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Rpas photogrammetric models for documenting and monitoring damage in Accumoli following the central Italy earthquakes

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A significant sequence of earthquakes occurred in central Italy in 2016, beginning on 24 August 2016 at 03:36 AM local time. The moment magnitude of this event is listed as 6.0 by INGV (Istituto Nazionale di Geofisica e Vulcanologia). The current source model from INGV places the hypocentral depth of the event at 8 km. This 24 August event was followed by two additional earthquakes: a moment magnitude 5.9 event on 26 October, and a moment magnitude 6.5 event (the largest event) on 30 October.
The Geomatics team of the Politecnico di Torino, in cooperation with the US GEER (Geotechnical Extreme Events Reconnaissance Association), participated in a multi-disciplinary team (expertise in geology, seismology, geotechnical engineering, and structural engineering) to investigate and map some of the geotechnical and structural effects from these earthquakes. Reconnaissance missions were performed by the team in September and November/December following the earthquakes.
Access to many damage sites of interest remains difficult because the sites were (and still are) located in restricted red zones, and are dangerous because many of the structures are unstable and still prone to collapse. For these difficult sites, the preferred approach to investigate their damage involved the use of photogrammetric-based acquisition using RPAS (Remotely Piloted Aircraft Systems) and three-dimensional (3D) modeling using Structure from Motion (SfM) computer vision techniques. The teams incorporated multiple aerial platforms and imaging sensors including COTS (commercial off the shelf) platforms and a customized heavy-lift platform. The acquisition strategy for each system varied based on its strengths and capabilities, but provided a wide range of remote sensing data that can be used for subsequent analysis.
This paper focuses on the remote sensing data obtained from the specific site of Accumoli, a village that was significantly damaged by the earthquakes. Descriptions will be provided regarding the equipment that was used, the workflow employed in the field (including surveying and RPAS flights), the computational workflow used to process the field data, and the final products that were created. Some comparisons of the damage observed following the September and November/December reconnaissance missions will be performed to show the evolution of the damage in the village following the earthquake sequence.