

Study of UAV photogrammetry toward efficiently grasping volcanic landform

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In this study, we conducted three-dimensional modeling of volcanic landform using photogrammetry by UAV aerial photography with the aim of efficiently grasp landform. This method, which has been spread in recent years, can grasp landform as not points but planes, and it is thought that this observation can be conducted inexpensively, quickly, and without high-risks. In this study, aiming to make UAV observation efficient, we investigated relation between some factors of UAV observation and the accuracy of 3D model created.

We conducted mission flight on March and August 2018 at Kirishima Iwo-yama located Ebino city, Miyazaki prefecture. Iwo-yama erupted on April 2018, and landform change has occurred. We were able to get photogrammetric data before and after eruption. The UAV used on this study is DJI Mavic pro. The flying altitude from take-off point was 50 m, and the resolution of the images was 1.5 cm/pix. The photographed area was about 0.26 km², and we set frontlap: the overlap of image along flight route, to 90 %, and sidelap: the overlap of image between flight routes, to 60 %. The UAV flew 60 minutes, and we got 1379 images during each flight. In addition, we measured 16 points as Check points and Ground Control Points (GCP): the points used as standard of coordinates, by GNSS and Total station.

Using Agisoft' s software Photoscan, we created a three-dimensional model before and after eruption from images taken. By increasing a number of measured points, we got more accurate model than that of similar observation in 2017, On the other hand, there were partial vacancy on the model after eruption. This is probably because image processing was not successful due to a lot of volcanic gasses in the photographed image. For solving this problem, at next observation, we photograph from oblique angle in addition to vertical angle only around fumarole.

According to the above data, comparing models, we grasp volcanic landform change due to eruption on April 2018. Furthermore, we investigate relation between particularly GCP and the accuracy of 3D model in order to make UAV observation efficient.

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