Rock Coatings

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Research output: Chapter in Book/Report/Conference proceeding › Chapter

11 Citations

Abstract

Fourteen different types of coatings cover rock surfaces in every terrestrial weathering environment, altering the appearance of the underlying landform. Some accretions interdigitate, whereas others blend together, creating a great number of variations. Rock coatings are important in geomorphology because coatings: alter weathering rates; play a role in case-hardening surfaces; offer clues to understanding environmental change; and can provide chronometric insight into the exposure of the underlying rock surface. Following a landscape geochemistry paradigm, five general hierarchies of control explain the occurrence of different types of rock coatings: first order - geomorphic processes control the stability of bedrock surfaces on which coatings form; second order - coatings originating in rock fissures occur on subaerial surfaces when erosion of the overlying rock occurs; third order - the habitability of surfaces for fast-growing lithobionts such as lichens determines whether slowly accreting coatings occur; fourth order - the raw ingredients must have a transport pathway to the rock surface, and of course, they must be present; fifth order - physical, geochemical, or biological barriers to transport then result in the accretion of the coating.

Fingerprint

Keywords

ASJC Scopus subject areas
Rock coatings observed on the surface of Mars since the Viking landers of the mid-1970s continue to generate considerable interest in the field of astrobiology. Terrestrial rock coatings are associated with diverse microbial life, raising the question as to whether martian rock coatings might also be partly of biogenic origin. Rock coating formation can be mediated by microbes, which in turn are shielded from harmful radiation and can obtain nutrients from the coating. Fourteen different types of coatings cover rock surfaces in every terrestrial weathering environment, altering the appearance of the underlying landform. Some accretions interdigitate, whereas others blend together, creating a great number of variations. Rock coatings are important in geomorphology because coatings: alter weathering rates; play a role in case-hardening surfaces; offer clues to understanding environmental change; and can provide chronometric insight into the exposure of the underlying rock surface.