Geophysical Research Abstracts
Vol. 12, EGU2010-13811, 2010
EGU General Assembly 2010

Field testing of rockfall attenuating systems

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Differing from standard rockfall barriers, rockfall attenuator systems are an innovative new technology that intercepts rockfall trajectory guiding it under a tail drape, its kinetic energy is then dissipated through net deformations and interaction with the slope. Rockfall can then be contained at the base of slope avoiding costly maintenance and clean out costs commonly associated with standard rockfall barriers. They are intended as a low maintenance passive barrier system without the use of dynamic energy absorbing brake elements or lateral restraining anchors (Badger et al, 2008). Till now the loading mechanisms and energy dissipation characteristics are largely unknown.

The testing of these systems proves a challenge when placed in the framework of Swiss or EOTA guideline for technical approval of rockfall protection kits (Gerber, W. 2001, EOTA. 2008). Testing to a prescribed energy rating produced from vertical free fall is not possible due to their reliance on an open ended system. Moreover, the process after initial impact is dependant on the orientation of the boulder trajectory with respects to vertical. The importance of net and rock slope interaction during the attenuating process therefore necessitates a test load that models closer the natural occurrence of rockfall. Testing programs to date (Ortiz. et al. 2008, Sassudelli et al. 2007) have focused on materials testing for the design of hybrid and attenuator systems. However, a dimensioning concept that identifies system attenuating capacity with respects to rock slope properties and expected hazard has yet to be produced. Building on the knowledge from testing programs to date, along with prototype installations, a joint research program investigating rockfall attenuator and hybrid barriers has been initiated. Marking the first of a series of full scale dynamic testing in Switzerland - 2009, a prototype hybrid barrier was impacted horizontally using natural rock boulders with rotation.

The contribution presents the test setup, the obtained results together with an outlook to additional experimentation planned from the experiences.

References

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