CRITICAL RAINFALL CONDITIONS TRIGGERING SHALLOW LANDSLIDES OR DEBRIS FLOWS IN TORRENTS - ANALYSIS OF DEBRIS FLOW EVENTS 2012, 2013 AND 2014 IN AUSTRIA

MOSER, Markus*; JANU, Stefan; MEHLHORN, Susanne

Austrian Service for Torrent and Avalanche Control, Austria

markus.moser@die-wildbach.at

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Generally, debris flows are caused by both small-scale intensive precipitation and long lasting rainfalls with lower intensity but high pre-wetting or both combined. The triggering mechanism of the debris flow events in Austria 2012, 2013 and 2014 were mass movements (rapid shallow landslides) on steep slopes in the upper catchments. Those masses slide with very high velocity into the torrent beds provoking hyperconcentrated flows or debris flows. In areas of the geologically unstable Greywacke zone, the torrents were cleared up onto the bedrock and the debris was deposited in the storage areas of existing debris flow breakers or in torrents without technical protection measures the debris caused catastrophic damage to residential buildings and other infrastructural facilities on the alluvial fan. Following the events, comprehensive documentation work was undertaken comprising precipitation analysis (rainfall data, weather radar data), identification and quantification of the landslide masses, cross profiles along the channel and of deposition in the storage areas or on the fan. The documentation and analysis of torrential events is an essential part of an integrated risk management. It supports the understanding of the occurred processes to mitigate future hazards. Unfortunately, the small-scale heavy rain events are not detected by the precipitation stations. Therefore, weather radar data (INCA-Data) analysis was used to determine the - usually very local - intensities which caused those catastrophic landslides and debris flows. Analysis results showed an agreement with the range of the previously known precipitation thresholds for debris flow triggering in the Alps.