Geophysical Research Abstracts
Vol. 12, EGU2010-9807, 2010
EGU General Assembly 2010

Catchment-scale sediment transport in torrents: the case of the Manival (French Prealps)

Joshua Theule (1), Frédéric Liébault (1), Alexandre Loye (2), Dominique Laigle (1), and Michel Jaboyedoff (2)

(1) Torrential Erosion Snow and Avalanches (ETNA), Cemagref Grenoble, France (joshua.theule@cemagref.fr), (2) Institute of Geomatics and Risk Analysis, University of Lausanne, Switzerland

The monitoring of sediment transport in the Manival Torrent and its catchment (Chartreuse mountain range, France) began in spring 2009 with a sediment budget approach. The objective is to explore topographic, spatial, and morphologic correlations with sediment transport activities throughout the catchment and its torrent channel.

The catchment area is 3.6 km2 (800m relief) which feeds a 1.8 km length (mean gradient of 16%) of the torrent terminating at a sediment trap (25,000 m3 capacity). A terrestrial laser scanner is used for monitoring erosion and deposition in the source area, main channel, and sediment trap. In the torrent, 39 cross-sections are surveyed after every sediment transport event. A tipping-bucket raingauge located at the lower extent of the source area is used for monitoring rainfall intensities. Finally, a preliminary airborne LiDAR survey (1 meter grid) is used as the base map and for morphometric analysis.

Three significant events occurred in 2009; a debris flow induced by summer convective storms, and 2 floods induced by long duration rainfall events in autumn. These events revealed the cycle of entrainment in the main torrent channel (debris flow originated in the torrent) and its recharge from the source area. Terrestrial LiDAR results revealed events in the source area that were disconnected to the torrent during the debris flow event. In the main torrent, particular reaches have experienced both significant erosion and deposition for all of the events. Topographic and spatial correlations are made identifying the main controlling characteristics of these reaches. Topographic characterizations of disconnection for activity from the hillslopes to the torrent are also made.