Danube Sediment Management
Restoration of Sediment Balance in the Danube
A still ongoing project preparation

Values in fluvial ecosystems to protect and preserve
All depending a lot on hydro-morphology

Water - sediment - vegetation interaction mechanism

Space- and timescales very different from each other, strong seasonality etc., issues on fish habitat
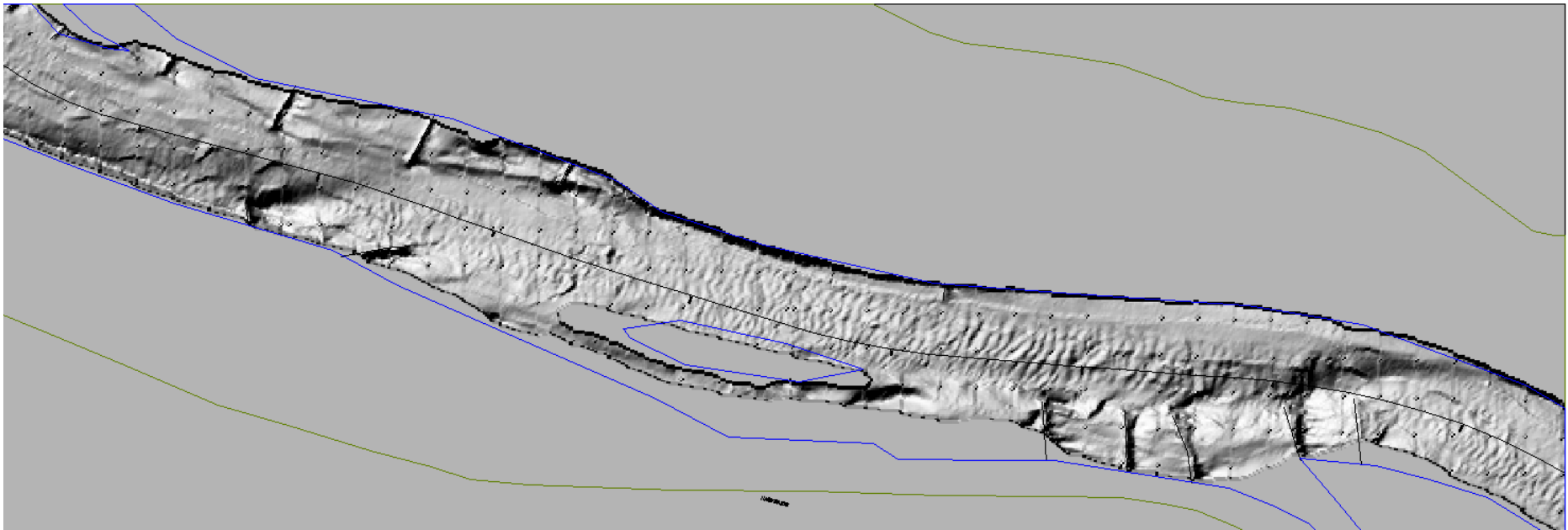
River Danube, sense of flow

Example:
Main channel of River Danube between 1802-1792 rkm

Width: ~300 m
Depth: 0-10 m

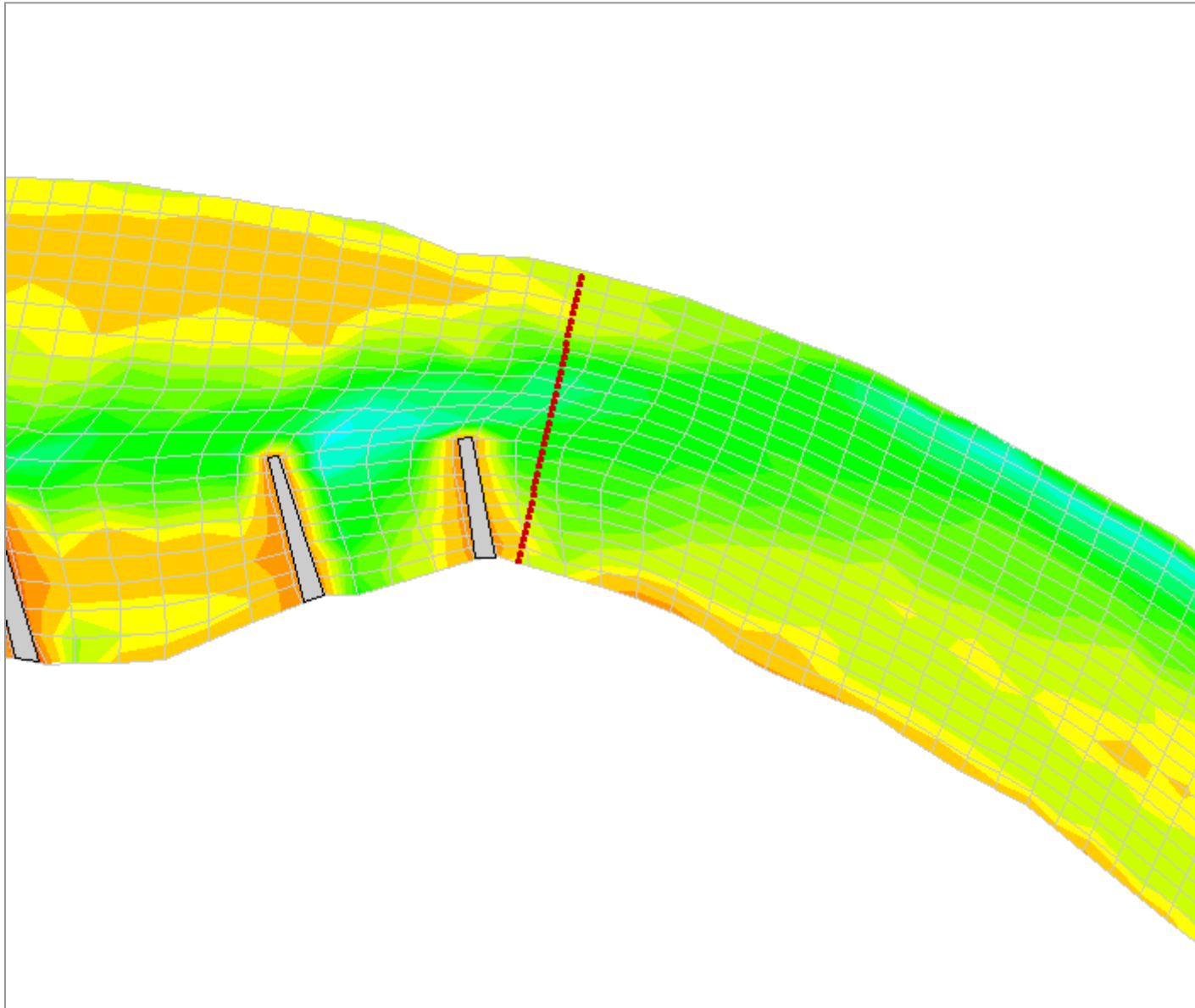Part of the high resolution digital bed elevation model
See complexity!

Sampling the bed surface by freezer plates
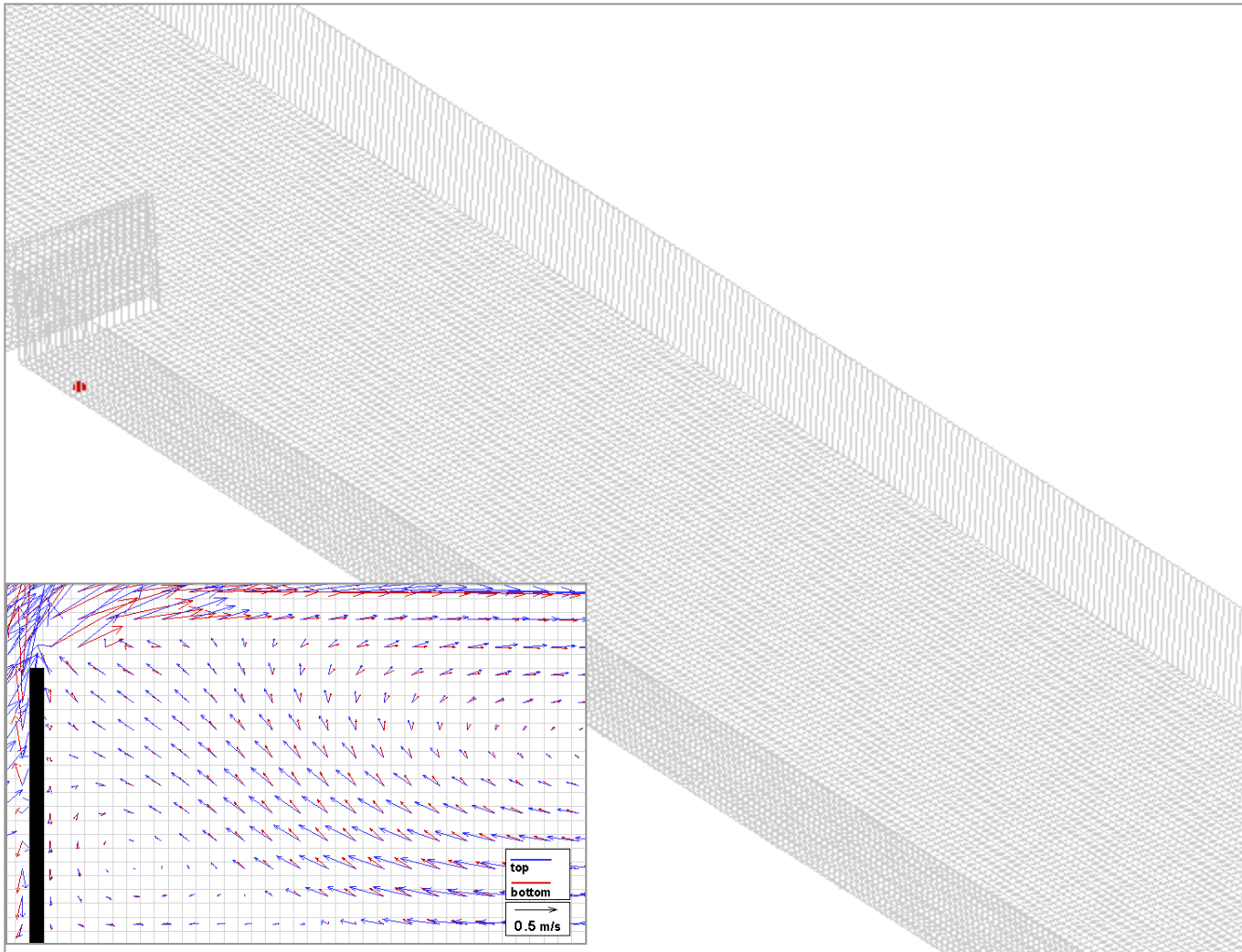# to see the bottom surface as e.g. benthic habitat location

The motion of water particles
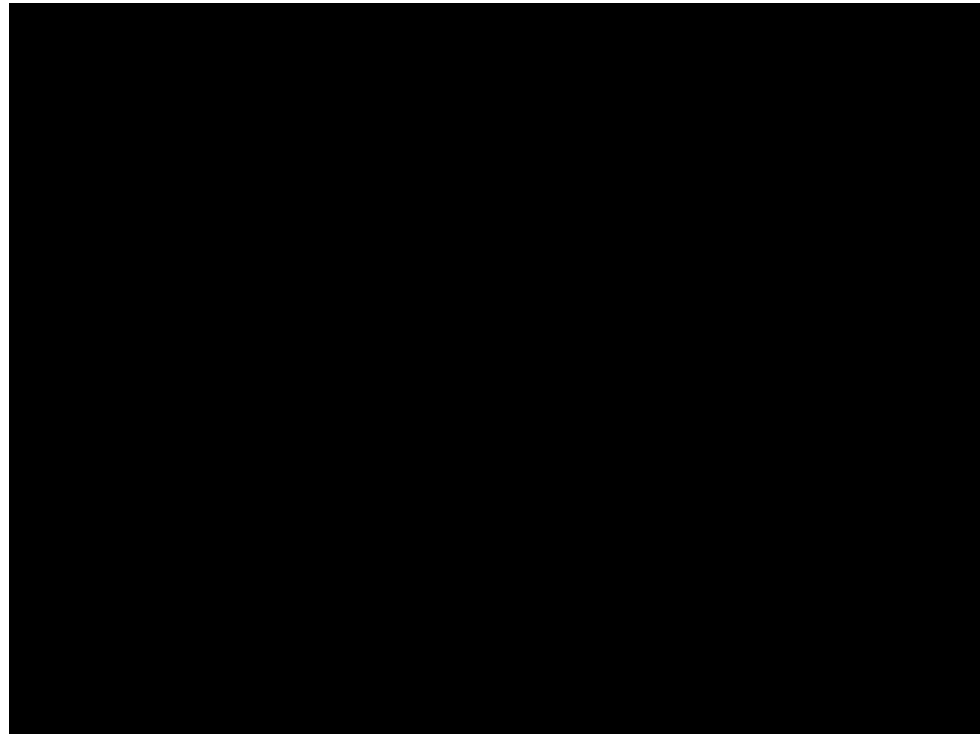in such a complex flow pattern

A closer look at the complexity of the flow behind a groin

Typical 3D path of a water or very light solid particle
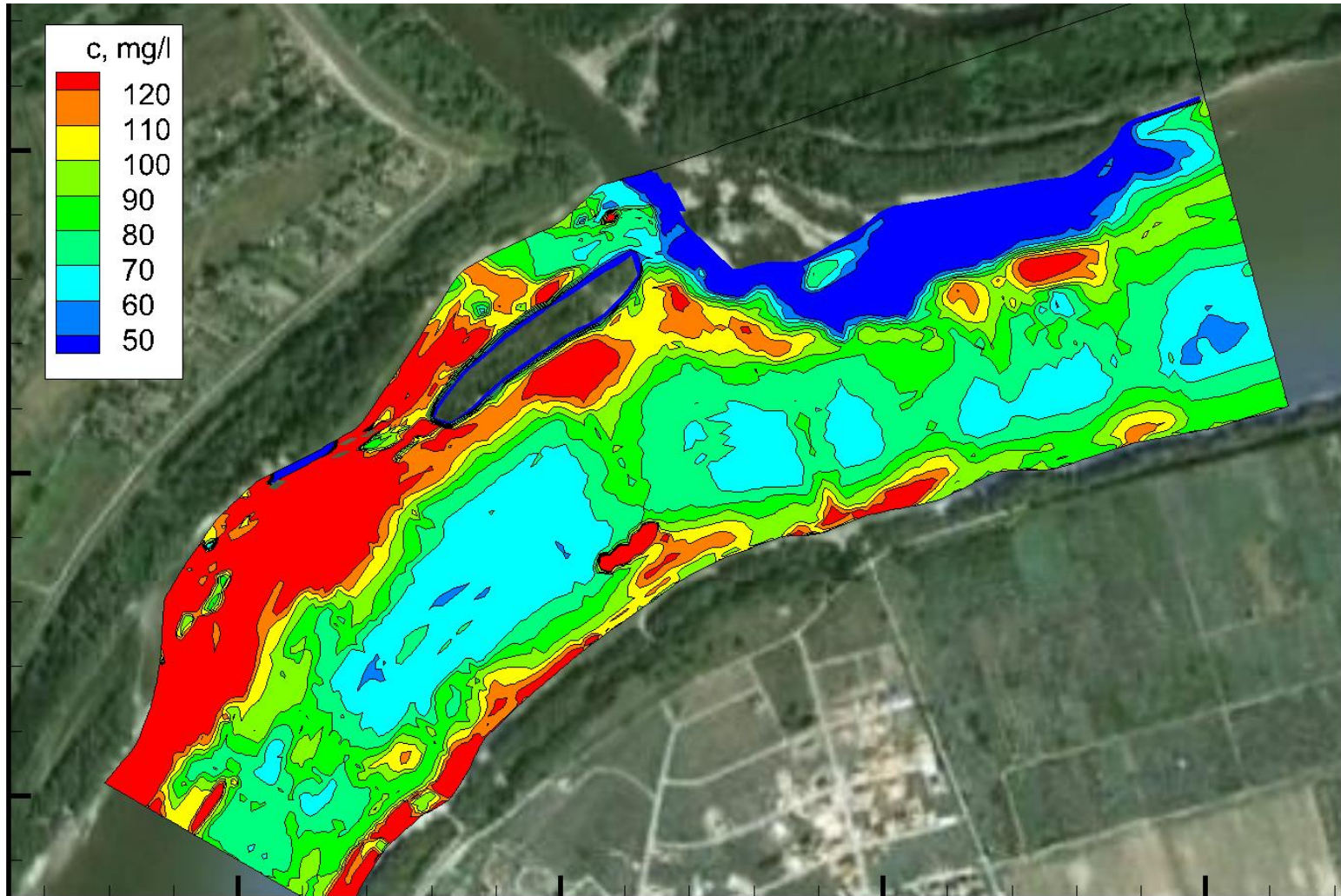
Up-to-date investigation methods

- <u>Bathymetry</u>: Single- or multi-beam Echo sounder

- <u>Flow velocity</u>: Fixed and moving ADCP

- <u>Suspended sediment</u>: Laser-based Lisst-SL

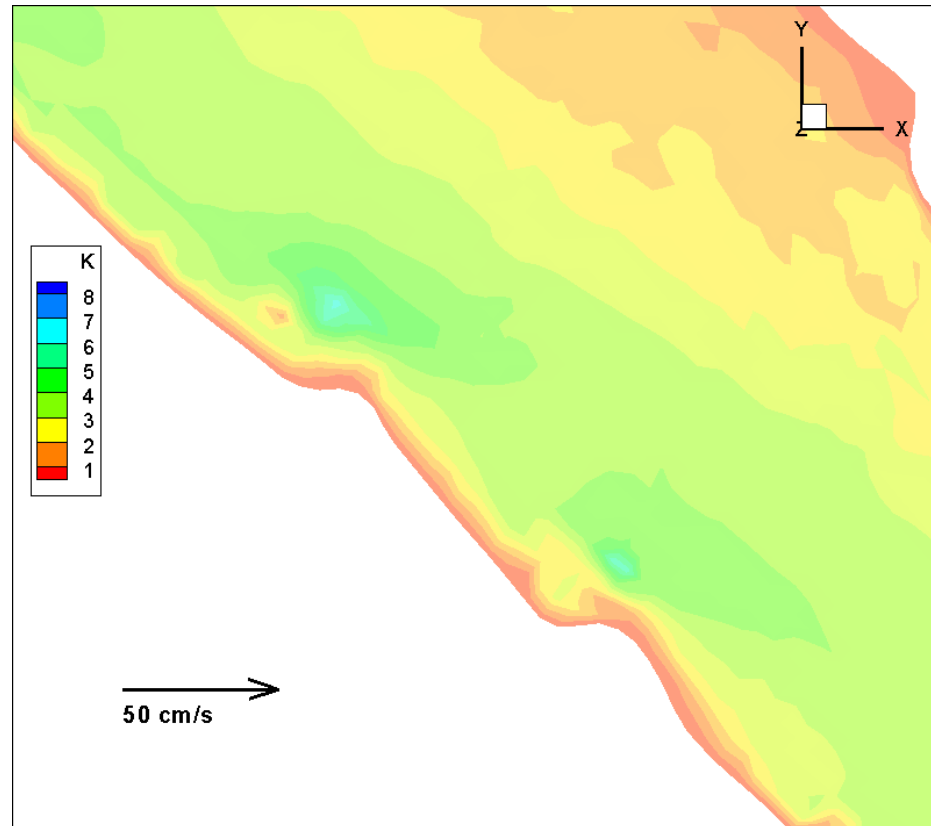- <u>Bed material</u>: bucket sampler and bead-load samplers
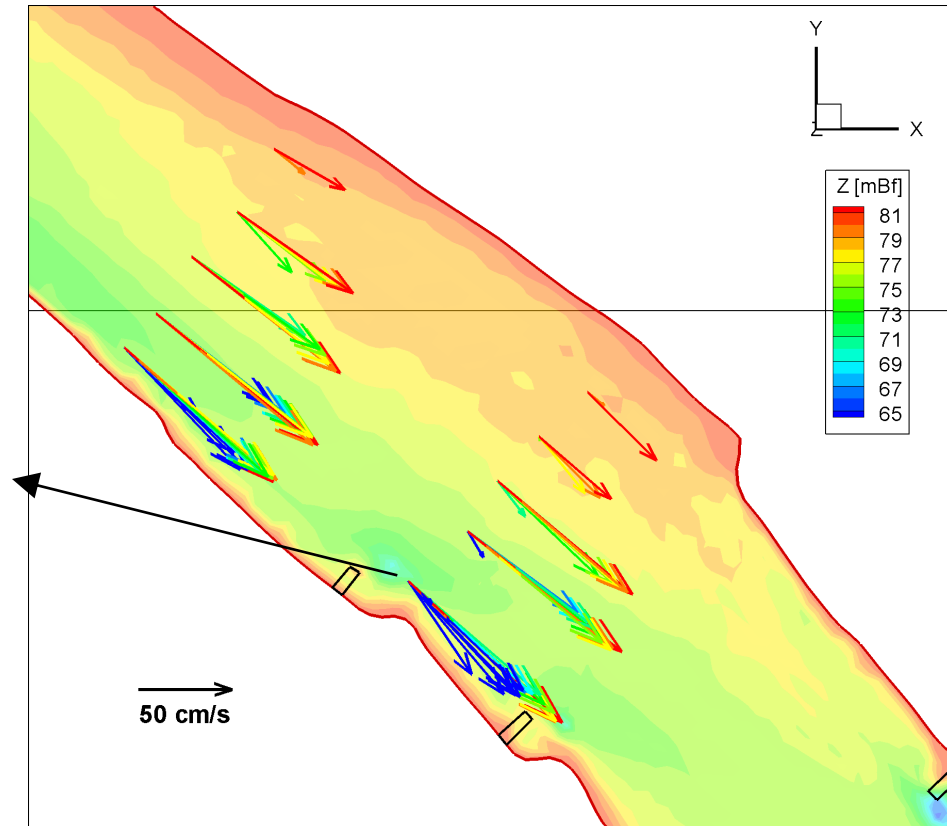
Mapping suspended sediment distribution (LISST-SL)

Long term fixed boat ADCP measurements

- Sampling frequency: 2.5 Hz
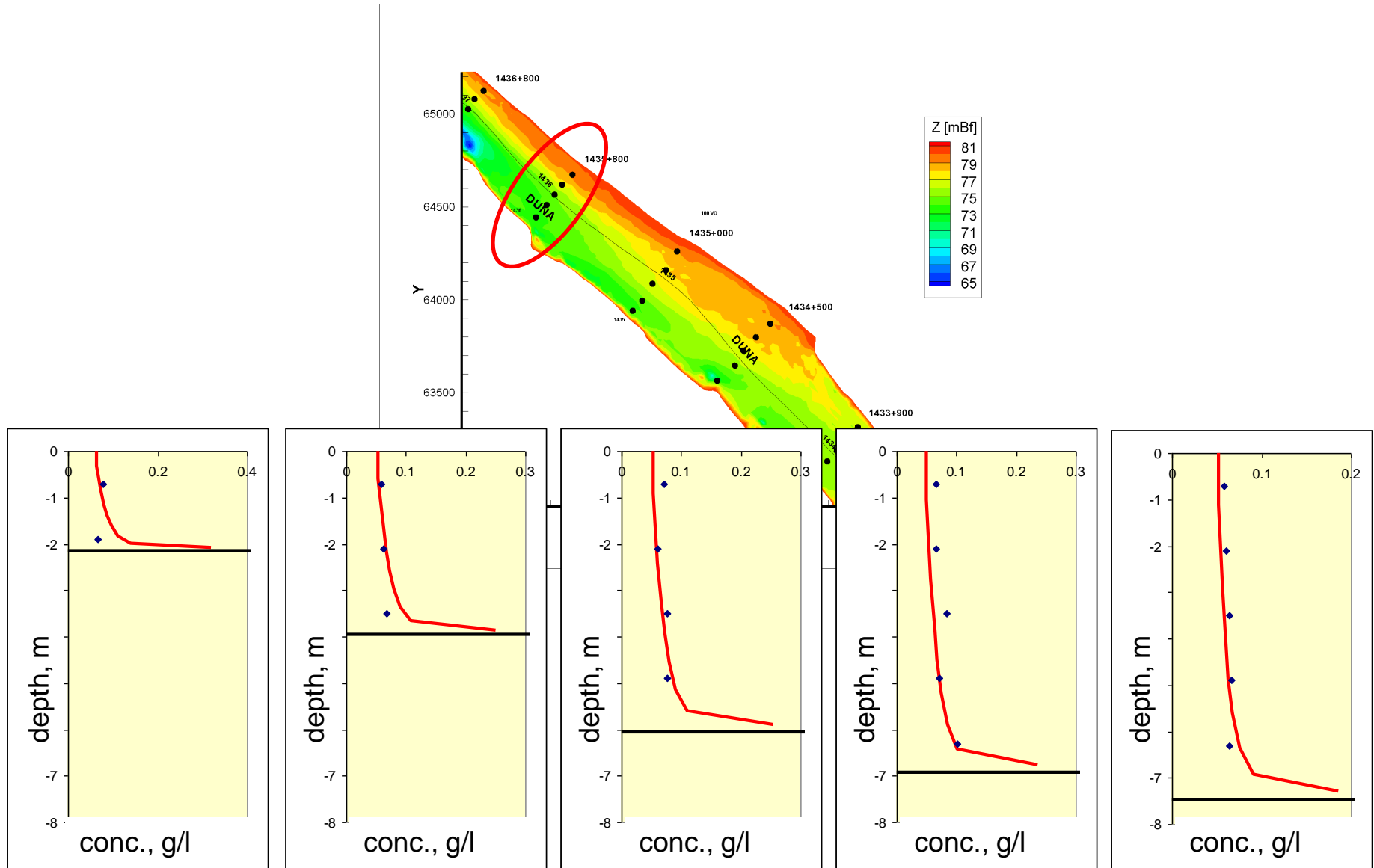- Measurement intervall: 10 min

Instantaneous velocity vectors in the vertical   **Time-averaged vectors**
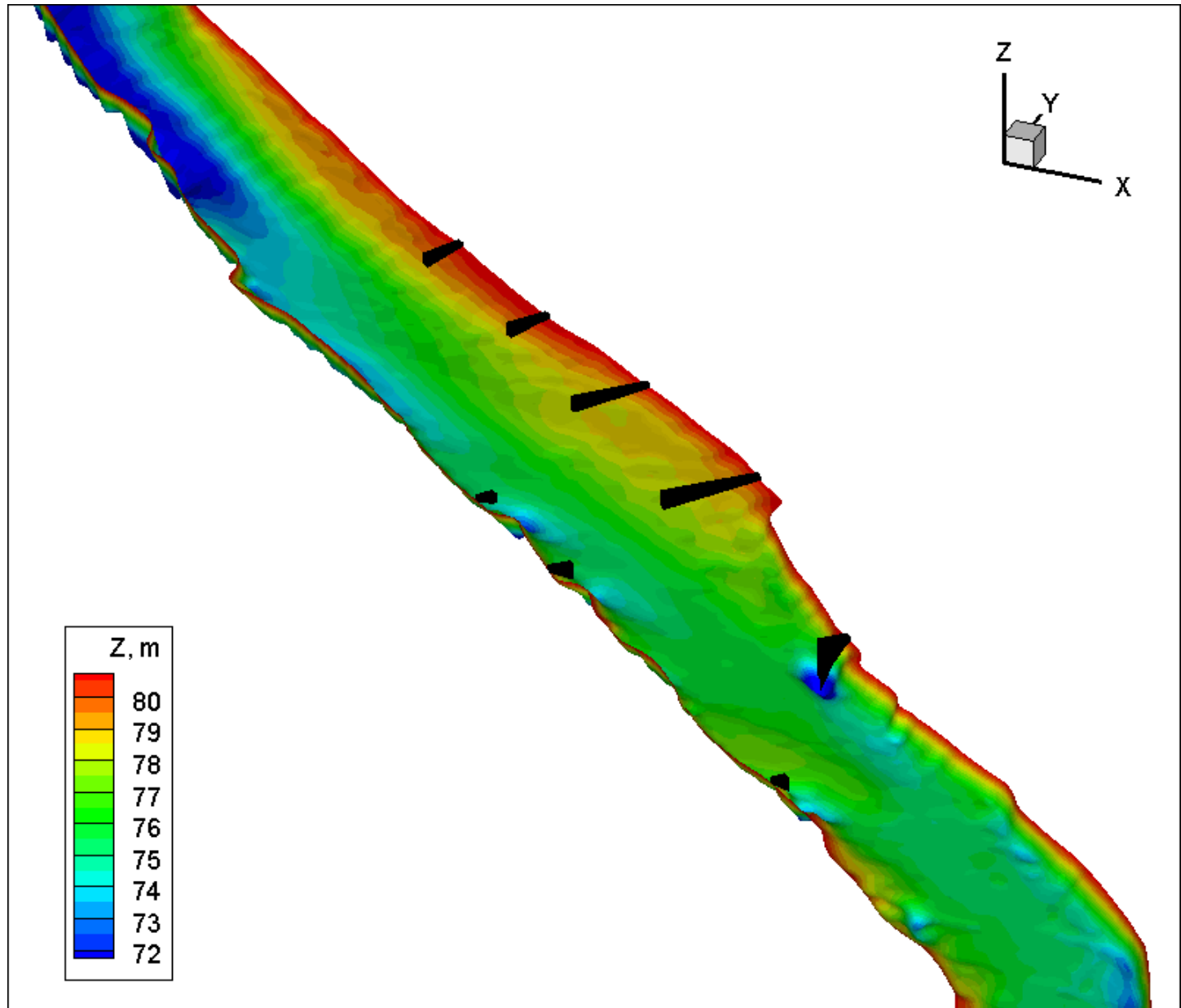
3D flow and sediment transport modellingwith calibration and verification against field data verification

Modelled morphological changes due to new groins

Modelled morphological changes due to new groins
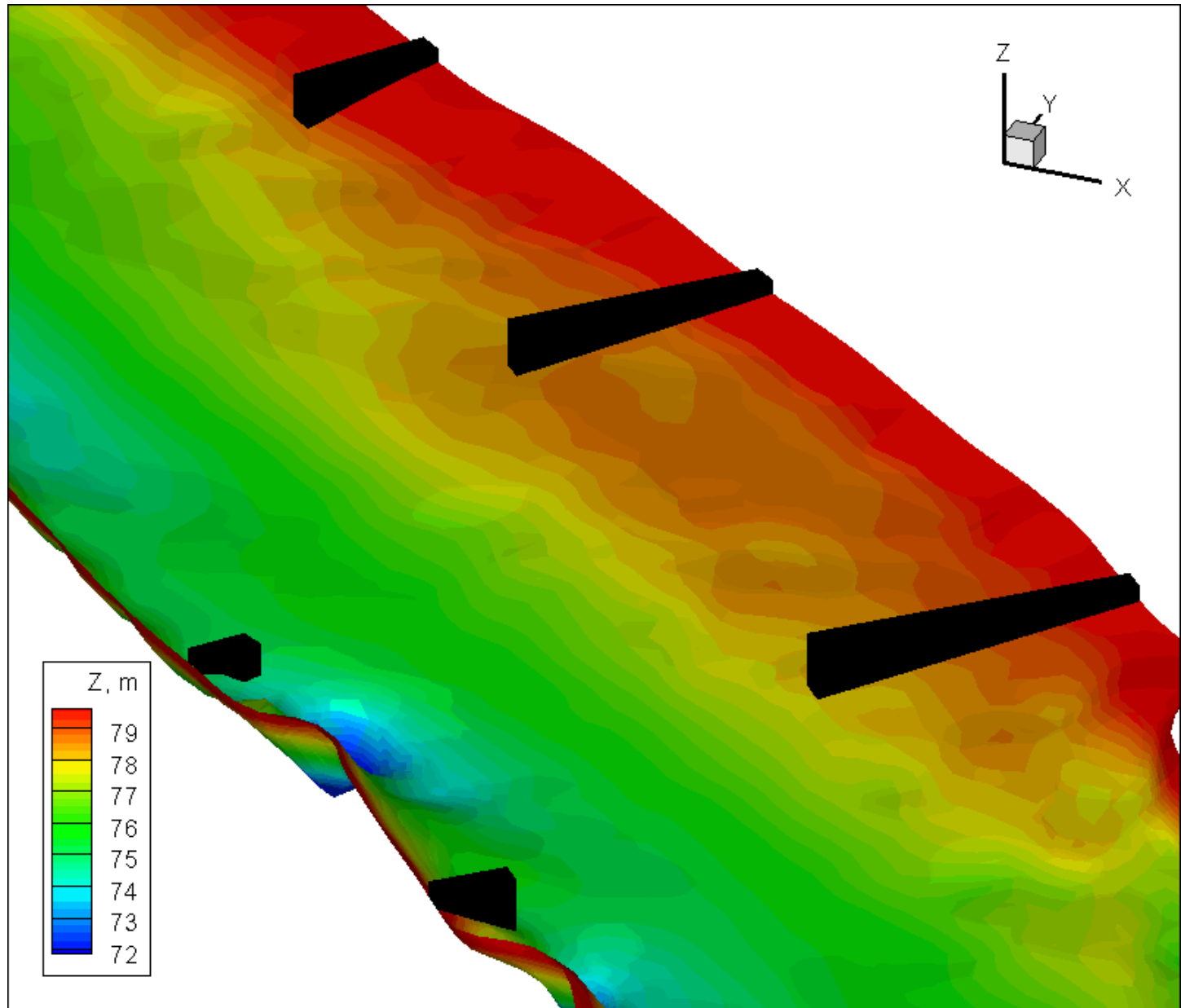
Modelled water depth changes

(according to low flow regime), favourable for navigation

Present   **Simulated**

water depth, m

	6
	5
	4
	3
	2
	1
	0
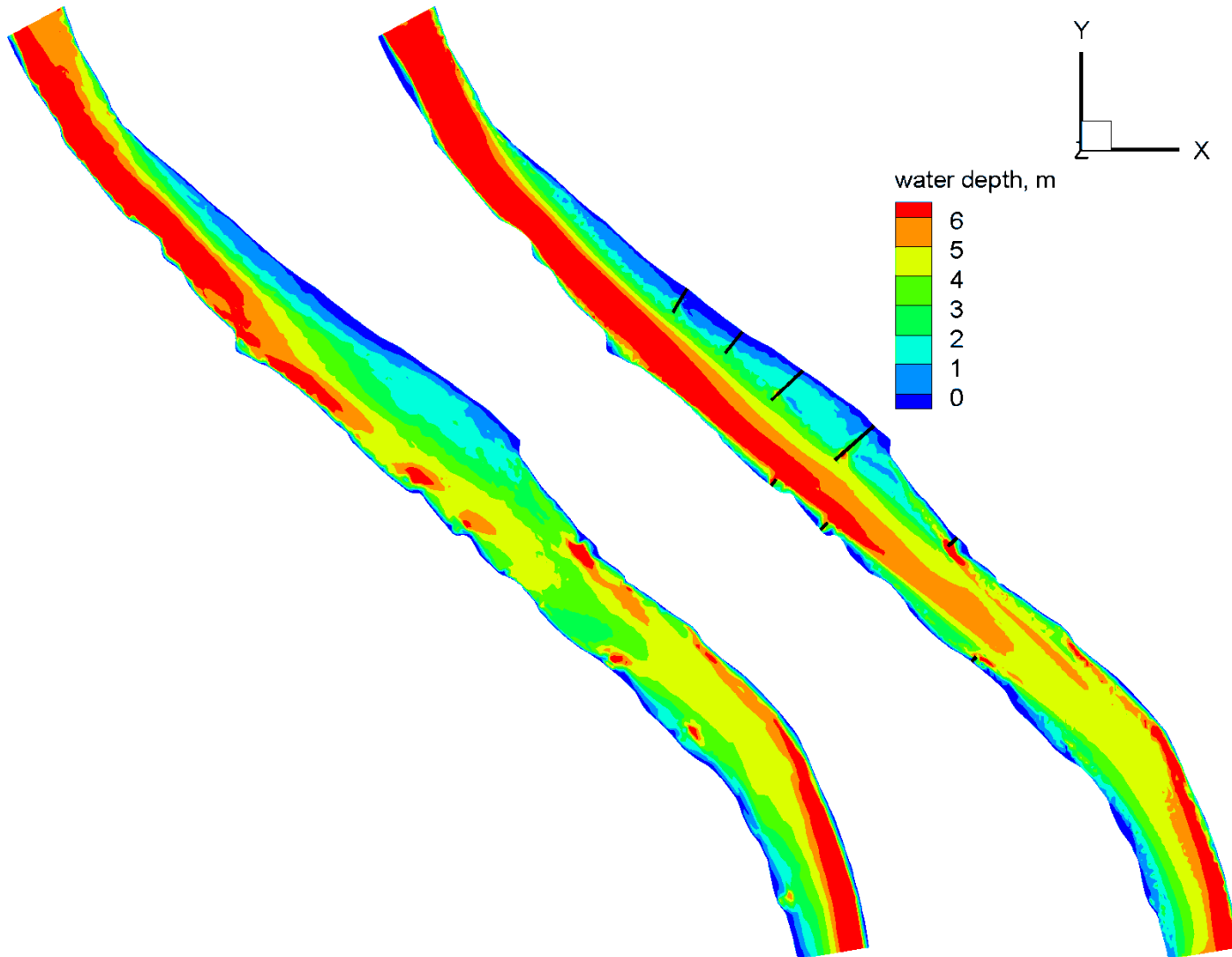
Habitat evaluation based on the modelling: present

Key abiotic features: water depth, flow velocity, bottom surface sediment composition

		v, m/s		
		< 0.2	0.2 - 0.5	0.5 <
h, m	< 3			
	3 - 6			
	< 6			

Habitat evaluation based on the modelling: future
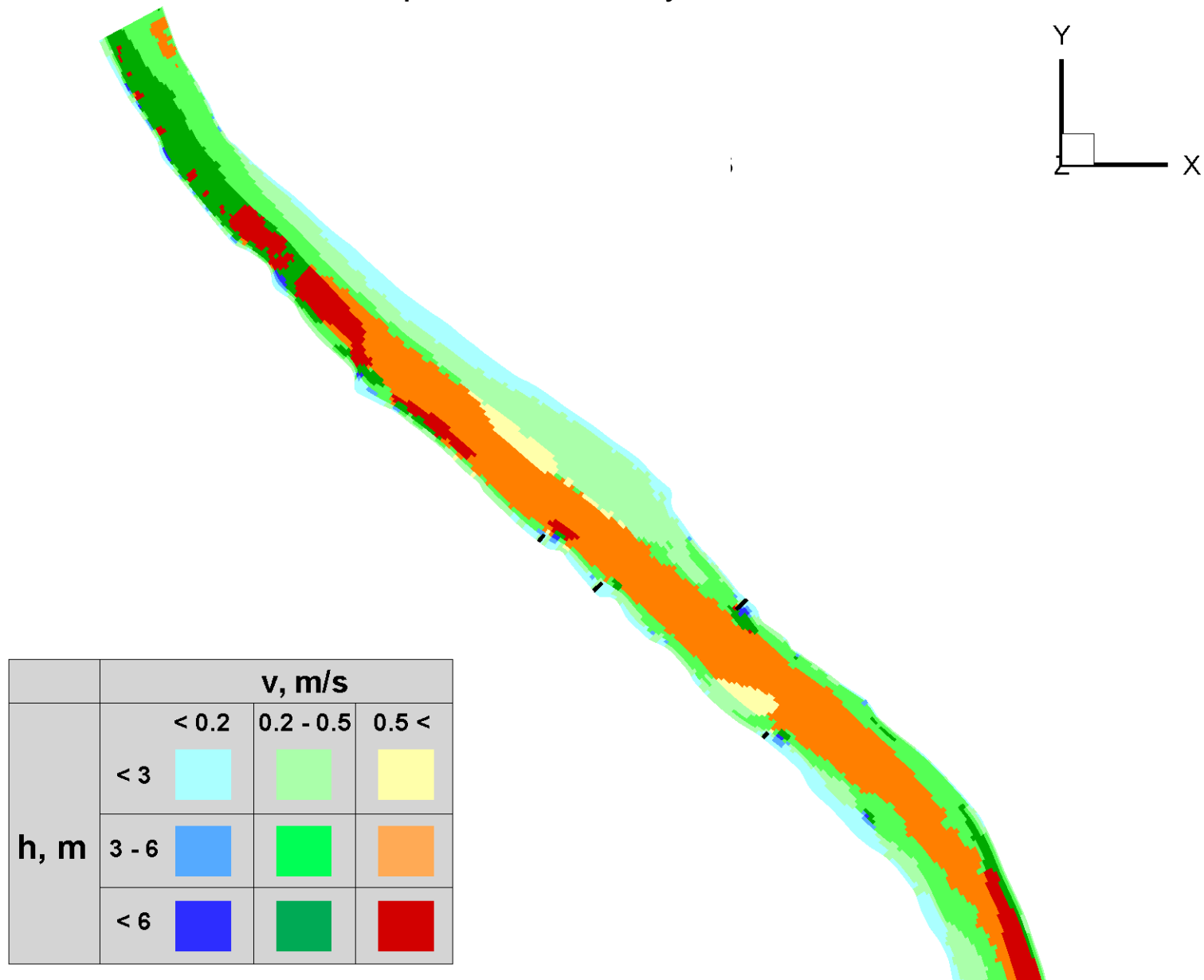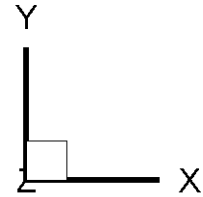
Key abiotic features: water depth, flow velocity, bottom surface sediment composition

Think also of the changes in bank filtered water abstraction conditions!

		v, m/s		
		< 0.2	0.2 - 0.5	0.5 <
	< 3			
h, m	3 - 6			
	< 6			

Background and objective of an Danube sediment project of significant scale

An ICPR-initiated activity

- Putting together a Sediment Issue Paper for several years
- Identifying significant sediment imbalance
- Core countries: Austria, Hungary, Rumania

Objectives

- A review of the current status
- proposal for actions to be taken
- in order to enhance the sediment transport along the Danube
- with the view of improving the sediment continuity and
- establishing a dynamic balance

Danube Sediment Management – Assessment for Restoration of Sediment Balance in the Danube River Basin

Partners (**15** institutions)

Leader Partner: Department of Hydraulic and Water Resources Engineering, Budapest University of Technology

Putting together a proposal by November 2012

Expected potential source of funding

South East Europe Transnational Cooperation Programme (SEE)

Total Project Budget

~EUR 3M

Proposed Project Period

07.2012-06.2014   2 YEARS

Link to EU Strategy for the Danube Region

Pillar B, PA4: To restore and maintain the quality of rivers

According to Danube River Management Plan one of the main challenges in relation to the quality of water across Danube Basin is the <u>Hydro-morphological alterations of rivers</u>, such as

• The interruption of river and habitat continuity

• The disconnection of wetlands/floodplains

Danube Sediment Management – Assessment for Restoration of Sediment Balance in the Danube River Basin

<u>A Danube Sediment project meets the targets of PA4, because</u>

- An adequate sediment management is crucial to achieve the environmental targets set out in the Danube RBMP
- It essentially contributes to the improvement of habitats and biodiversity with improved methods of sediment management in the ecologically important side-branch systems and floodplains of Danube
- It will support to reduce the existing ecological continuity interruption for fish migration in the Danube River Basin

Feasibility of such a project:

- All the relevant institutions related to sediment issues within River Danube are involved

- The finances necessary to implement the project can be secured via a successful SEE application

- The 2-year long duration is adequate, the timeframe for the project is being established and feasible

- The frame for the project has been established, LP, PPs and ASPs are identified and commitment for the implementation has been assured

Providing added value, because

- The project directly addresses Pillar (2) Protecting the environment in the Danube Region
- The project is going to enhance the cooperation of several research institutes and other stakeholders throughout the basin from Bavaria to the Delta
- There has been a lack of knowledge on overall sediment conditions in Danube which will be amended via the project outputs

Danube Sediment Management – Assessment for Restoration of Sediment Balance in the Danube River Basin

Work Packages

Work Package	Title	Lead Institution(s)	PP
WP0	**Project preparation**		Each PP
WP1	**Project management**	Budapest University of Technology (BME)	Each PP
WP2	**Communication, dissemination and public participation**	Austrian Environment Agency (UBA) – to be clarified	UBA, NTD Directorate Gyor, VUVH, AR, JC
WP3	**Data collection, analysis and harmonization**	University of Natural Resources and Life Sciences, Vienna (BOKU)	BOKU, BME, VITUKI, NTD&LDV Directorates, AR, NIMH, VUVH, JC,
WP4	**Composition of a sediment balance**	Budapest University of Technology (BME)	BME, BOKU, VITUKI, NTD&LDV Directorates, NIMH, VUVH, JC,
WP5	**Pressures and impacts analysis**	National Institute for Hydrology and Water Management - National Administration "Apele Romane" (NIMH)	NIMH, AR, BME, VITUKI, BOKU, VUVH, JC
WP6	**Solutions for improving sediment transport and establishing a dynamic balance in the DRB**	Budapest University of Technology (BME) together with University of Natural Resources and Life Sciences, Vienna (BOKU)	BME, BOKU, NIMH, AR, VUVH, JC

Expected results of the proposed project

- A transparent harmonised database including metadata of sediments

- Best practice on data collection of sediment

- Harmonised methodology

- Sediment balance of Danube

- Definition of pressures and impacts, their ranking according to their relevance and impact on the Danube

- Catalogue of solutions and measures for the Danube and its major tributaries ranked according to their efficiency and feasibility.

Project proposal failed at SEE this summer