

Development of tafoni and occurrences of rock falls controlled by elevated wave cut benches in Oda coast, Shimane, Japan

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Roughness of steep rock surfaces is one of important potential causes to occur rock fall from coastal cliff in addition to its steepness. Tafoni, concave structures with overhanged portions on steep rock surface

may become remarkable roughness. Numerous tafoni are developing on the cliff along the Oda coast, Japan, and rock fall frequently occurred in there. Such tafoni distributed there looks like to be controlled by elevated

wave-cut benches. Then, mechanical relations between evolution of tafoni and elevated cut wave benches have been studied. Steep rock surfaces, where, tafoni are distributed, are mainly composed of lapilli tuff and tuff breccias as andesitic to hyalitic pyroclastic rocks of the Miocene, and most of them are thermally altered regionally. Some zones of high water contents and precipitations of salt are observed along inner wall of tafoni there. These mean that they might have been formed under the processes of salt eathering due to infiltrated water as well as those in another areas. Most of tafoni shapes half moon types as well as those developed on

sandstone slopes in another area. Transverse profile of tafoni is little different from those of sandstone slopes, whereas aspect ratio of w/h is also similar each other. Narrow and concave structure inner wall of the roof are not remarkable in comparison with those in sandstone slopes. This may

depend on the configuration of water paths within rocks and strength of weathered rock mass supporting tafoni.

Wave-cut benches are widely distributed in this area, of which elevation is around 0.5 meters and 2.5 to 3.0 meters. Relative height above the mean sea level changeable place to places, but positive correlation is

distinct between them, and this means continuous land uplifting in this region. In the Isotake area, distinct differences are recognized in the size of tafoni between upper and lower cliffs of the wave cut bench of 2.5 meters. This may be the influence of different degrees of weathering of rock

surfaces, which corresponds to the difference of time elapsed after reveal from sea water.

In general, notches tend to appear on rock surface of sea cliff. Notch is defined as a concave portion formed by sea wave only. Probably, it may be results of abrasion by sea wave force. However, tafoni described above may include various ones, which have been formed from tiny concave portions,

originally formed as notch, or which have been formed as pure tafoni due to only salt weathering in coast. Consequently, we must take into account various processes in addition to the formation of notches due to sea wave in rock coast.