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

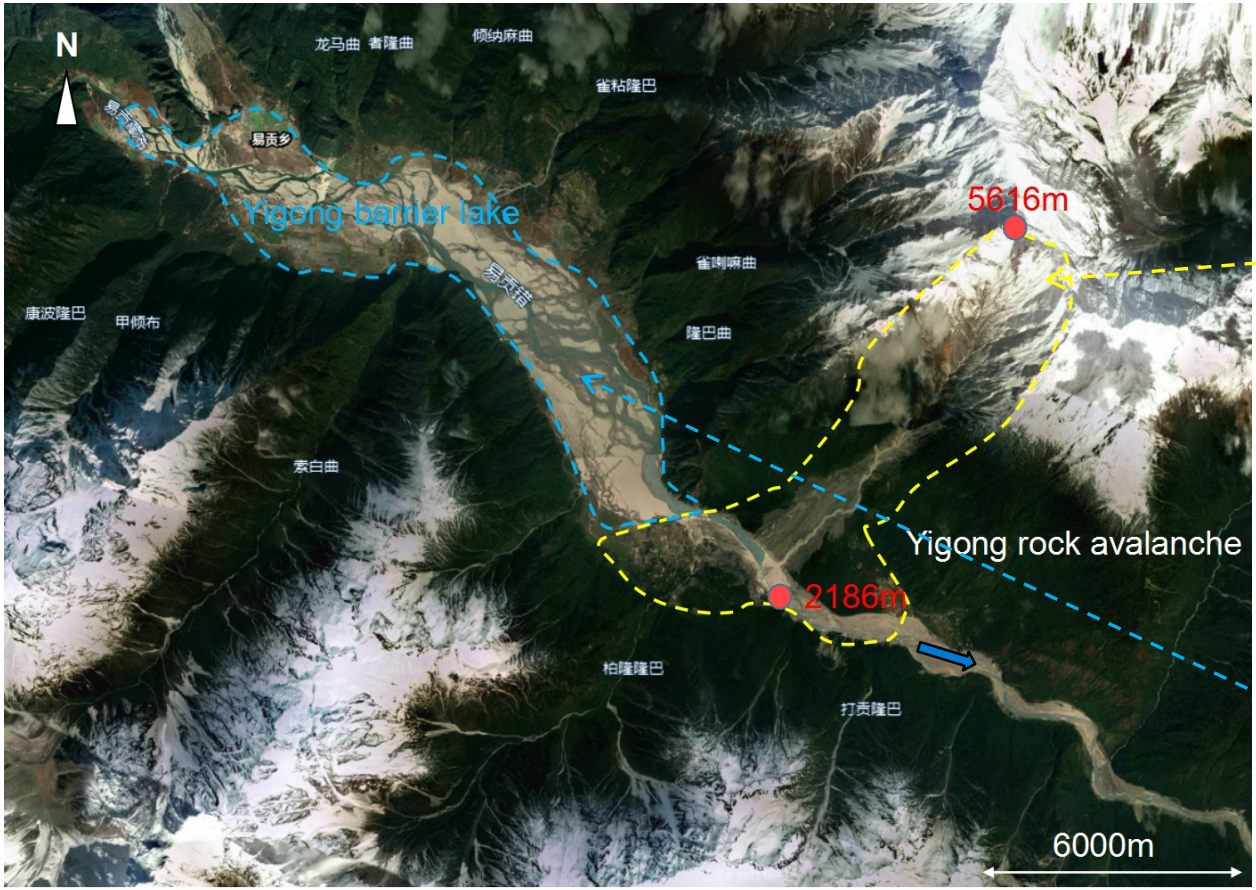
Feb. 3rd, 2022

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

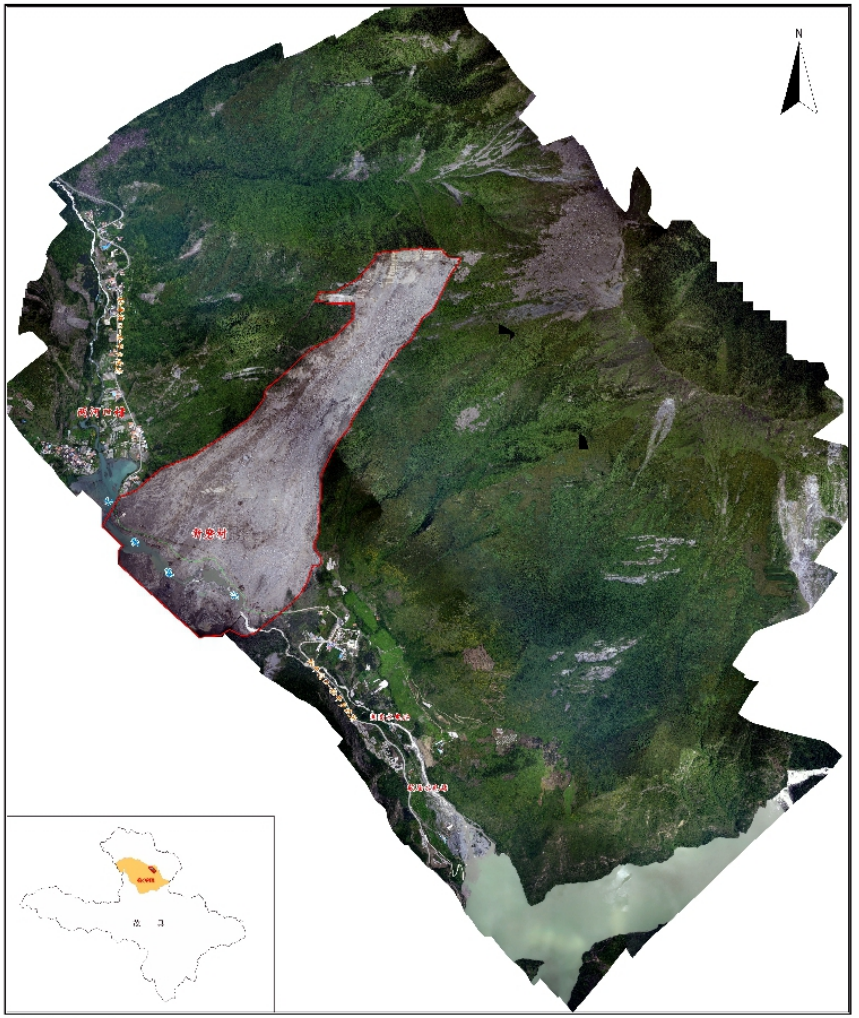
- Southeast Tibitan Plateau (Bomi County)
- Occurred twice (Caused by tectonic uplift):

In 1902 ($60\times10^6 m^3$); in 2000 ($0.3\times10^9 m^3$) : Floods reach India (Brahmaputra river) and lead to about dozens of peoples death

Case 2: Xinmo avalanche (2017.6.24)

From the field work

四川茂县叠溪镇山体高位垮塌（山体至顶部）灾后影像图



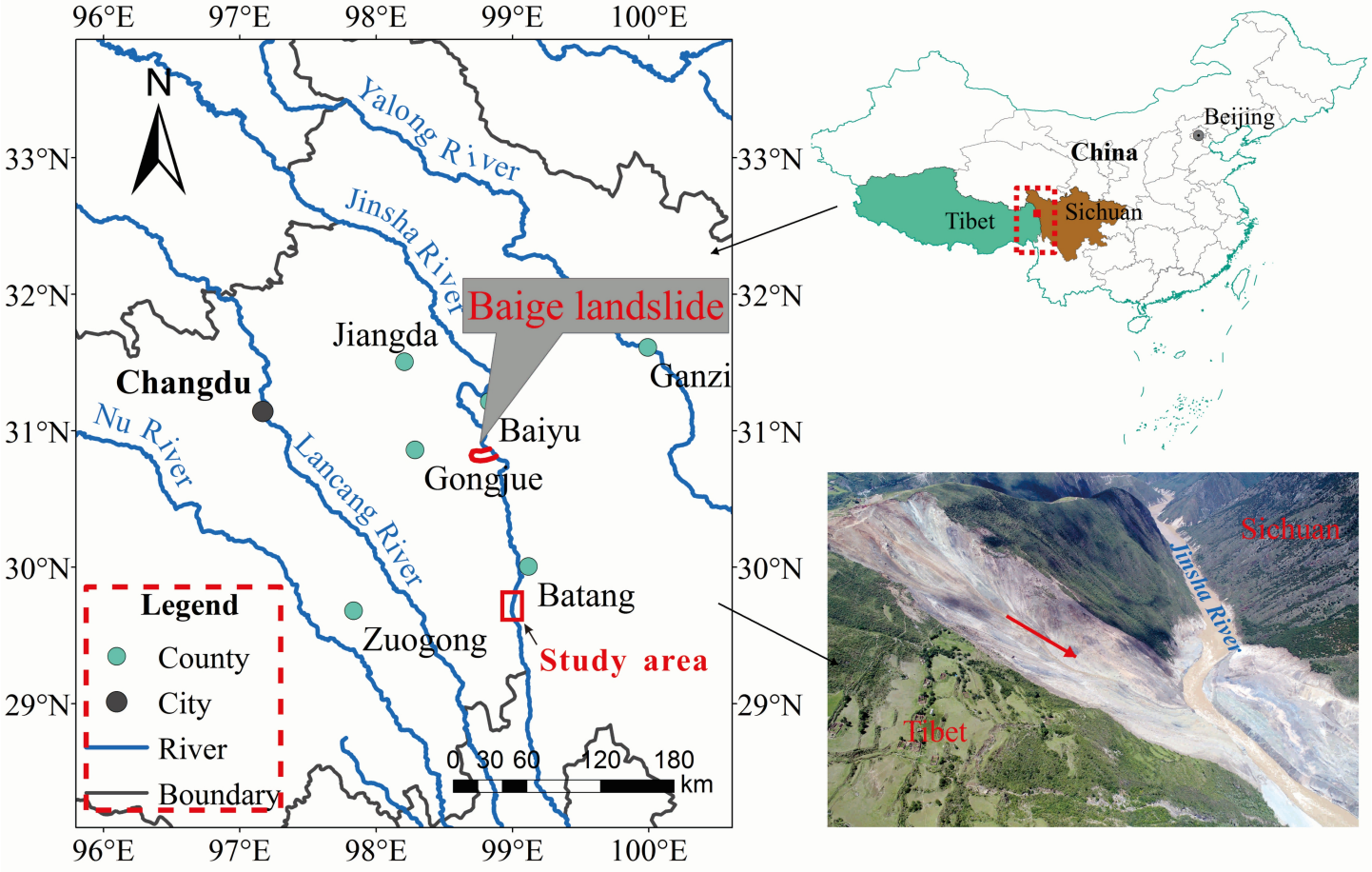
Cited from Sichuan Bureau of Surveying and Mapping

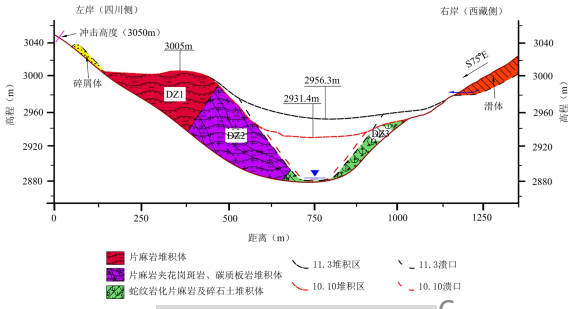
- Tibetan Plateau east edgy (Mao County)
- Caused by earthquake ($8\times10^6 m^3$)
- 82 peoples death

Contents:

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

2.1 Selecting the study area





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

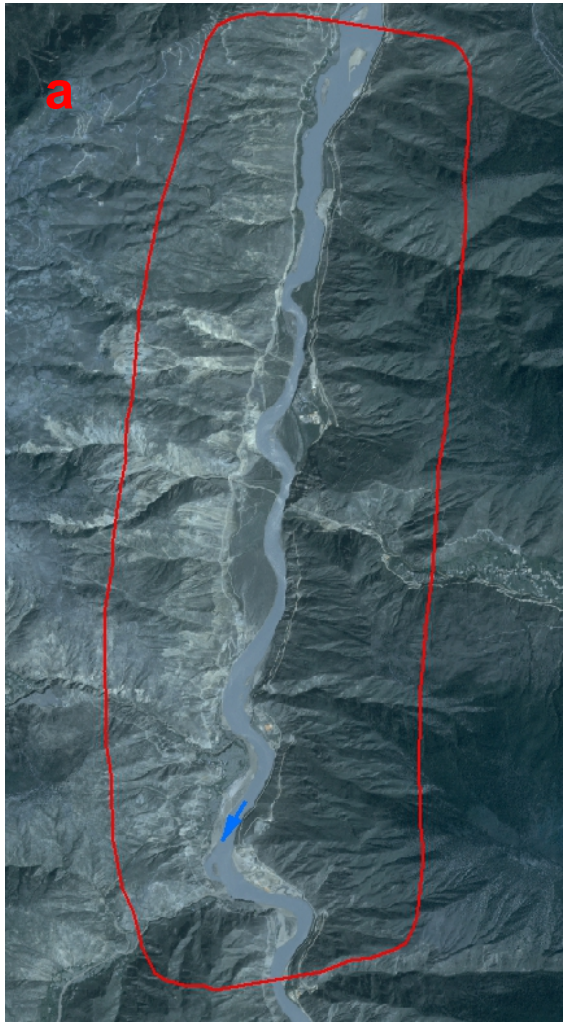
Volume: $18\times10^6 m^3$ (First time,), $6\times10^6 m^3$ (Second time)

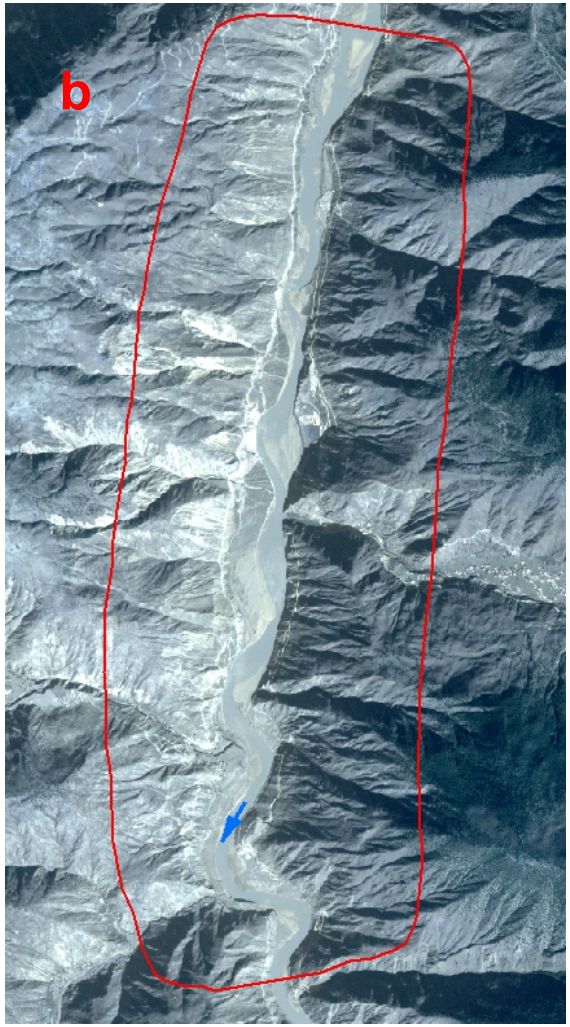
Flood impact distance: 670km on the downstream, 70km on the upperstream

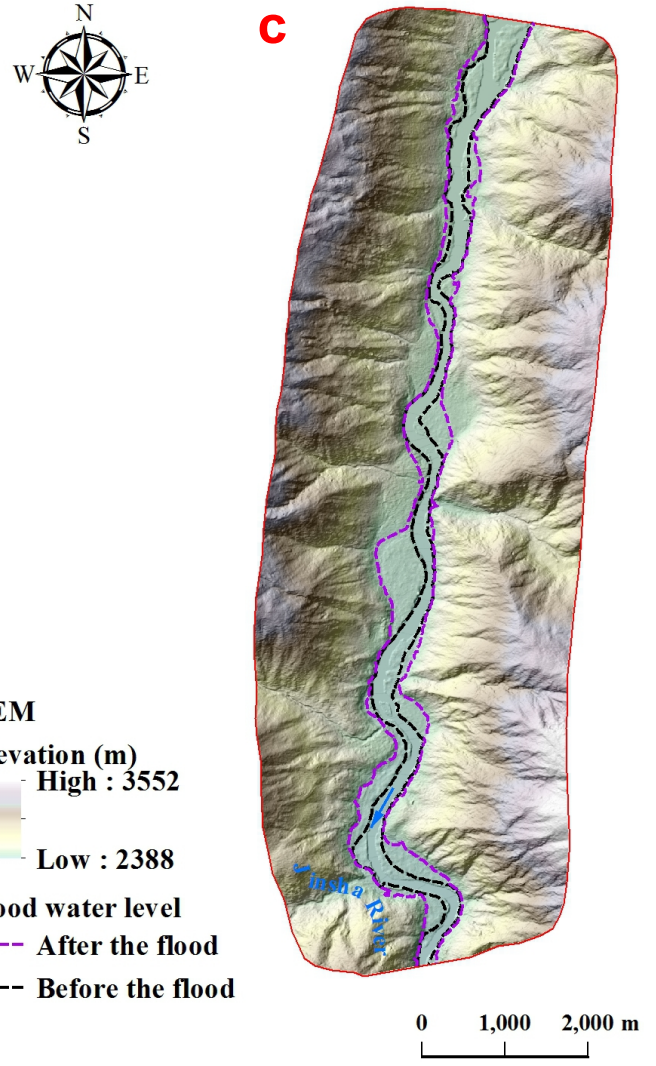
Barrier dam

The remote sensing interpretation result

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

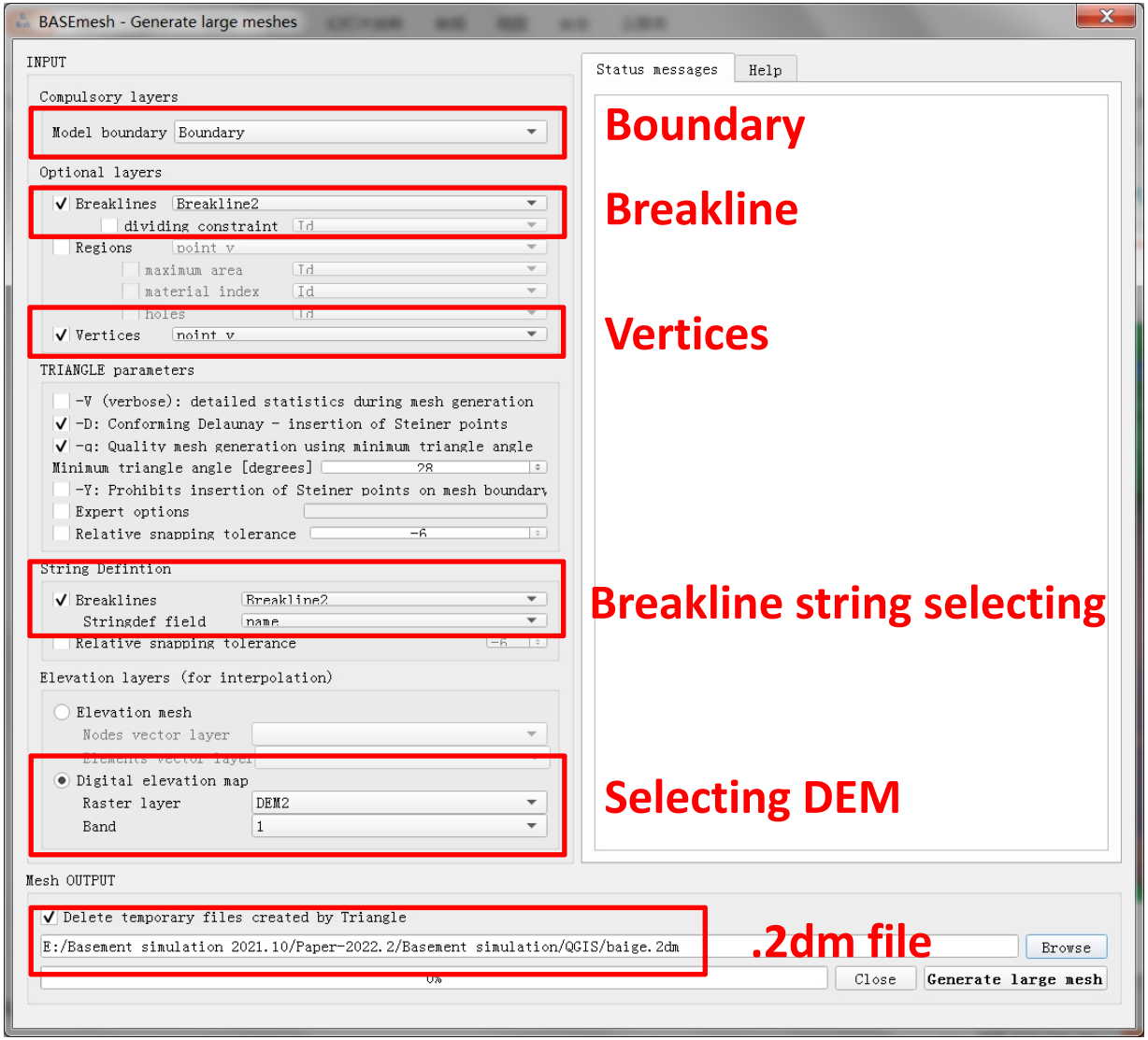




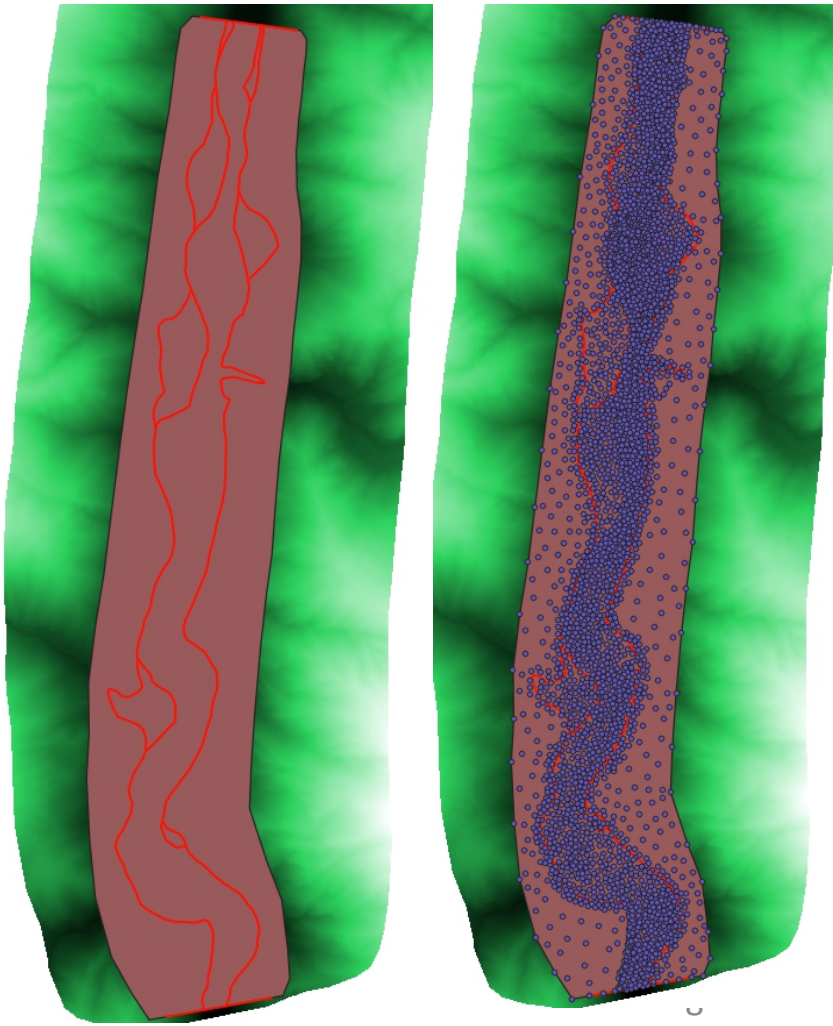


2.2 Outburst flood simulation based on the BASEMENT model

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



Boundary/breakline Vertices(Node)

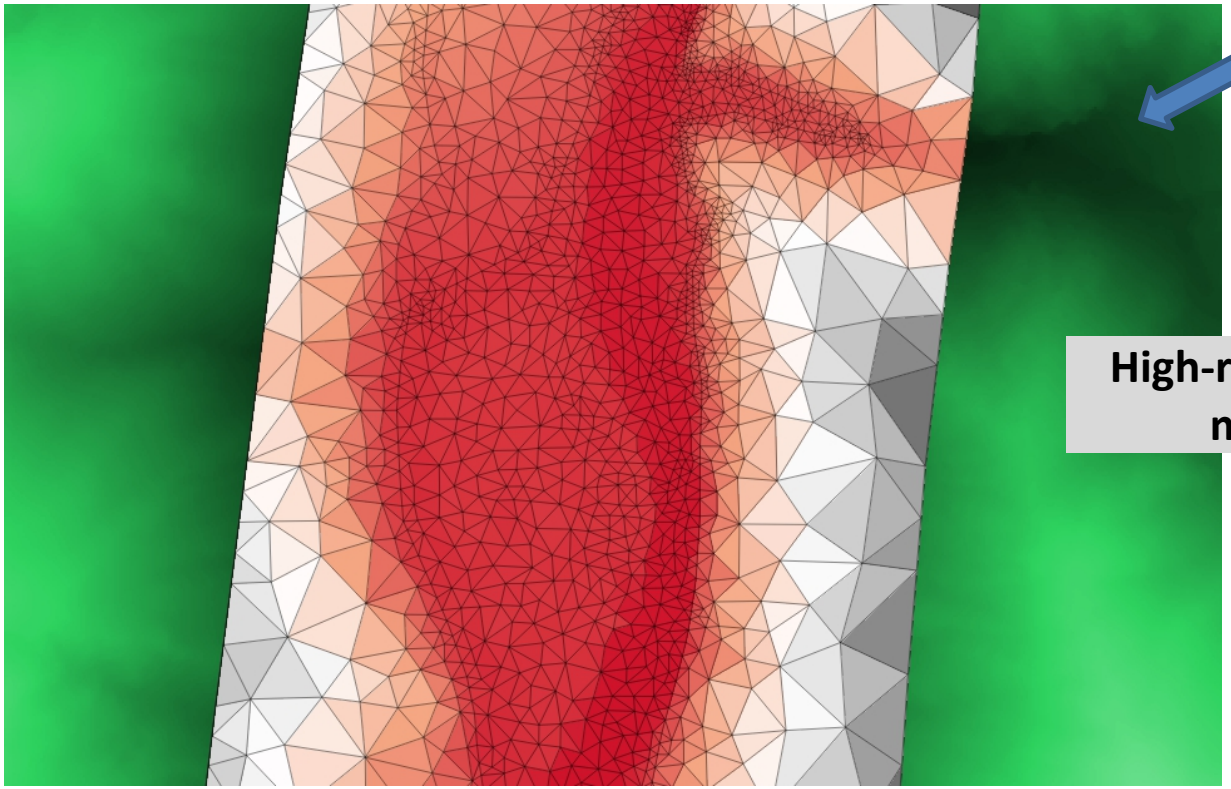


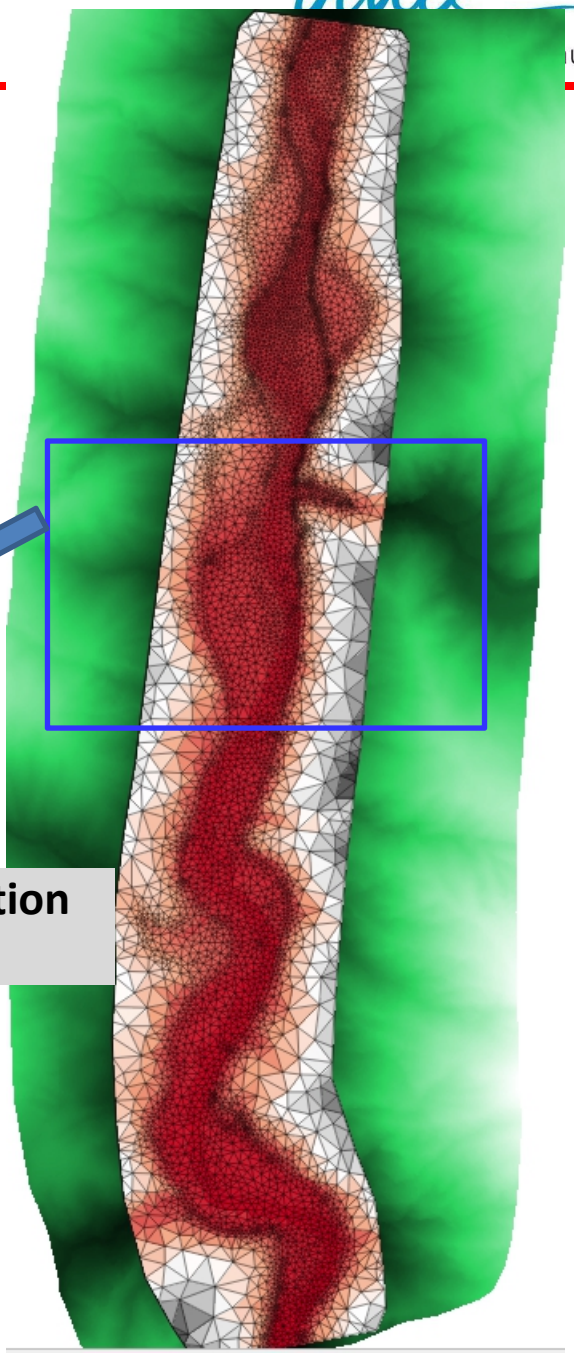
B. Obtaining the .2dm file

Reference standards:

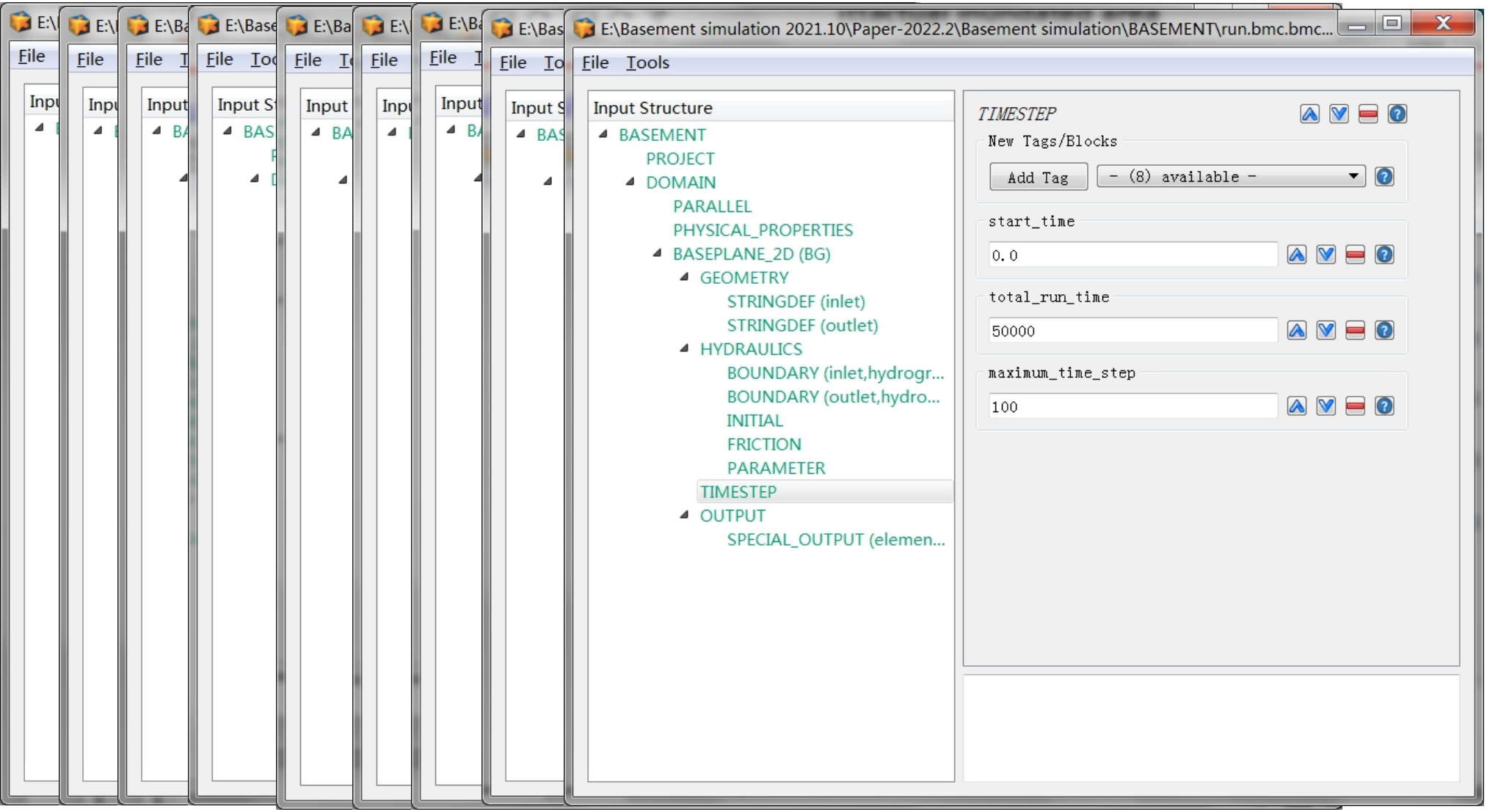
(1) More water depth require more dense triangular

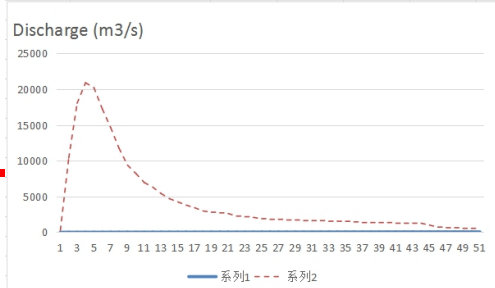
(2) The density of the triangular numbers gradually change





C. BASEMENT simulation

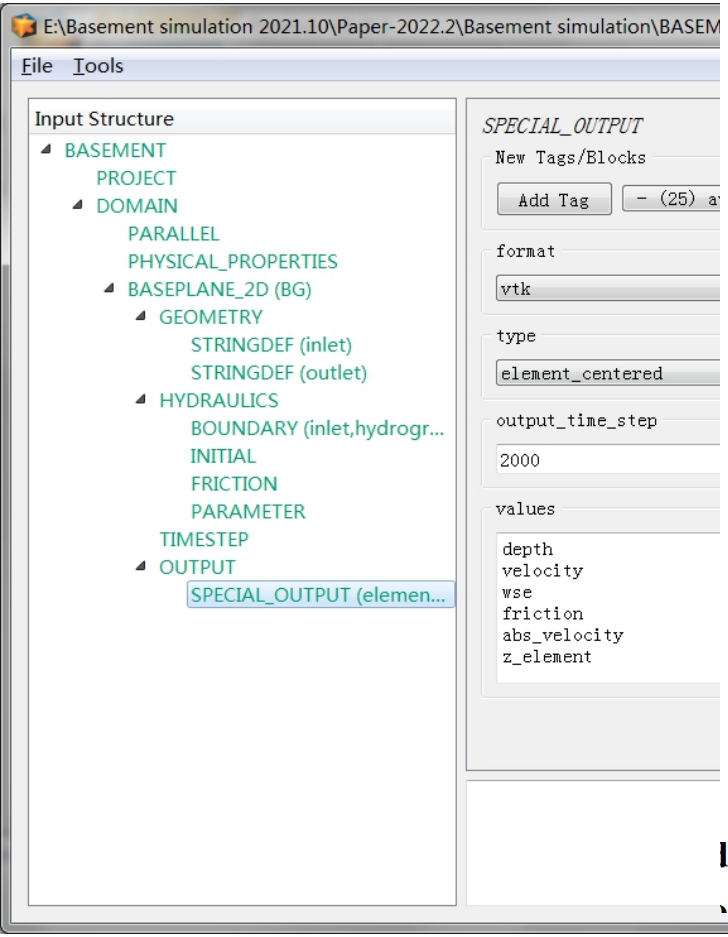




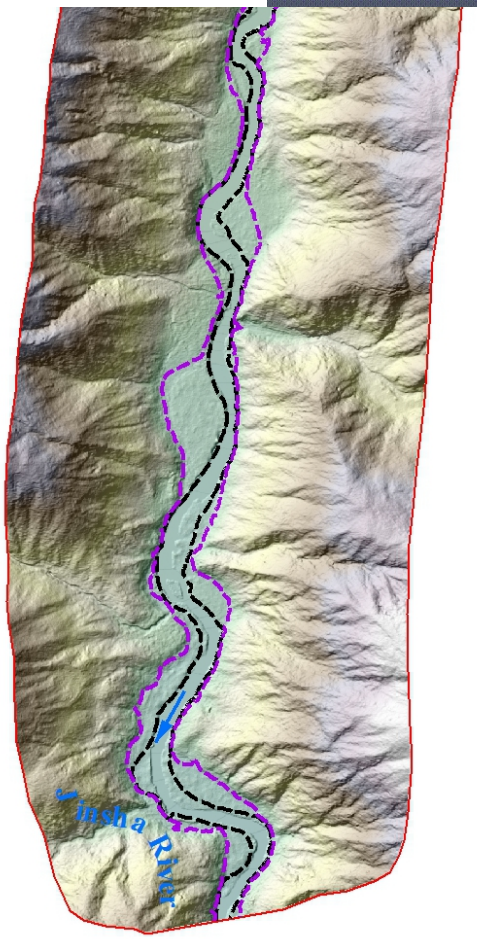
D. Simulation results visualization

Simulation inundated area is consistent with the actual inundated area

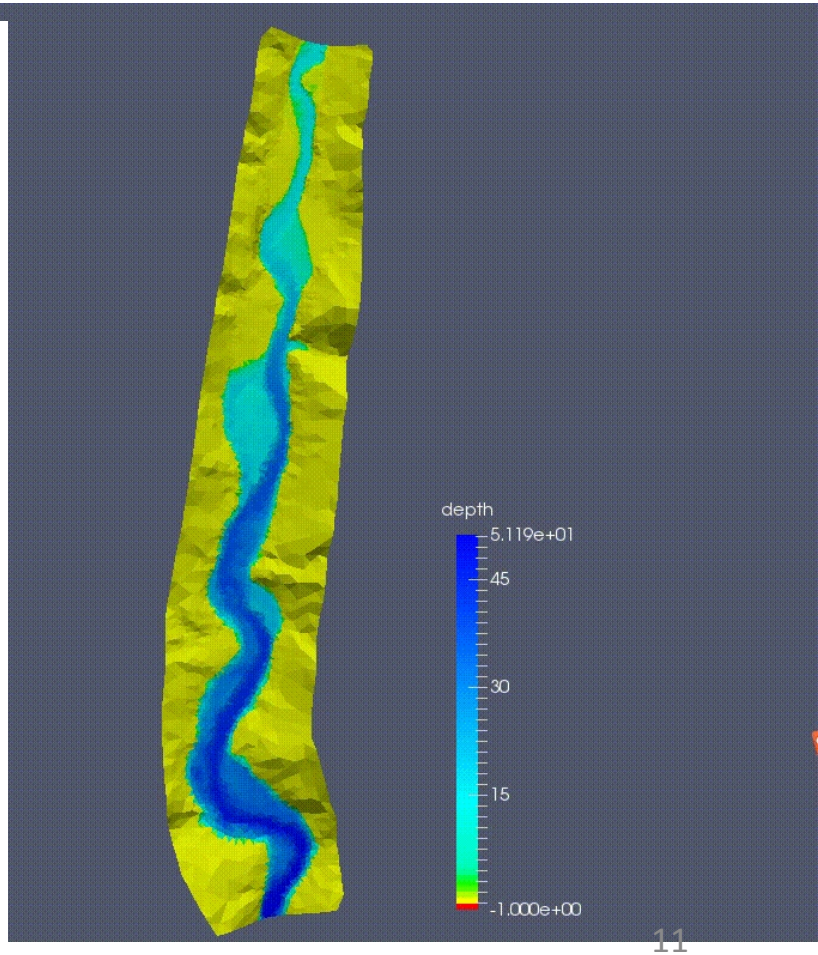
Result types



Actual inundated area

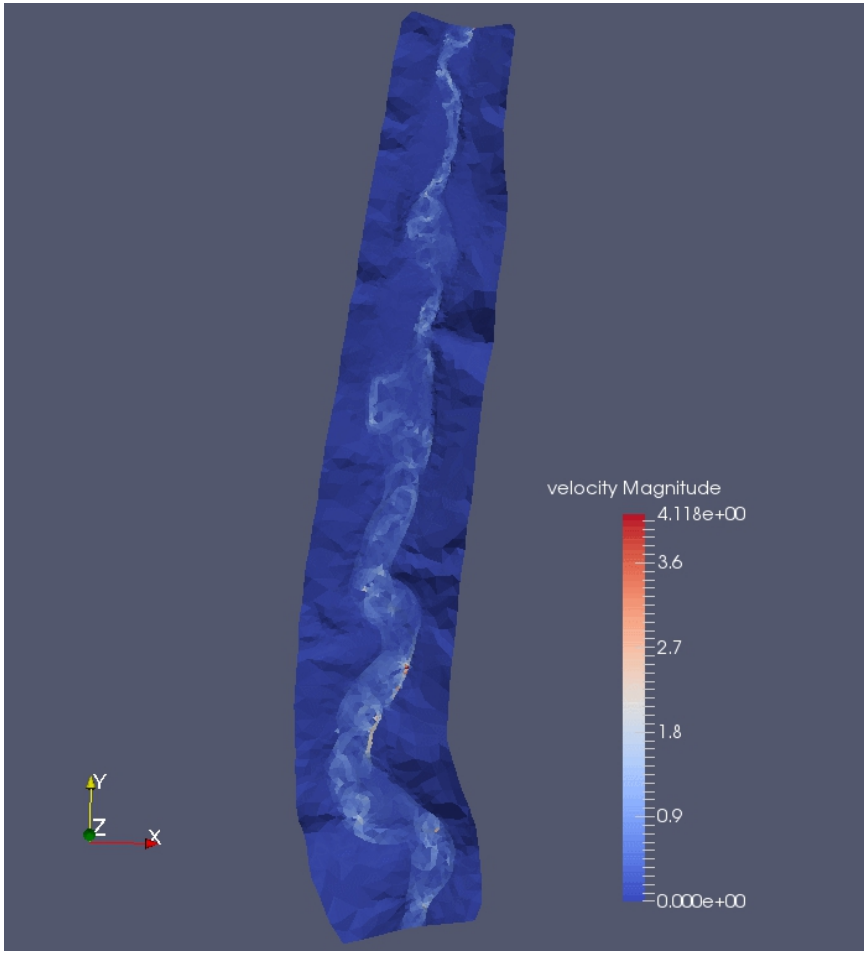


Depth

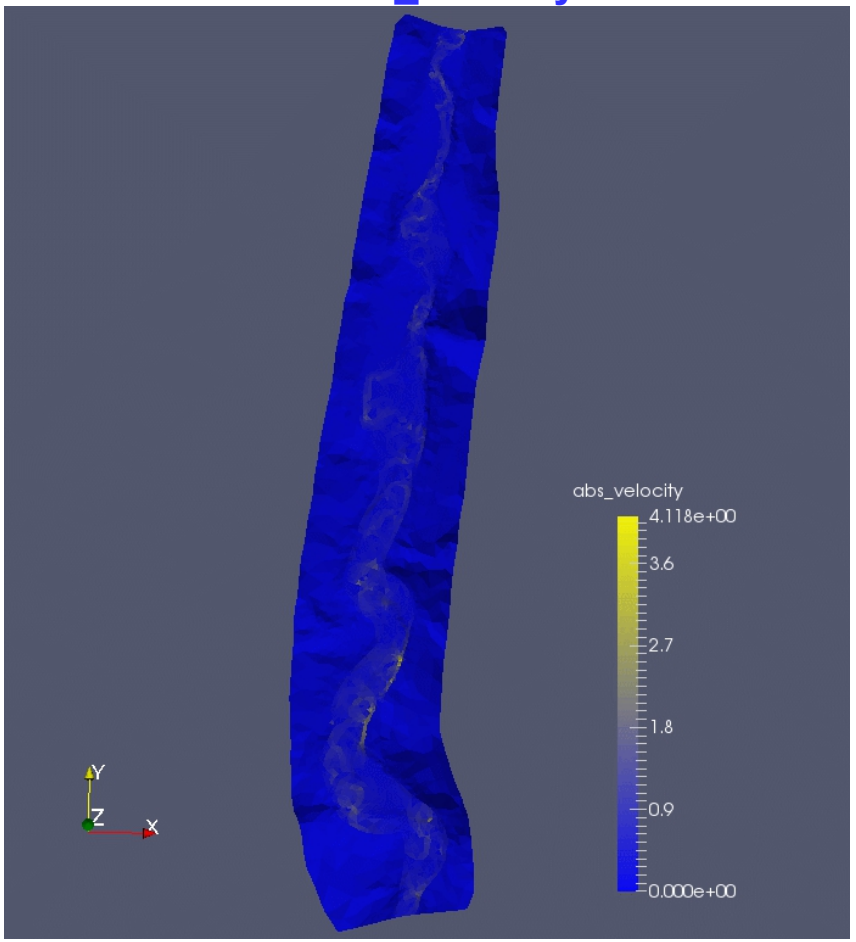


Velocity:

Velocity



Abs_velocity



Thank you for you attention!