



## **A search for applications of Fiber Optics in early warning systems for natural hazards.**

Koen Wenker and Thom Bogaard

Department of Water Management, Delft University of Technology, Delft, The Netherlands (k.j.r.wenker@student.tudelft.nl)

In order to reduce the societal risk associated with natural hazards novel technologies could help to advance in early warning systems. In our study we evaluate the use of multi-sensor technologies as possible early-warning systems for landslides and man-made structures, and the integration of the information in a simple Decision Support System (DSS). In this project, particular attention will be paid to some new possibilities available in the field of distributed monitoring systems of relevant parameters for landslide and man-made structures monitoring (such as large dams and bridges), and among them the distributed monitoring of temperature, strain and acoustic signals by FO cables.

Fiber Optic measurements are becoming more and more popular. Fiber optic cables have been developed in the telecommunication business to send large amounts of information over large distances with the speed of light. Because of the commercial application, production costs are relatively low. Using fiber optics for measurements has several advantages. This novel technology is, for instance, immune to electromagnetic interference, appears stable, very accurate, and has the potential to measure several independent physical properties in a distributed manner.

The high resolution spatial and temporal distributed information on e.g. temperature or strain (or both) make fiber optics an interesting measurement technique. Several applications have been developed in both engineering as science and the possibilities seem numerous.

We will present a thorough literature review that was done to assess the applicability and limitations of FO cable technology. This review was focused but not limited to application in landslide research. Several examples of current practices will be shown, also from outside the natural hazard practice and possible application will be discussed.