

Evolution of tafoni due to salt weathering and rock fall

Shuichiro Yokota[1], Ken-ichi Nishiyama[2], Kazuya Takehara[3]

[1] Geoscience, Shimane Univ., [2] Disaster Prevention Res. Insti., Kyoto Univ., [3] Dep. Geoscience, Shimane Univ.

Tafoni is a small cavity appeared on steep rock slopes, and it is believed to have formed due to mainly salt weathering. Piling up of rock blocks on the foot of such cliffs indicates that evolution of tafoni may be closely related to rock fall from the cliff. Configuration of tafoni and distribution of water contents on its inside walls were measured in some places of western Japan. As results, following process of tafoni evolution is estimated; (1) inward infiltration of water from cliff surface depending on plunging structure, (2) solution of rock materials in water, (3) concentration of water into roof of tafoni, (4) occurrence of tensile failures due to salt precipitation in surface portion of rocks, (4) exfoliation and degradation of rocks on rock surface.

Development of tafoni makes a sort of canopies overhanging on steep cliff, and such unstable portions fall down as rock fall. In addition to development of tafoni, cracks within sandstones are also one of causes for rock fall. Two types of cracks may influence them. One is the cracks originally existed cracks perpendicular to bedding planes, and others is newer cracks occurred due to rotational moment of overhanging portion. The former develops usually constant spacing, the latter appear in thin canopies. Consequently, weathering rate of rocks due to salt weathering and spacing of these cracks may control the frequency of rock fall in these areas.