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Soil erosion assessment via temporal and spatial high-resolution time-lapse Structure from Motion on rainfall simulation plots

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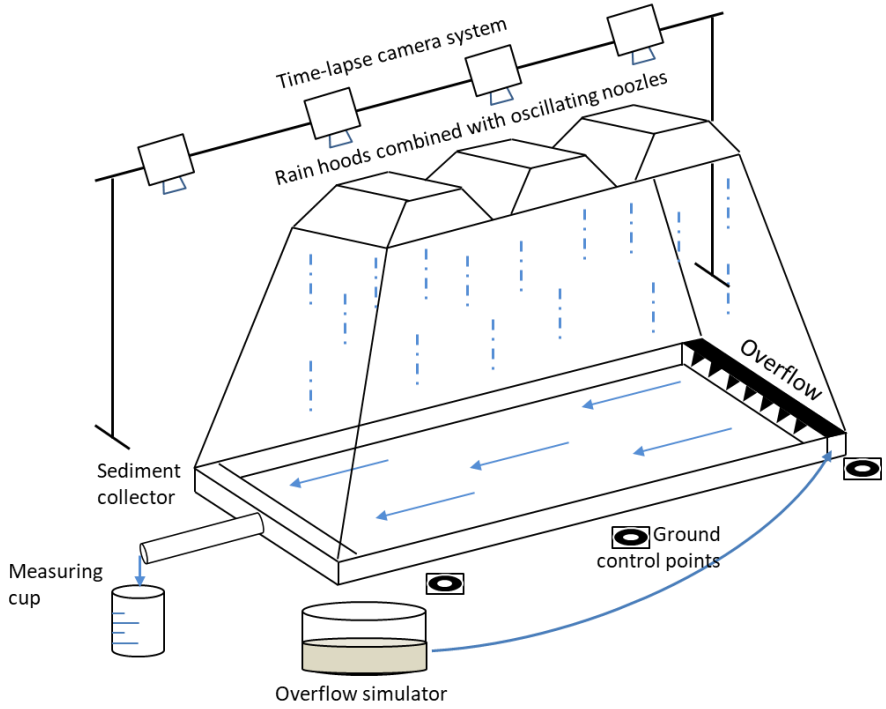
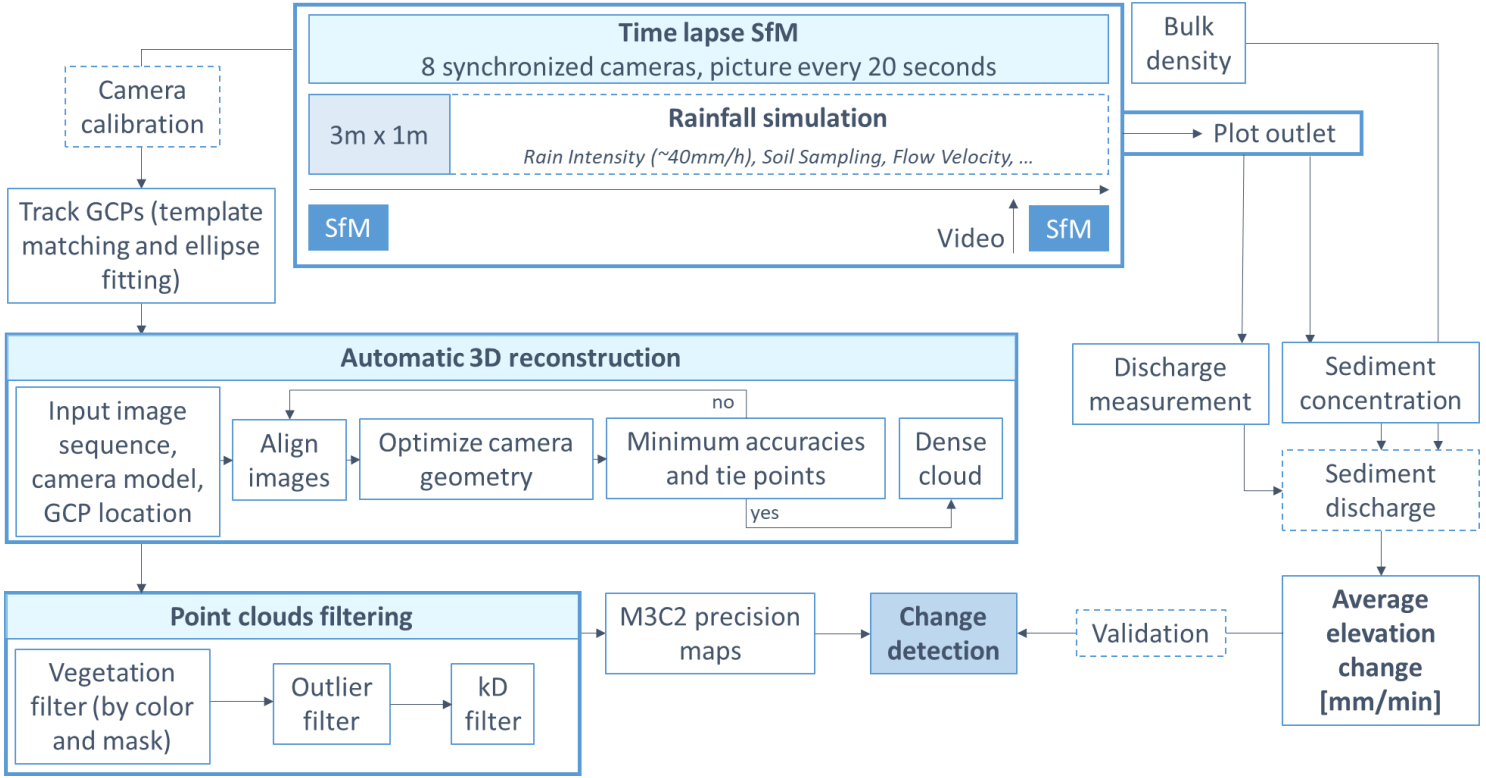
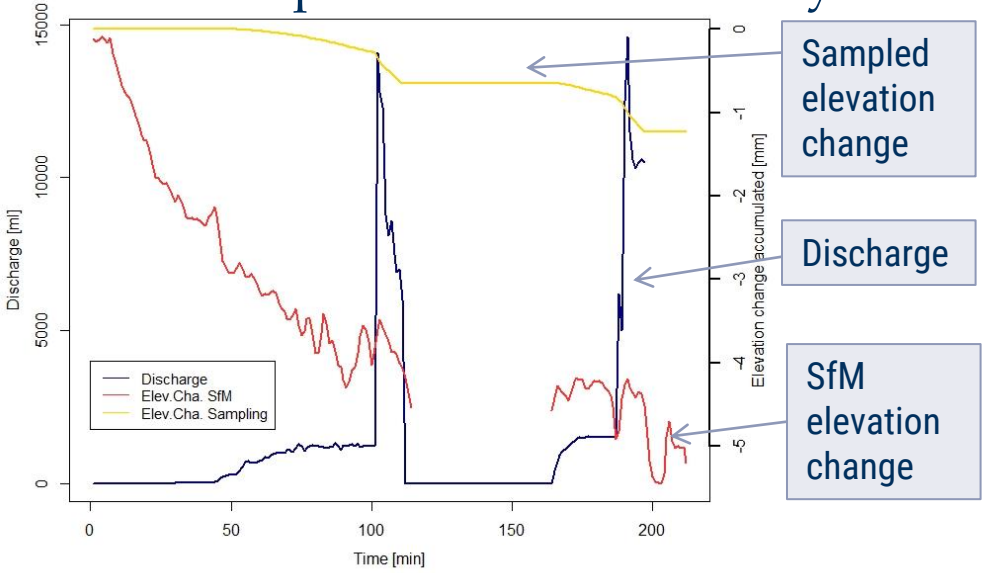
Rainfall Simulations measured with time-lapse SfM



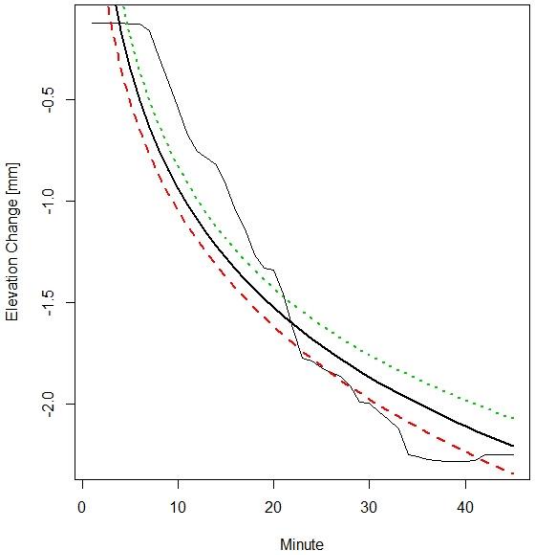
Workflow – Processing of sampled & SfM data



At the beginning of the rainfall simulation, non-erosional processes such as aggregate breakdown and soil compaction mask in the SfM data the erosional processes measured by sediment sampling



Rainfall simulation 06.05.2020



Logarithmic regression 06.05.2020

Fitting a logarithmic function to describe this first part: minute 0 until the beginning of discharge (in this example minute 43).

Logarithmic multiple regression based on time-lapse SfM models to estimate the influence of erosion masking process at reconstructed surface elevation changes at the beginning of synthetic rainfall simulations

Input parameter
- Soil bulk density
- Soil moisture
- Soil fraction distribution
- ….

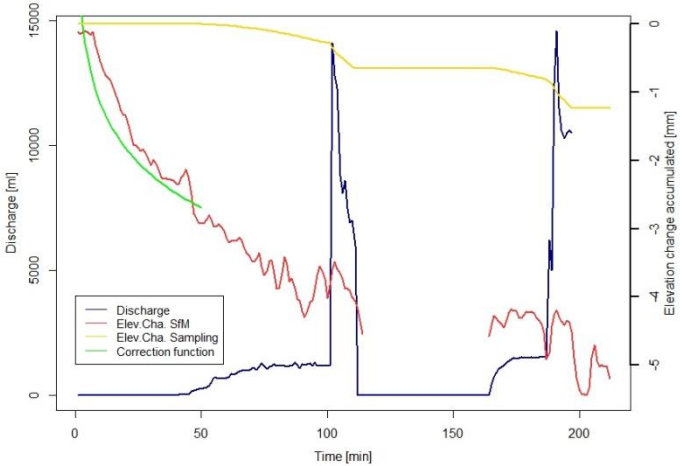
Y = a + b * ln(x)

11 rainfall simulations

Leave-One-Out Cross-validation

Least square optimisation

Predicting soil surface changes at beginning of the rainfall simulation, i.e. estimating parameters a and b of the logarithmic function, based on the soil input parameters, using average elevation changes as observation



Example: Fitted function, based on the calculated equation with soil bulk density and initial soil moisture (rainfall simulation 06.05.2020)

Thank you for your attention