



Primary and secondary risks of landslide outburst floods (BASEMENT application)

Name: Gao Yunjian

Institute: Sichuan University (Chengdu, China)

University of Lausanne (Lausanne, Switzerland)

E-mail: gaoyunjiansu@163.com

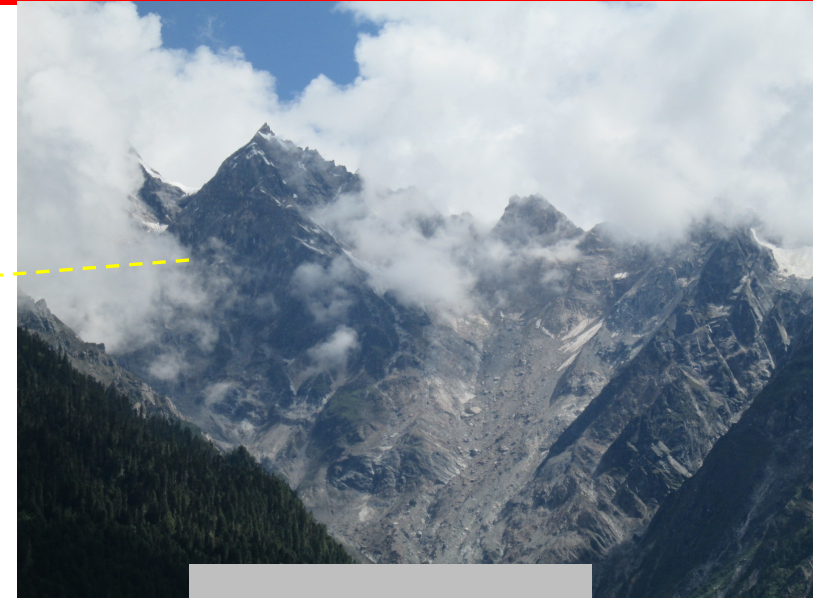
Feb. 3rd, 2022

Contents:

1. The typical landslides dam causing the outburst flood case in China
2. BASEMENT model applied to the outburst flood simulation

1. The typical case in China

Case 1: Yigong avalanche (1902/2000)



From the field work



- Southeast Tibitan Plateau (Bomi County)

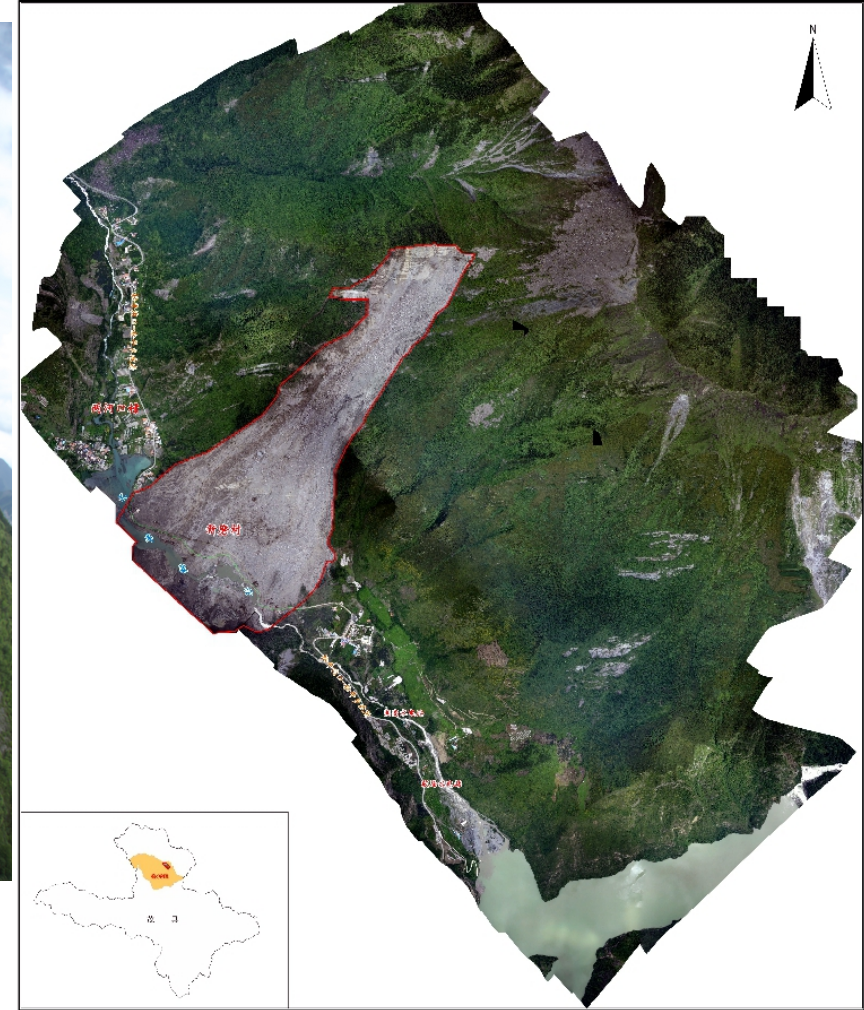
- Occurred twice (Caused by tectonic uplift):

In 1902 ($60 \times 10^6 \text{m}^3$); in 2000 ($0.3 \times 10^9 \text{m}^3$) : Floods reach India

(Brahmaputra river) and lead to about dozens of peoples death

Case 2: Xinmo avalanche (2017.6.24)

四川茂县叠溪镇山体高位垮塌（山体至顶部）灾后影像图



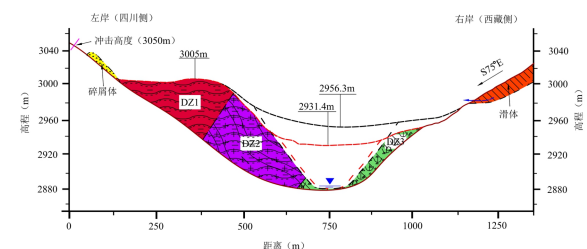
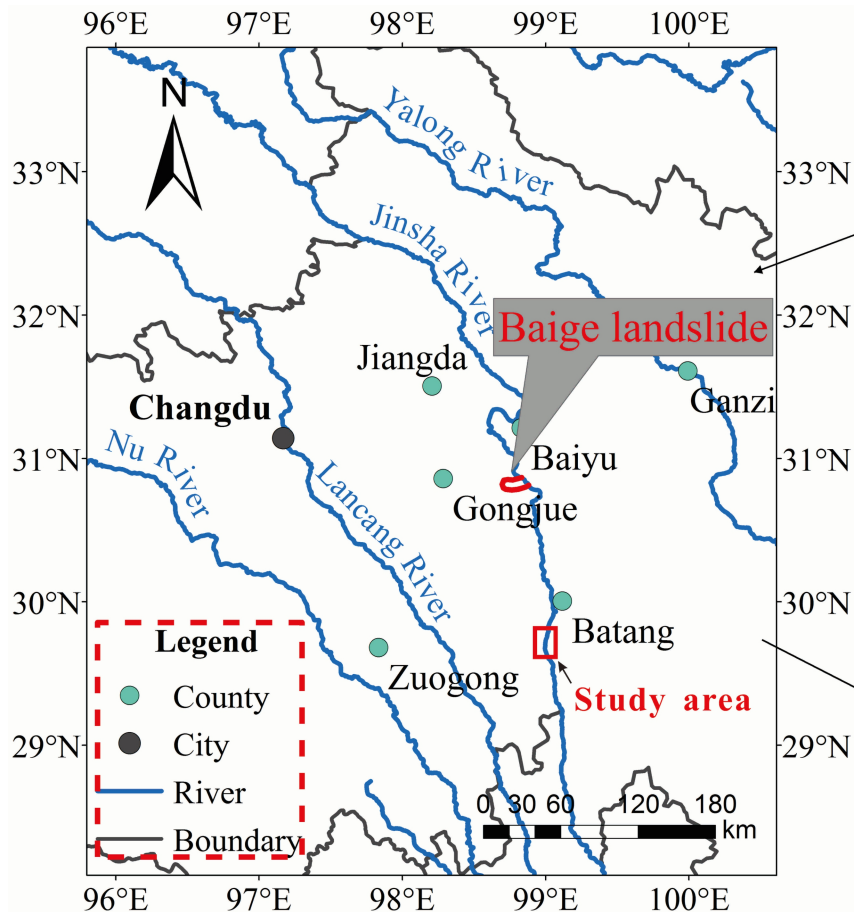
- Tibetan Plateau east edgy (Mao County)
- Caused by earthquake ($8 \times 10^6 \text{m}^3$)
- 82 peoples death

Cited from Sichuan Bureau of Surveying and Mapping

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2.1 Selecting the study area



Location: Baige Vallage, Jiangda County, Tibet, China (No people death)

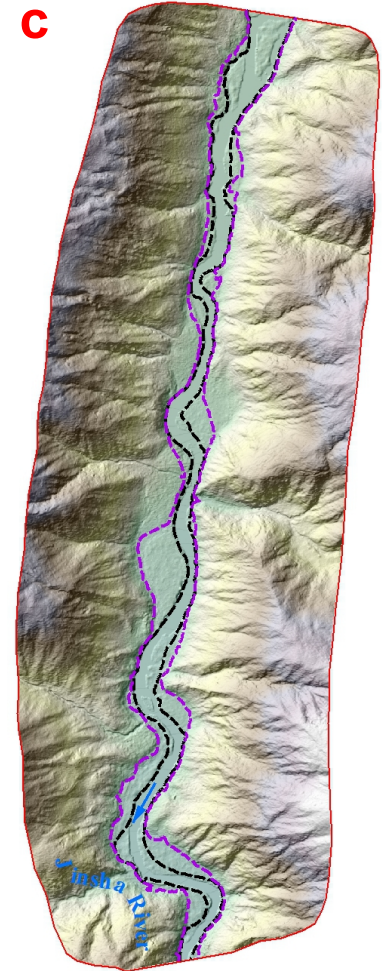
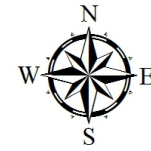
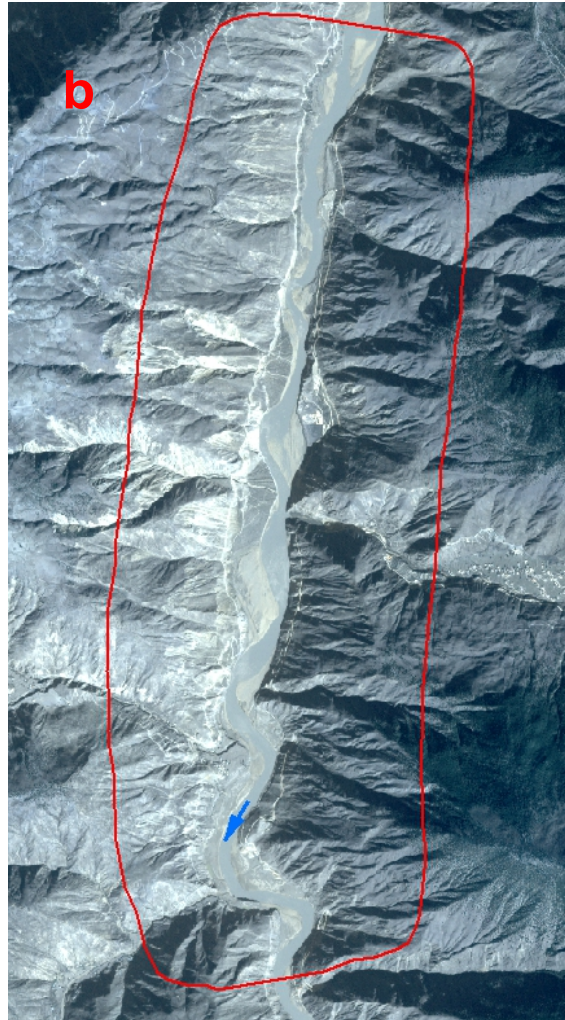
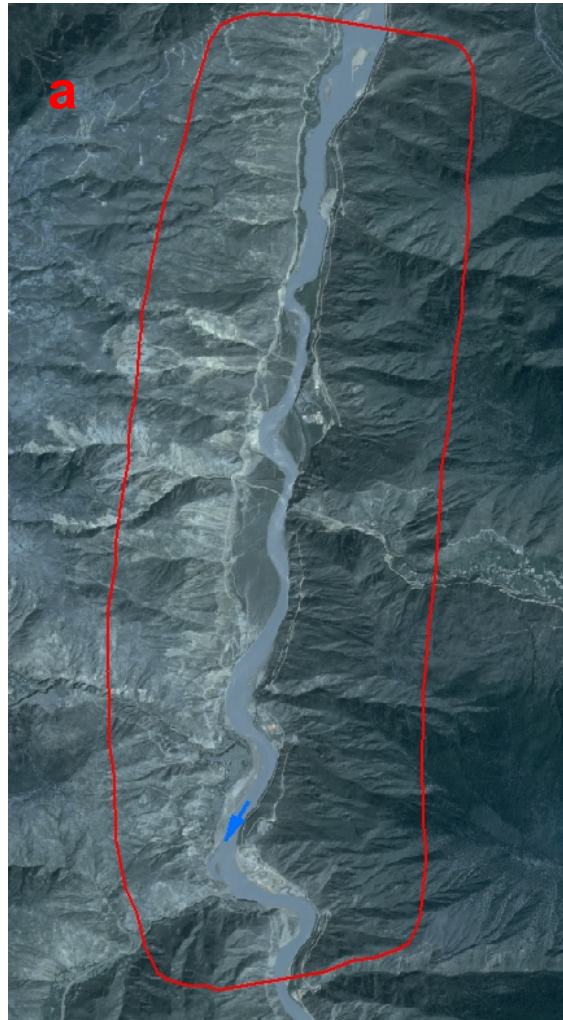
Volume: $18 \times 10^6 \text{m}^3$ (First time,), $6 \times 10^6 \text{m}^3$ (Second time)

Flood impact distance: 670km on the downstream, 70km on the upperstream

Barrier dam

The remote sensing interpretation result

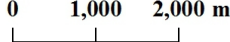
2018.10.07(Before the flood) 2018.11.15(After the flood)



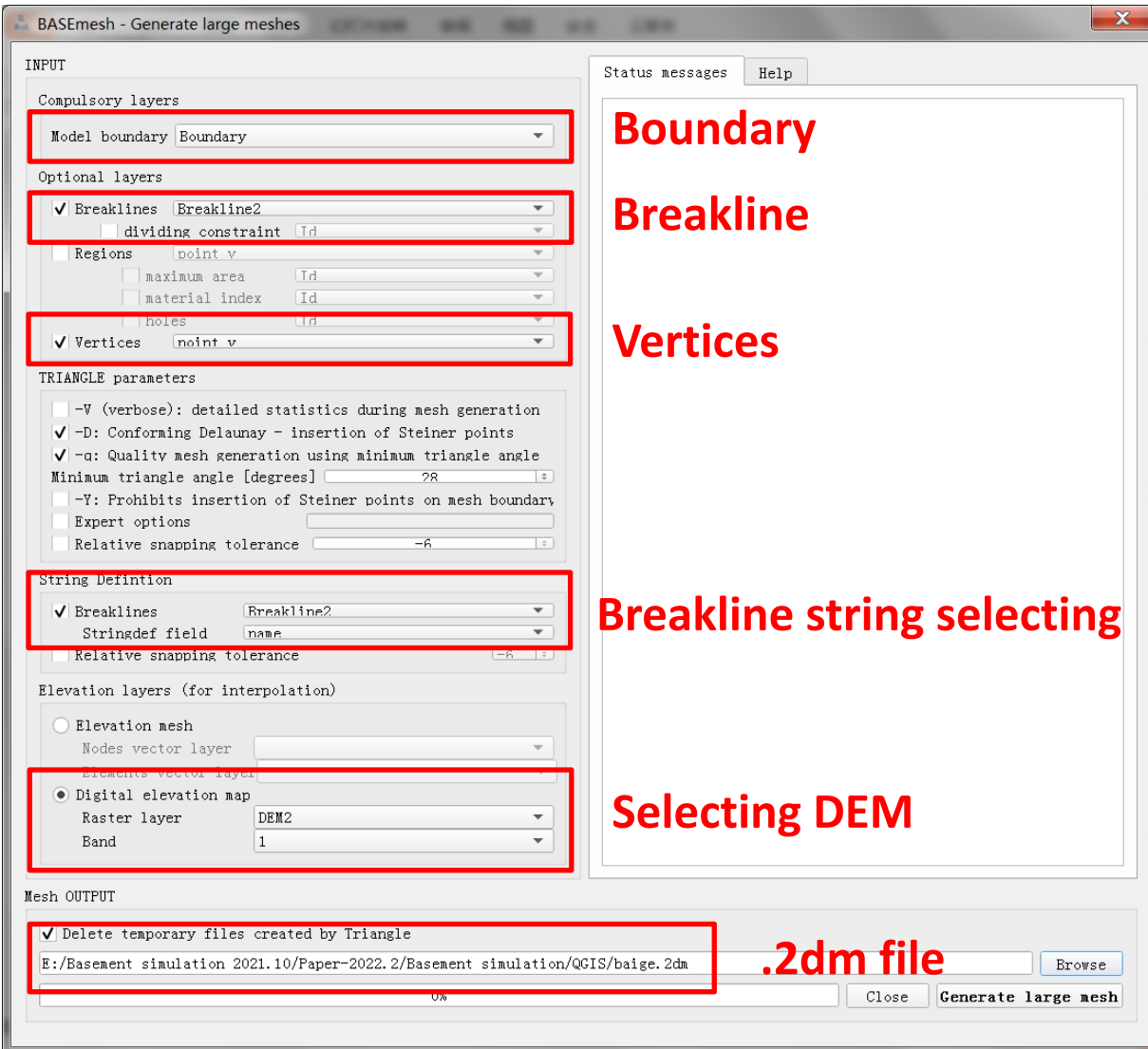
DEM
Elevation (m)
High : 3552
Low : 2388

Flood water level
- - - - After the flood
- - - - Before the flood

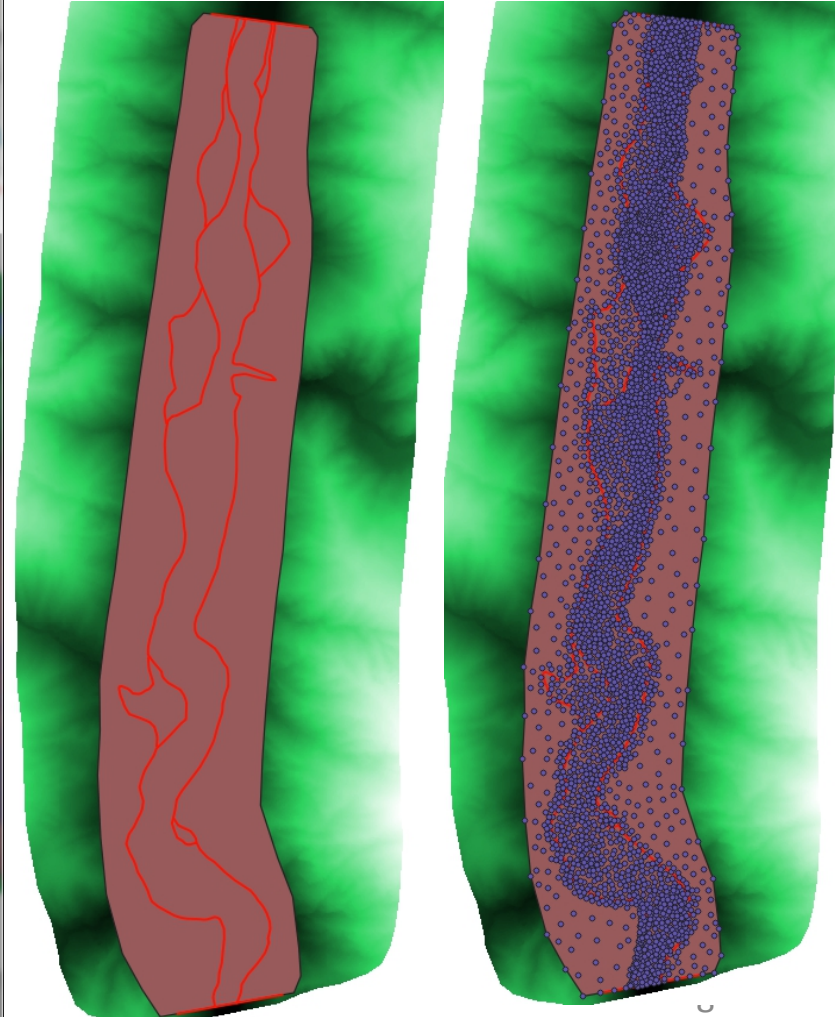
0 1,000 2,000 m



A. Using QGIS to generate the mesh (Large mesh tool)



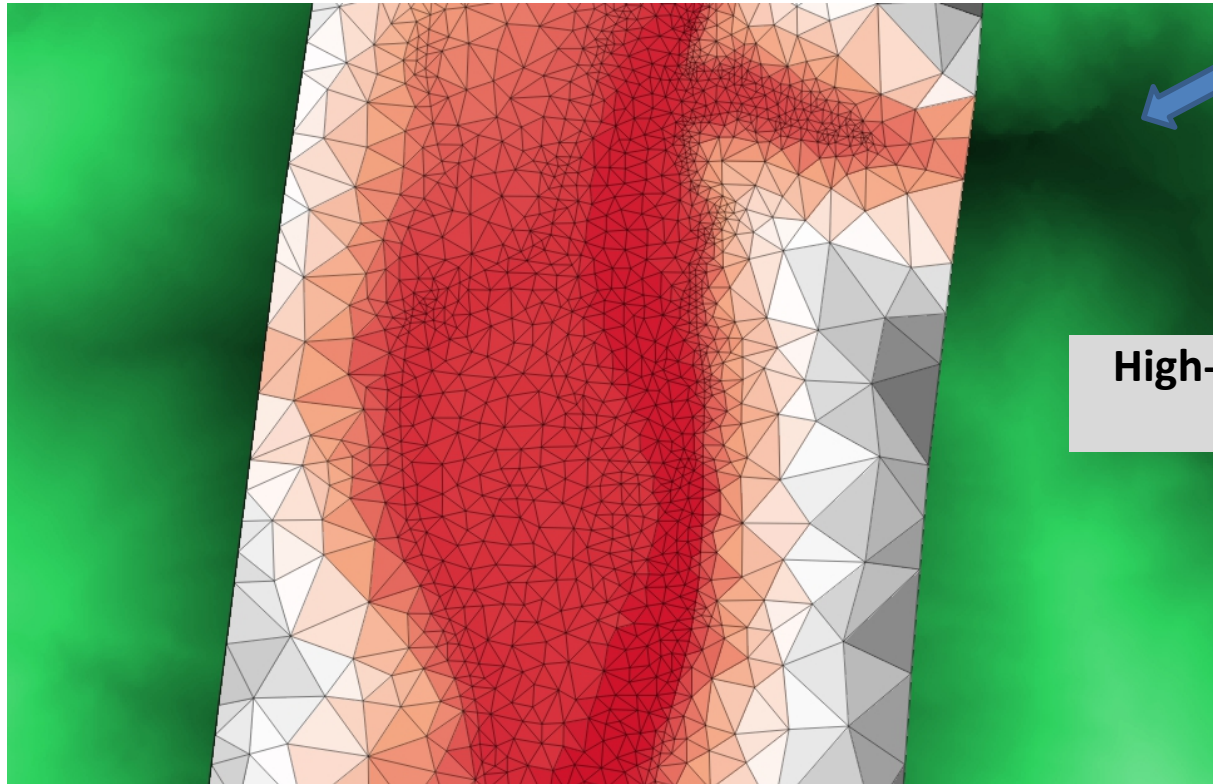
Boundary/breakline Vertices(Node)



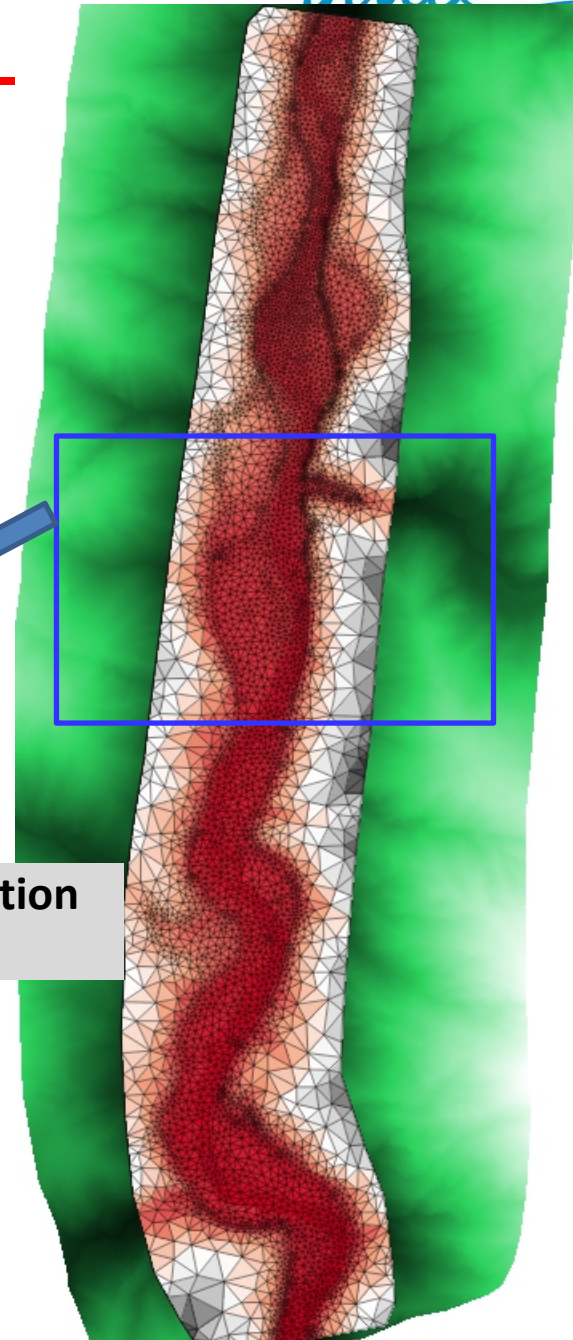
B. Obtaining the .2dm file

Reference standards:

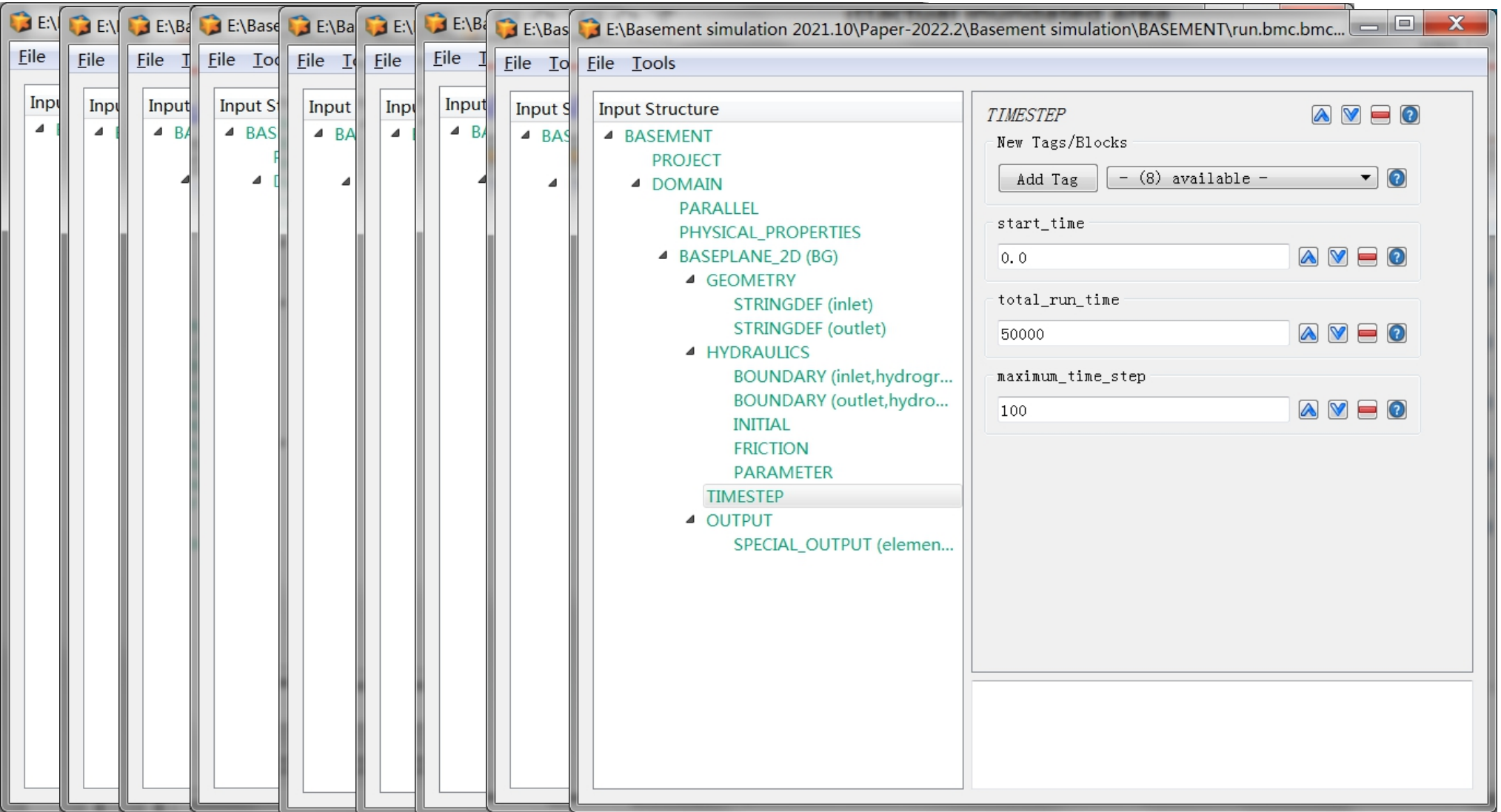
- (1) More water depth require more dense triangular
- (2) The density of the triangular numbers gradually change



High-resolution mesh



C. BASEMENT simulation

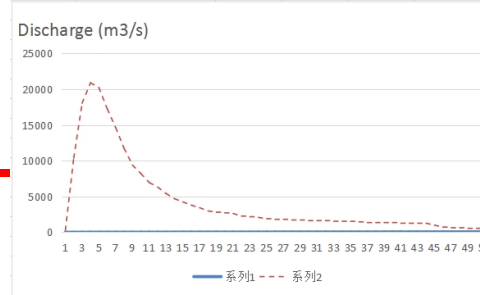


The screenshot displays a software interface for a BASEMENT simulation. The main window shows a tree view of the 'Input Structure' with the following categories:

- BASEMENT
 - PROJECT
 - DOMAIN
 - PARALLEL
 - PHYSICAL_PROPERTIES
 - BASEPLANE_2D (BG)
 - GEOMETRY
 - STRINGDEF (inlet)
 - STRINGDEF (outlet)
 - HYDRAULICS
 - BOUNDARY (inlet,hydrogr...)
 - BOUNDARY (outlet,hydro...)
 - INITIAL
 - FRICITION
 - PARAMETER
 - Timestep
 - OUTPUT
 - SPECIAL_OUTPUT (elemen...)

The 'Timestep' panel on the right shows the following settings:

- Timestep** (with navigation icons)
- New Tags/Blocks**: Add Tag, - (8) available -
- start_time**: 0.0
- total_run_time**: 50000
- maximum_time_step**: 100



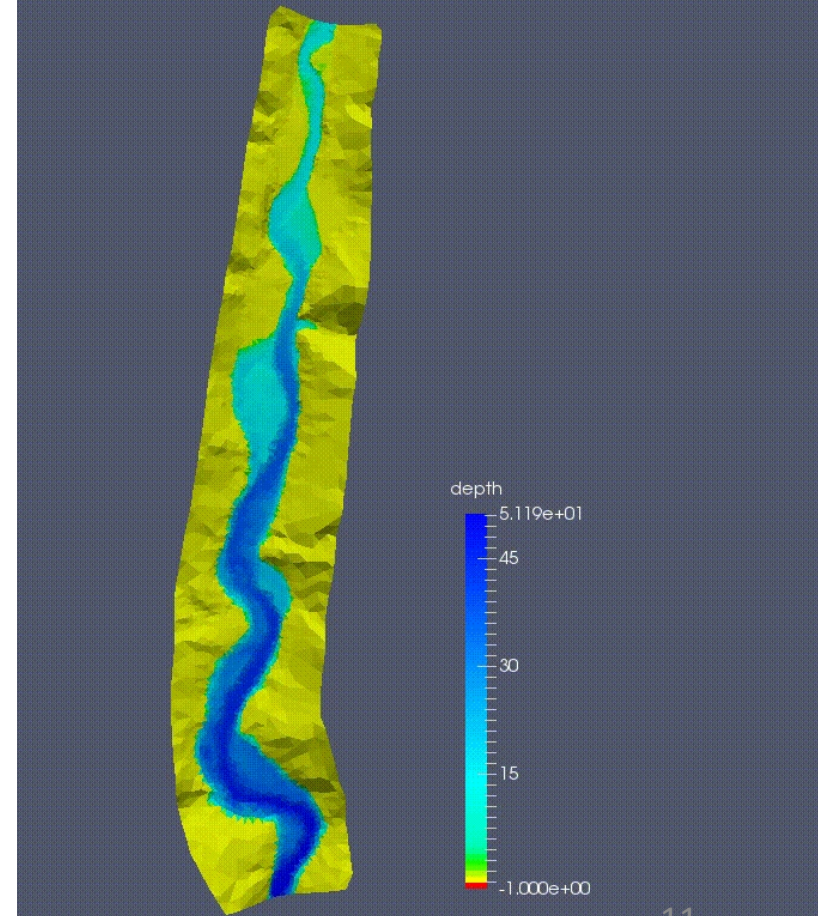
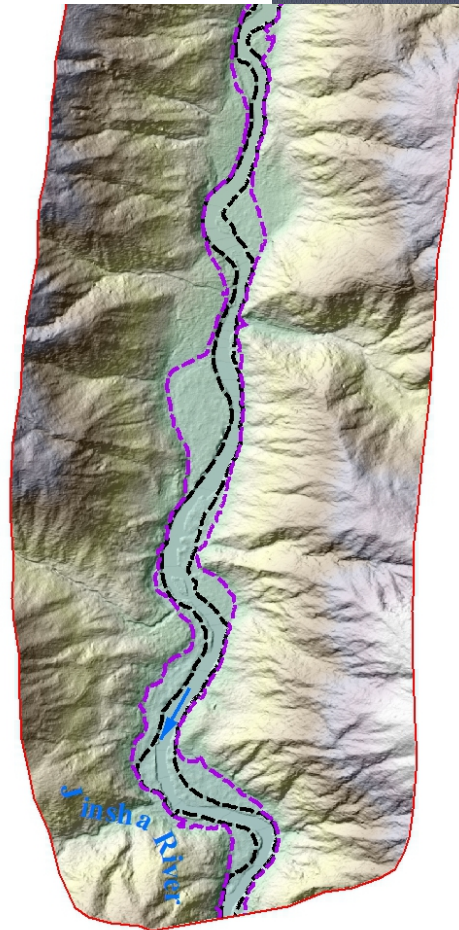
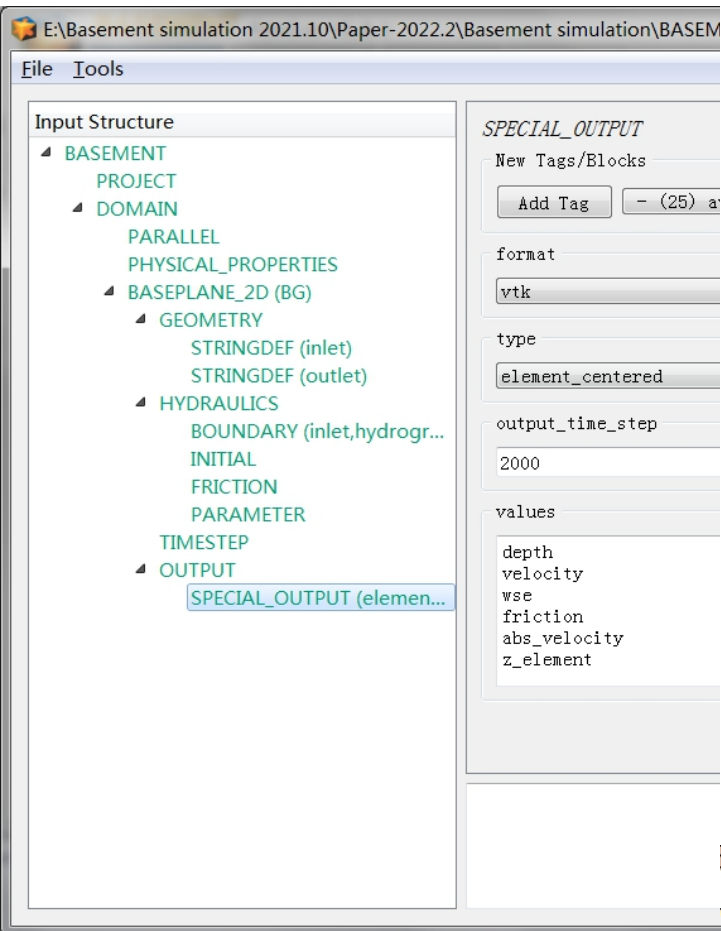
D. Simulation results visualization

Simulation inundated area is consistent with the actual inundated area

Actual inundated area

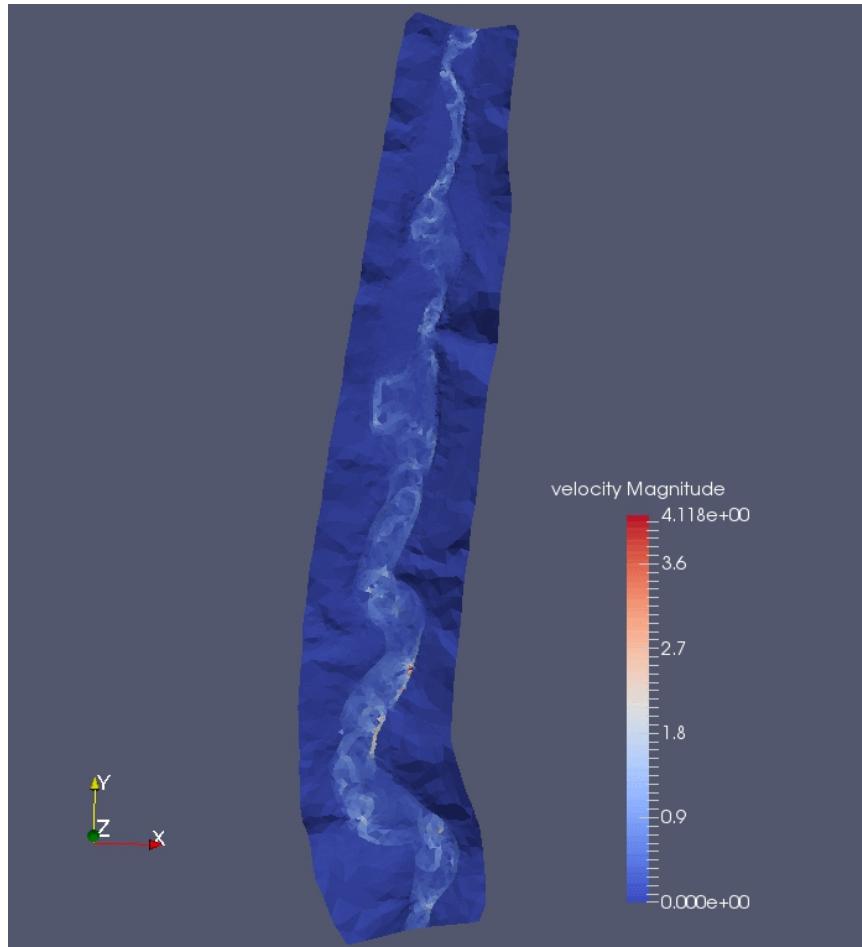
Depth

Result types

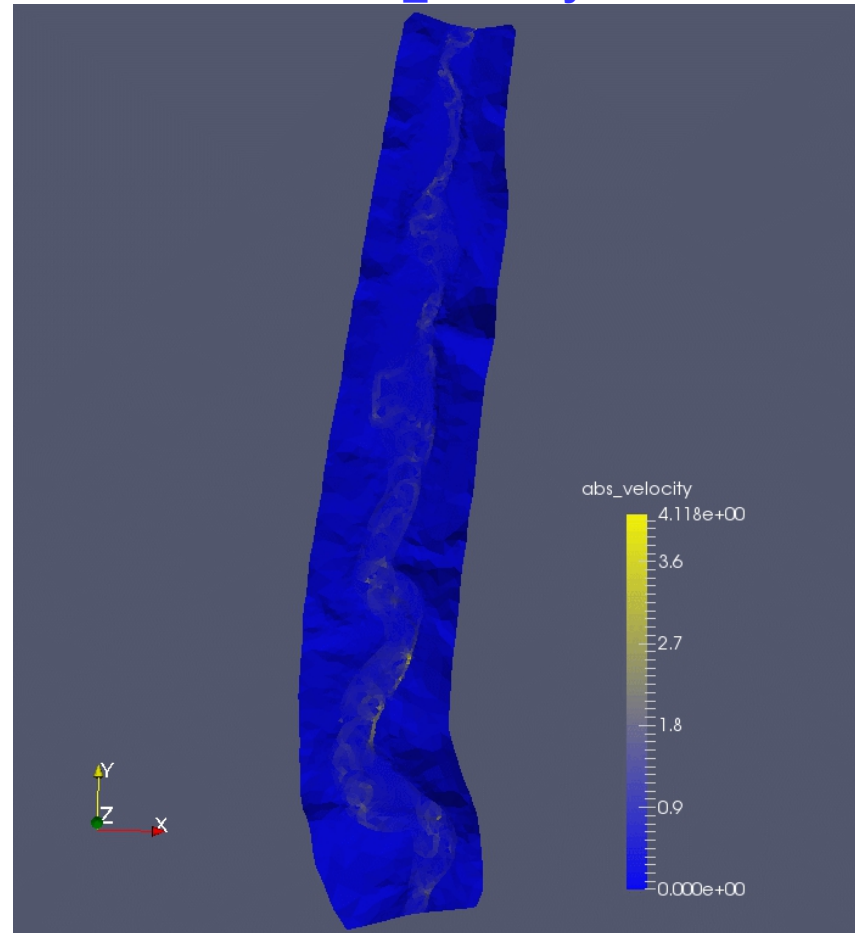


Velocity:

Velocity



Abs_velocity



Thank you for you attention!