Statistical Analysis of Glacial Boulders Limits Past Shaking Since the Last Ice Age

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Harriman State Park reveals a tapestry woven by the enduring forces that have formed the landscapes of our planet over eras within the span of the Hudson Valley. Exploring the interaction between prehistoric glaciers and seismic activity, can reveal a geological mystery that spans over millennia. Boulders from glaciers are among the park's distinctive geological features and serve as sentinels for the planet's evolutionary processes. The placement of these glacial boulders, which were left behind by the Ice Sheet by 15,000 years ago, reveals an intriguing puzzle and suggests that seismic activity continued to have an impact even after the glaciers had retreated. Thus, there is a fascinating possibility that the under-representation of glacier boulders on steeper slopes is due to earthquake shaking near a fault. This paper offers insights into the seismic history of Harriman State Park's geology as well as the relationship between geological dynamics and boulders from glaciers. Theoretical simulations were run in Python to investigate the potential seismic influences on boulder distribution. These simulations create histograms of boulder slopes that shed light on the interaction between slope angles and the representation of glacier boulders on a hilltop. The research methods used a variety of approaches to solve the geological enigma. Such as a specific tool, that made it easier to calculate the slope measurements for the boulders and the use of digital elevation models (DEMs). As a result, it was crucial in the production of histograms and a scatter plot, which reveals the patterns in boulder distribution and slope dynamics. These potential findings can suggest the influence of ground shaking on the distribution of glacier boulders within the park. The intriguing interplay between ground shaking, a seismic activity, and the amount required to prompt boulder movement, may explain boulder displacement on steeper slopes. Investigating such phenomena, can give us a definite answer whether or not a significant geological event took place at Harriman State park since the end of the last Ice Age.