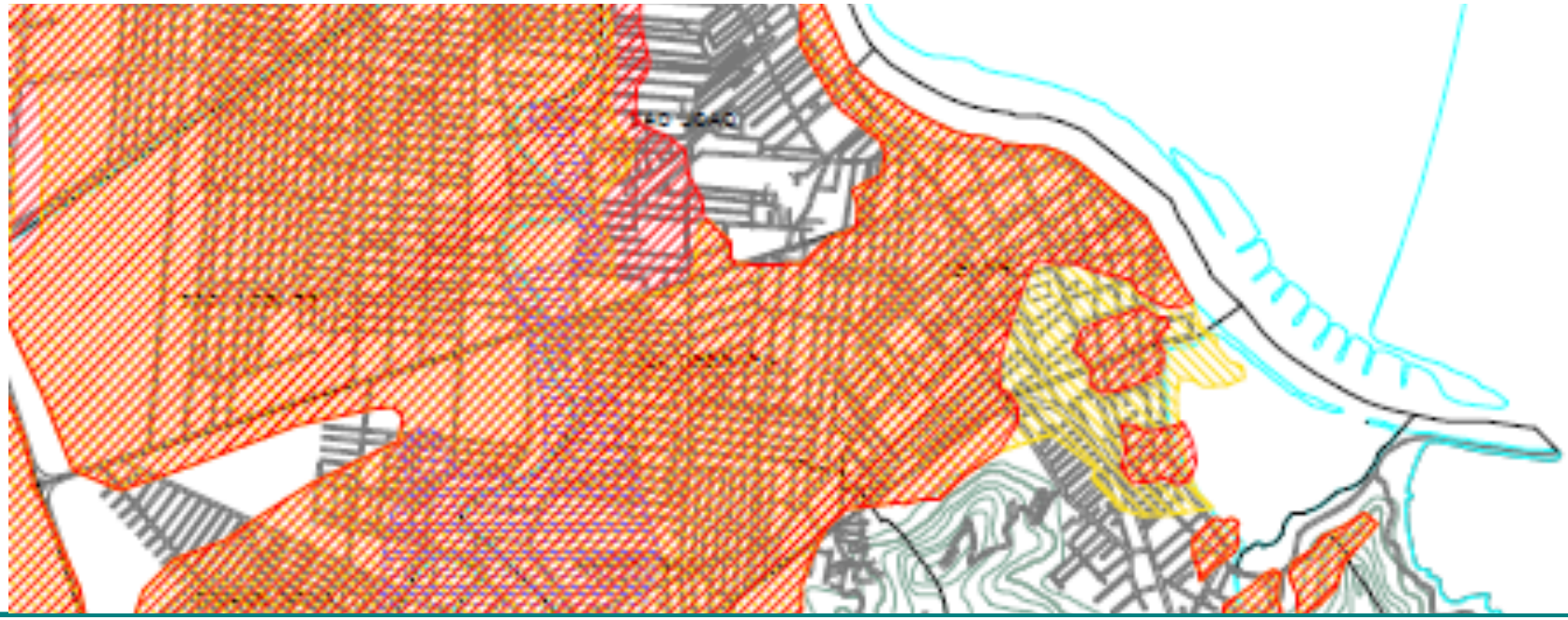
OPTIMIZATION OF NUMERICAL MODELLING IN THE CONTEXT OF SENSITIVITY ANALYSIS

Bruno Oliveira



STOCHASTIC NUMERICAL MODELLING OF FLUVIAL MORPHODYNAMICS

METHODOLOGY FOR STOCHASTICALLY GENERATING MODEL INPUT

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EXISTING NUMERICAL HYDRODYNAMIC AND MORPHODYNAMIC MODELS

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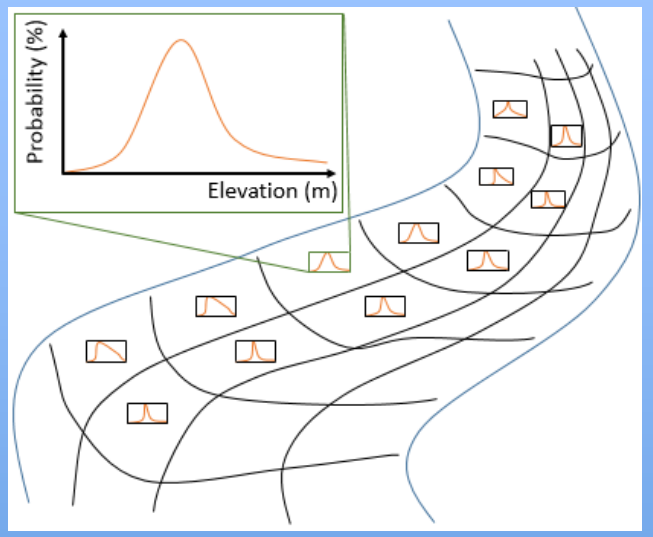
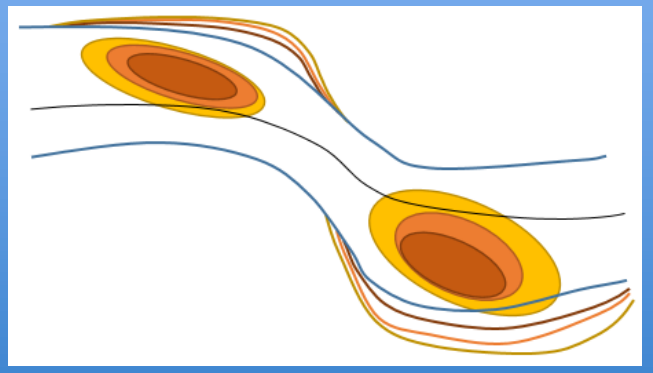
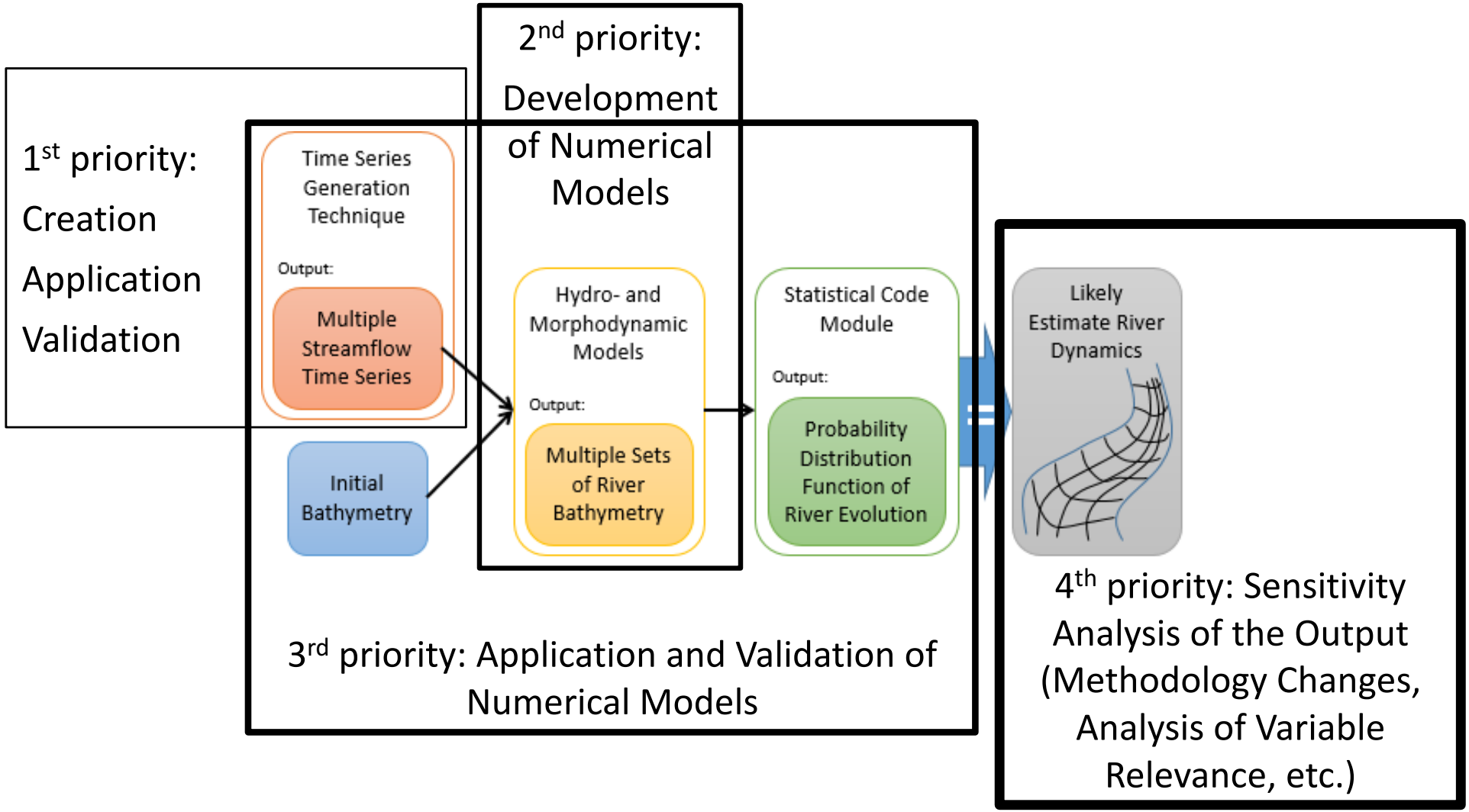
GOAL





Main Objectives



Work Plan

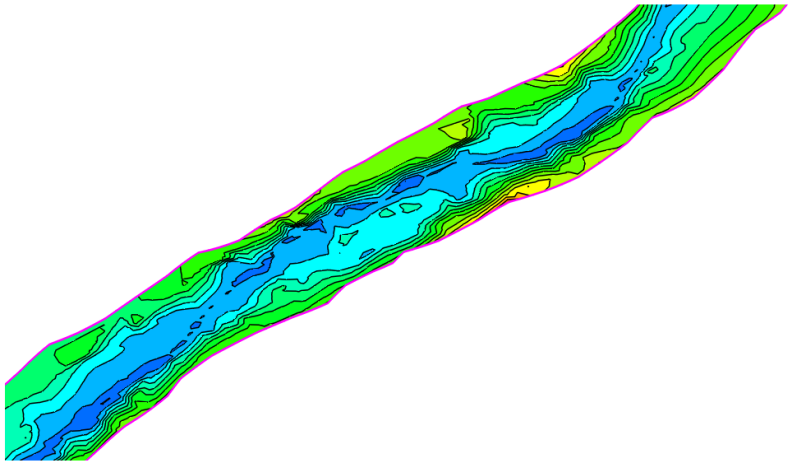
- Collection of in-situ information from case study(ies)
- Collection of historical records
- Stochastic Series Generation

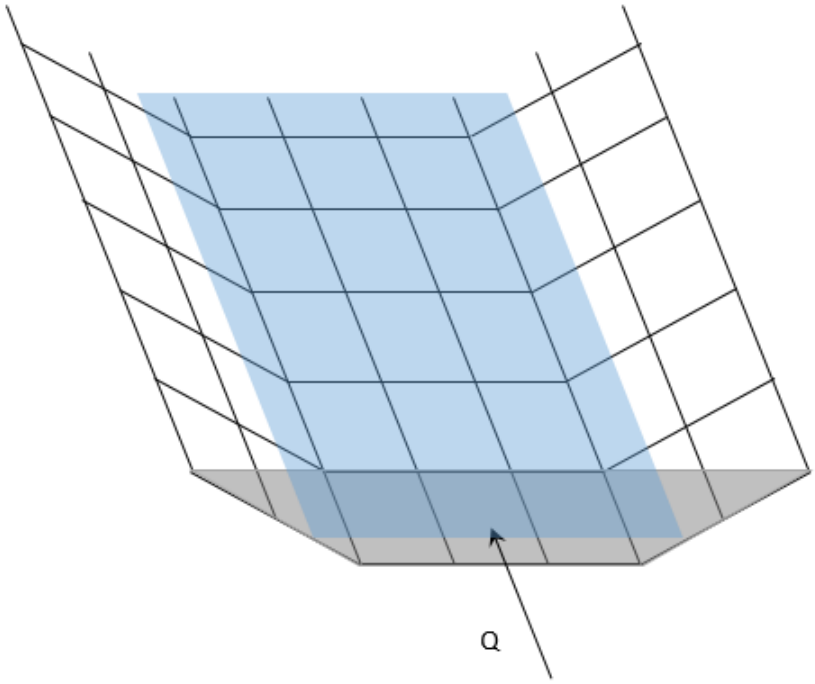
- Development of the hydro- and morphodynamic models
  - Model Selection and Integration
- Application of the methodology
  - Calibration, Application and Analysis
- Sensitivity analysis
  - Analysis of Variable Relevance
  - Etc.
- Structural Safety Analysis

Present Stage

Work completed so far

- Data collection on case study
  - Appended simplified example case study
- Finalized Stochastic Series Generation Methodology (paper presently under review)
- Selected numerical model for PhD (CCHE2D)
- Methodology for numerical model optimization





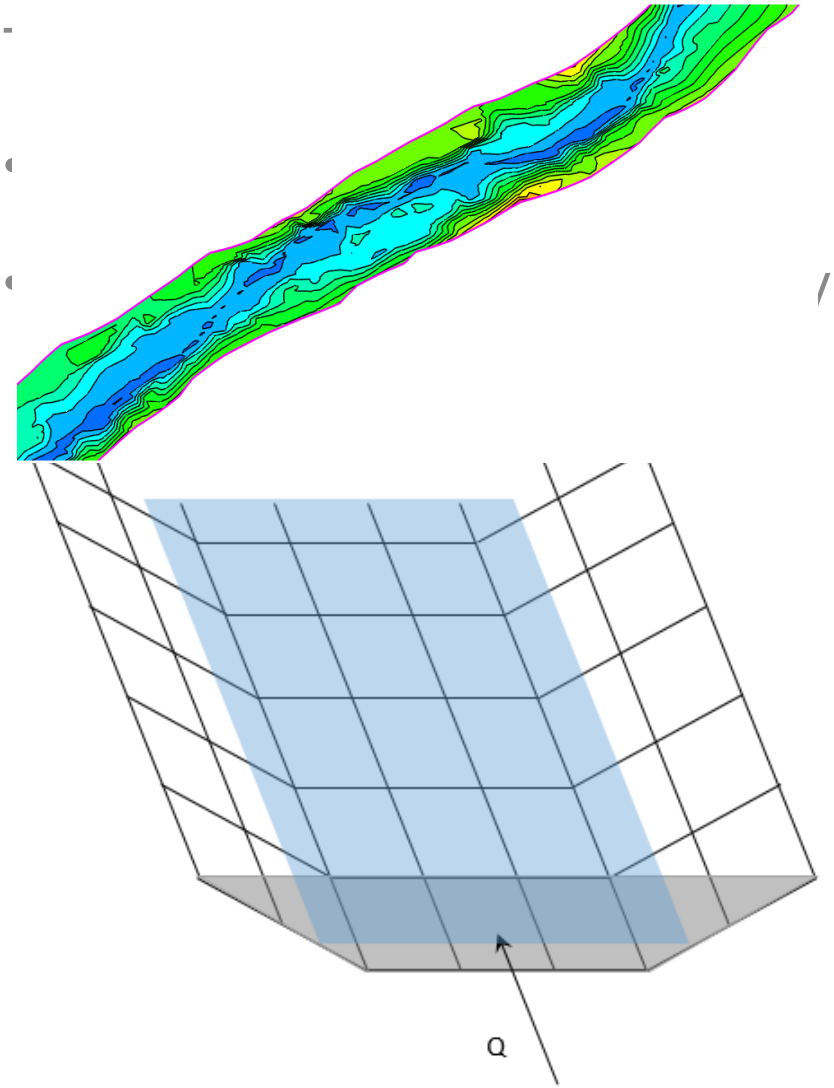
Case Studies

Mondego River

Data from two stretches in the Mondego river

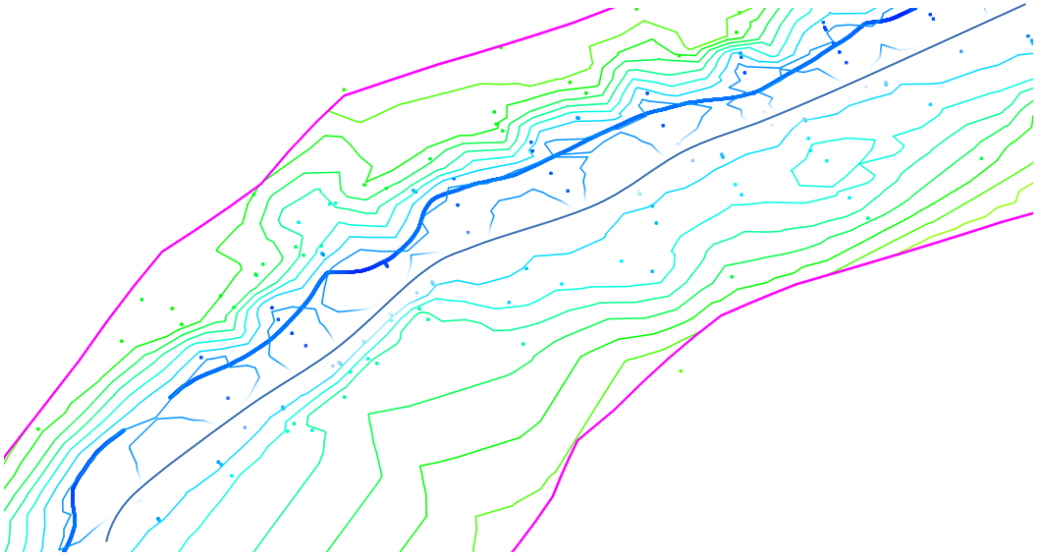
- Available bathymetry and topography data
- Point measurements of granulometry
- Well-defined boundaries
- Large hourly records of streamflow values

Simplified Channel



Numerical Model Optimization

5 VARIABLES,
4000 CELLS,
5-10 YEAR LONG
SIMULATIONS



Objective: Reducing model uncertainty

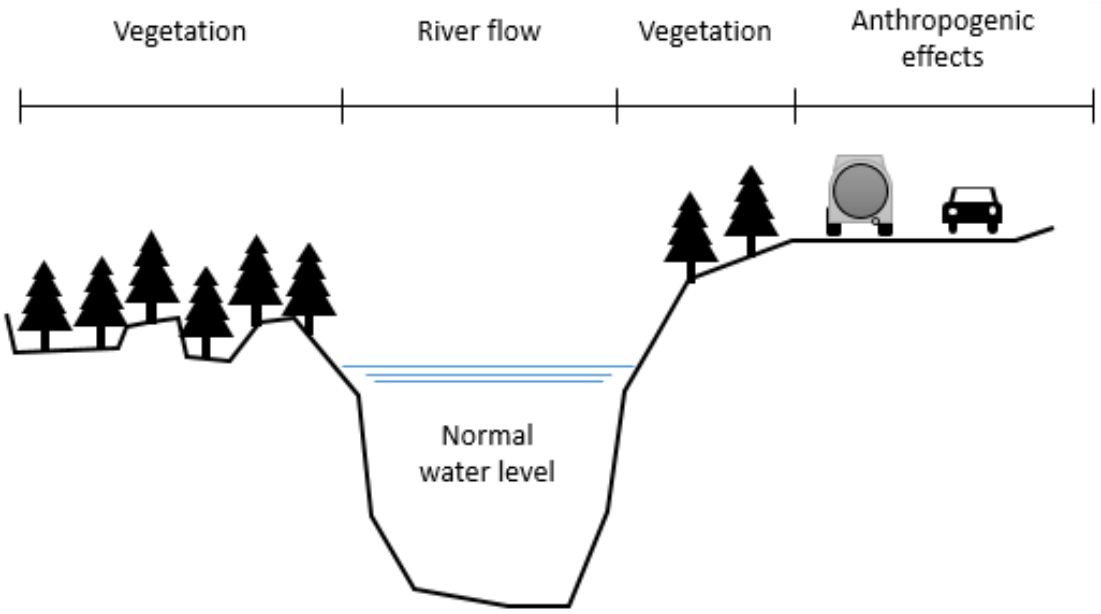
Focus: Bathymetry and Topography data

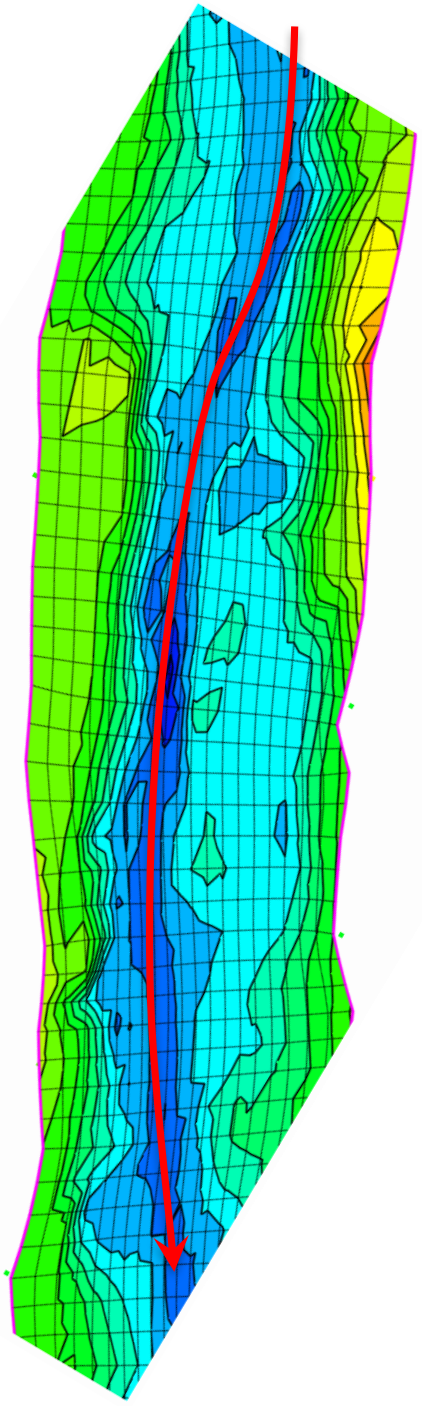
Numerical Model Optimization

Pre-modelling

Fluvial morphodynamics forcings include:

- River flow
- Vegetation
- Anthropogenic effects

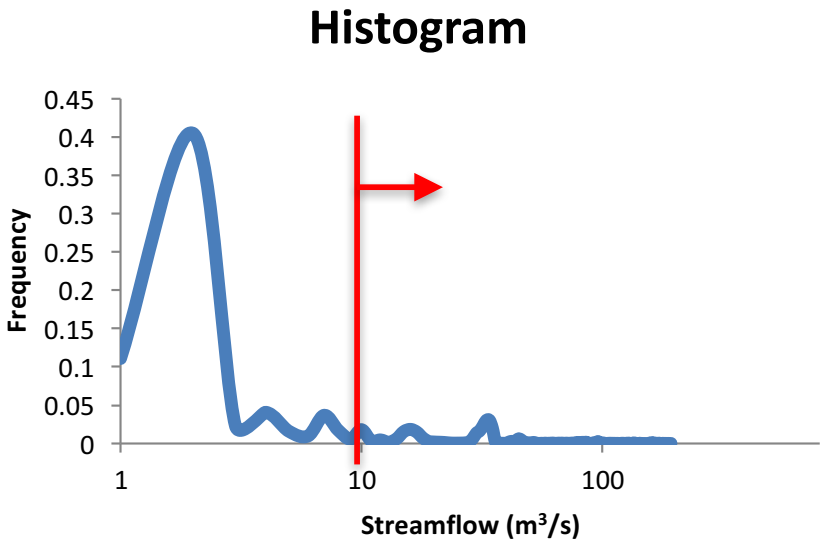


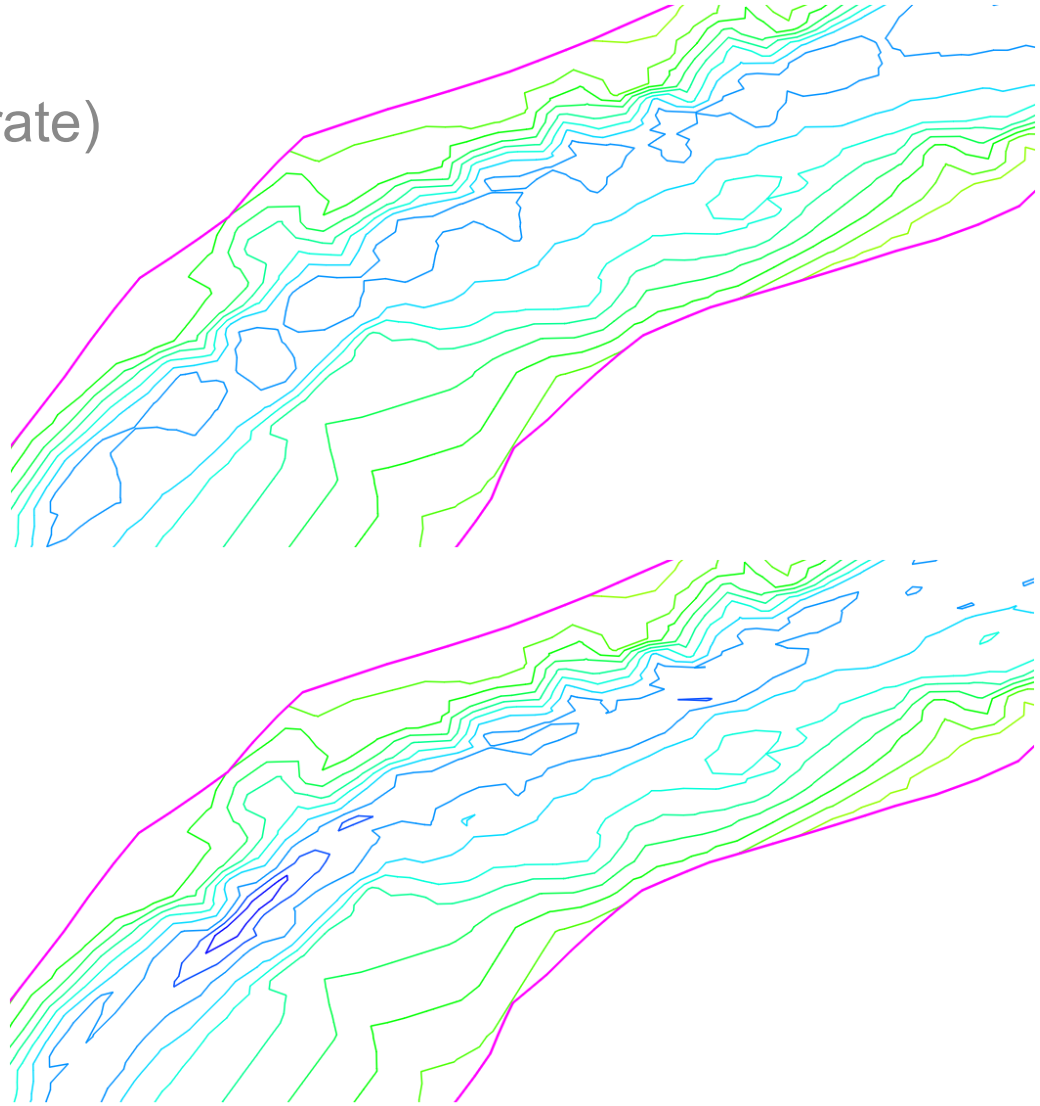


Numerical Model Optimization

Reduced model uncertainty implies:

- Better quality results (more accurate)
- Faster simulations
- Clearer comparison of different solutions (more precision)
- Clearer sensitivity analysis





Future Work

- Journal paper "*Pre-modelling as a tool for the optimization of morphodynamical numerical simulations*"
- Completion of numerical modelling process
- Sensitivity Analysis (& preparation for publication)

Thank you for your attention!

The End