Risk along a road from rheological data: application on Pont Bourquin landslide.

Philippe Limousin, Marc-Henri Derron, and Michel Jaboyedoff
University of Lausanne, ISTE, Lausanne, Switzerland (fifou.limousin@gmail.com)

The landslide of Pont Bourquin is investigated, both in the field and in the lab, to assess its potential impact on population, infrastructures or environment. In particular, rheological properties are characterized because important mud flows have already occurred on this site and may occur again in a near future. Rheology is used to better constrain the flow dynamics and propagation, and to design proper prevention and protection measures.

Several hydraulic models of predictions of mud flow are in development, as well as on-going researches on the rheology of complex fluids. The latter allows proposing equations of material viscosities according to applied constraints and to define various types of fluids. Along this line, the material of the landslide was characterized with a rheometer (Haake rheostress), to compare the results with defined equations, and to choose the best model. Softwares like Bing or Dan3D have been used to show the propagation and draw possible zones of risk. As these softwares use rheological parameters to calculate the run out and the height of the landslide, a good rheological characterization appears to be critical to better assess the risk.

Possible zones of release of the site of Pont Bourquin (Switzerland), in marly black shales, have been investigated, their rheology characterized and the potential propagations assessed. Many simulations were made for three zones of departure. An important 2007 event could be used to calibrate the propagation models. It appears that the risk for local infrastructure (mainly the road) is high yet despite the mitigation measures built on the slide. A complete risk analysis made with the most realistic scenario justifies the works already made but shows that these measures may not be sufficient.