[EJ] Evening Poster | S (Solid Earth Sciences) | S-TT Technology & Techniques

[S-TT49]Airborne surveys and monitoring of the Earth

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Airborne surveys are useful to better understand the whole and/or the detailed structures of the Earth and their variations. They can be implemented from a traditional manned and newly-developed unmanned aircraft to efficiently map very large or remote areas with difficult access. We invite studies on theory, instrumentation, processing, modeling or inversion and applications of airborne surveys.

[STT49-P09]The validation results of the DSM of the geothermal area from the multiple-view images of an airborne sensor (ARTS-SE’s camera systems)

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Since 1990, the National Research Institute for Earth Science and Disaster Resilience (NIED) has been developing original airborne imaging spectral systems for the volcanic field. We have developed our 2.5nd - generation airborne imaging system, the Airborne Radiative Transfer Spectral Scanner for a single-engine aircraft (ARTS-SE) for volcano observations in June of 2015. ARTS-SE consists of a modified system of our former push-broom imaging spectrometer (ARTS) and a newly developed camera system: Structure and Thermal Information Capture (STIC). This system consists of four cameras. These cameras are the two visible cameras and the two thermal infrared cameras. The STIC specifications were planned to provide images data set for Structure from Motion (SfM) technique. We have been conducting development of data analyses method for visible and infrared image from STIC images.
This study describes the validation results of the Digital Surface Model (DSM) from the multiple-view images from STIC images (Hakoneyama (Owakudani) acquired on 5 December 2015). The validation results indicate that there was good agreement between the Digital Map 10m Grid(Elevation) from Geospatial Information Authority of Japan and the measured DSM from the STIC’s multiple-view images. The difference of the elevation is typically 1 to 5m for the DSM from visible camera , and 3 to 15m for the DSM from thermal infrared camera, except for the area strongly affected by the plumes in geothermal area. In addition, at the Owakudani area, STIC’s thermal infrared cameras system could partially detect the DSM for the area affected by the plumes which we could not estimate the DSM from STIC’s visible camera system. Using these DSM data, we could estimate the orthorectified natural color image around the Owakudani from ARTS-SE’s visible camera (spatial resolution is 0.25m) and the orthorectified ground-surface brightness temperature images around the Owakudani from ARTS-SE’s thermal camera (spatial resolution is 1.4m). The geo-correction accuracy is typically less than 4 to 20 m difference (RMS).
From these results, we conclude that the DSM from ARTS-SE’s camera systems can be used for operational volcano observations.