The contribution of Unmanned Aerial Vehicles (UAVs) in post-flood surveys: Strengths and weaknesses. The case of Lakonia floods 2016

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Abstract

Flash floods are the most common type of flooding in the ephemeral torrents of the Mediterranean region. Post-flood field surveys in flash flood prone areas of South Europe, are hampered by scarcity of instrumental data and the short duration of flooding. Geomophic changes and the diversity of impacts accompanying flash flood flows make the accurate mapping of affected areas and the holistic understanding of flood processes even more difficult. In recent years, the use of Unmanned Aerial Vehicles (UAVs) provides an additional tool for studying natural disasters, functioning in a scale-of-observation different than this of satellite imagery or of the typical ground-based survey.

In 7 September 2016, a high-intensity rainfall event, caused flash flooding in Evrotas, Mariorema and Vlachiotis Rivers in Laconia, South Peloponnese, Greece leading to extensive damages in properties and infrastructure and 1 fatality.

Following the event, a post-flood field survey was carried out with the aid of a UAV in an effort to explore its strengths and weaknesses in mapping the flood's impacts and characteristics.

In the course of this survey, the UAV provided:

i. A faster overview of the flooded area in comparison with the traditional ground-based survey
ii. An accurate mapping of flood extent and recording of impacts (e.g. road closures and collapses, levee breaches, property damage assessment on a plot-by-plot or building-by-building basis)
iii. Imagery from locations, where access was restricted (e.g. in steep canyons)
iv. mapping of erosion and sediment deposition processes that were not possible from ground- and satellite-based observations (the latter due to time- and resolution-related issues), such as the mapping of sediment loads in the coastal area or the size of geomorphic effects (e.g. erosion of river banks)
v. mapping of floodwaters routing

The survey highlighted also certain weaknesses inherent in the use of UAVs including restrictions in their use due to weather conditions, safety considerations, legal framework, licensing and permissions or battery use.

Experience from this study showed that future research should focus on providing guidance on optimizing the use of UAVs in similar surveys as a systematic tool for users in post-flood cases.

Λέξεις κλειδιά*: UAV; drone; floods; flood risk; disasters.*