

The Research Group
Physical Geography

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

Antoine DILLE

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

**Remote sensing of slow-moving landslides in the tropics:
natural and anthropogenic controls**

Supervisors:

Dr. Olivier Dewitte | Royal Museum for Central Africa

Prof. Dr. Matthieu Kervyn | Vrije Universiteit Brussel

Dr. François Kervyn | Royal Museum for Central Africa

The defense will take place on

Thursday, March 25, 2021 at 16h00

The defense can be followed through a live stream at the address <https://bit.ly/3uYWNod>. Contact antoine.dille@vub.be for further information.

Members of the jury:

Prof. Dr. Frank Canters | VUB, Chairman

Prof. Dr. Benoît Smets | VUB & RMCA, Secretary

Prof. Dr. Veerle Vanacker | UCLouvain

Dr. Benedetta Dini | University of East Anglia

Prof. Dr. Jonathan Chan | VUB

Curriculum vitae

Antoine Dille completed a B.Sc. in Geography at the Université Libre de Bruxelles and a M.Sc. in Physical Geography in a joint program between the Vrije Universiteit Brussel and the KU Leuven.

He started in 2016 a PhD research project aiming at improving our understanding of the controls on landslide occurrence and motion in tropical environments. Strongly based on remote sensing data, this work was supported by the BELSPO STEREO III program. This work has led to several publications in international peer-reviewed journals.

Abstract of the PhD research

Slow-moving landslides are very common in mountain landscapes. Often manifesting long-term, persistent movements, they exert strong controls on sediment transfers and hillslopes morphology. They also severely affect the livelihood of local communities. Our incomplete understanding of the causes of landslide failure and controls on later motion is a major source of uncertainty in assessing their impacts. It is especially true in montane regions of the tropics, where landslide impacts are disproportionately high, but our understanding of local controls largely elusive. Analysing how tropical environmental conditions (e.g., intense rainfalls, deep weathering of rocks) and a growing human influence on landscapes control the occurrence and motion of landslides is the main aim of this PhD research. This open research question is tackled by an investigation of two slow-moving landslides in the tropical environment of the Kivu Rift, in eastern DR Congo. One, sited in the rapidly expanding city of Bukavu, experienced rapid and informal urbanisation over the last decades. The second is only a few decades old and has been largely preserved from human activities. Analysis of the origin and controls on these landslides required measurement of surface motions over long periods of time. To circumvent the lack of historical records, but also difficult field accessibility conditions and constraints brought by tropical context (e.g., persistent cloud cover) we exploited synergies between radar and optical satellite remote sensing, archive aerial imageries, modelling and careful field investigations. This PhD research provides a rare analysis of the causes, triggers, and mechanisms of slow-moving landslides in an under-researched climatic region. The detailed analyses offer new perspectives to understand how conditions in tropical regions are affecting landslides, and how changing landscape conditions may affect the occurrence and movement of landslides in the future – of crucial importance considering the rapid changes observed in many places of the tropics. By improving our understanding of landslide processes in environmental conditions largely overlooked in the literature, this PhD research aims at improving the evaluation of landslide hazard and mitigation in the area, but also across many other regions of the tropics where similar environmental and societal conditions are met.