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A methodology to track temporal dynamics and rainfall thresholds of landslide processes in the East African Rift

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The East African rift valley is a major tectonic feature that shapes Central Africa and defines linear-shaped lowlands between highland ranges due to the action of geologic faults associated to earthquakes and volcanism. The region of interest, covering the Virunga Volcanic Province in eastern DRC, western Rwanda and Burundi, and southwest Uganda, is threatened by a rare combination of several types of geohazards, while it is also one of the most densely populated region of Africa. These geohazards can globally be classified as seismic, volcanic and landslide hazards. Landslides, include a wide range of ground movements, such as rock falls, deep failure of slopes and shallow debris flows. Landslides are possibly the most important geohazard in terms of recurring impact on the populations, causing fatalities every year and resulting in structural and functional damage to infrastructure and private properties, as well as serious disruptions of the organization of societies. Many landslides are observed each year in the whole region, and their occurrence is clearly linked to complex topographic, lithologic and vegetation signatures coupled with heavy rainfall events, which is the main triggering factor. The source mechanisms underlying landslide triggering and dynamics in the region of interest are still poorly understood, even though in recent years, some progress has been made towards appropriate data collection.

Taking into account difficulties of field accessibility, we present a methodology to study landslide processes by multi-scale and multi-sensor remote sensing data from very high to low resolution (Pléiades, TRMM, CosmoSkyMed, Sentinel). The research will address the evolution over time of such data combined with other earth observations (seismic ground based networks, catalogues, rain gauge networks, GPS surveying, field observations) to detect and study landslide occurrence, dynamics and evolution. This research aims to get insights into the rainfall thresholds that trigger and control the different types of landslide in this region of the East African Rift. A specific attention will be given to the landslide processes in relation to volcanic activity and earthquakes.