, for example, present day topography or pre-glacial topography. Exfoliation joints exposed on Cadillac Mountain, and adjacent Pemetic and Dorr Mountains on Mount Desert Island provide an excellent data set to test these alternate hypotheses. The three adjacent mountains lie within the homogeneous Silurian Cadillac Mountain granite. This is also of interest for risk assessment associated with rock slides and falls initiated on the sloping joint surfaces, in 2006 earthquake damage closed several trails in the park. Measurements of joint orientations were taken across the area, with UTM coordinates recorded using a GPS unit. The absence of mineral infillings suggest the joints form in response to near-surface tensile stresses. A grid of orientation matrixes was calculated from the orientation data, and a dip line field was determined from the grid. The surface normals were used to create a pseudo-shaded relief map using standard illumination angles (45-315) and bilinear interpolation of the calculated light intensities. The dip line field was then overlain on a smoothed DEM model. The results show that there is a single elongate exfoliation dome over the three mountains. This supports the hypothesis that the exfoliation dome reflects pre-glacial topography. However, an additional hypothesis yet to be tested is that the principal topographic curvatures (second surface derivatives) may create principal tensile stresses steeper than local surface normals.

[Northeastern Section - 44th Annual Meeting \(22–24 March 2009\)](#)

[General Information for this Meeting](#)

Session No. 9--Booth# 22

[Structural Geology and Tectonics \(Posters\)](#)

Holiday Inn By the Bay: Casco Bay Hall

8:00 AM-12:00 PM, Sunday, 22 March 2009

Geological Society of America Abstracts with Programs, Vol. 41, No. 3, p. 14

© Copyright 2009 The Geological Society of America (GSA), all rights reserved. Permission is hereby granted to the author(s) of this abstract to reproduce and distribute it freely, for noncommercial purposes. Permission is hereby granted to any individual scientist to download a single copy of this electronic file and reproduce up to 20 paper copies for noncommercial purposes advancing science and education, including classroom use, providing all reproductions include the complete content shown here, including the author information. All other forms of reproduction and/or transmittal are prohibited without written permission from GSA Copyright Permissions.
