



ROMAN ROADS IN ISTRIA

An example of a *Least Cost Path* analysis

Katarina Šprem, PhD candidate
Juraj Dobrila University of Pula
Faculty of Humanities
Department of Archaeology

Roman roads in Istria

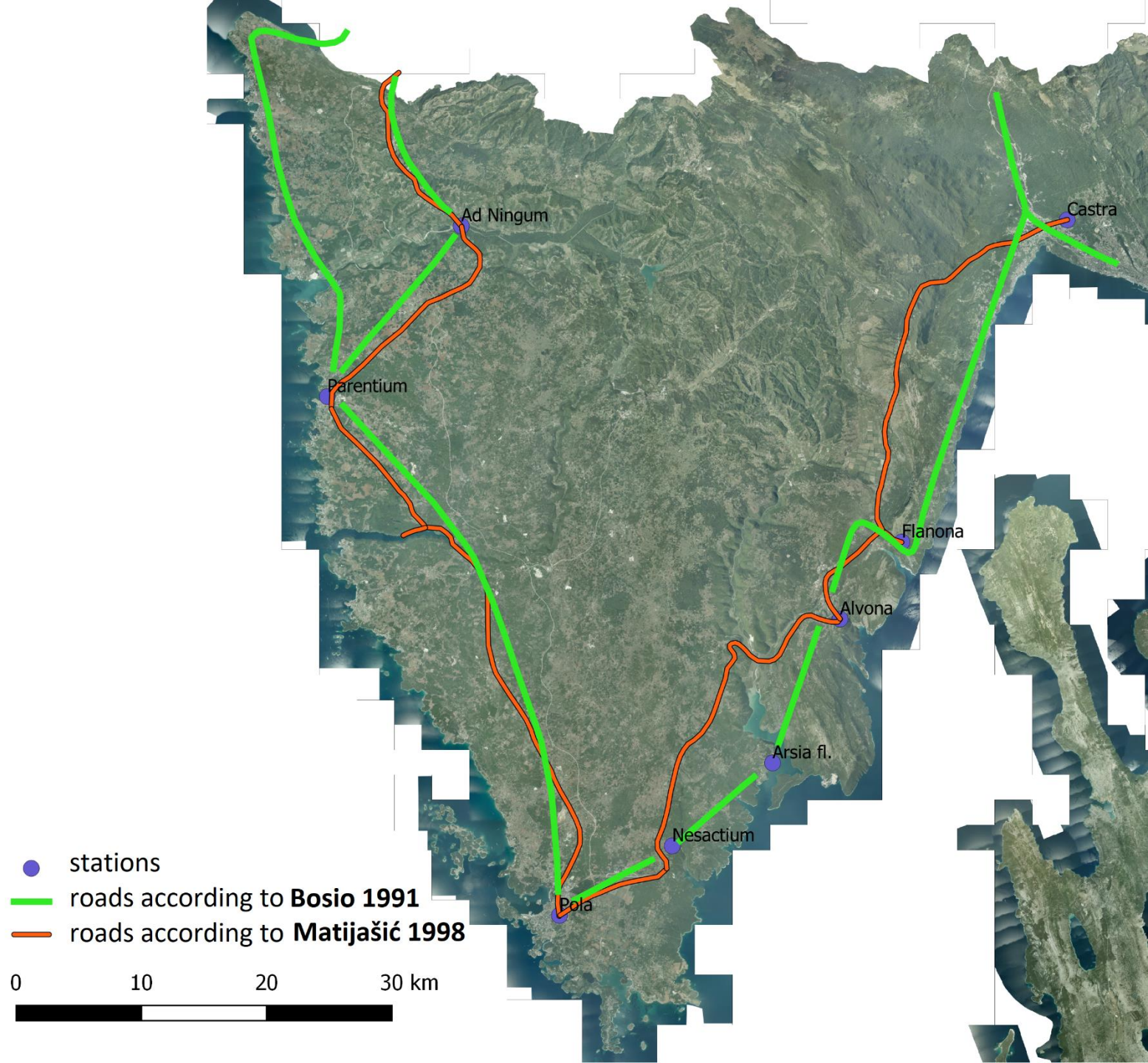
Regio X (*Venetia et Histria*)

- the road network in Istria was probably not formed before Augustus
- Roman roads in Istria known only in **basic directions**
- two **Roman milestones** (*miliaria*) of Flavian age found north of *Pola* (Via Flavia)
- the focus of Roman policy was on maritime transport – **lower transport cost** (Russell 2014)
- Aquileia – Pola -> *Via Flavia*



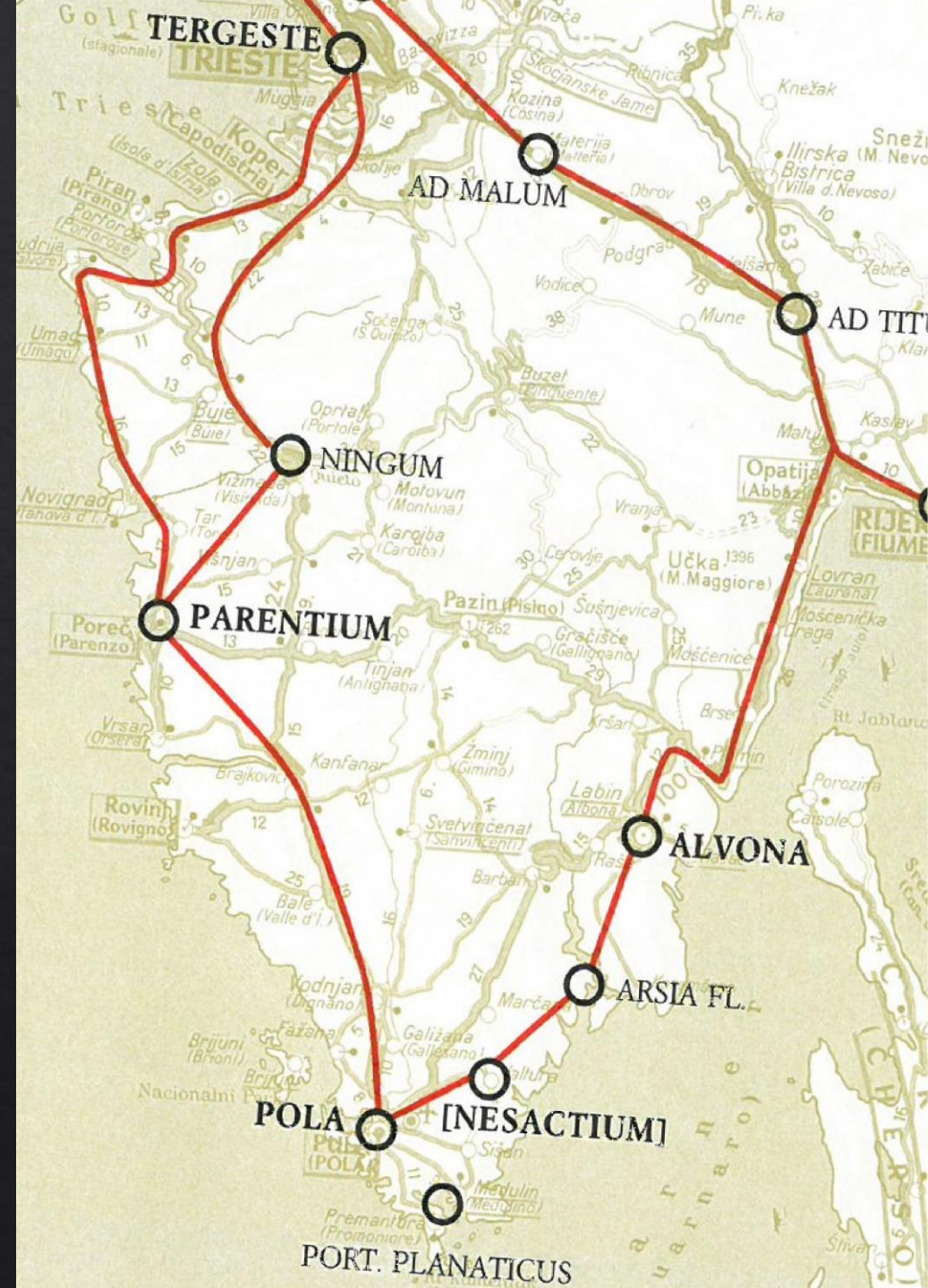
QGIS

- ◆ Geoportal
(www.geoportal.dgu.hr)
WMS servers
- ◆ digital orto-photo,
topographical, basic map
- ◆ hand-drawn georeferenced
roads according to two
authors – **Bosio** (1991) and
Matijašić (1998)



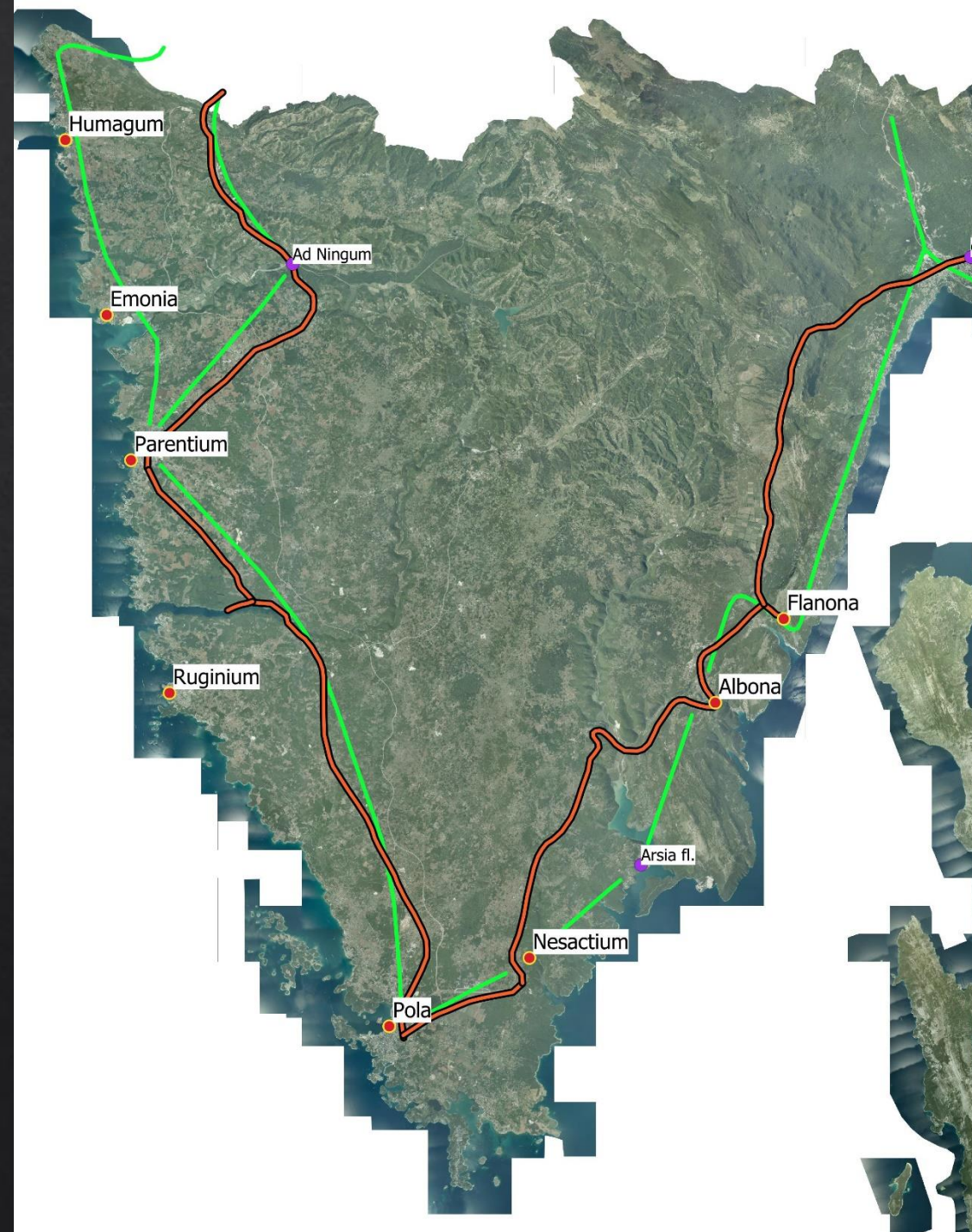
WORKFLOW

◆ data on Roman roads (Bosio and Matijašić)



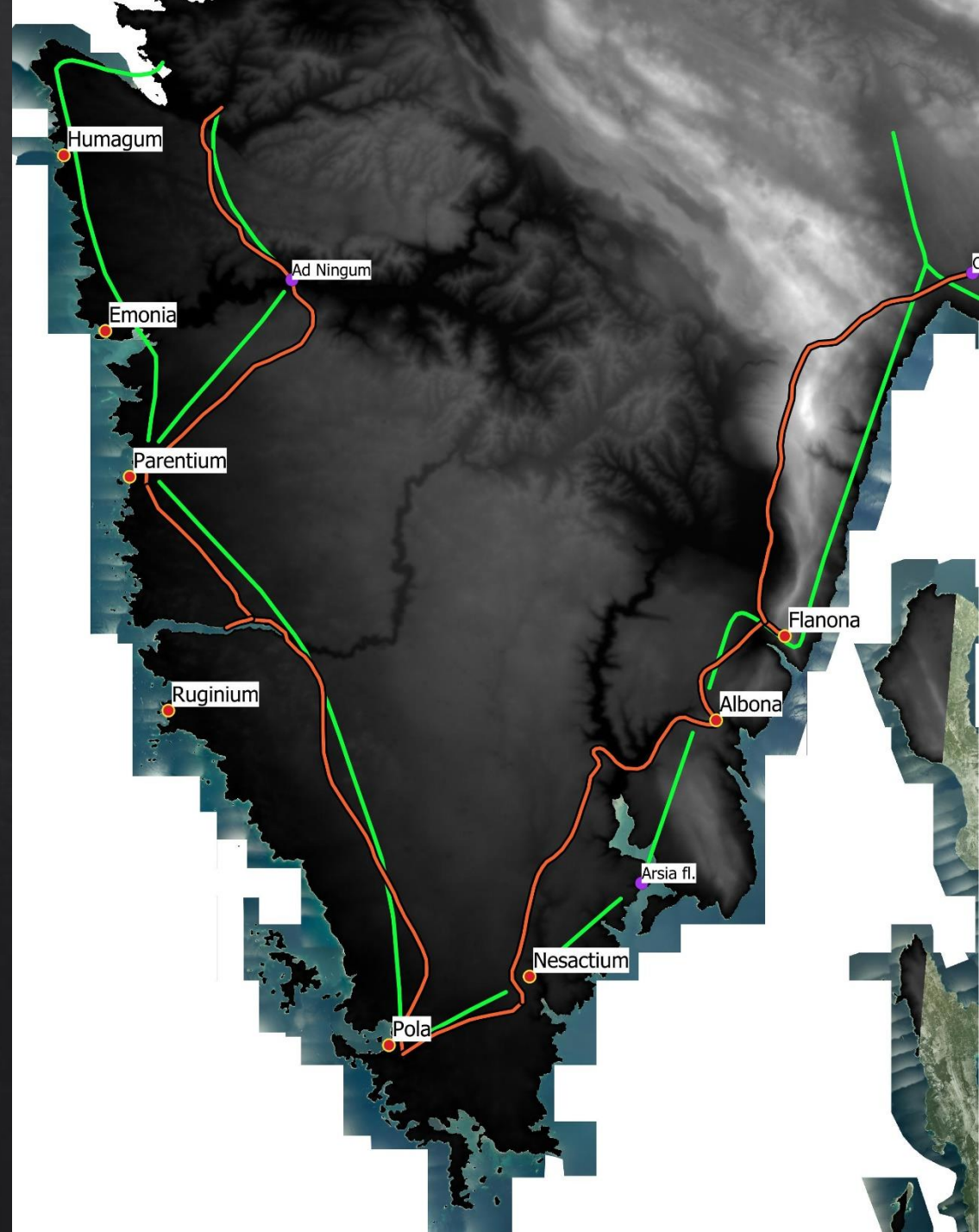
WORKFLOW

- ◆ data on Roman roads (Bosio and Matijašić)
- ◆ georeferenced roads on digital ortophoto and topographic maps (QGIS database)



WORKFLOW

- ◆ data on Roman roads (Bosio and Matijašić)
- ◆ georeferenced roads on digital ortophoto and topographic maps (QGIS database)
- ◆ **Digital Elevation Model (DEM)** of the Istrian peninsula (**Copernicus** and **NASA**)



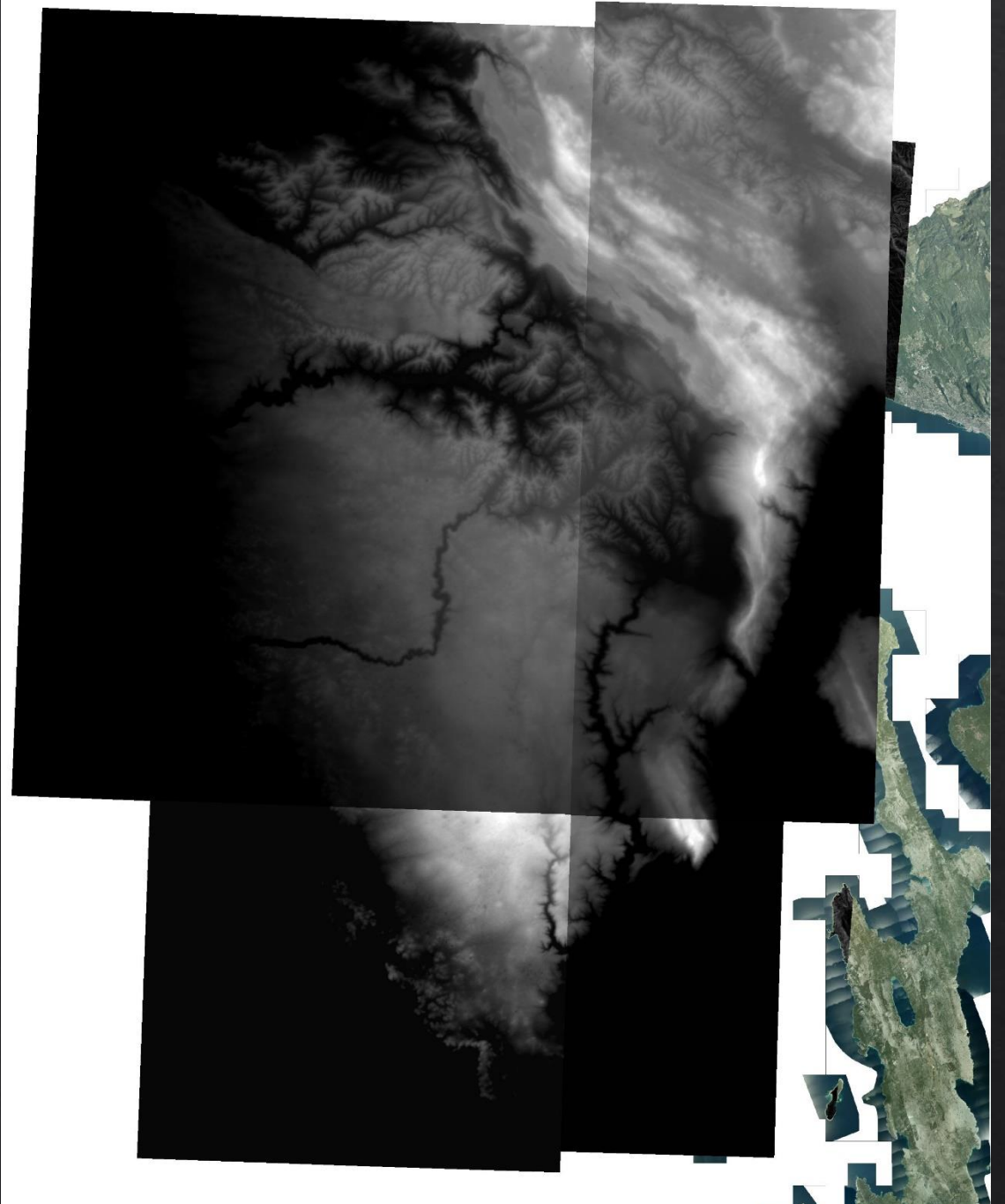
WORKFLOW

- ◆ data on Roman roads (Bosio and Matijašić)
- ◆ georeferenced roads on digital ortophoto and topographic maps (QGIS database)
- ◆ **Digital Elevation Model (DEM)** of the Istrian peninsula (**Copernicus** and **NASA**)
- ◆ making a **slope raster** from the DEM of the Istrian peninsula (**slope is our *cost***)



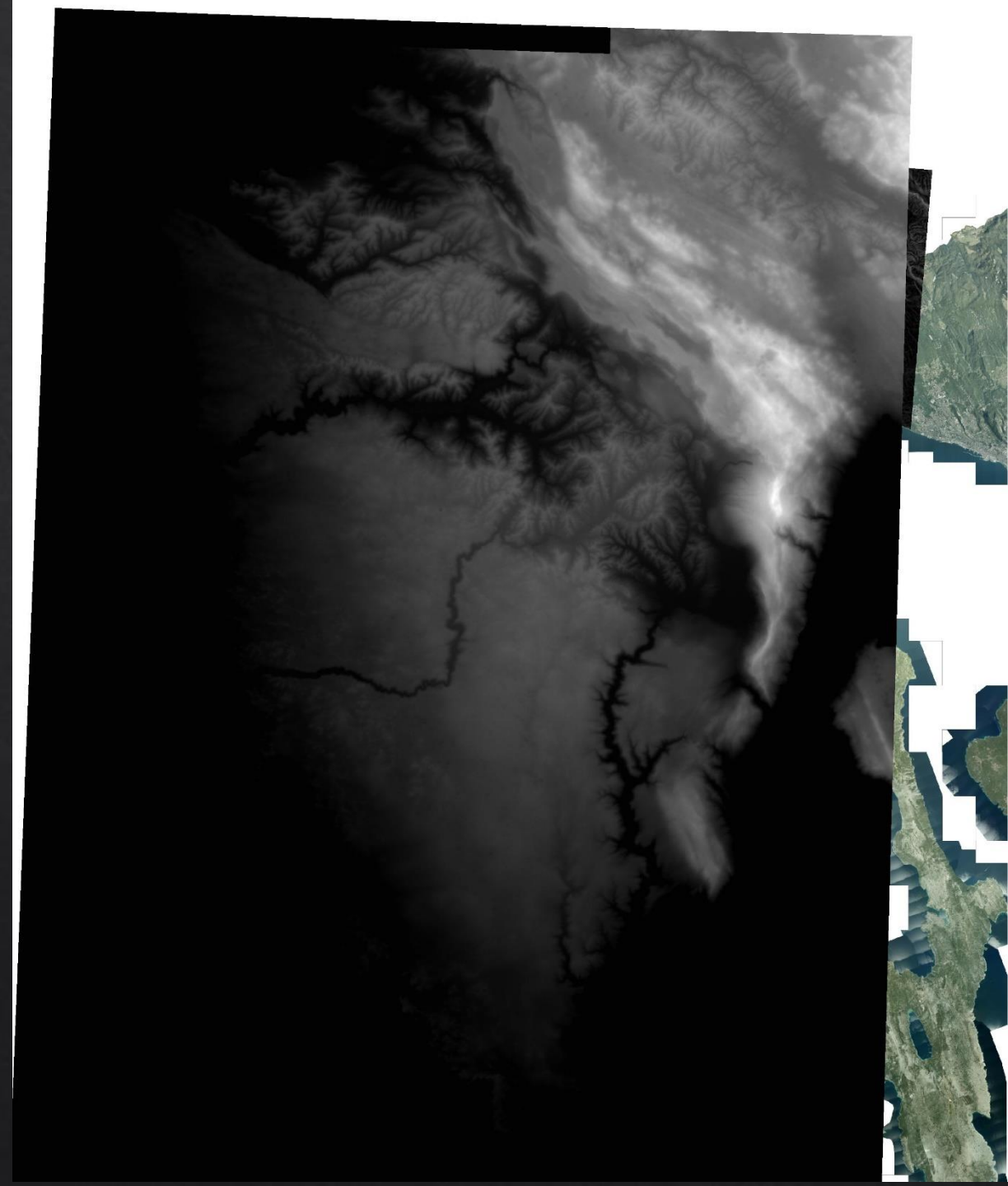
NASA DEM

- ◊ ASTER Global Digital Elevation Model V003 (<https://earthdata.nasa.gov/>)
- ◊ split into 4 granules („files”)
- ◊ merge raster



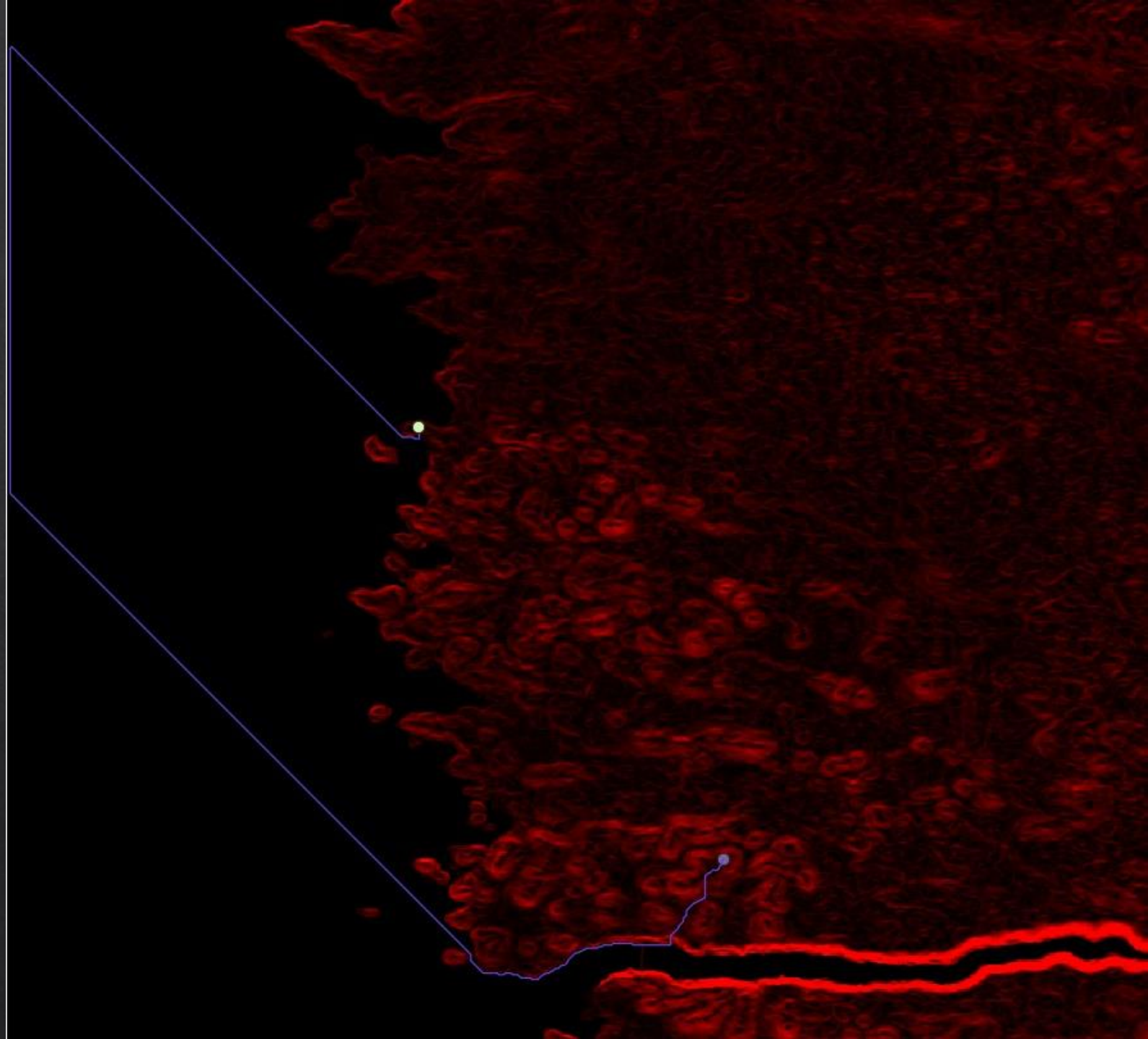
NASA DEM

- ◊ ASTER Global Digital Elevation Model V003 (<https://earthdata.nasa.gov/>)
- ◊ split into 4 granules („files”)
- ◊ merge raster



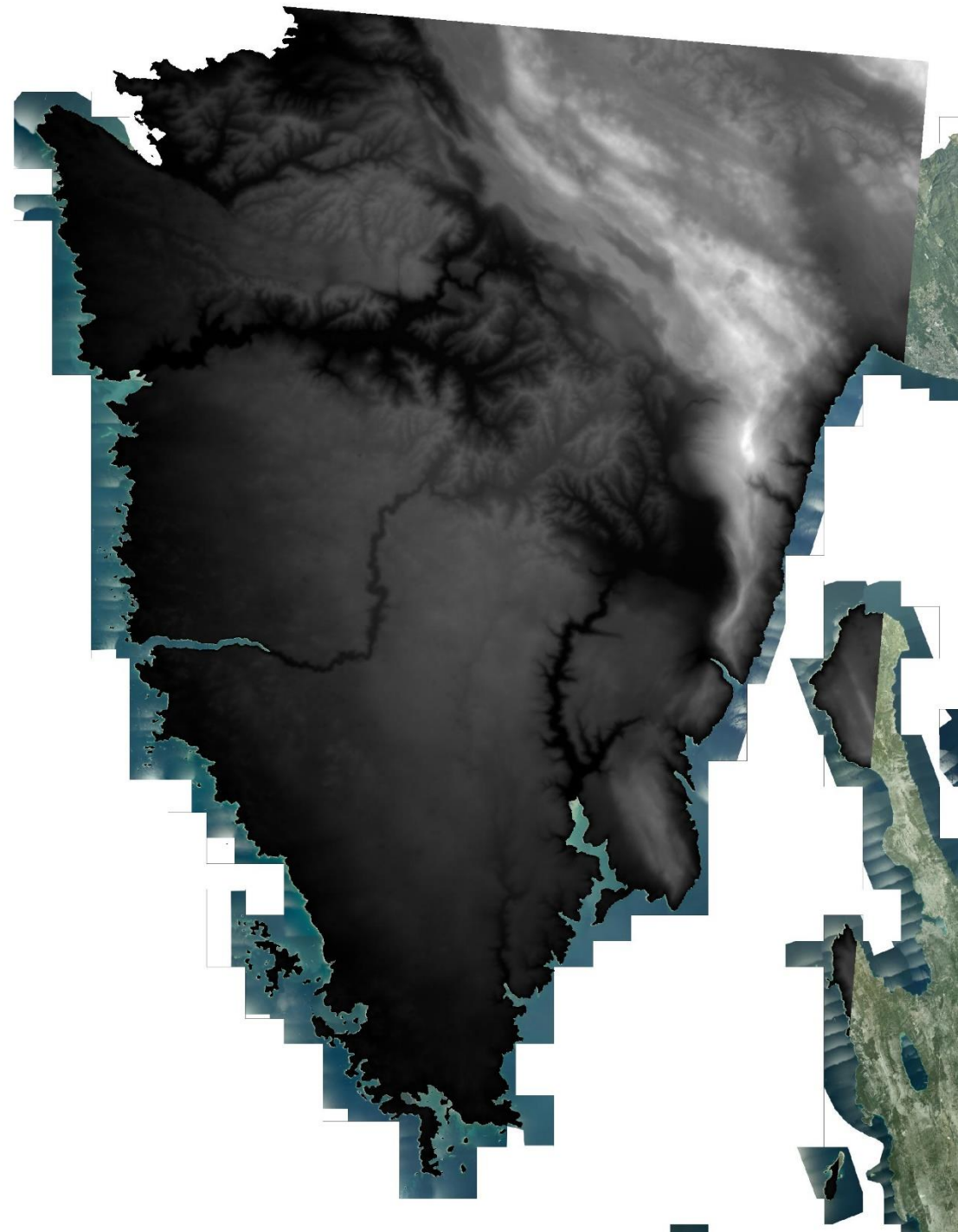
First try

- ◇ Roman quarry at **Monte del Vescovo** to *Parentium*
- ◇ **fail**
- ◇ the program is telling me **the sea is perfect for transport**
- ◇ Russell 2014
- ◇ lowest cost **slope-wise**



COPERNICUS DEM

- ◇ <https://land.copernicus.eu/imagery-in-situ/eu-dem/eu-dem-v1.1/view>
- ◇ one raster file
- ◇ the sea already cut out



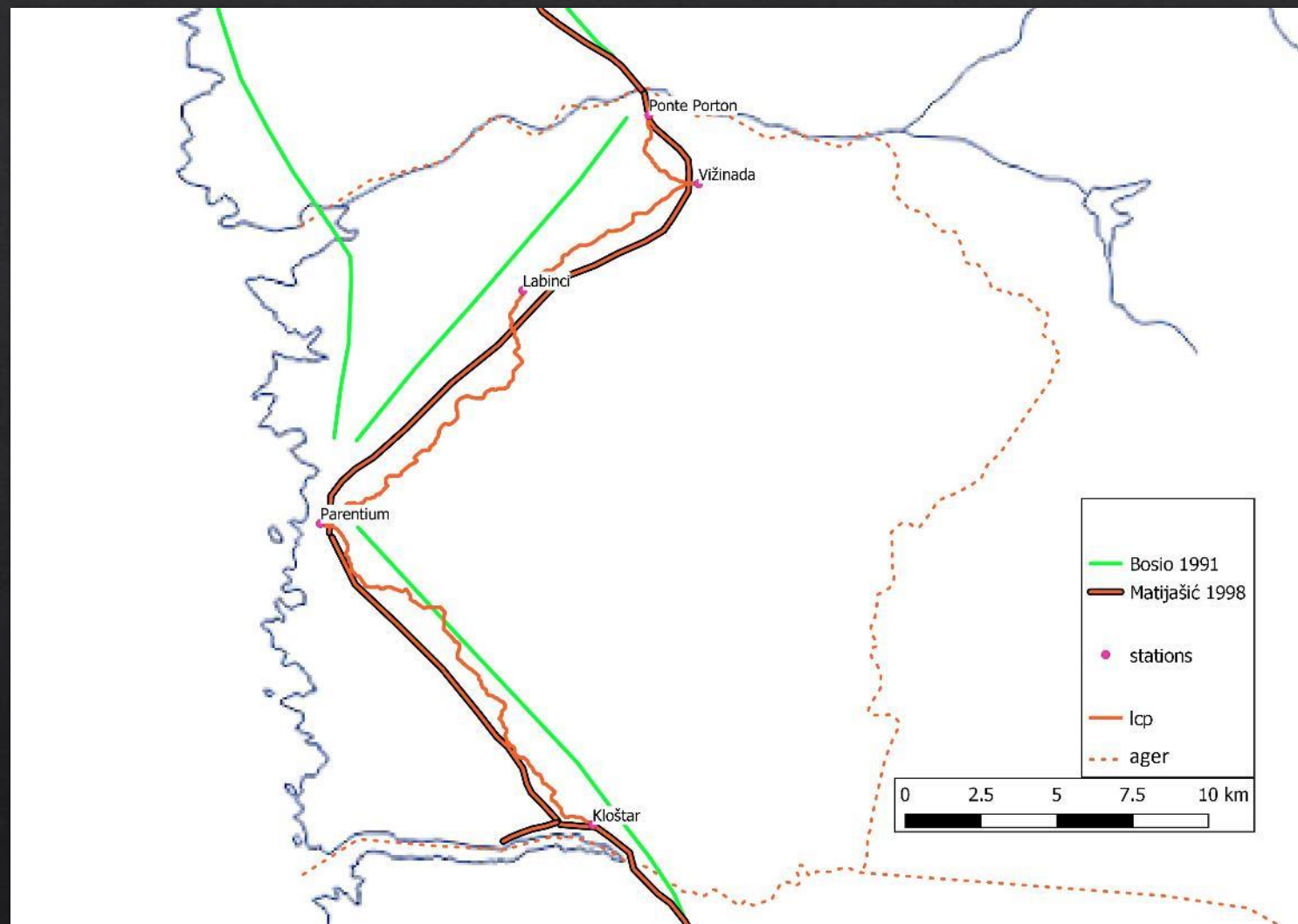
COPERNICUS DEM

- ◇ <https://land.copernicus.eu/imagery-in-situ/eu-dem/eu-dem-v1.1/view>
- ◇ one raster file
- ◇ the sea already cut out
- ◇ creating **slope** raster file

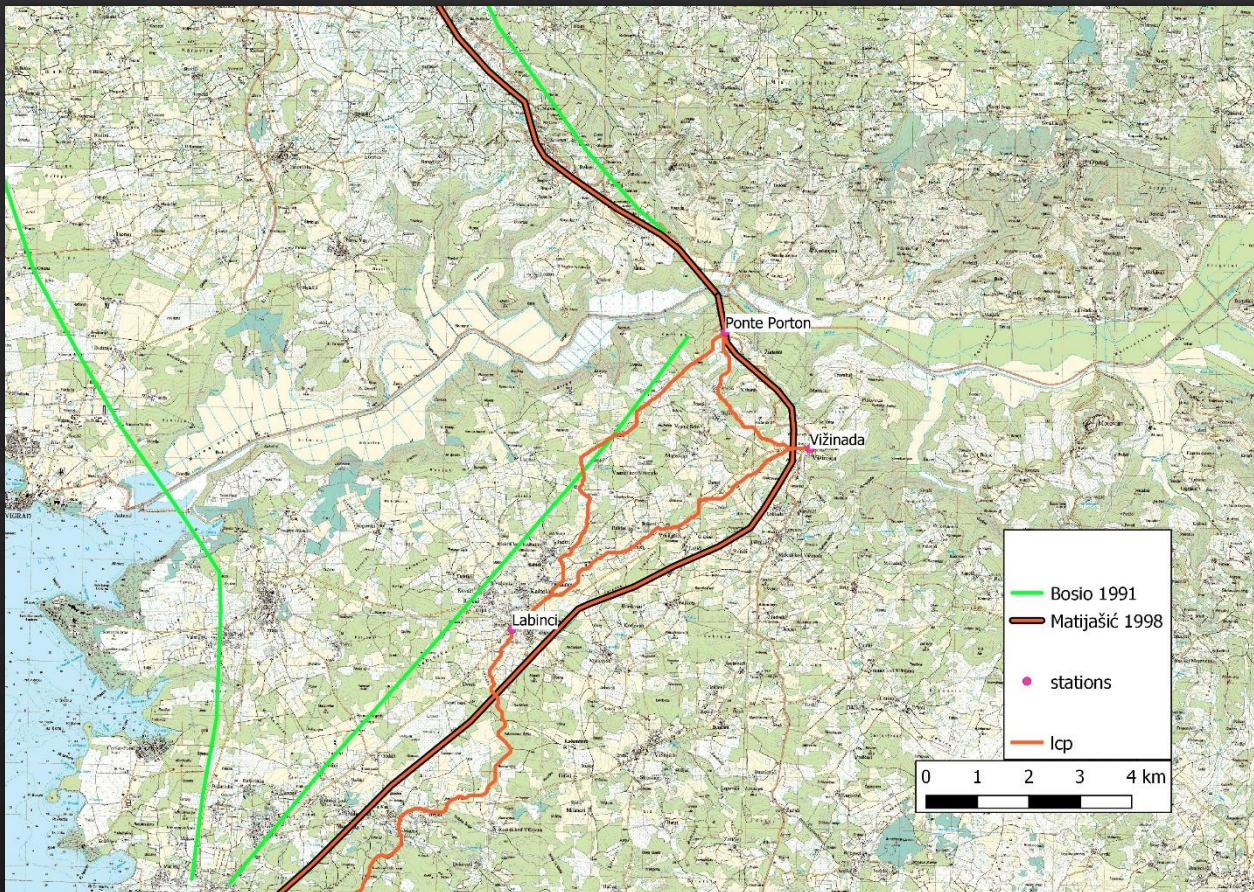


PARENTIUM AGER

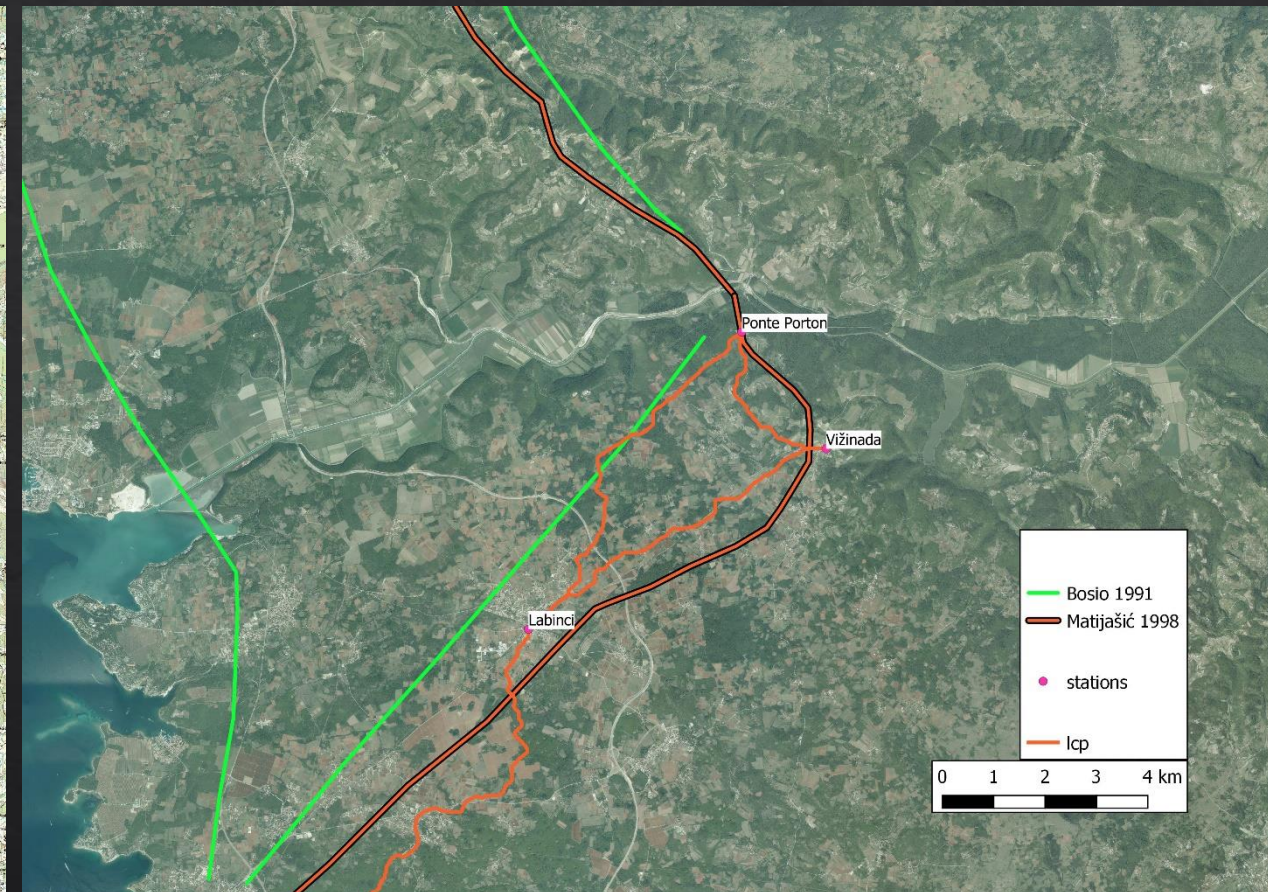
- ◆ the road from **Mirna** (*Ponte Porton*) to *Parentium*
- ◆ the road from *Parentium* to **Kloštar**
- ◆ meandering roads?



NORTH PART OF THE *PARENTIUM* AGER

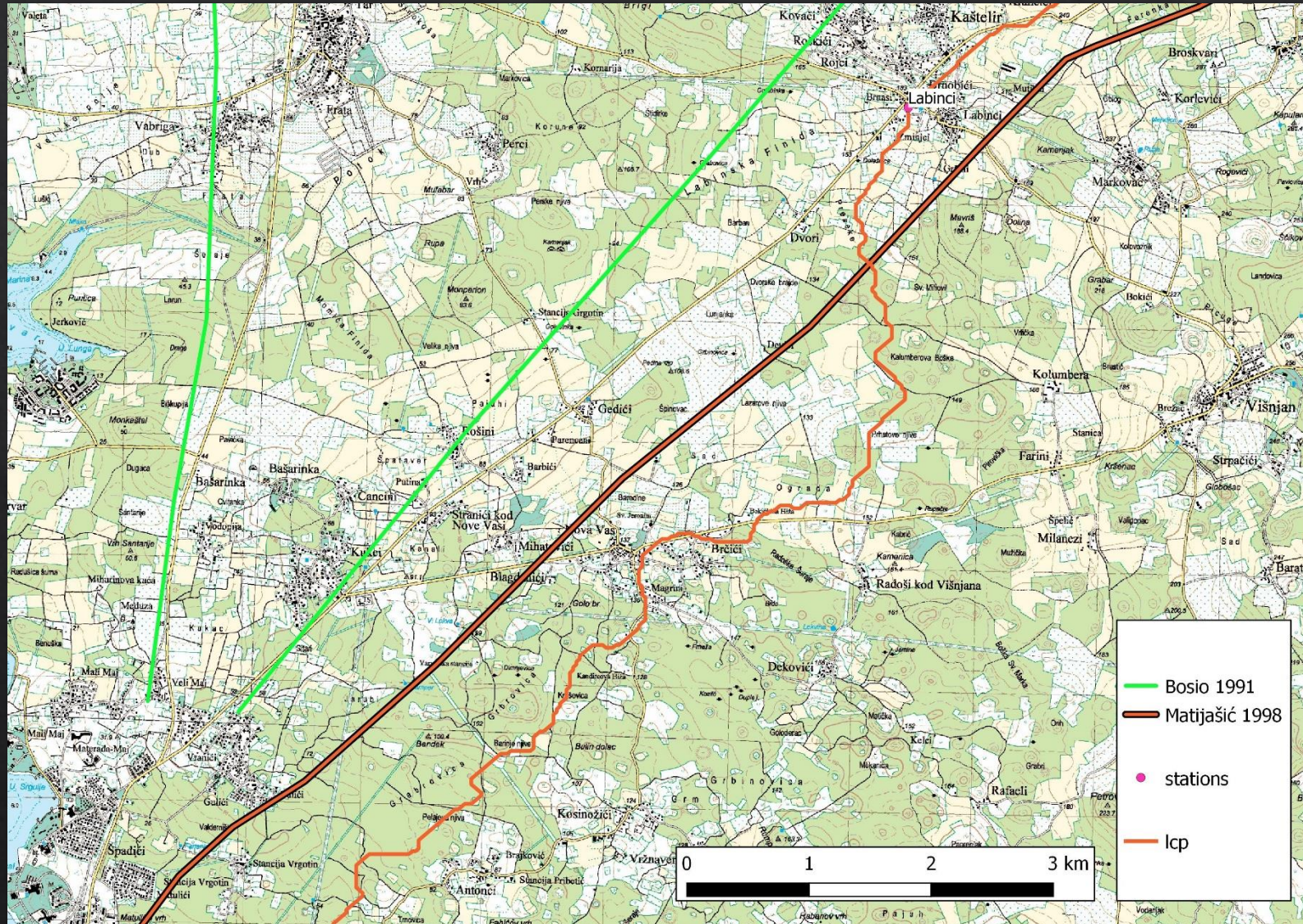


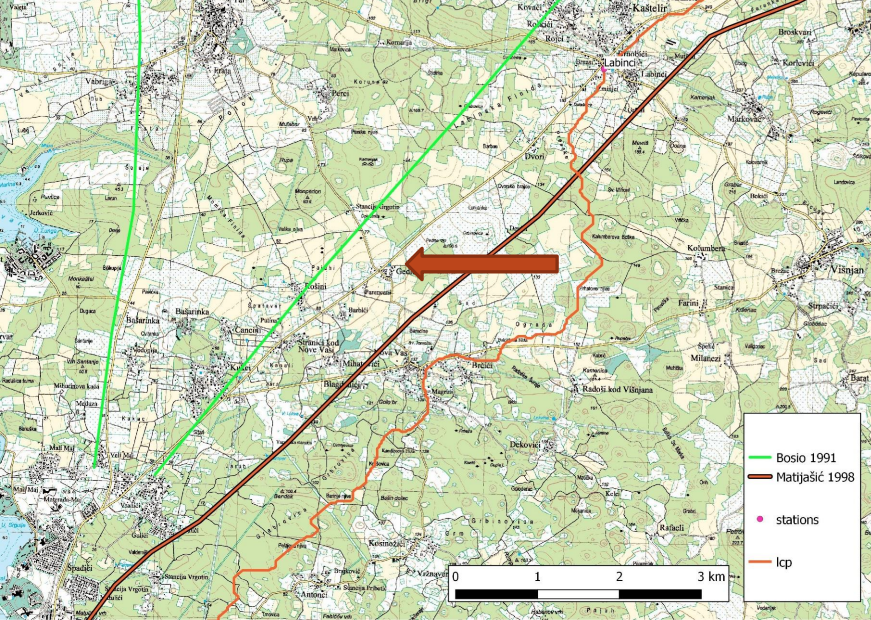
- ◇ **Ponte Porton** – bridge over the river Mirna
- ◇ funerary monuments in **Vižinada**



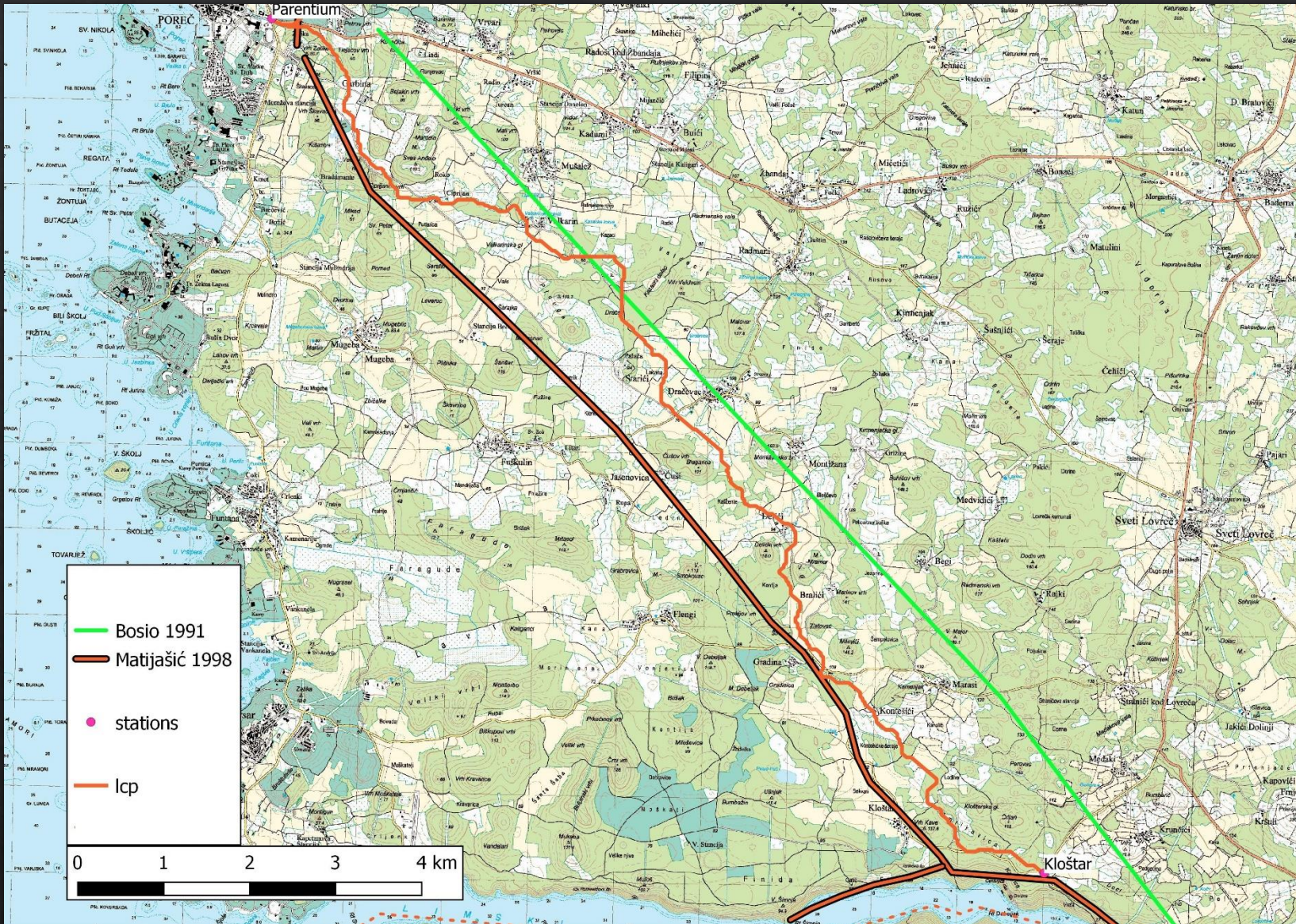
- ◇ **LCP analysis** gives another route

NORTH PART OF THE *PARENTIUM* AGER

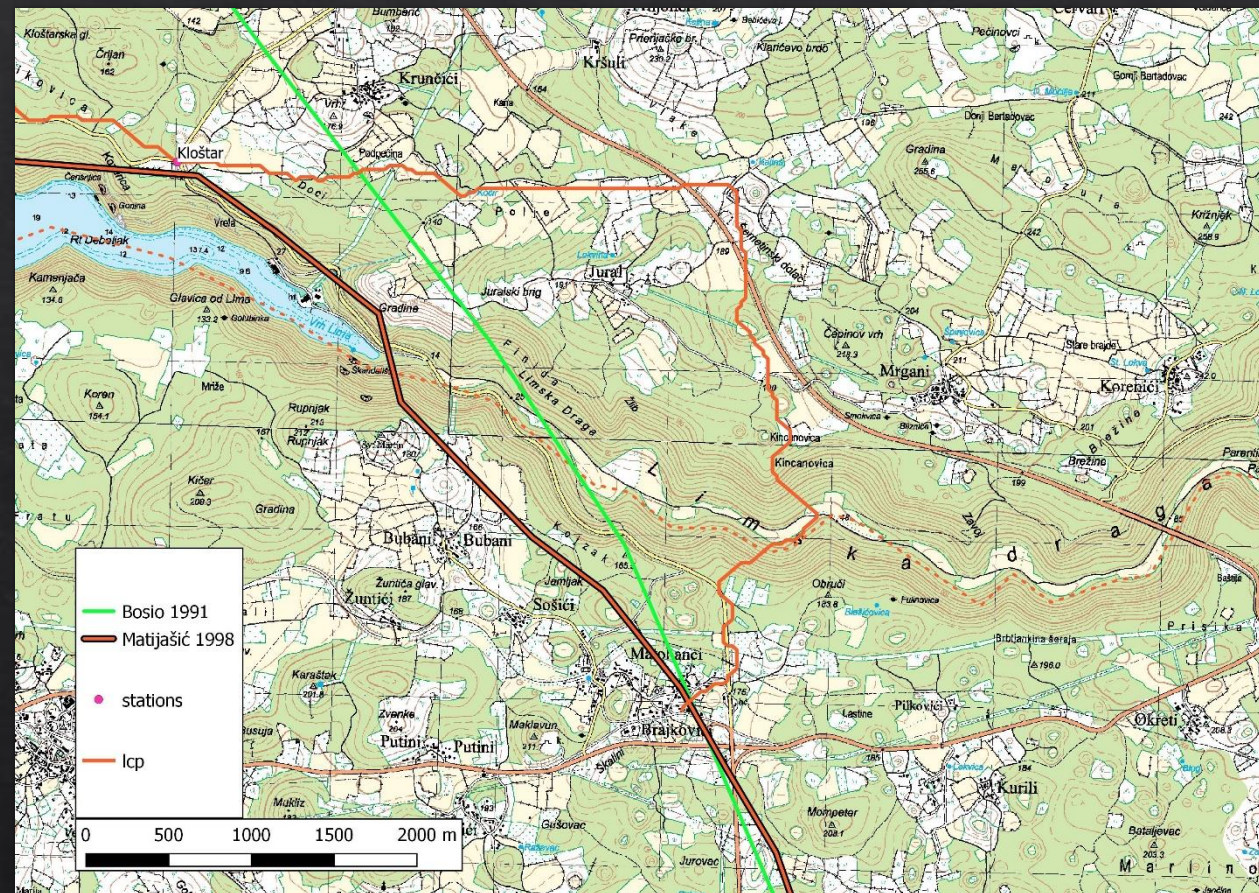




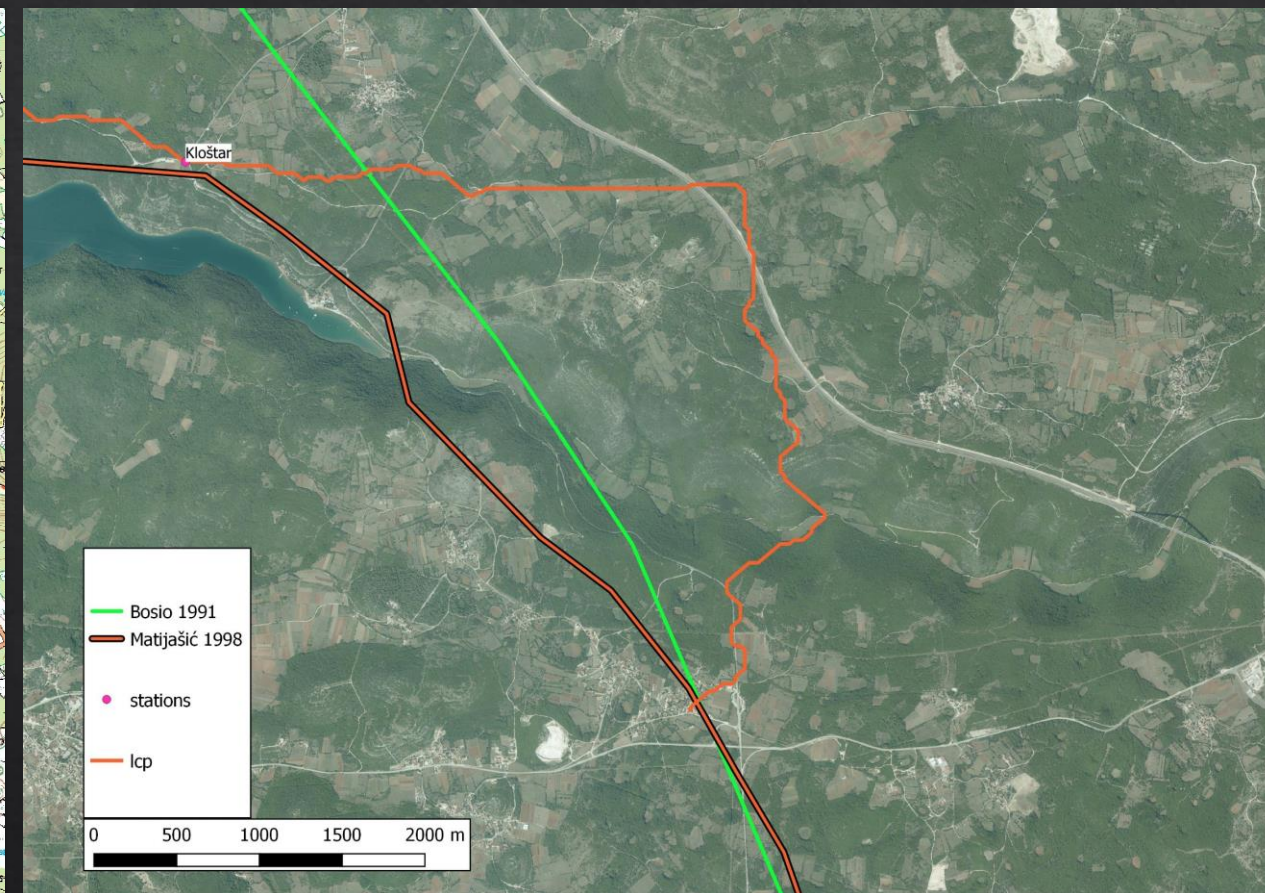
SOUTH PART OF THE *PARENTIUM* AGER



CROSSING LIMSKA DRAGA



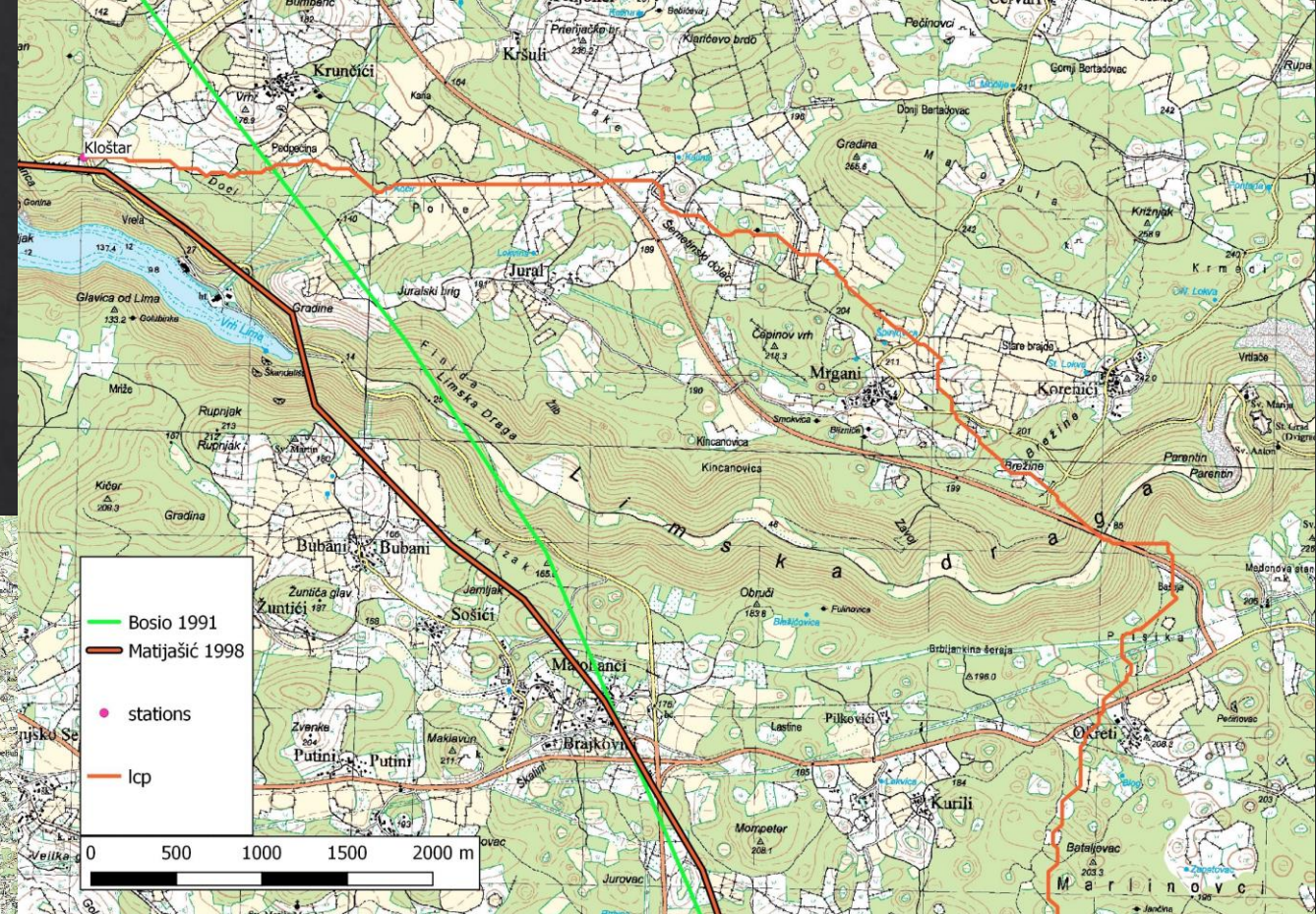
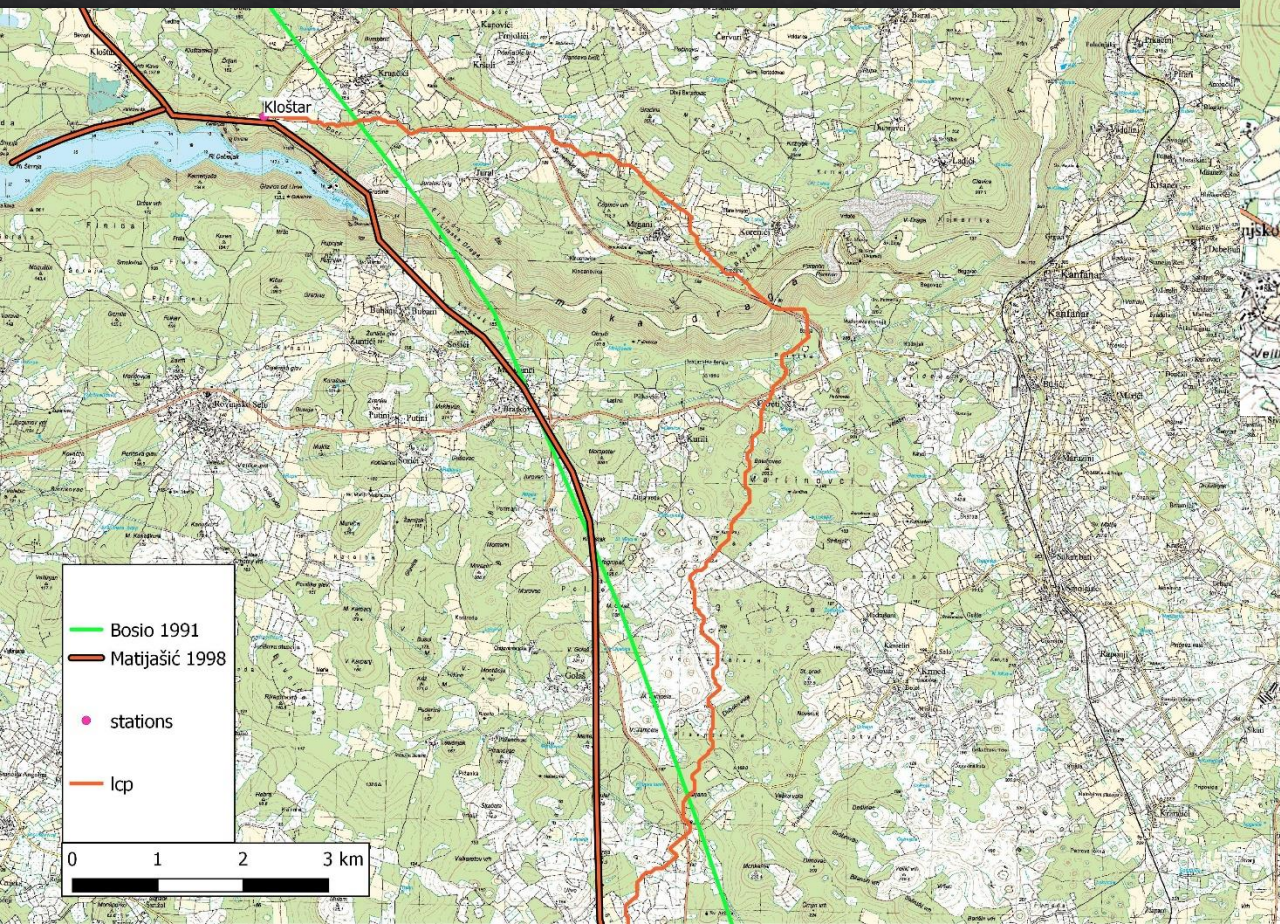
- ◇ crossing into *Pola* ager
- ◇ a geomorphological border between *agri*



- ◇ counter-intuitive lcp result
- ◇ steep slope

LIMSKA DRAGA

◆ Kloštar – Bale



◆ very steep incline

◆ today's highway (Istrian Y)

A9

Korenič, Kanfanar, Istria County

Google

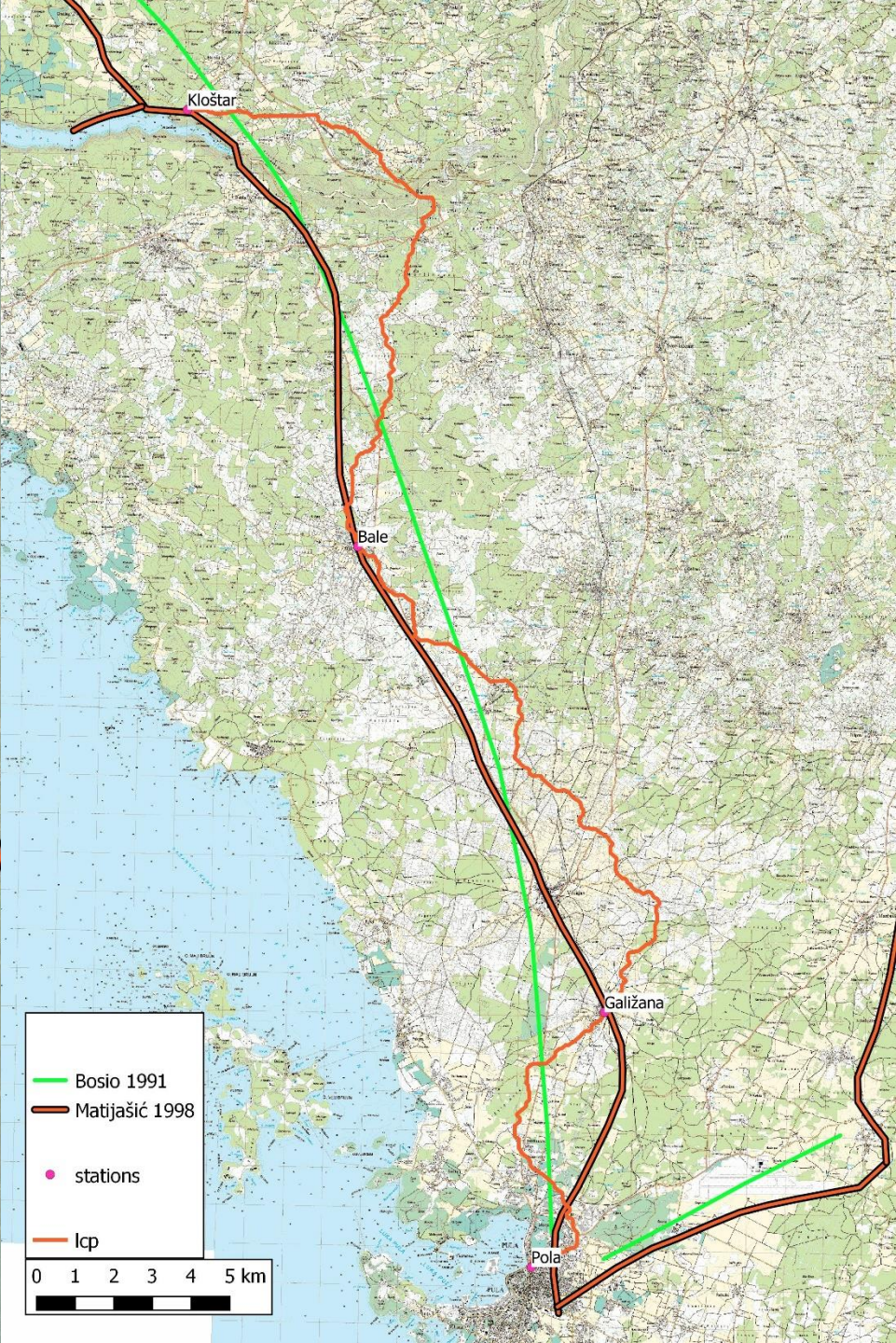
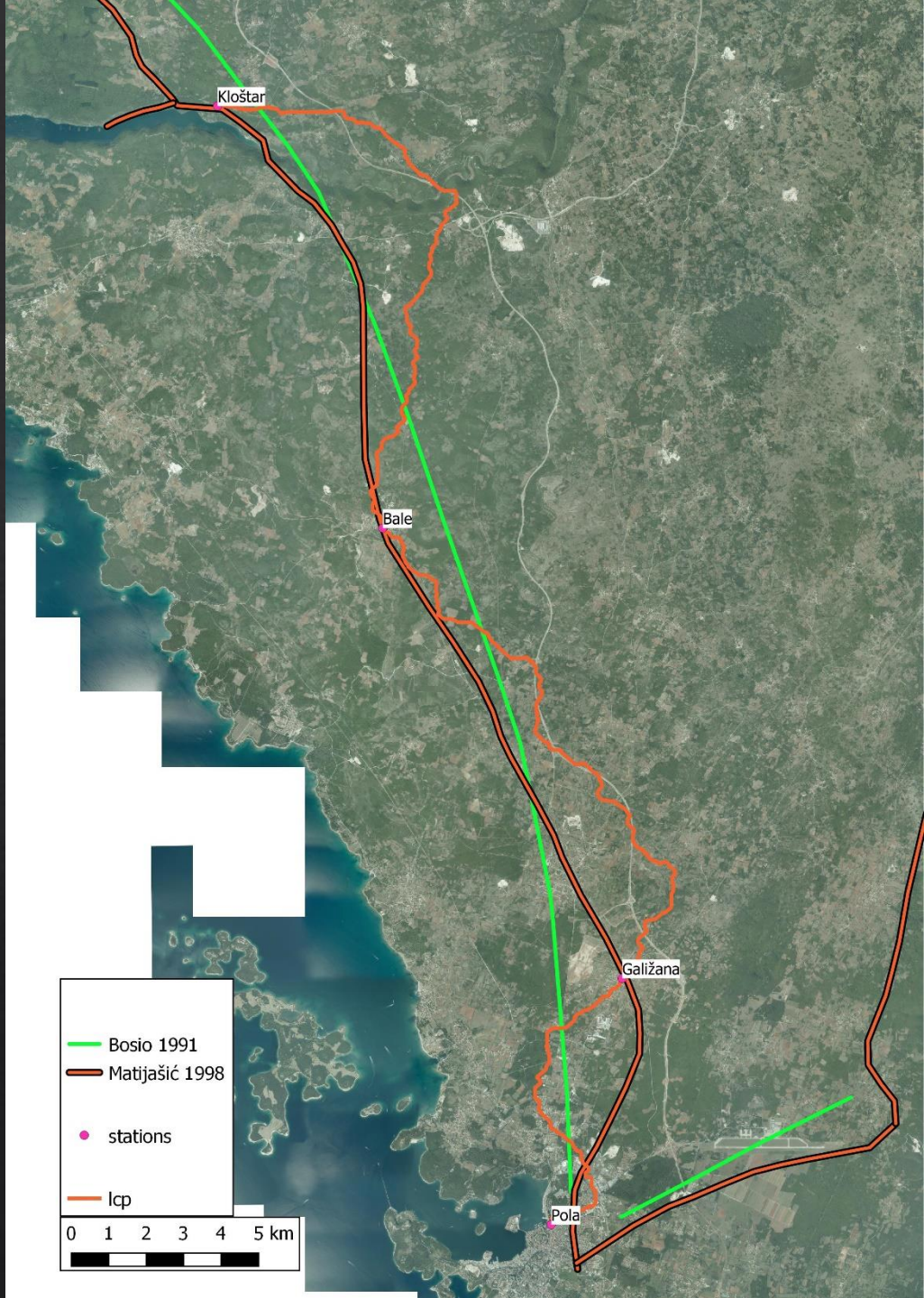
Street View - Sep 2011



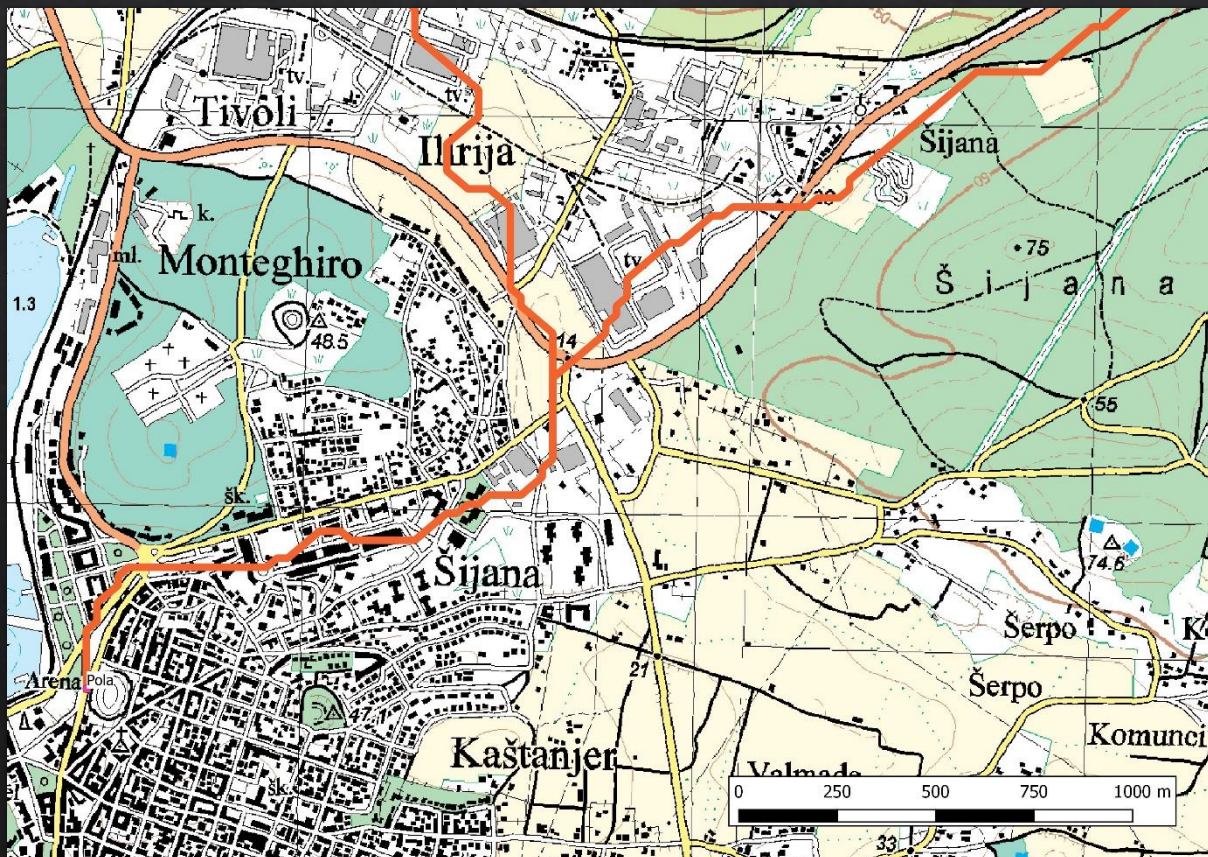
Google

POLA AGER

- ◇ (Kloštar)
- ◇ Bale
- ◇ Galižana
- ◇ *Pola*



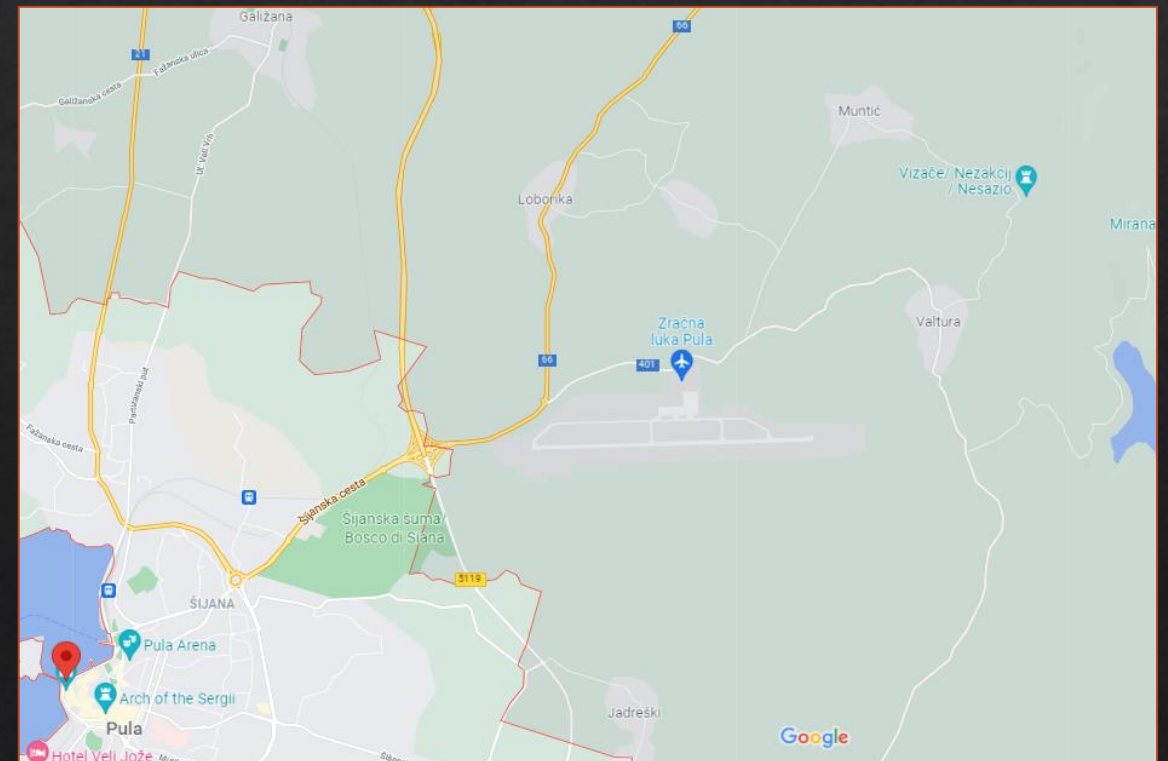
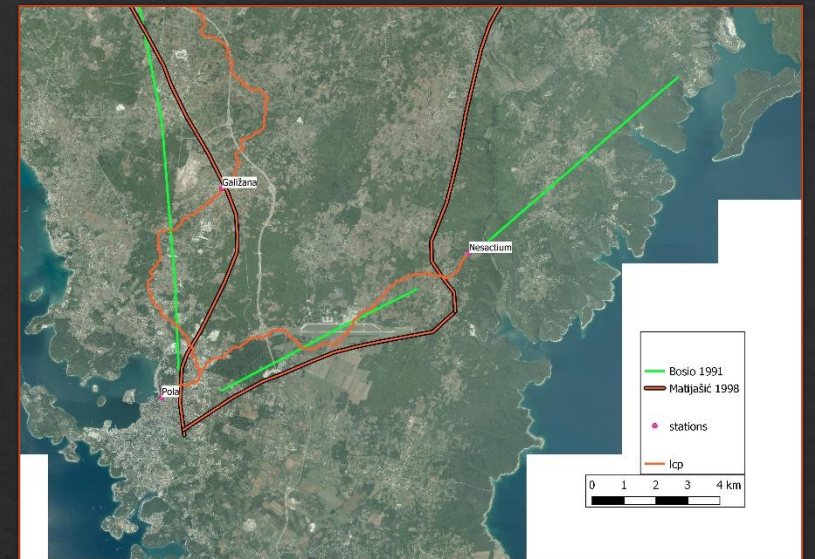
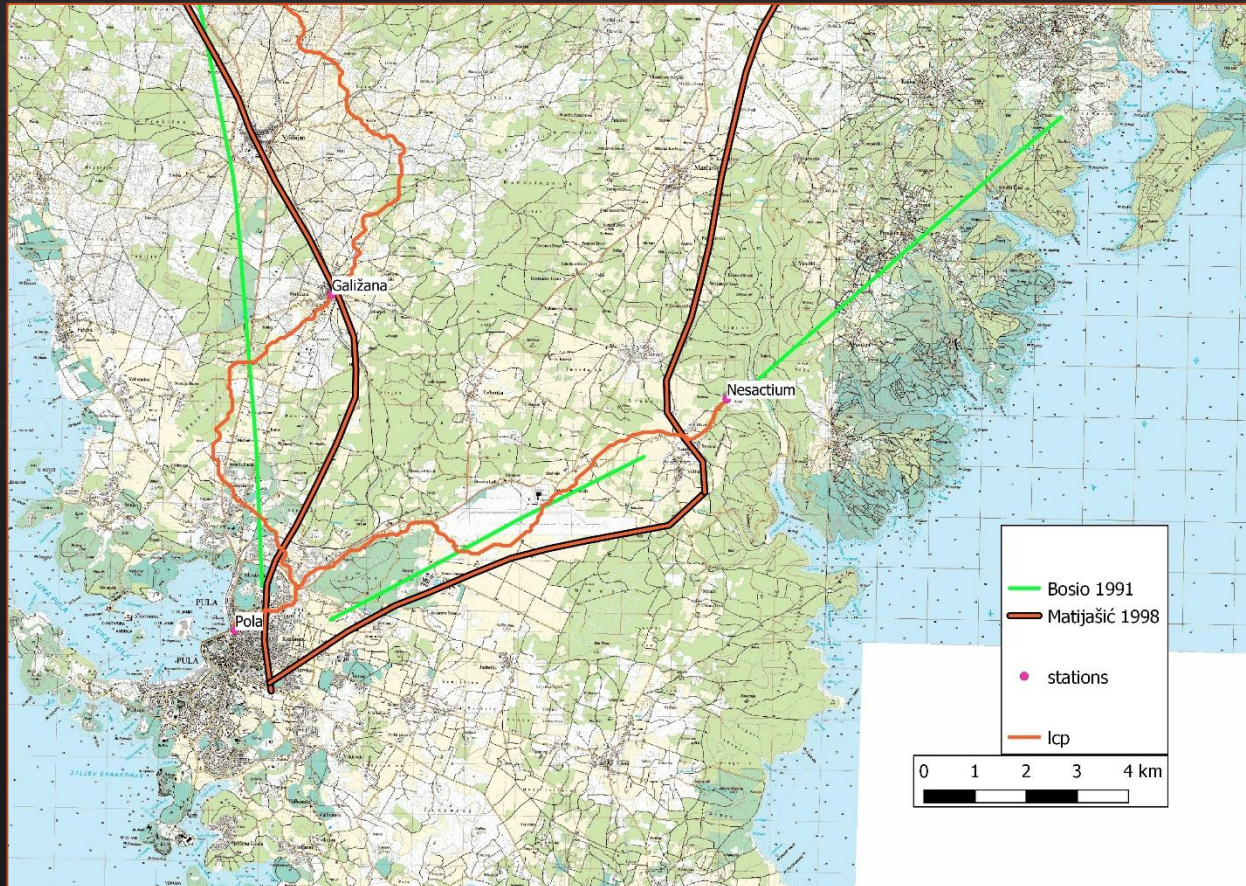
POLA



◇ more or less the same path as today

SOUTHERN ISTRIA

- ◇ more meandering
- ◇ Šijana forest as a landmark



DISCUSSION AND CONCLUSION

- ◇ the accuracy of the least cost path analysis depends on the **resolution** of the DEM and consequently **slope raster**
- ◇ we used **slope** as the cost for our analysis; **other variables** can also be used
- ◇ the problem with the seas or rivers
- ◇ meandering paths can be turned into straighter lines
- ◇ recent landmarks – Istrian Y, Šijana forest? Mirna valley very different today



- ◇ LCP analysis can be used as a guide or a curiosity

ACKNOWLEDGEMENTS

- ◆ A big thanks to Jere Drpić.

BIBLIOGRAPHY

- ◆ **BOSIO, L. 1991.** *Le strade romane della Venetia e dell'Histria*. Studio Editoriale Programma, Padova.
- ◆ **MATIJAŠIĆ, R. 1998.** *Gospodarstvo antičke Istre*. Zavičajna naklada „Žakan Juri“ Pula, Pula.
- ◆ **RUSSELL, B. 2014.** *The Economics of the Roman Stone Trade*. Oxford University Press, Oxford.