PA4 – 8th Steering Group meeting
14th October 2014

Danube Sediment Project

Background, preparatory work for consortium organisation and proposal development

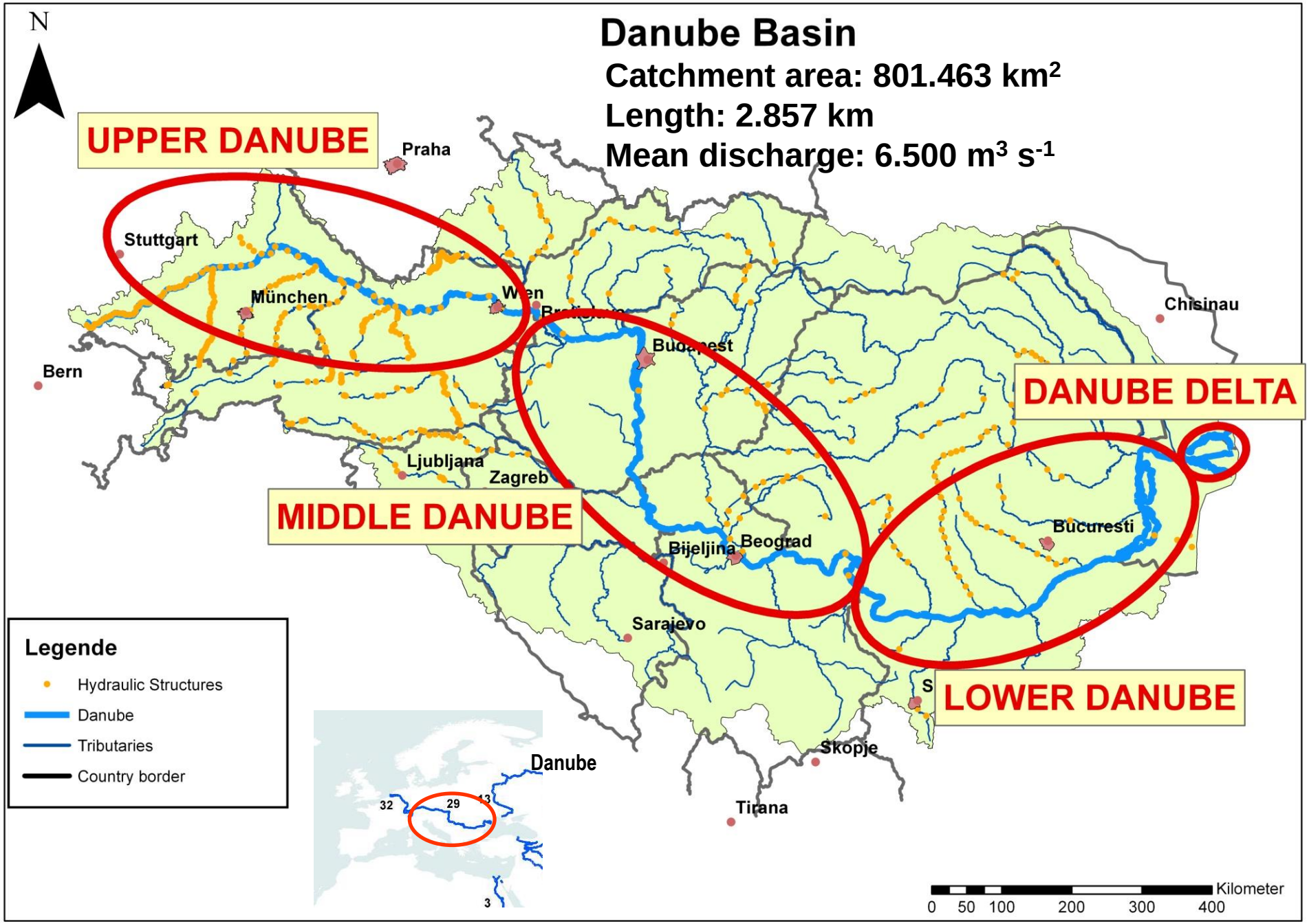
by Prof. János Józsa
head of department, BME

Budapest University of Technology and Economics (BME)
Department of Hydraulic and Water Resources Engineering

Danube River – Pressures and Impacts

A quick overview

(Slides of Porf. Habersack, BOKU)


N
Danube Basin
Catchment area: 801.463 km²
Length: 2.857 km
Mean discharge: 6.500 m³ s⁻¹
UPPER DANUBE
MIDDLE DANUBE
DANUBE DELTA
LOWER DANUBE
Praha
Stuttgart
München
Wien
Bern
Budapest
Chisinau
Ljubljana
Zagreb
Bucuresti
Bijeljina
Beograd
Sarajevo
Skopje
Tirana
Legende
Hydraulic Structures
Danube
Tributaries
Country border
Danube
32
29
13
3
Kilometer
0 50 100 200 300 400

Hydroelectric Energy

Danube River Basin – Hydropower

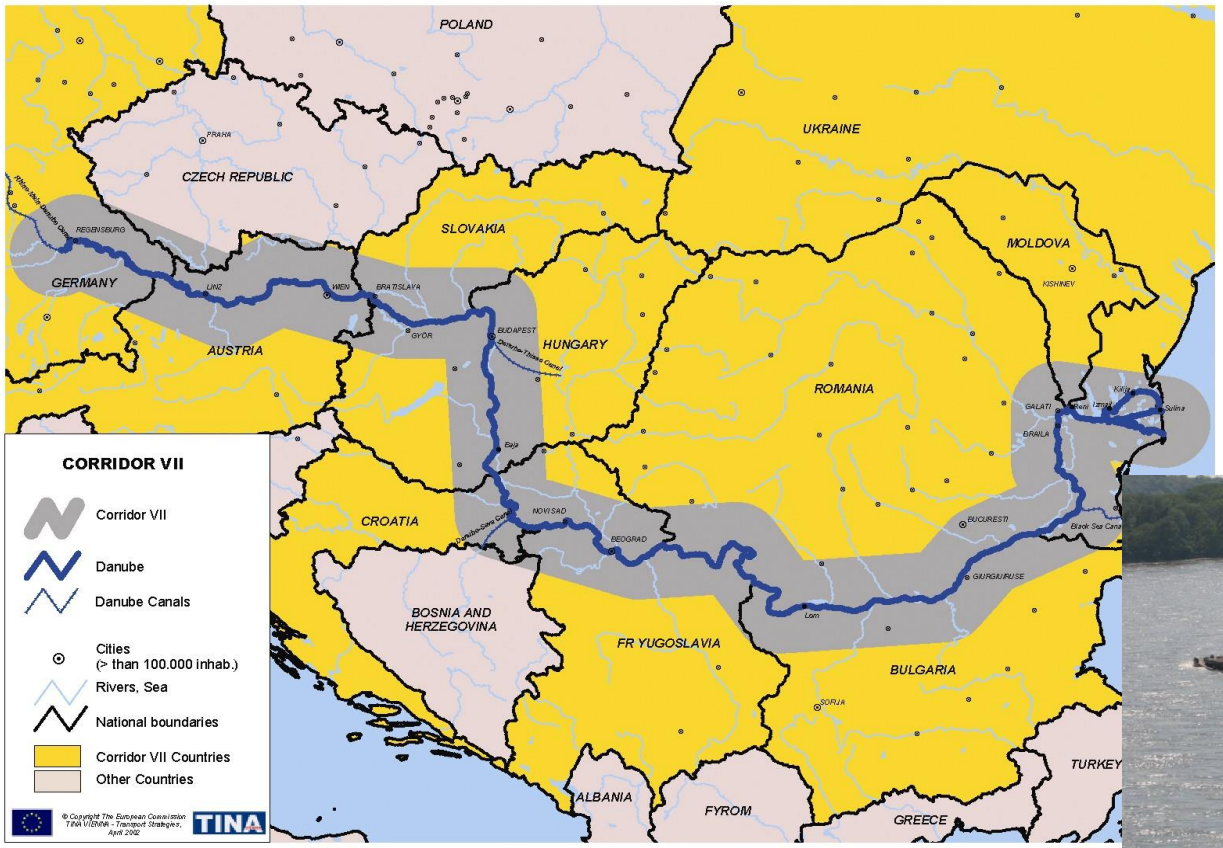
78 barriers along the Danube

5 free-flowing sections

Schiemer et al., 2004

International Waterway

Danube River Basin - Navigation



2411 km navigable (Sulina-Kelheim)

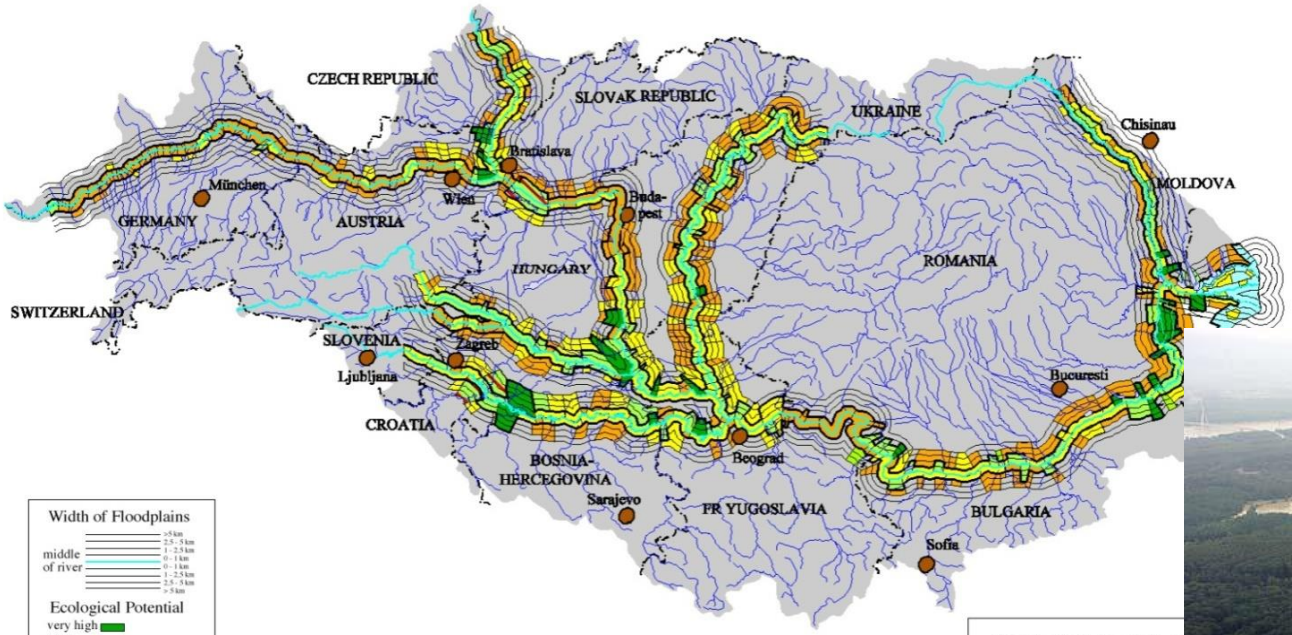
Waterway transport in the Danube aims to be increased from 10 mio to 30 mio t / year (e.g. in Austria)

via donau, 2007

Flood Risk Management

Danube River Basin – Flood protection

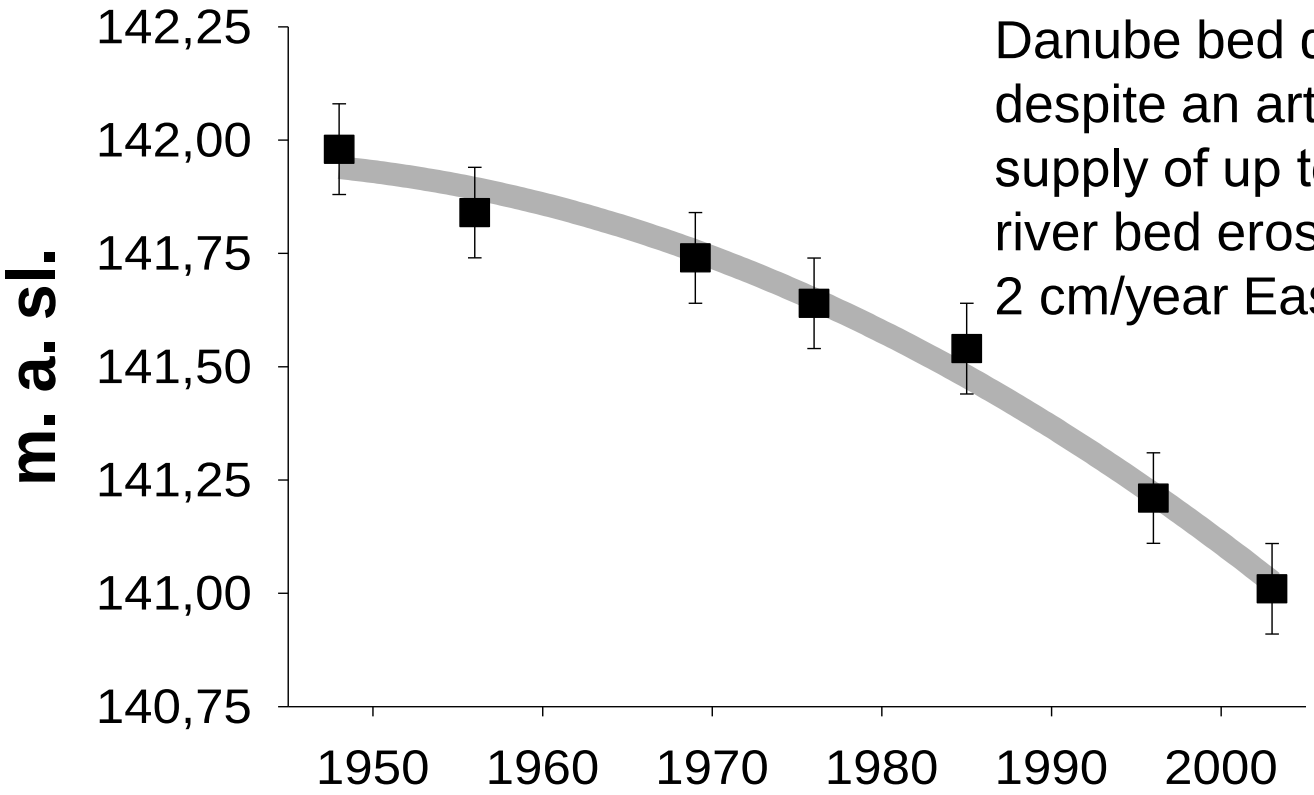
Ecological potential of floodplains in the Danube River Basin



Loss of 80 % of the original floodplain area

River Bed Degradation

Upper Danube - Consequences

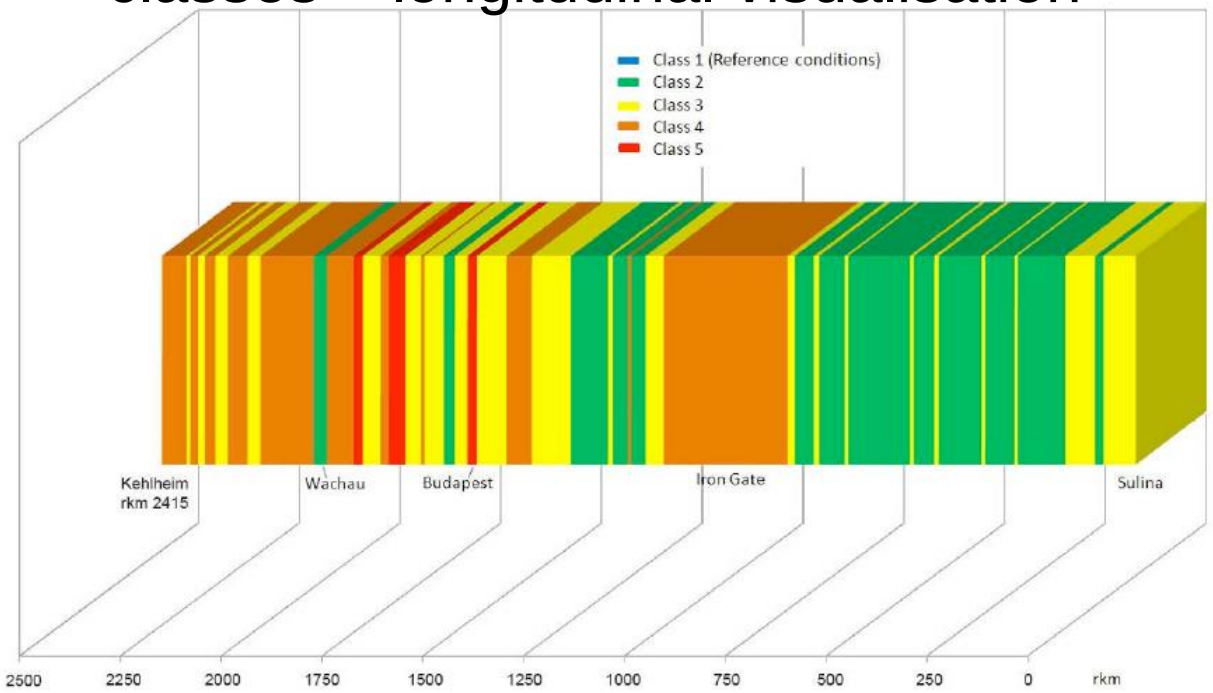


Danube bed degradation:
despite an artificial gravel supply of up to 200.000 m³/year river bed erosion of 2 cm/year East of Vienna

River Morphology

Hydromorphological conditions

Overall total hydromorphological assessment in five classes – longitudinal visualisation



1/3 good hydromorphological conditions

1/3 strongly altered

Upper Danube - most affected by significant hydromorphological changes

ICPDR, JDS, 2008

Overall existing (as well as future) situation strongly linked to sediment conditons

Driving forces and impacts, most of them as interaction mechanisms

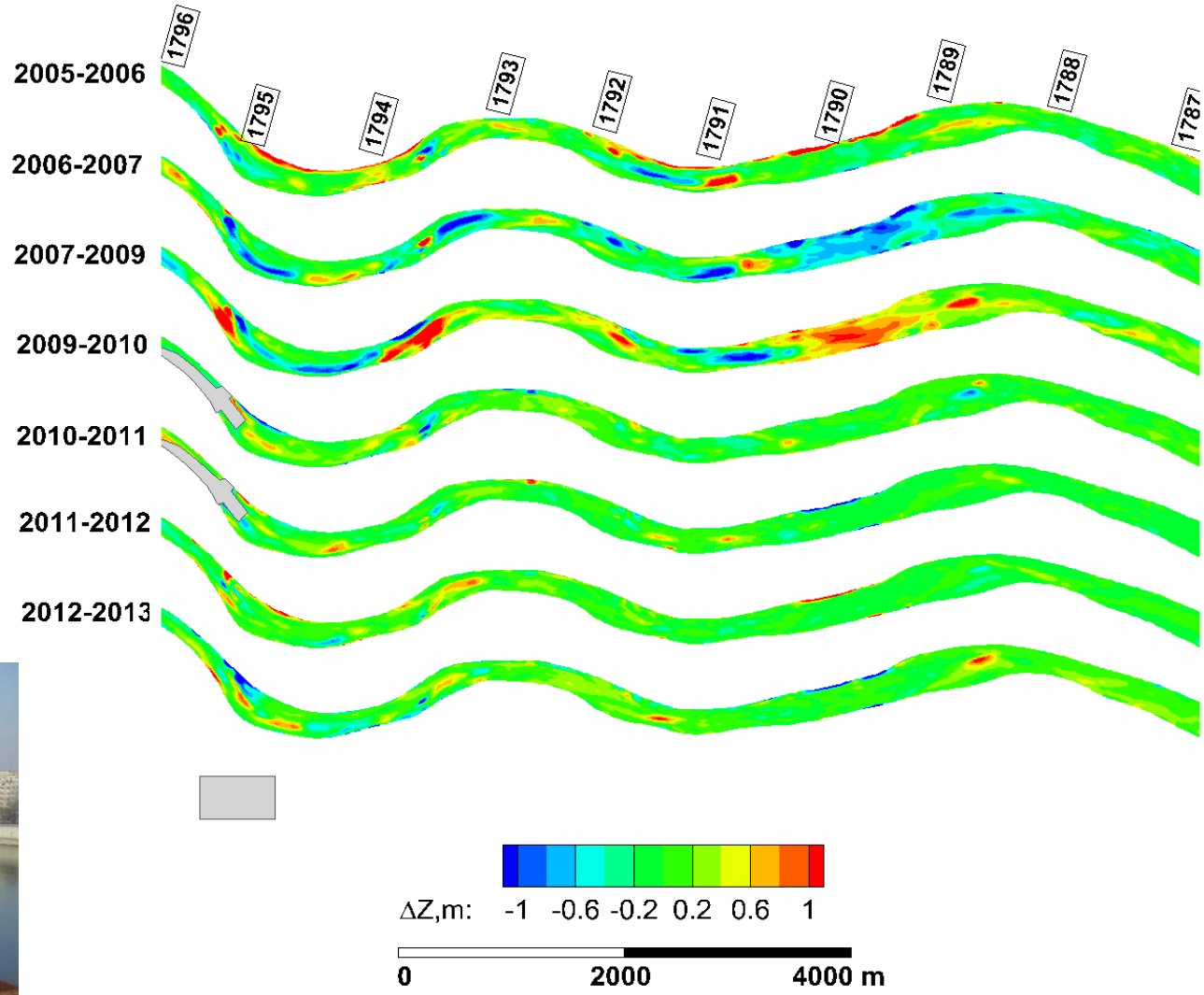
- ⇨ **Hydropower plants**
- ⇨ **Navigation**
- ⇨ **Flood protection**

- ⇨ **Climate change**
- ⇨ **Changes in land use**
- ⇨ **Point and diffuse source pollution**

On selected sediment-related problems

On the sediment related problems

- Intensive morphological changes in Danube (directly affecting e.g. navigation)



On the sediment related problems

- Intensive morphological changes in Danube
- Increased sedimentation in sidearms (ecological, recreational issues)

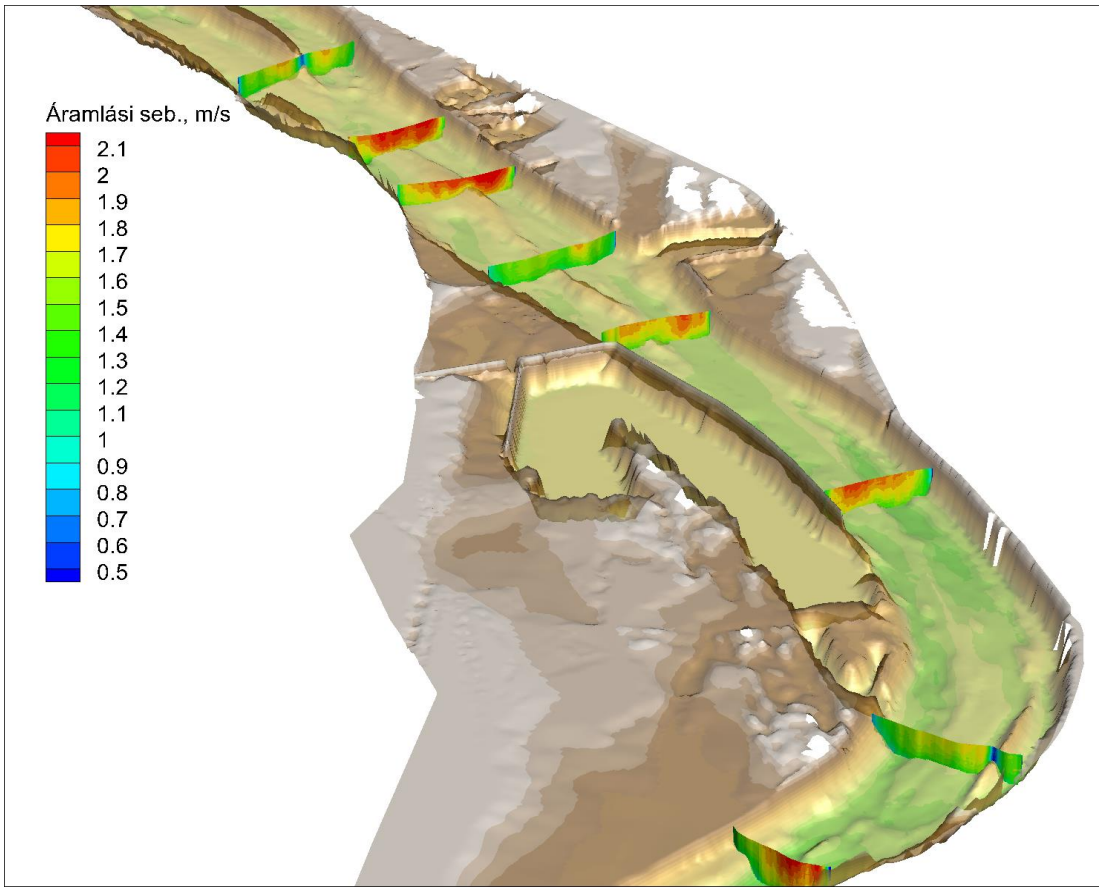
On the sediment related problems

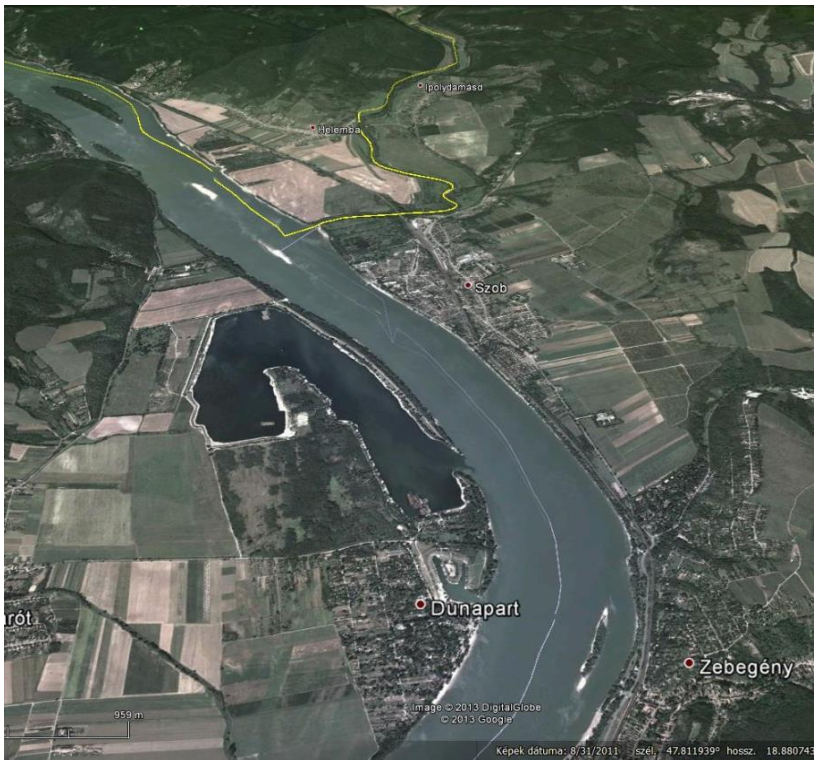
- Intensive morphological changes (affecting e.g. navigation)
- Increased silting in sidearms (ecological, recreational issues)
- Sedimentation on floodplains and shallow areas (problems related to flood risk, drinking water supply)

Availability of up-to-date measurement and numerical modelling tools to enrich knowledge base on Danube sediment processes

Field measurement methods

ADCP-based measurements (even in severe flood conditions like the one last year)

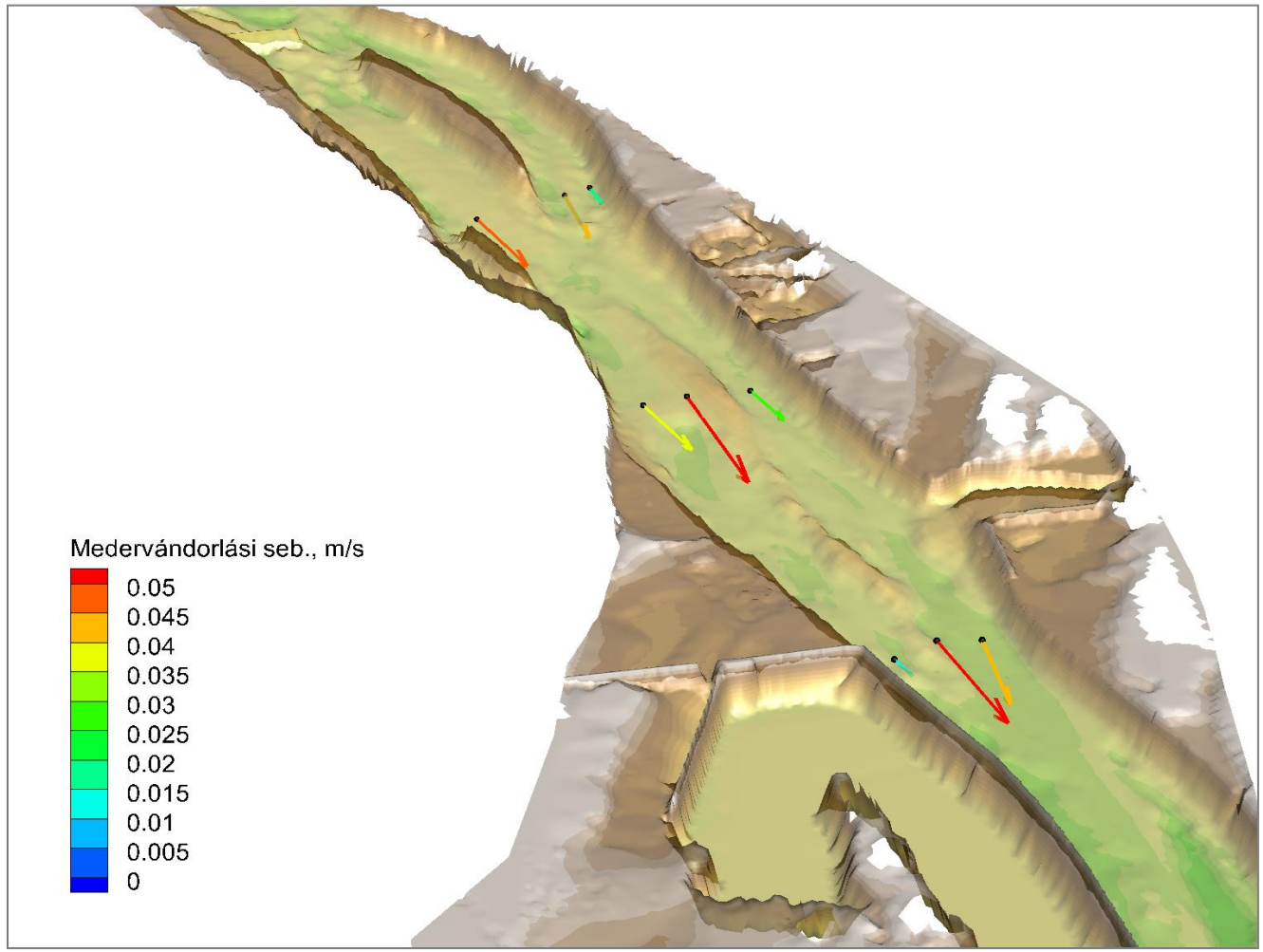




Field measurement methods

ADCP based measurements

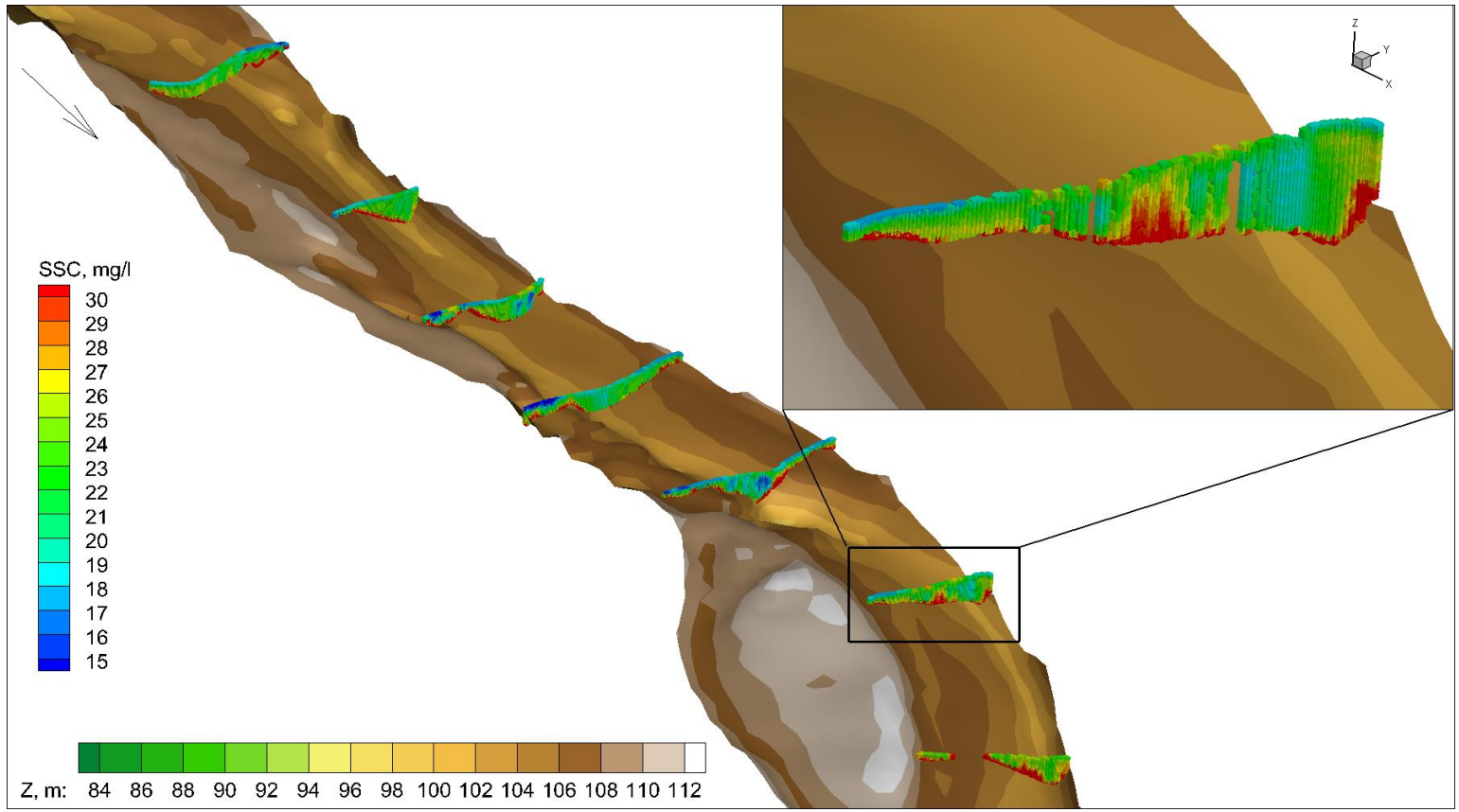
- **Estimation of bed surface sediment velocity**



Field measurement methods

ADCP based measurements

- **Estimation of suspended sediment concentration**



Field measurement methods

Sampling the bed surface by freezer plates to see the undisturbed bottom composition

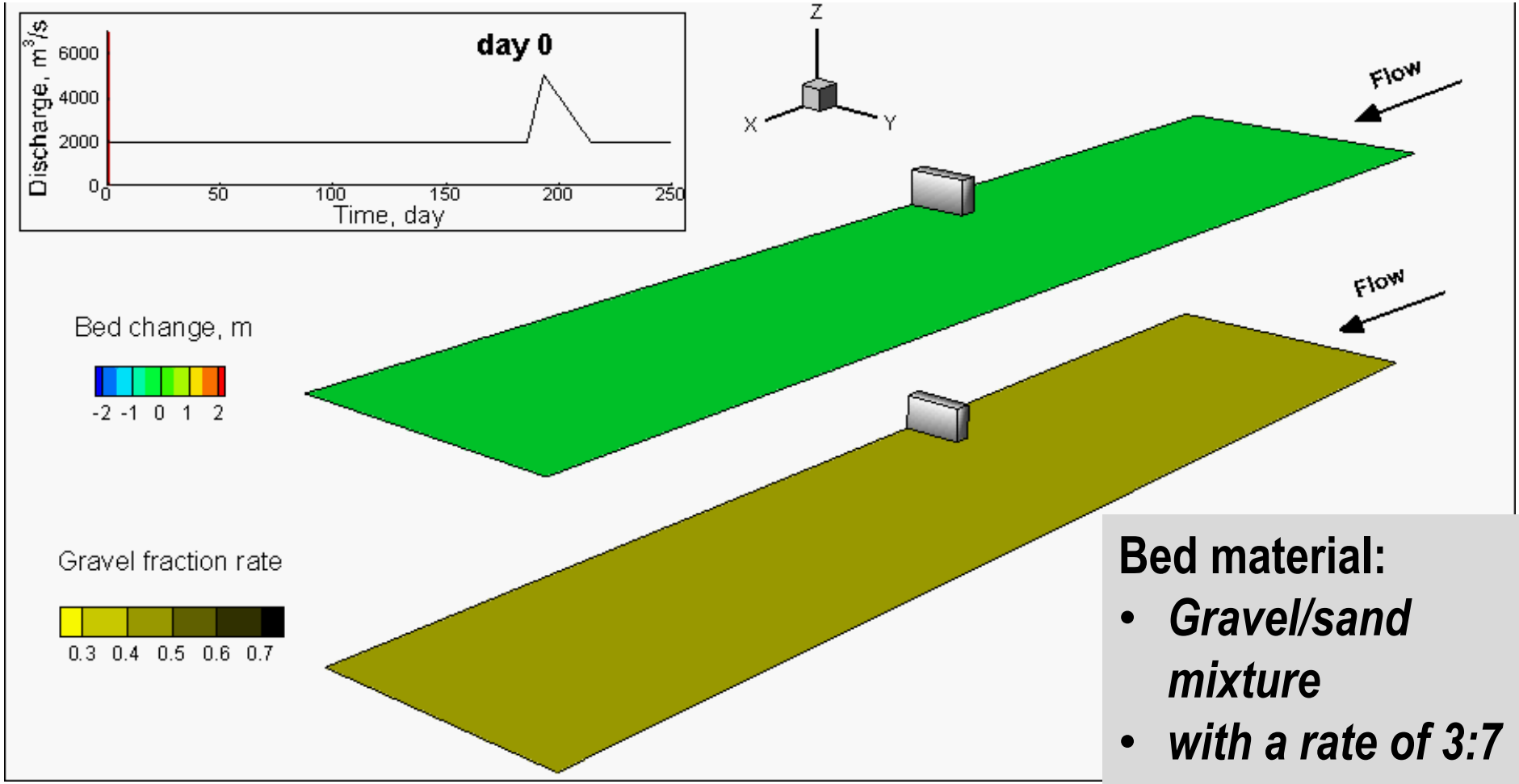
Fine gravel

Mixed sediment

Armoured surface

Numerical modelling capabilities

Example: Modelling of bed armouring



Bed material:

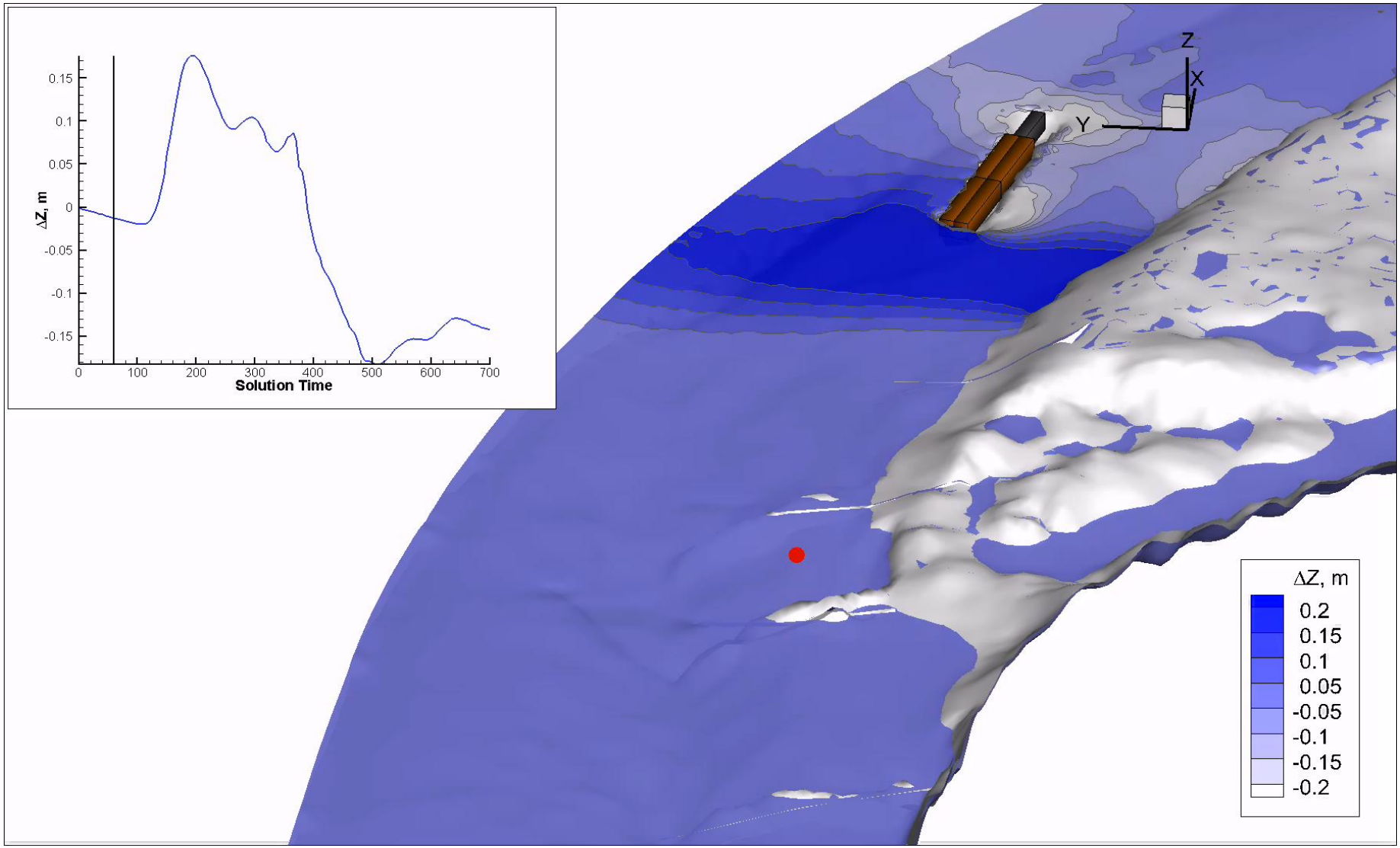
- ***Gravel/sand mixture***
- ***with a rate of 3:7***

d_{gravel} = 20 mm

d_{sand} = 0.6 mm

Numerical modelling capablities

Navigation affecting bank erosion and nearshore habitats



On the recent basin-wide, subcatchment-wide and CBC project application activites

A recent CBC project example supporting the forthcoming Danube Sediment Project application

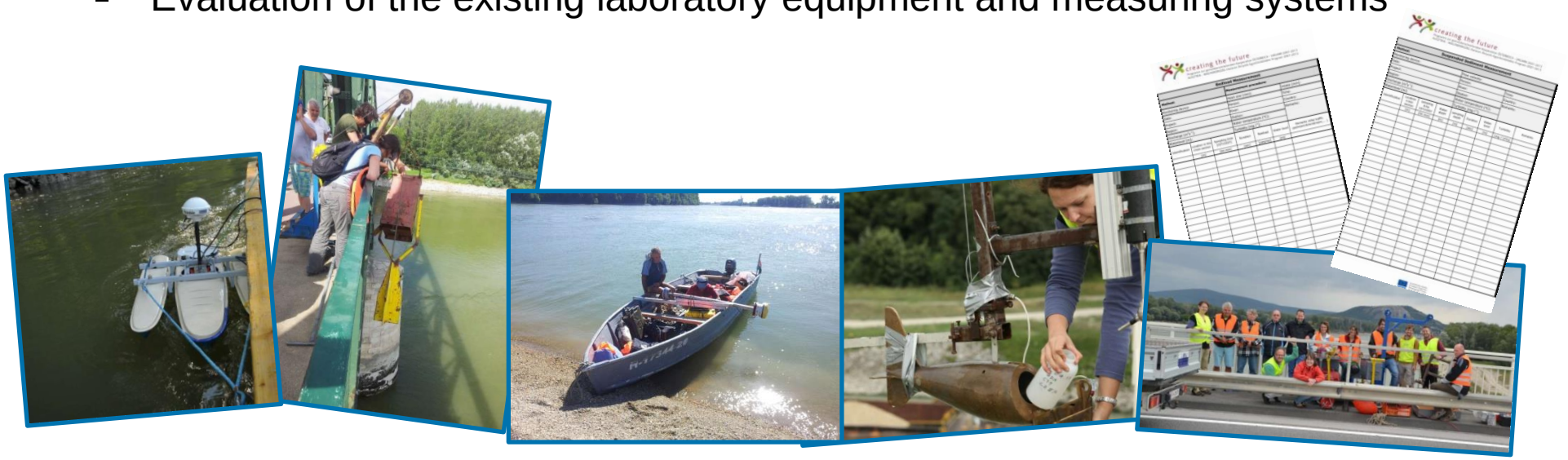
SEDDON

AT – HU, 2012-2014
BOKU – BME – NTDWD

Sediment Research and Management on the Danube River

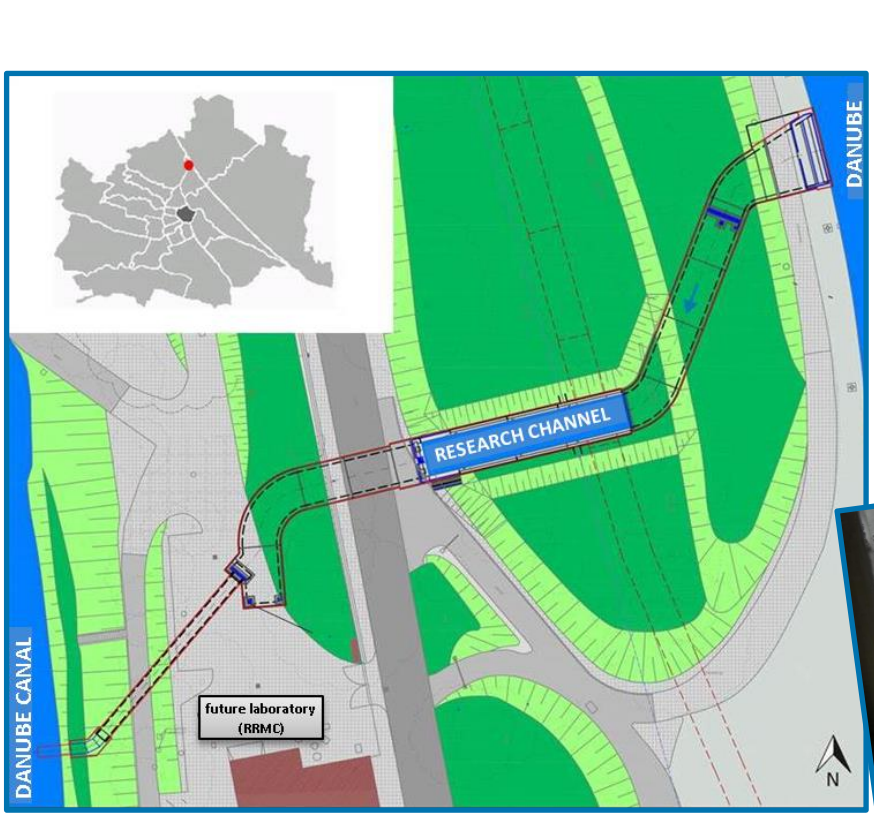
SEDDON – on the project aims

- Achieve a scientific basis to analyze problems concerning sediment transport in **Austria and Hungary**
- Development of integrative management solutions
- Comparison between the different problem fields **Upper/Middle Danube**
- **Harmonized measuring and modeling systems**, standardized field reports and manuals
- Development of **practical management solutions**
- Evaluation of the existing laboratory equipment and measuring systems



SEDDON – on the project aims

- Construction of a **research channel** with a **free-flowing discharge of 10 m³/s**



Finally: the Danube Sediment Project

Core partner countries: AT, HU and RO

Long preparatory work under strong ICPDR umbrella

Key goals (with significant updating compared to the ones from 2011)

- To **bring together** everything which is already in place in terms of **sediment data**, sediment related activities, knowledge, main actors in the different river stretches
- **To develop a basin-wide sediment balance for the Danube**
- To **implement pilot studies** covering the key activities (navigation, hydropower, biodiversity, flood risk, drinking water supply, etc) as basis for follow up recommendations
- Sound **recommendations** for a forthcoming programmes of measures targeted to locations as well as to sectors
- Development of **Best practices manua**l

Danube Sediment Project

Stakeholders included and/or to be invited:

- **Navigation**: as provider of data and further input, as well as beneficiary of project
- **Hydropower** sector (in same role and function as navigation sector)
- **Biodiversity**: as provider of data and further input, as well as beneficiary of project
- **Science**: to compile and assess data to ensure comparability and robustness of results, to cover workload of project
- **Administration** (covering river basin management as well as flood risk management) including ICPDR (as a sort of observer / steering committee; details how to ensure an appropriate participation should come from leader of consortium) : main role would be to ensure that the deliverables of the project will meet initial expectations
- **NGO** such as WWF (as a sort of observer / steering committee; details how to ensure an appropriate participation should come from lead of consortium): to ensure acceptance of results also from the NGO sector

Danube Sediment Project

Foreseen funding framework:

Danube Transnational Cooperation Programme

Danube Sediment Project

Preliminary work package formulations:

- **WP1** Project management
- **WP2** Sediment transport and morphodynamics: data collection, establishing information system
- **WP3** Establishing basin-wide sediment budget
- **WP4** Identifying sediment related deficits and management issues
- **WP5** Concieving a set of measures for sustainable, improved sediment management, towards restoring a resonable balance

Short term steps to do

- **Arrange financing the preparatory activities:** **ICPDR sources as well as support from the Hungarian National Contact Point**

- **Having noticed meeting in person are far the most efficient:**

  Core members' meeting in Budapest on 21 November

  (tentative, shifted from 31 October)

- **Participants:** **Austria, Hungary, Romania, ICPDR**

- **Expected outcome:** **Finalise focuse areas, drafting the work packages and contents, decide upon further partners as well as key stakeholders, setting up further roadmap**