Resourcing a disaster response map for the 2015 heavy rain in Joso city

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1. Motivation
From September 9th to 11th 2015, an exceptionally heavy rain storm caused the occurrence of the overflow of the Kinugawa River and landslides in a wide range of areas in the Kanto and Tohoku districts. One bank of Kinugawa River collapsed causing wide-spread flood damage in and around Joso city in the Ibaraki Prefecture of Japan. Homes were destroyed and washed away leaving many residents' property completely underwater. Gaining a quick understanding of the disaster's magnitude was critical for effective search and rescue (SAR) response, and decision-making so as to carry out local government offices' rehabilitation measures to rescue the residents of the submerged town.
2. Approach
In this case, the disaster area was as vast as 100 square kilometers as documented by aerial photography using a Nikon D810 from a manned helicopter, rather than from any unmanned aerial vehicles. The flight level was 1,200 m in altitude and course and speed were set to create a 75% overlap in the photography.
3. Results
About 600 oblique photographs were taken from flight level 1,200 m between 15:30-16:30 hours on September 11, 2015 to create a digital orthoimage of about 100 square kilometers of the flood region. In addition to the aerial photographs, ground survey data and the orthoimage were made available to the public within 12 hours on the crisis response website of the NIED. These resources have been provided under the auspices of the Creative Commons license "CC-BY 4.0 international." Subsequently, the map that overlaid the housing map of Zenrin, Inc. was created for September 15, 2015, and the disaster countermeasures office was provided with it. In addition, a missing person's distribution was estimated from the map and a professional team of private SAR and a NPO Japan rescue dog association provided search assistance on the same day.
4. Considerations
First, although a lot of information has been released by each organization, there are some problems regarding copyright, data size, and reliability. Effective use of such information in a post disaster situation is difficult. In this case, the information was provided as open data, allowing users access to the information without the difficulty of making an application for permission. The data was used by the disaster countermeasures office, the volunteer center, and the university investigating the disaster. Second, the high definition photographic map of a disaster site makes it much easier to grasp the full impact of a disaster situation. However, when the user is not familiar with how to interpret the information provided by such maps, it is difficult to utilize these map resources effectively. Consequently, it is necessary to support local public entities by also providing directions for how to understand the map information. Finally, although photography was performed from a manned helicopter, 14 or more rescue/reporting helicopters surveyed the area for only 30 minutes. Though there may be an expectation that unmanned aerial vehicles may be deployed for information gathering following a disaster, it is difficult to operate such aerial vehicles safely in airspace where manned aerial vehicles are operational simultaneously. Excellent communication and cooperation are necessary during such operations to protect the safety and integrity of both.

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