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Analysis with SfM on-motion method of July 2015 extreme rainfall impacts on the S-charl valley road in the Canton of Graubünden, Switzerland

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The 22-23th July 2015, two severe storms at one day interval have caused in Scuol, lower Engadine (Canton of Graubünden, Switzerland). The static storm cells produced up to 150 mm rain precipitations in three hours generating several debris flow. On 22 July 2015, three buildings in the Pradella hamlet near Scuol were damaged by a debris flow. People of two holiday camps, 100 children and 40 adults, were evacuated. Nobody was injured but the buildings damages are important. A day after, about 200 mm rain in a short time were measured in the same area. A car was been swept away by a debris flow in the Scuol village and its driver could escape at the last moment. The S-charl valley was isolated during more than one week by seven big debris flows and several little ones. About 100 people, in majority holidaymakers, were blocked in the S-charl hamlet without power supply during few days. Until the swiss army built a provisional emergency bridge to open the valley access, the only way to access the S-charl valley was by helicopter. Overall damages –roads infrastructures, buildings, drinking water supply, power supply and other- are estimated to one million Swiss Francs and the debris flow volume is estimated to 100'00 cubic meters.

The S-charl valley roadsides were photographed fifteen days before the extreme storm event from an on-motion vehicle. The same roadsides were photographed twenty days after the event with the same acquisition methodology. 3D point clouds from Structure of Motion (SfM) from the -before and after event- pictures have been produced and compared. Thus, is was possible to evaluate the number of debris flows that occurred in the S-charl valley and estimate their volume in the roadsides. This study case allows to evaluate the low-cost SfM on-motion methodology and to give theirs main advantages and disadvantages when it is used to estimate changes roadsides due to a natural hazard event.