



# Towards a simple predictive erosive debris-flow model

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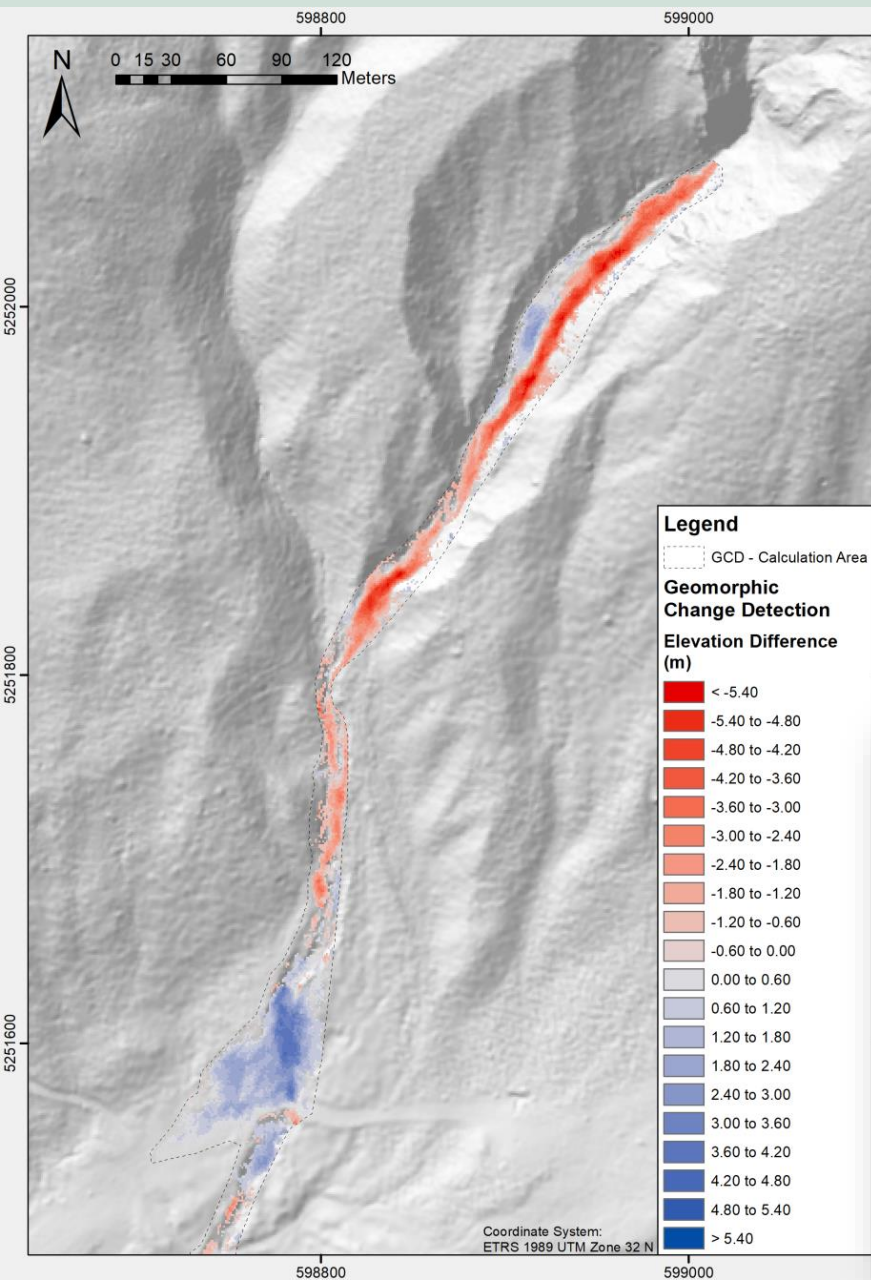


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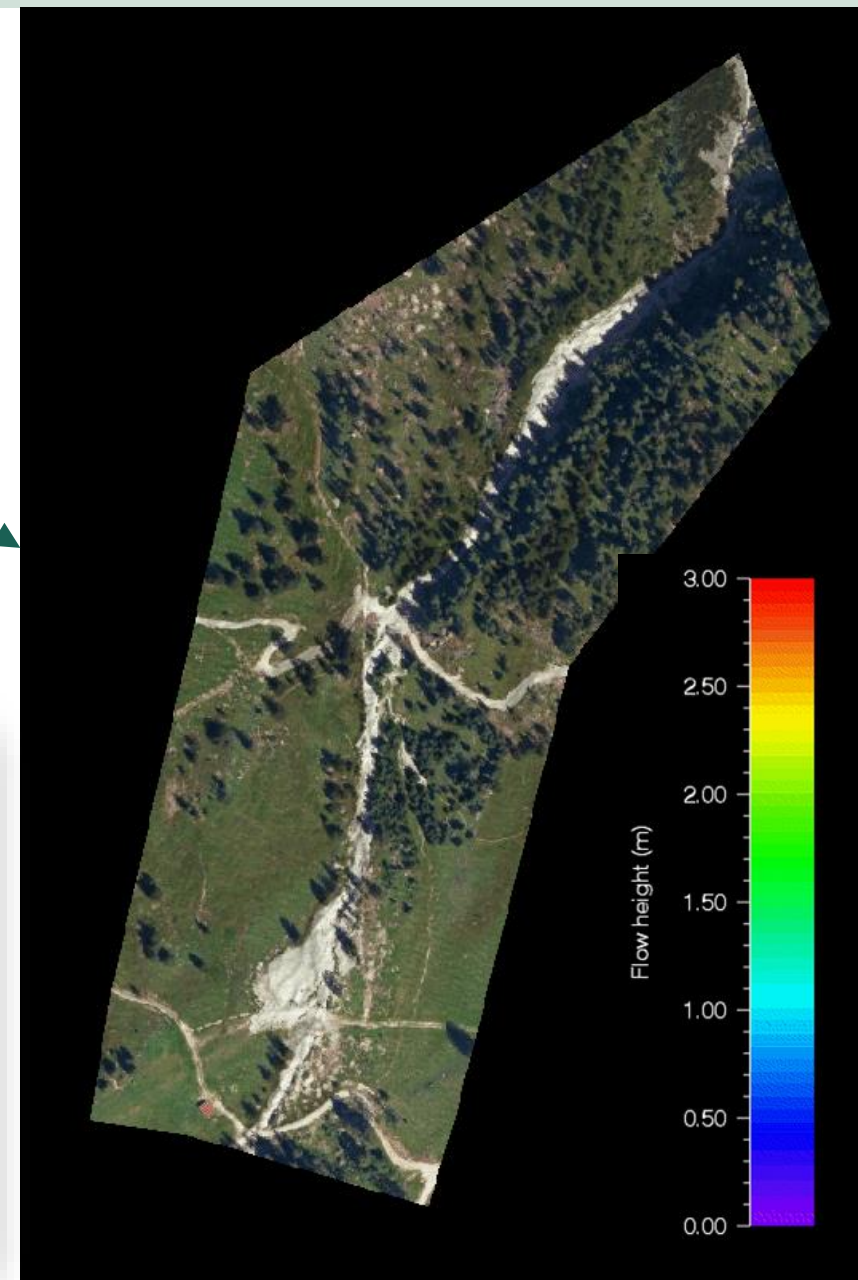
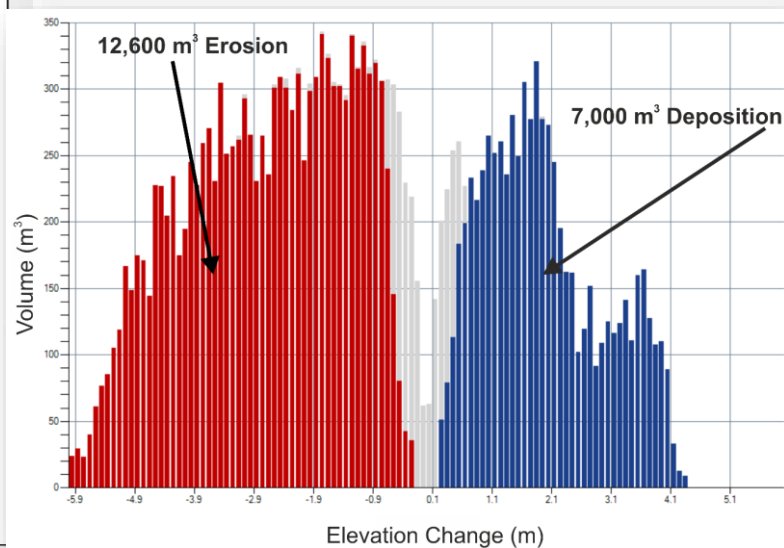


# Debris flow event June 2015 - Roßbichelgraben, Oberstdorf, Germany

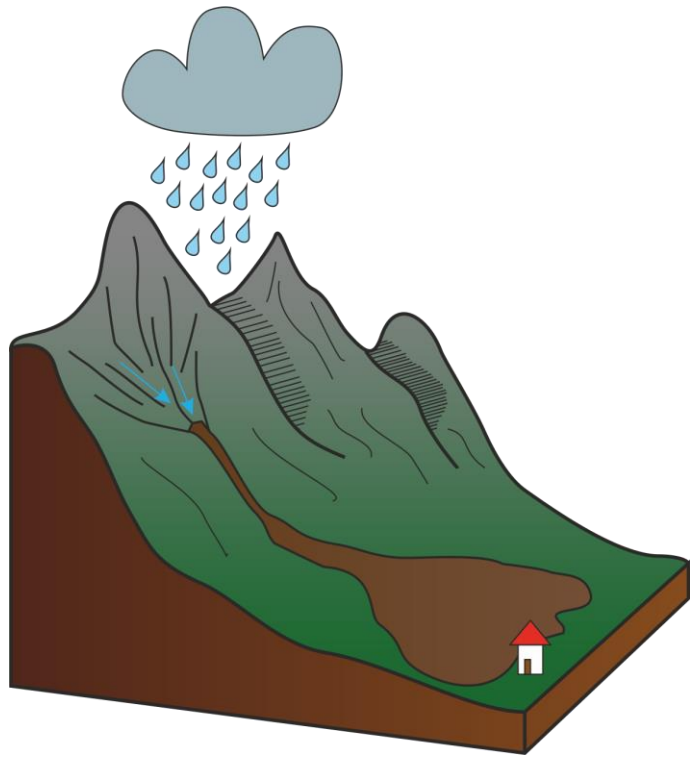


DoD 2007 - 2015

Calibration of  
numerical model in  
RAMMS::Debrisflow



# The problem with numerical debris flow models

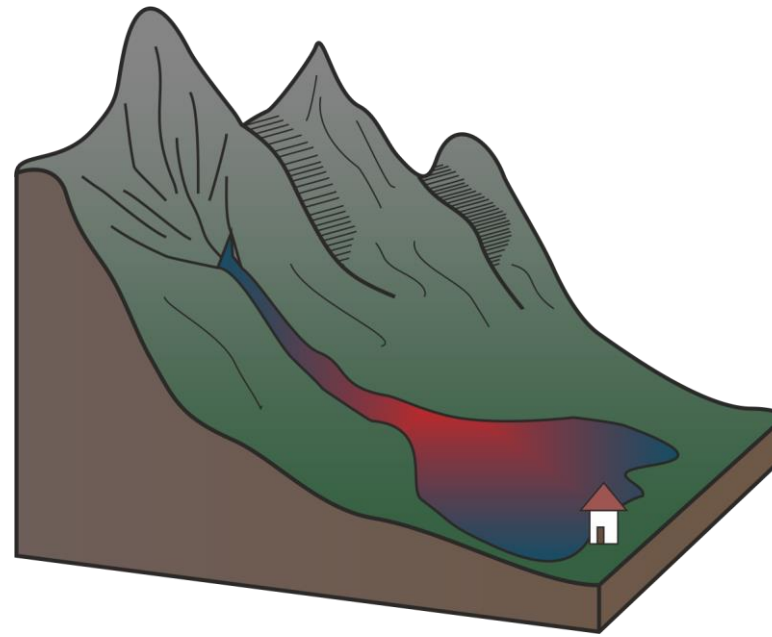


Debris flow occurs



Backward calibration of flow

Initial release volume  $\neq$  deposition volume



## Developed workflow:

Divide channel in Sections



Individual RAMMS  
simulations for each section



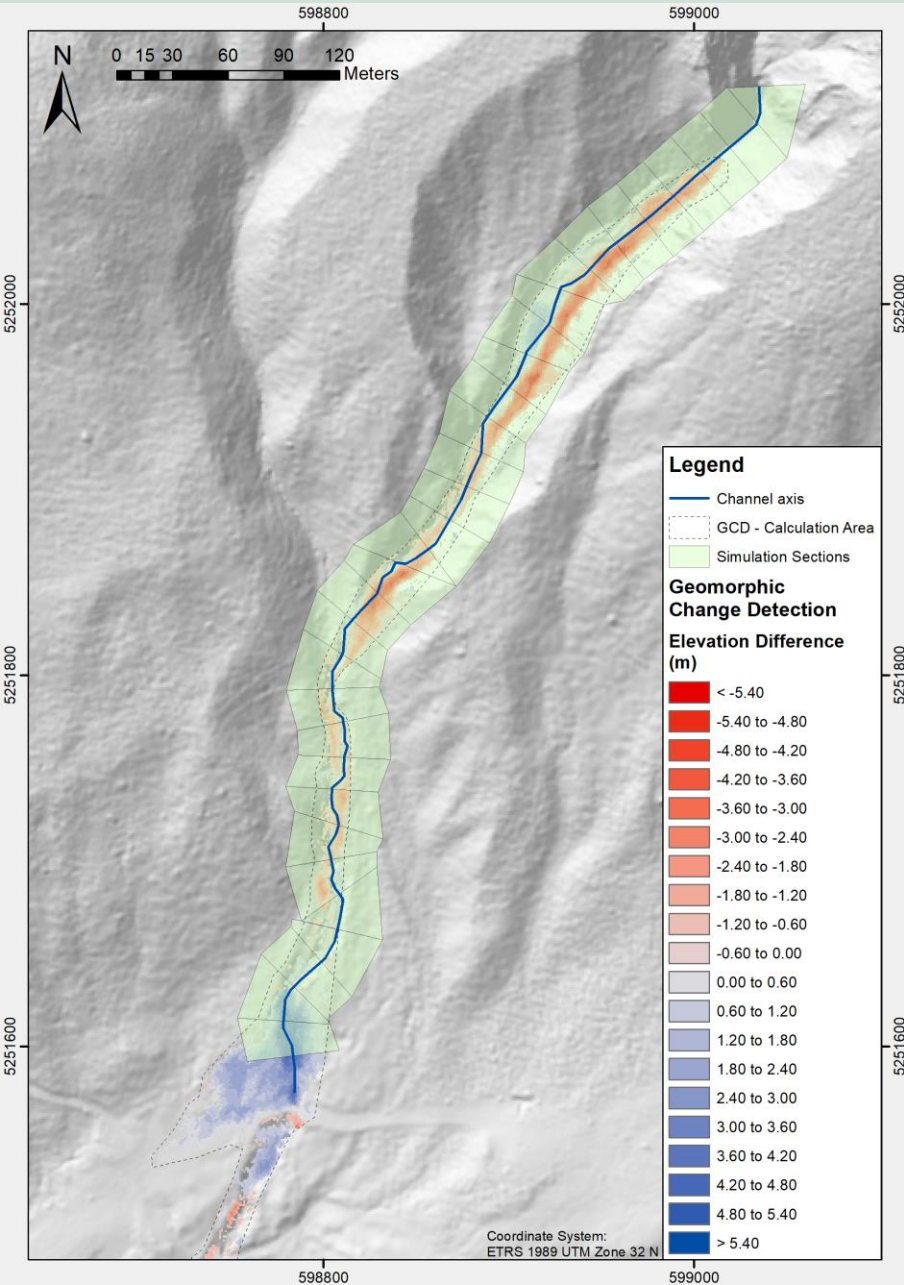
Correlate flow parameters  
and erosion depth



Forward calculation of  
channel possible

→ Can we make a model that predicts the erosion during the flow?

# Determine erosion depth in channel sections - GCD



Division in  
20 m - sections

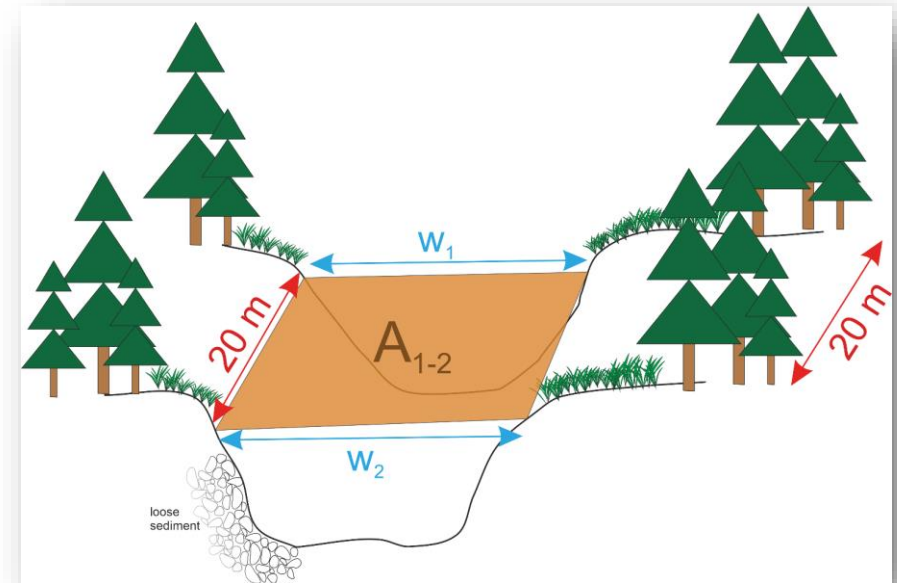


Manual determination of  
the **channel width**  $W$  at  
single profiles (DTM, Orthophoto)



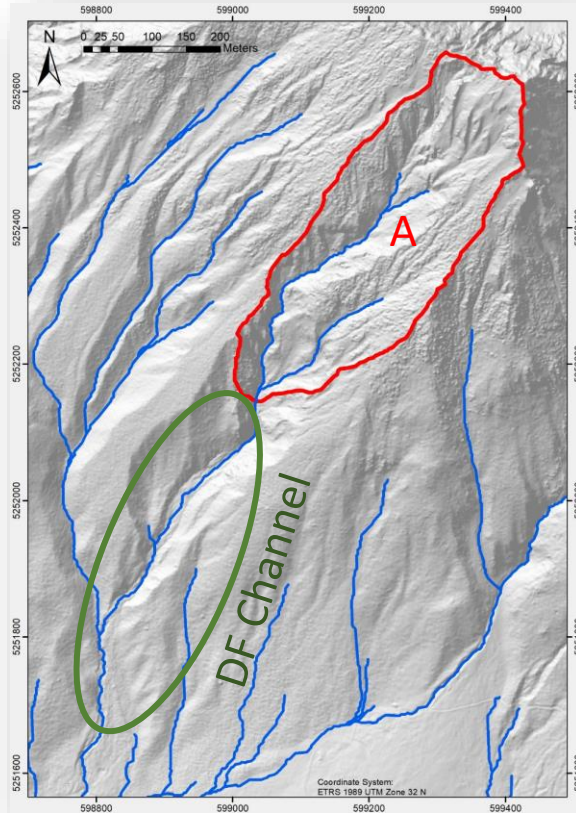
Calculation of the mean erosion  
depth in each section from DoD

$$ED_{i-(i+1)} = \frac{V_{i-(i+1)}}{A_{i-(i+1)}}$$





# Numerical modelling in single sections – determination of flow parameters at profiles



Initial release volume  $RV_0$   
determined by the size of the  
catchment above channel

$$RV_0 = A[m^2] \cdot P[mm] \cdot \Psi[-]$$

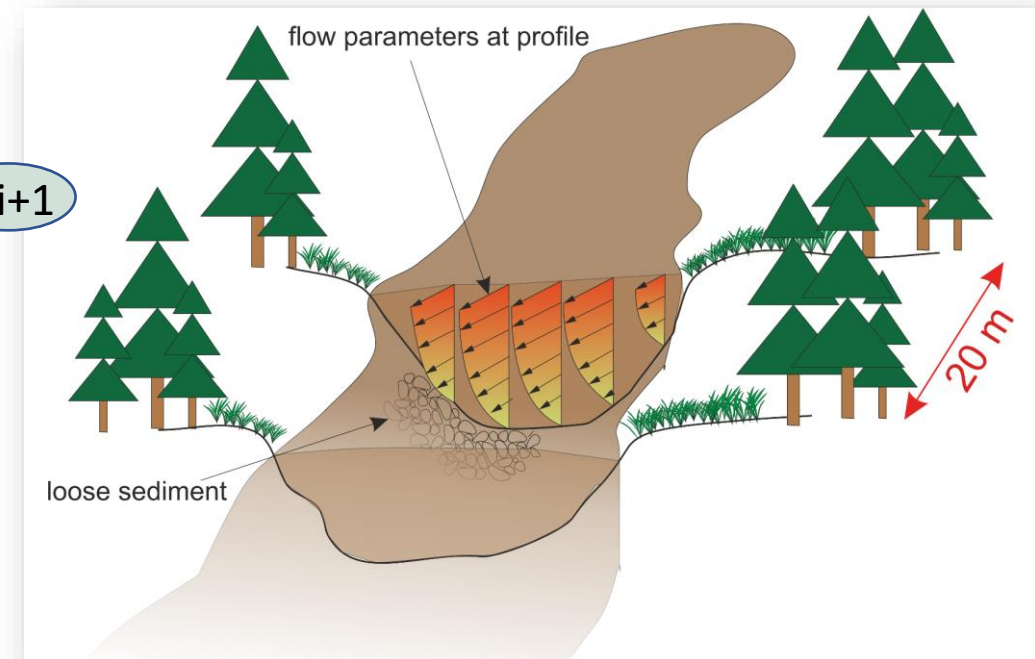
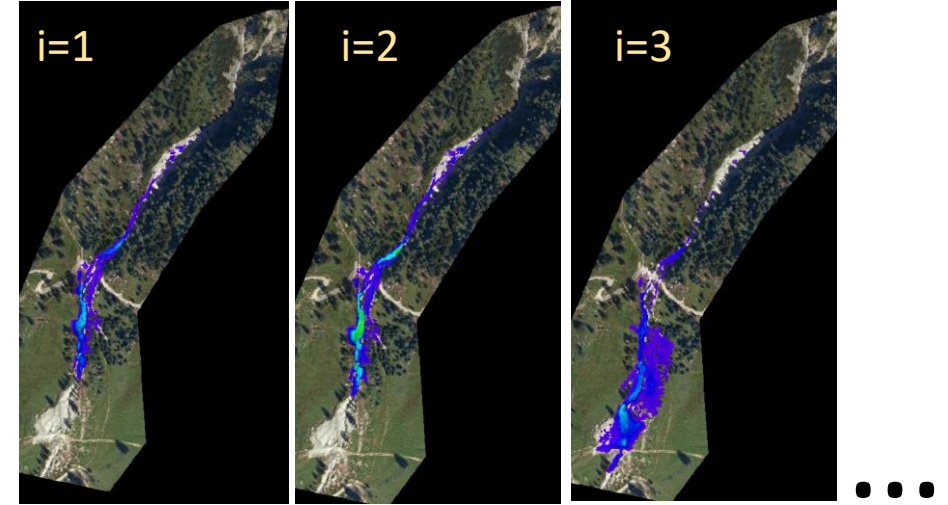
Numerical modelling of DF with RV

Read parameters at profile  $i=1$   
(velocity, momentum, shear stress)

Release volume for section  $i$ -( $i+1$ ):

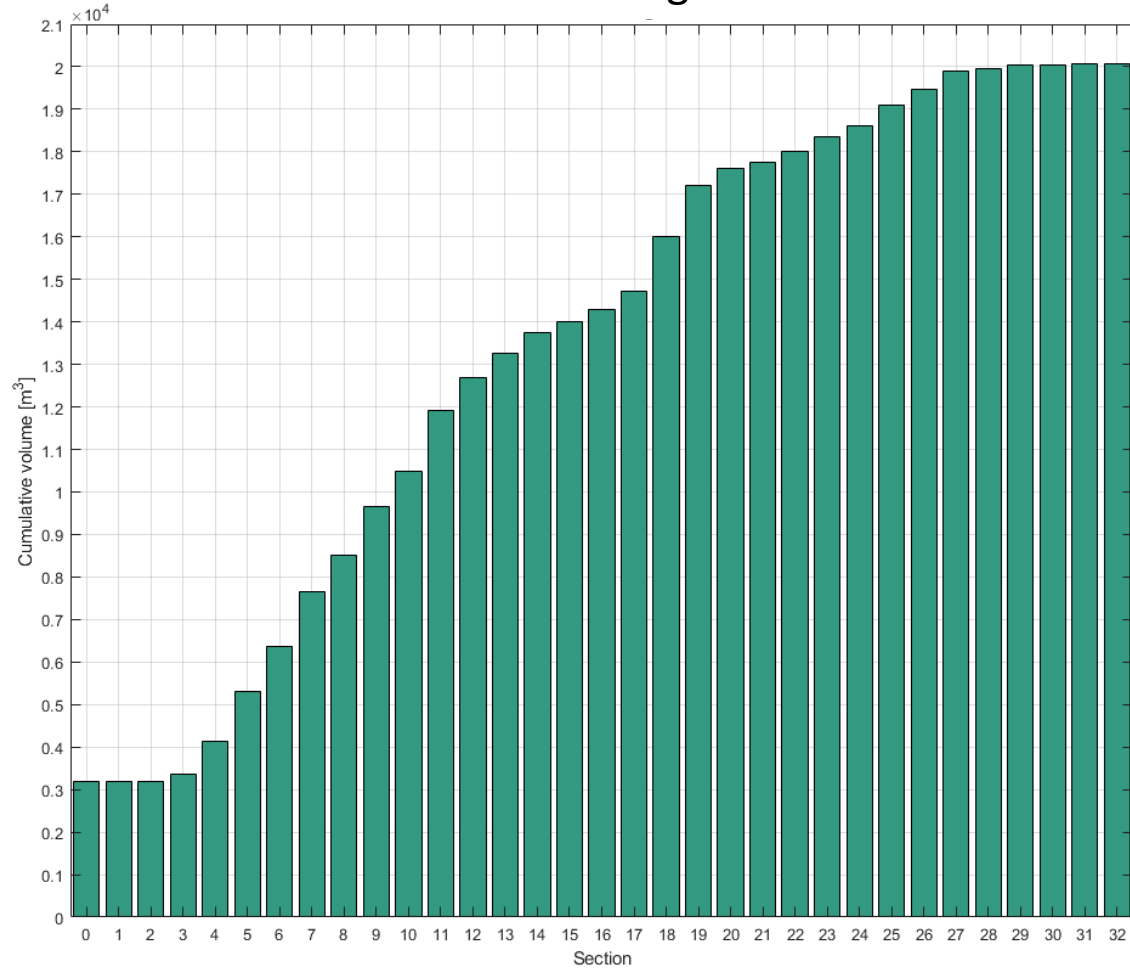
$$RV_1 = RV_0 + V_{1-2}$$

Individual calculations for each section  
→ Parameters at every profile

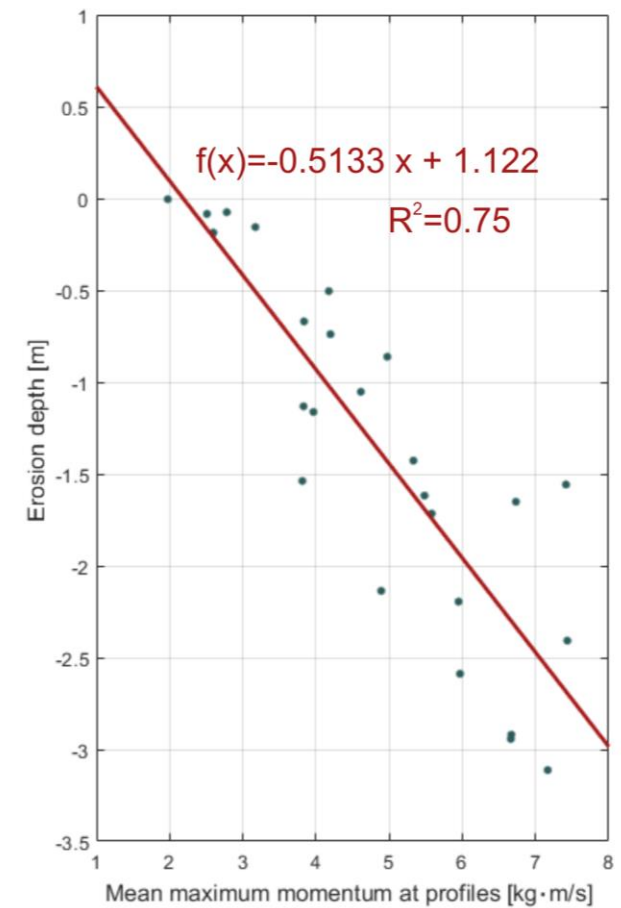
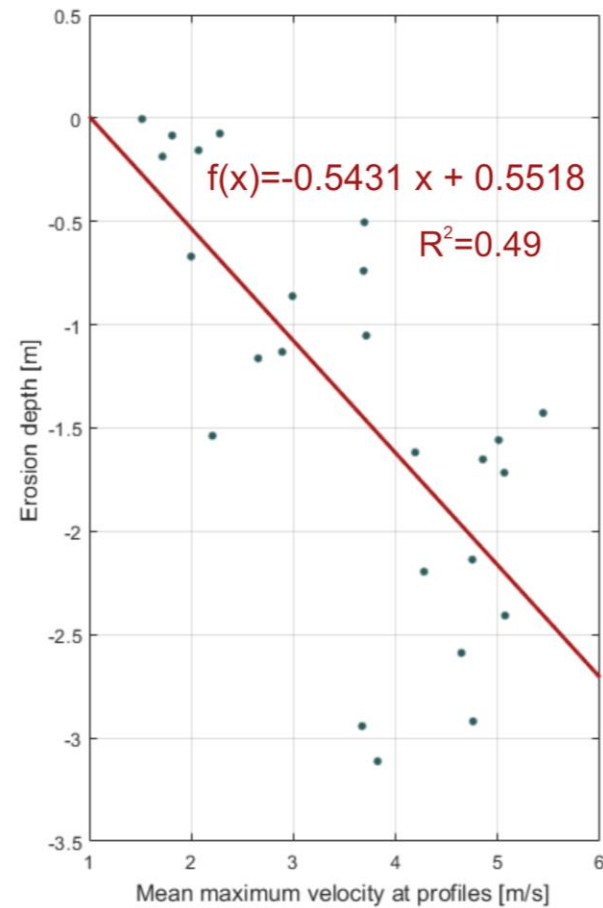


# Preliminary results

## Release volume for single sections



## Scatter plots of flow parameters vs. Erosion depth ED



**NEXT STEPS:** Forward modelling by calculating erosion in sections with functions  
Calibration of several different channels



# Thank you for your attention!

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