[EE] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-TT Technology & Techniques

# [M-TT35]HIGH-DEFINITION TOPOGRAPHY AND GEOPHYSICAL DATA ANALYSIS

convener:Yuichi S. Hayakawa(Center for Spatial Information Science, The University of Tokyo), Christopher A Gomez (Kobe University Faculty of Maritime Sciences Volcanic Risk at Sea Research Group), Shigekazu Kusumoto(富山大学大学院理工学研究部(理学))

Sun. May 20, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

High-definition, or high-resolution data of earth surface topography and geophysical properties have become widely available for better understandings of the earth surface processes and dynamics. Here in this session, we accept discussions on high-definition topographic and geophysical data, including its theory, acquisition, archiving, processing, modeling and analysis. The approaches may include applications of, but not limited to, laser scanning, SfM-MVS photogrammetry, GNSS positioning, SAR interferometry, multi-beam sonar, geomagnetics and electromagnetics sensors based on terrestrial (fixed or mobile) and aerial (UAV or manned airborne) platforms.

## [MTT35-P07]Applications of low-cost, high-precision GNSS positioning for RPAS measurements in an inaccessible area

*Yuichi S. Hayakawa[1], Shigekazu Kusumoto[2], Takuro Ogura[3] (1.Center for Spatial Information Science, The University of Tokyo, 2.University of Toyama, 3.Frontier Science, The University of Tokyo)

Keywords:UAS, GNSS, photogrammetry, GCP, change detection

The photogrammetric approach using remotely-piloted aircraft systems (RPAS, also known as UAS: unmanned aerial system or drone) for the acquisition of high-definition topographic data has become widely available in geosciences. However, the accuracy of such data needs careful assessments particularly for the change detection of landforms using multitemporal datasets. Although setting numerous and distributed ground control points (GCPs) in a target area is a promising solution to improve the accuracy of topographic data, limitations in the accessibility are often found for target areas including oceanic coasts and volcanoes. Here we demonstrate the way of improving the accuracy of topographic data derived from RPAS using an onboard global navigation satellite system (GNSS) receiver. The study area is a crater of an active volcano of Tateyama Midagahara in Toyama Prefecture, Japan. An L1 GNSS receiver (emlid Reach) with a small antenna, which is capable of kinematic corrections, was attached on the aircraft body of RPAS (DJI Phantom) and its precise positioning data were recorded and post-processed with the camera images. The geographical coordinates of several GCPs were separately measured using another GNSS with kinematic corrections, which are compared with those on the RPAS-derived topographic model. The onboard high-precision GNSS positioning data improved the accuracy of the photogrammetric data by one order of magnitude (decimeters to centimeters), enabling us to proceed to the widespread, accurate monitoring of topographic changes in the crater without GCPs.