Spatial pattern analysis of wall surface modification by weathering in Yoshimi-Hyakuana cave using terrestrial laser scanning
Spatial pattern analysis of wall surface modification by weathering in Yoshimi-Hyakuana cave using terrestrial laser scanning

*早川 裕弌[1]、小口 千明[2]、青木 久[3]、有賀 夏希[3]
*Yuichi S. Hayakawa[1], Chiaki T. Oguchi[2], Hisashi Aoki[3], Natsuki Ariga[3]

1.東京大学空間情報科学研究センター、2.埼玉大学理工学研究科、3.東京学芸大学大学院教育学研究科
1.Center for Spatial Information Science, The University of Tokyo, 2.Graduate School of Science and Engineering, Saitama University, 3.Graduate School of Education, Tokyo Gakugei University

Detection and quantitative evaluation of actual changes in rock surface morphology are crucial for understanding weathering processes. Repeated measurements by terrestrial laser scanning (TLS) were performed at test sites in the Yoshimi-Hyakuana cave in Saitama Prefecture, central Japan. Six time series of point clouds were obtained in 3 years, and those point clouds were finely aligned to each other at millimeter-scale accuracies applying the ICP algorithm for unchanged domains. Digital elevation models (DEMs) were then produced by projecting the point cloud on a vertical plane at a resolution of millimeters. Centimeter-scale changes in the wall surface were successfully detected. Such changes are particularly active at a wall close to the outlet of the cave, and are found to be concentrated on a certain height above ground. This indicates that the rock surface modification is actively induced by salt weathering where groundwater evaporation is favorable. In contrast, walls located more inside of the cave show less or almost no changes in their surface. The air temperature and humidity monitoring at the wall surfaces supports this fact, suggesting the decreasing effects of environmental fluctuations which are higher around the cave entrance but lower in the inner side. This study is supported by JSPS KAKENHI Grants (20312803, 25702014).

キーワード：地上レーザ測量、風化、点群、デジタル標高モデル
Keywords: terrestrial laser scanning, weathering, point cloud, digital elevation model