# Living Planet Symposium 2019

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**Guidelines abstract**: <https://lps19.esa.int/QuickEventWebsitePortal/living-planet-symposium-2019/website/ExtraContent/ContentSubPage?page=2&subPage=2>

*a. Title.*

*b. Author(s) and affiliation(s) of author(s) (including full first names -no initials, last names and emails).*

*c. Abstract (mathematical symbols and equations must be typed in, and metric symbols should be used. Figures in jpg format can be included).*

*d. Abstract length should be at least 300 words and maximum 1500 words (corresponding roughly to one A4 page, single space)*

**Session for abstract submission:** A4.13 Satellite soil moisture and precipitation for predicting extreme hydrological events(<https://lps19.esa.int/QuickEventWebsitePortal/living-planet-symposium-2019/website/ExtraContent/ContentSubPage?page=2&subPage=1#themeA4> )

**Presentation type :**  Poster

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**Title** : The use of satellite rainfall estimates for a susceptibility-based rainfall threshold approach for landslide occurrence in data scarce regions

**Abstract** :

Rainfall thresholds are one of the main tools used to characterize and warn against landslide hazard. While main improvements have been made towards more reproducible techniques for the identification of triggering conditions for landsliding, the now well-established rainfall intensity or event – duration thresholds for landsliding suffer from several limitations, e.g., the variable definition of triggering rainfall events and non-consideration of ground conditions. Here, we propose a new approach of the frequentist method for threshold definition based on satellite-derived antecedent rainfall estimates directly coupled with landslide susceptibility data. Adopting a bootstrap statistical technique for the identification of threshold uncertainties at different exceedance probability levels, it results in thresholds expressed as AR = (α ± ∆α)\*S^(β ± ∆β), where *AR* is antecedent rainfall (mm), *S* is landslide susceptibility, α and β are scaling parameters, and ∆α and ∆β are their uncertainties. In assigning the triggering and causative roles to *AR* and susceptibility respectively within a renewed 2D frequentist graph, we distribute the influence of hydrological conditions between trigger (by devising an elaborate *AR* function that aims to reflect the hydrology of an empirical average soil) and cause (by capturing in the susceptibility the spatial variations of hydrological conditions expected from the distribution of the causative ground factors). In this way, we obtain rainfall (*AR*) thresholds as functions of susceptibility, which enables us to associate threshold mapping with susceptibility maps. Rainfall threshold research is almost inexistent in Africa despite high levels of landslide susceptibility and hazard, especially in mountainous tropical Africa, characterized by intense rainfall, deep weathering profiles and high demographic pressure on the environment. We apply our approach in the western branch of the East African Rift based on landslides that occurred between 2001 and 2018, satellite rainfall estimates from the Tropical Rainfall Measurement Mission Multi-satellite Precipitation Analysis (TMPA 3B42 RT), and the continental-scale map of landslide susceptibility of Broeckx et al. (2018) and present the first regional rainfall thresholds for landsliding in tropical Africa. This work is carried out within the framework of the BELSPO RESIST project.