

Application of repeated impacts method of the Schmidt hammer test to coastal cliff surface at Shimane, Japan: evaluation of the degree of weathering

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The processes by which two types of cliff surface develop have been discussed in order to shed light on the mechanism of rockfalls on the Isotake coast of Shimane, Japan. We found that the cause, which differentiates the two types of surface topography, is salt weathering due to the precipitation of calcareous sinter, leading to the development of tafoni formed by small-scale fragmentation of cliff materials. The weathered surface is frequently removed by salt weathering in the tafoni, keeping the surface fresher. This is reflected in the results of the Schmidt hammer rebound test, which clearly distinguish two types of weathered surfaces, with higher rebound values at the surface of the tafoni than at the surface of cliffs without tafoni. Continuous fragmentation of the pyroclastic rock due to the salt weathering by calcareous sinter causes the recession of the coastal cliff, but this fragmentation also keeps the cliff surface relatively intact, preventing rockfall disasters. The analysis of the results of the Schmidt hammer test in this study can be applied to any kind of rock surface, because the condition of the weathered surface was extremely fragile. Data from different kinds of rock with differing degrees of weathering will improve this method and future estimates of the characteristics of weathering determined via the Schmidt hammer test.

Keywords: Schmidt hammer test, tafoni, rockfall, salt weathering