The role of lavaka in the landscape of Madagascar: A process-based approach

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MaLESA project (Malagasy Lavaka, Environmental reconstruction and Sediment Archives)

1. Lavaka formation and development
2. Sediment and carbon transfer
3. Sedimentary archives: environmental reconstruction

What are lavaka?

- "hole" in Malagasy
- Inverse teardrop-shaped
- Initiate at mid-slope (convexity)
- Headward growth
- Lack surface feeder channels

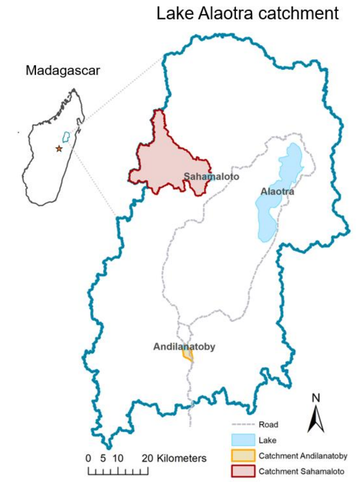
Why do we study lavaka?

- Natural or human induced?
- Statistical correlations between lavaka densities and controlling factors identified but processes remain unknown (Cox et al., 2009 and 2010)

OBJECTIVE
Obtain better mechanistic understanding of lavaka initiation and evolution

HYPOTHESIS
Lavaka formation tightly coupled to long-term hillslope evolution
-> 'weak' convexities

Study area

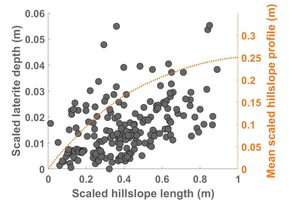


How will we study lavaka formation and development?

FIELD DATA

SOIL PROPERTIES: TRANSECT SAMPLING FOREST VS. GRASSLAND

Laterite depth variations

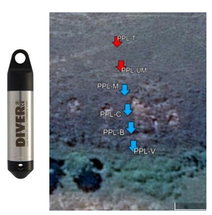


Vegetation density

Soil physical properties

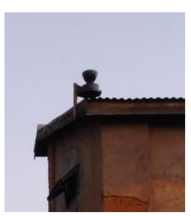
HYDROLOGY

Groundwater



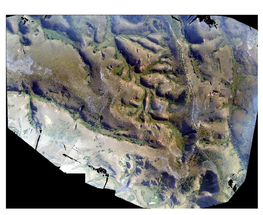
Lavaka outlet

Rainfall



MORPHOLOGY

Drone



ANALOGUE MODELLING

LABORATORY SET-UP

MATERIALS

- Sand, gypsum, cement
- …

-> work in progress

NUMERICAL MODELLING

- Mechanistic lavaka evolution model
- Implement in TTLEM (TopoToolbox landscape evolution model) (Campforts et al. 2017)

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