The Geomorphological Effects of Old Routes

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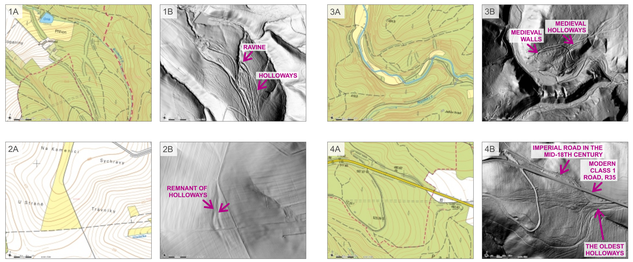
- Old routes present an abandoned communication network used up to the Middle Ages.
- Distinct remnants of paths can be found, particularly in forested areas, in form of holloways – moderate to deeply incised linear erosional forms.
- The complete network is nowadays being discovered using LiDAR and field mapping.
- Old routes quite often interact with landslides, streams or old human constructions.

Examples of old paths:

1) A group of parallel holloways which were transformed into an erosional ravine.
2) A slightly visible remnant of a holloway, which was filled up to allow land cultivation.
3) A rampart of an old settlement built across the holloways. The village was provably abandoned during the 14th century. The holloways were therefore formed earlier.
4) An example of temporal stability of a general transportation direction between Moravia and Bohemia. The recent road (I/35) maintains the same direction as the groups of the oldest routes.

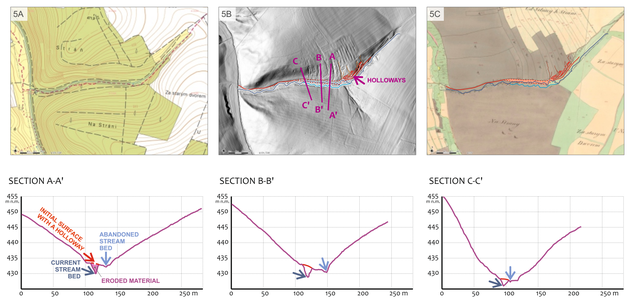
(A: Basic maps ČR 1 : 10 000, B: LiDAR hillshade)

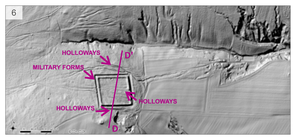


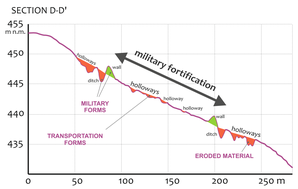
5) Ješov site:

- An unique example of stream capture due to human-induced incision after a holloway formation.
- An abandoned stream bed is currently up to 2 meters above the active one.
- The bed of the originally narrow an straight holloway is gradually becoming curved due to the recent stream dynamics
- This discovery would not be possible without the LiDAR data.

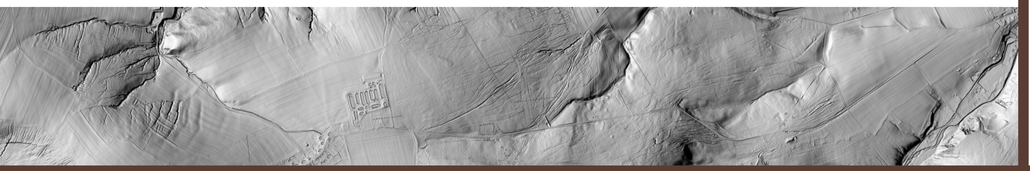
(A: Basic maps ČR 1 : 10 000, B: LiDAR hillshade, C: Map of the Stable Cadaster)







6) Model: An erosional effect of the old paths can be quantified. A precise DEM is used to reconstruct the former surface. Mathematical methods are applied to compute the eroded material.



Recommended methods and procedures in the research of old roads

7) LAND SURVEYING – Identification of old roads in forest landscapes:

A) A gully created by the erosion of a sunken lane (with a depth of approximately 10 m) found near Cetkovice, on the route running from the Prostějov region to the centre of Malá Haná.

B) A deep sunken lane at Vanovice (with a depth of approximately 5 m).

C) Sunken lane cluster near Seč.

D) Sunken lane cluster by Ptení.

E) Sunken lane cluster near Bílsko on the Olomouc – Bouzov route.

F) Sunken lane cluster near Bezděkov.

8) AERIAL SURVEYING

Identification of buried road structures in oblique aerial photographs using vegetation indicators:

A) The merging of two clusters of buried sunken lanes at the Žlebce site near the village of Kovářov on the historical road of Olomouc – Bouzov.

B) A former crossroads near the village of Luká. One of the roads branched off toward the limestone mining area near Březina, which also corresponds to the crossroads toponym Na Vápeničkách.

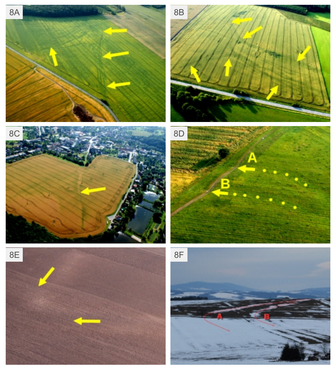
C) Significant indicator of a defunct road that merges smoothly onto Žadlovická Street in Loštice.

Identification of buried road structures on oblique aerial photographs using land, spatial, shadow, and snow indicators:

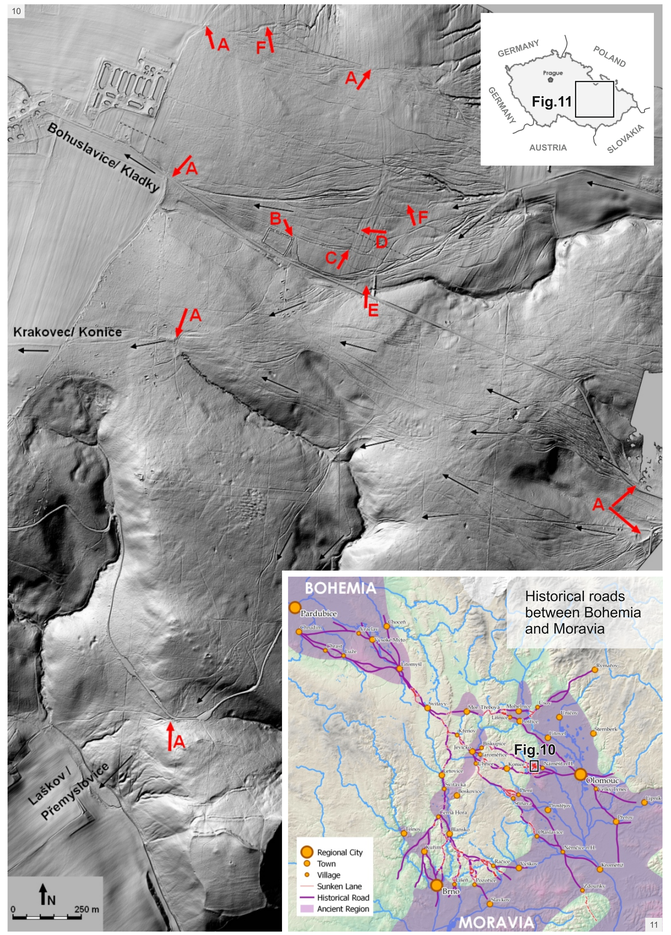
D) Verification of road routes using spatial indicators at the Slavětín cadaster. Figure depicts a spatial indicator discernible at the transverse-running field road, which is visibly sunken in the area of the filled-in sunken lanes. Also visible in the section marked by the yellow dots is the sunken lane from shadow indicators.

E) Identification of buried road structures using land indicators near Senice na Hané.

F) Delineating roads using snow indicators in a section near the village of Ješov. This is the same site as the one in Figure 8D.



9) METHODS OF ROAD RELICT DATING – Archaeological investigation using metal detectors:
Prehistoric (A – E) and medieval (F – O) finds from sunken lanes. © D. Vích.
A) Bronze headband "Kronenhalsring", Nordic import – Iron Age, 3rd to 1st century BC. **B)** Bronze spur – Roman Age, 2nd to 3rd century. **C)** Gold Solidus of Valentinianus III., Avers – Migration Period, 425–455. **D)** Bronze spear tip – Bronze Age , 1900 to 750 BC. **E)** Bronze needle – Early to Middle Bronze Age, 1800 to 1600 BC. **F)** Arrow – Early Middle Ages, 7th to 8th century. **G)** The Tip of the Blade – Early Middle Ages. **H)** Thorned Mace – High Middle Ages, 13th to 15th century. **I)** Hoard of Prague groschen of Karol IV., Avers – High Middle Ages, 1346–1378. **J)** Bell with Clapper – Roman Age to Modern times. **K)** Spur with Spike – Early Middle Ages and Late Hillfort Period, 12th to 13th century. **L)** Asymmetrical Caliper – High Middle Ages to Modern times, 15th to 17th century. **M)** Spur – High Middle Ages, 13th to 14th century. **N,O)** Horseshoe – High Middle Ages, 13th to 15th century.



10) AIRBORNE LASER SCANNING (LiDAR)

Identification of sunken lane road clusters in forest landscapes:

A common sign of these road systems is their convergence at a single place, most likely the location of distinct orientational features such as tall trees, sacred structures, feudal settlements, etc. (**A**). Still visible today are solitary deciduous trees in spruce monocultures at locations where the sunken lanes converge. The direction of sunken lanes may also be influenced by the proximity of certain obstacles (**B**) or a change in the land use (**C**). In some instances, sunken lanes were eliminated when new fields were established (**D**), during the construction of ponds (**E**), etc. Surface water erosion may reshape these buried road forms over time (**F**). By studying the results of aerial laser scanning, it is also possible to discern in select areas sunken lane clusters that cannot be visually detected in the field. The viewed area is located 2 km west of Náměšť na Hané.

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