Digital Twins for a Riverine Environment

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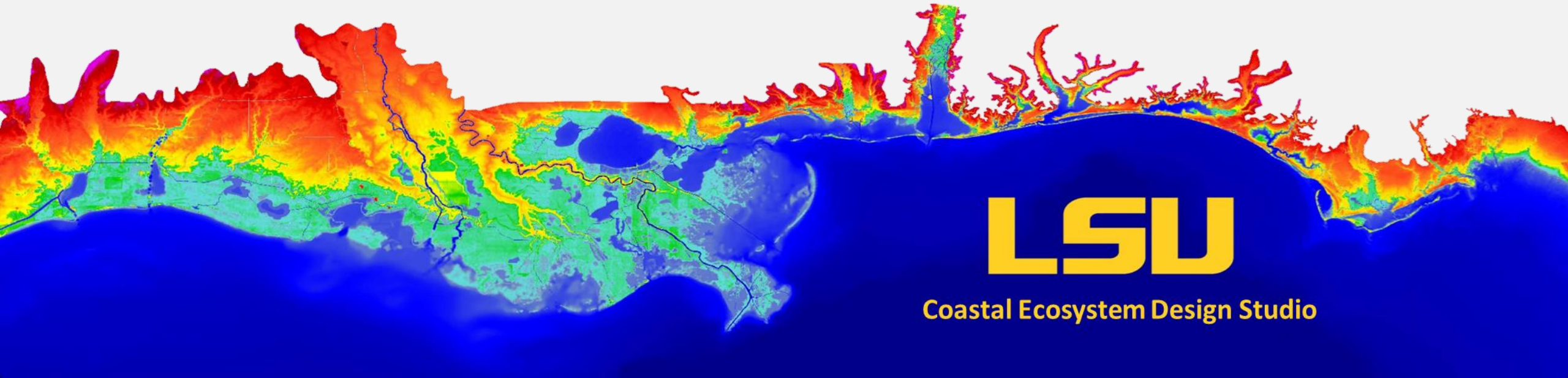
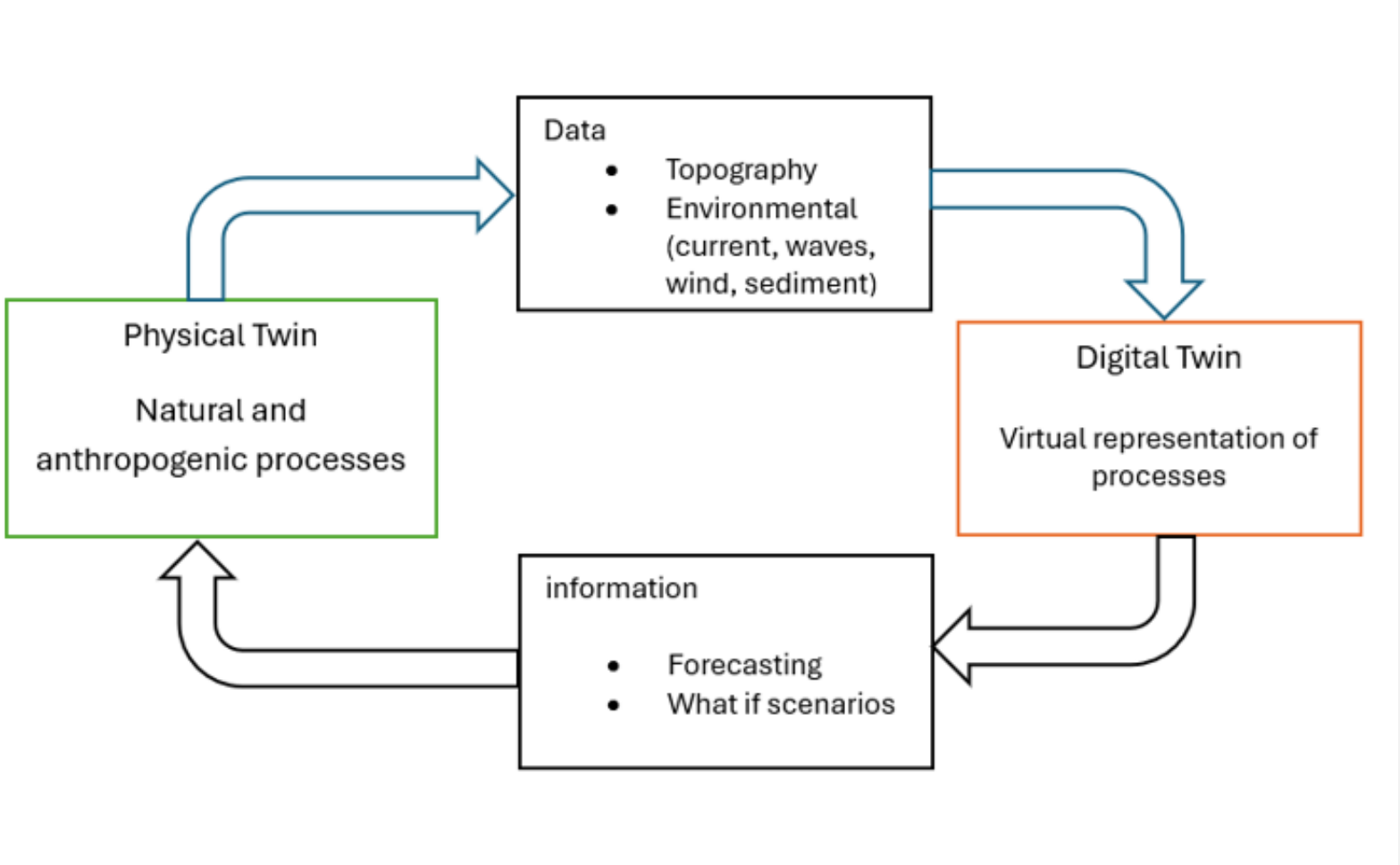


Digital Twins (DT)

- Virtual Representations
- Process DTs
- Models
  - ML
  - Numerical
  - Hybrid

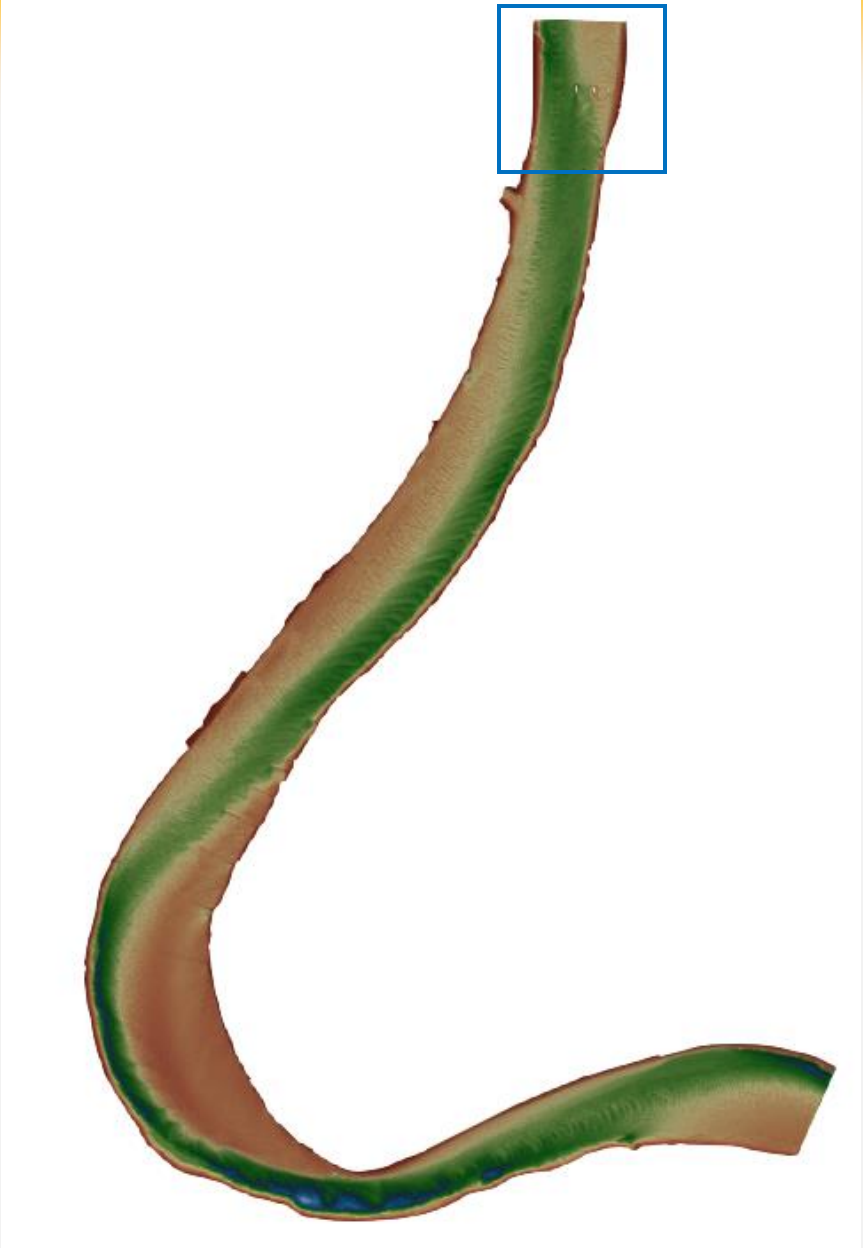


DTs of natural environment

- Numerical Models:
  - Multiphysics: Coupled models
  - Process fidelity depends on discretization -:Topography/bathymetry, boundary and initial conditions
    - Quality of the discretization- mesh resolution, representation of forcings
    - Quality of the data from physical twin- bathymetry, water level

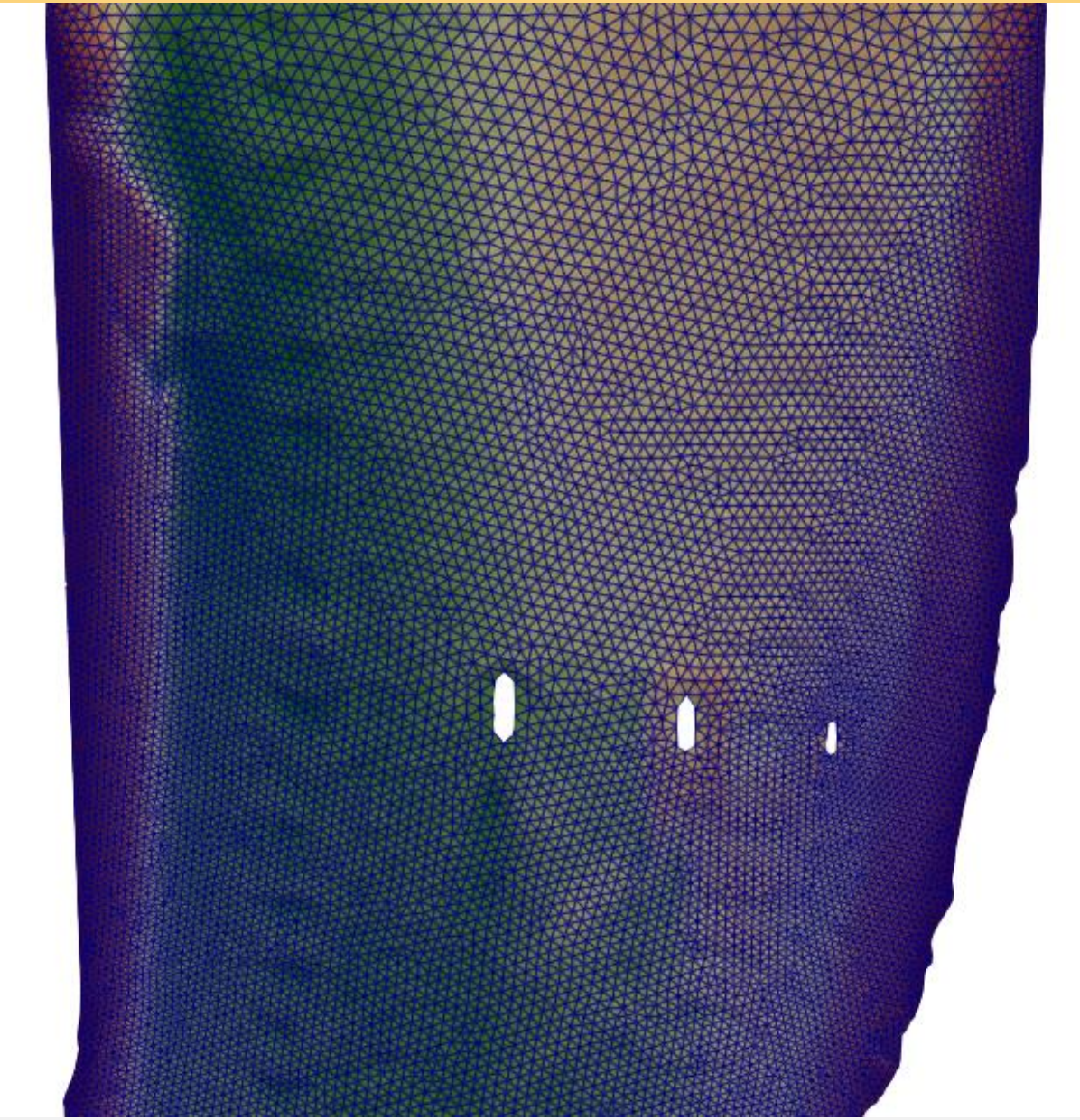
DT of a riverine system

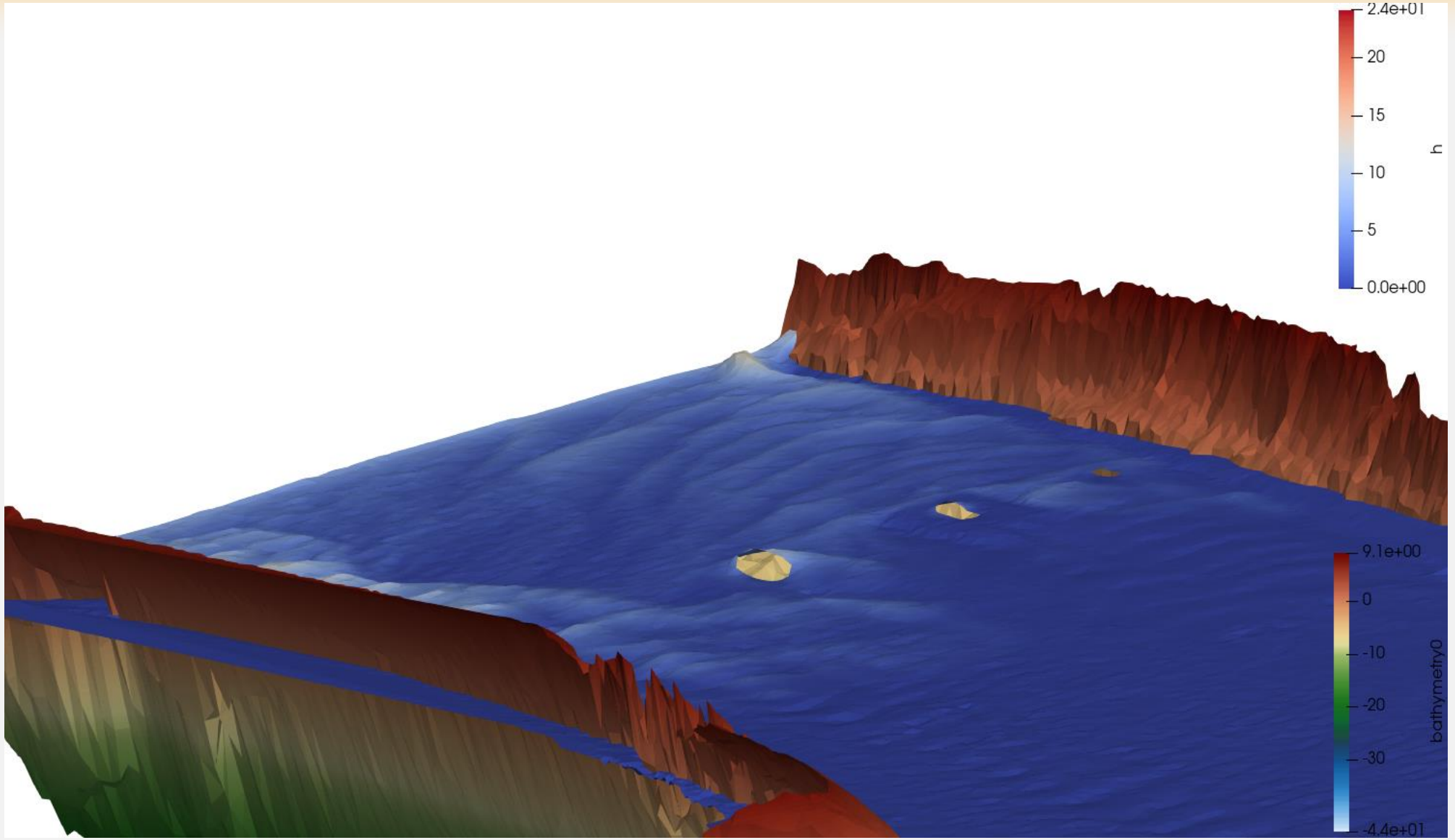
- Objective is to study meandering
- Data from Physical Twin:
  - Bathymetry data from USACE surveys (2'x2')
  - Upstream: Stage or discharge and current



- Adaptive mesh

- Dynamic wetting-drying




2.4e+01
20
15
10
5
0.0e+00
η
9.1e+00
0
-10
-20
-30
-4.4e+01
bathymetry0

- Coupling with ADE
- Testing on a distorted scale physical model of a river.
- Hybrid numerical-data driven DT