Study in Salt Weathering in Yoshimi Hyaku Ana Historic Site, Japan

Chiaki T. Oguchi[1]; Ryohei ohnishi[2]; Thidar Aye[3]; Yasuhiko Takaya[1]; Swe Yu[4]

[1] GRIS, Saitama Univ.; [2] Civil Eng., Saitama Univ.; [3] School Sci. & Eng. Saitama Univ.; [4] School of Sci. & Eng.

http://www.saitama-u.ac.jp/gris/

Salt weathering is known that it is sometimes one or the main cause of deterioration of cultural heritages or archeological sites made of stones. We investigated wall surface of artificial cave in the historic site Yoshimi Hyakuana, Saitama Prefecture. The wall is effloresced by salts and deteriorates severely.

The wall sites for our research were set in the cave, which are 12 sites in 3 corridors. Three data loggers were set the one site of each corridor and took temperature and relative humidity data. The data of temperature of wall surface of 12 sites were also investigated. Salt samples were taken from the walls of 12 sites. The fallen salt and debris on the plastic tray set at each site was also collected. These salt and debris collection and environmental investigation were carried once several months intervals from June 17th,2007 to January 22nd, 2008.

The sampled salts were analyzed using X-ray powder diffraction. In the seasons of autumn to winter, the main salts were alunogen (Al2(SO4)3.17H2O)on the walls near entrance and gypsum on the walls inside the cave. However, halotrichite (FeAl2(SO4)4.22H2O), sodiumalum (NaAl(SO4)2.12H2O) and epsomite (MgSO4.7H2O) were detected in January. These salts show fine powder, whereas alnogen shows harden and granule. The salts and debris were weighed and the results shows that their weight from inside walls were higher than those from the walls near entrance. From these results, it is concluded that halotrichite and sodiumalum damages to wall deterioration in the winter season.