

## **Using UAV System for monitoring landslides - case study Slanic Prahova, Prahova County, Romania**

Constantina Filipciuc, Radu Farnoaga, and Elena Tudor  
Geological Institute of Romania, GeoHazard, Romania (tatiana0906@yahoo.com)

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This study was carried out on the Slanic Prahova city that is set on a hilly - mountainous region in Romania. Slanic Prahova was practically built on and around salt deposits, being a very important salt exploitation point in the Romanian salt extraction industry, even today. Unfortunately the exploitation and especially part of its closure weren't always made "by the book" so, after shutting down a few mines, a new phenomenon was covering the area - subsidence followed closely by landslides.

Our Geohazard team at GIR studied these phenomena since the early 2000. We begun monitoring the landslides, that weren't always easy to reach or to assess, and the processes appeared here but due to lack of money and equipment, we weren't to a fault competitive. So in the beginning of 2015 we purchased a mini UAV System mainly because it offered us the possibility of having a systems that would allow us to obtain high-resolution imagery data on landslides and areas affected by them in real time.

Our aircraft is in fact a mini plane with a compact system used both in military and civilian applications. It can fly up to 3000 m, at a cruise speed of 130 Km /h and it can be operated from a range of 15 km. It's structure has as main components : the mini plane, the ground control station (GCS), the data link and the launcher. The aircraft body it's manufactured from carbon fiber and composite material making it easy to maneuver it and to use as a recovery system parachutes. Also, the navigation is automatic using an antenna tracking system and an extended operational range with the help of multiple ground data terminals. With the use of GCS and the mission planning software application the profile (the flight) can be easily put on a map and be modified. This kind of capacity makes the aircraft operational in various type of environment. In terms of navigation, the aircraft has a payload that is retractable and gyro-stabilized and a "camera follow" system with GPS algorithm and improved positioning that provides a high resolution imagery.

Using this type of aircraft we have done reconnaissance missions over the areas affected by natural hazards, including Slanic Prahova, and received real time imaging. Also, we used it to photograph and cartography the sites, the critical infrastructures and nevertheless monitoring landslides events.

The work undertaken in the area of Slanic Prahova city, in monitoring and assessing the areas affected by the landslides here was greatly improved when using this UAV. After processing the data downloaded from the aircraft, we put together the images taken, using a special software, and the final product was an ortophoto plan and a 3D model of the area, with real time imaging of the site and a high level resolution.

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