SCIENCES & BIOENGINEERING SCIENCES

The Research Group

Physical Geography

has the honor to invite you to the public defense of the PhD thesis of

Liesbet JACOBS

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

Landslides in the Rwenzori Mountains: field-based characterisation and susceptibility assessments in a data-scarce tropical environment

Promotors:

Prof. Dr. Matthieu Kervyn
Dr. Olivier Dewitte

The defence will take place on
January 9 2018 at 16.00h

in Auditorium D.2.01 at the Campus Humanities, Sciences and Engineering of the Vrije Universiteit Brussel, Pleinlaan 2 - 1050 Elsene, and will be followed by a reception.

Members of the jury:

Prof. Dr. Frank Canters (chairman)
Prof. Dr. Wim Thiery (secretary)
Prof. Dr. Jean Poesen (co-promotor, KUL)
Prof. Dr. Dominique Maes
Dr. Tom Dijkstra (Loughborough Univ., UK)
Dr. Jean-Philippe Malet (Univ. de Strasbourg)

Curriculum vitae

After graduating as a bio-science engineer (KU Leuven, 2013), Lies started a PhD in physical geography at the VUB. The PhD is a joint PhD together with the Royal Museum for Central Africa and embedded in a larger BELSPO project entitled AfReSlide, a project aiming at identifying suitable disaster risk reduction strategies in central Africa.
Lies supervised several Bsc and Msc theses and is first author of 4 peer-reviewed articles. Her research interest include the spatial and temporal understanding and prediction of landslides using field surveys, remote sensing, statistical and process-based modelling and crowd-sourcing.

Abstract of the PhD research

Landslides are globally amongst the most devastating geohazards. However, landslide risk remains poorly understood in many regions, especially in remote and data-scarce environments. In equatorial Africa, this systematic under-investigation of landslides is particularly pronounced. This is in sharp contrast to the estimated high fatality rate of landslides in this region, an increasing population pressure and an expected increase in intense precipitation. With this thesis, we aim to contribute to the state of knowledge on landslide processes in equatorial Africa and provide reliable landslide susceptibility assessments useful for policy action and tailored to a data-scare context.
The Rwenzori Mountains, located on the border of DR Congo and Uganda, is a prime example of a data-scarce region in equatorial Africa where landslides, despite their impact on life, livelihood and infrastructure, are poorly understood. The presence of large gradients in climate, geomorphology and lithology make this tropical region a suitable candidate for fulfilling the objectives of this thesis. In the first part of this thesis, landslide processes are identified and characterized with regard to their environment through archive study followed by systematic field surveys in 5 representative study areas. In the second part of this thesis, based on the established field inventories, susceptibility assessments are performed in order to identify those areas most prone to landslides. In first instance, we investigate the effects of using different topographic data sources and spatial resolutions and changing the scale of assessment, on landslide susceptibility models, using a pixel-based logistic regression approach. In combination with population density data, this assessment forms the basis of a first landslide risk hotspot identification. Outside of the five sampled areas, this regional susceptibility map should be considered as an extrapolation of an empirical model. A methodology is therefore developed to allow the inclusion of additional point-datasets where landslides are represented by a point with an unknown location within the landslide body. This resulted in the first spatially validated slope unit-based landslide susceptibility model for the inhabited highland region.
Through the Rwenzori focus, we provide insights on how landslides and landslide susceptibility can be characterized in data-poor environments. Finally, we provide new perspectives in regional landslide susceptibility mapping, useful in any environment where heterogeneous datasets with large spatial uncertainties form the basis of the susceptibility assessment.