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Geomorphometry.org Articles — a digital journal for free exchange of scientific information

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Abstract

GEOMORPHOMETRY.ORG ARTICLES is a new informal digital journal for a free exchange of scientific information. It will feature short (>2000 words long) to medium length (<8000 words long) articles covering topics that might be of interest to geomorphometry.org community, DEM users and GIS community in general. Here, you can find detailed instructions to prepare an article, upload it to the geomorphometry.org and refer to it in literature. An article has to be directly related to the field of geomorphometry and activities of the geomorphometry.org research group. The following short communications are especially encouraged: shorter discussions, book reviews, technical communications and similar. Compared with emails and discussion groups, GEOMORPHOMETRY.ORG ARTICLES is more persistent source of information. In addition, one can cite and comment the articles in the digital journal. There is no formal reviewing process yet, however some articles will be reviewed by the web-administrator to ensure the quality of the newsletter. Submissions is only available via the geomorphometry.org homepage, where also all template datasets and instructions for authors can be found. Articles that do not comply with the instructions for authors **WILL BE REMOVED** from the website without a previous notice.

Key words: geomorphometry, digital journal, DEM, software, community

1 Introduction

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We have specifically open this digital journal to stimulate open discussion among DEM users and GIS analysts that actively run geomorphometric analysis. When com-

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pared to scientific journals, this digital journal is faster, less formal, and more focused on technical (and social) aspects of geomorphometry.

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$$\mathbf{Z} = \{Z(\mathbf{s}_j), j = 1, \ldots, N\}\,; \quad \mathbf{s}_j \in \mathbb{A} \tag{1}$$

where $\mathbf{Z}$ is the elevation array, $Z(\mathbf{s}_j)$ is the elevation at the grid node $\mathbf{s}_j$, $\mathbb{A}$ is the area of interest, and N is the total number of grid nodes... etc. "

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To add a computer code use the `flushleft` environment and `texttt` typeface formatting, e.g.:

```
elevations <- read.delim("elevations.txt")
library(sp)
coordinates(elevations)=~x+y
```

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[1] `http://authors.elsevier.com/latex/instraut.pdf`

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Make sure you keep connected numbers and units, captions and numbers and last and first names. To achieve this use "∼":

e.g. "DEM can range from 0∼m to 8000∼m, as shown in Fig.∼`\ref{Fig:ch01:scheme}`."

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Type	**Format**	**Example**
Articles	AuthorYearJournal	`Hengl2004Geoderma`
Books	AuthorYearPublisher	`Hengl2002ITC`
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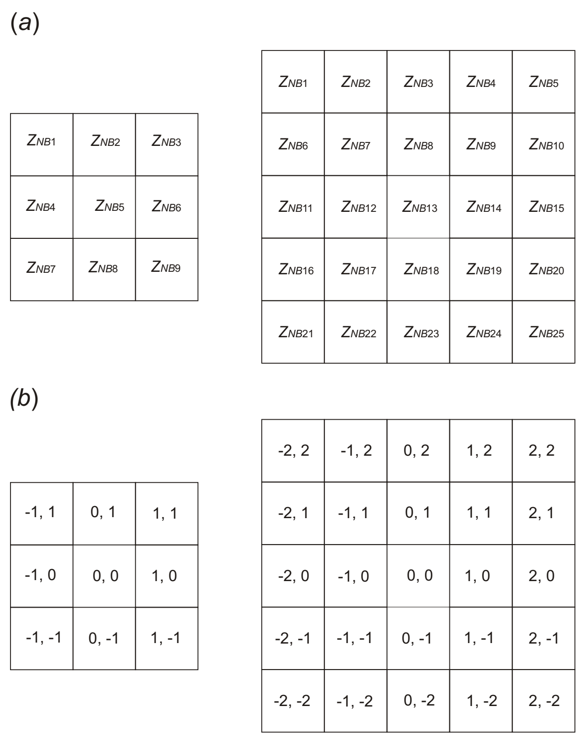

Fig. 1. The common designation of neighbours in 3×3 and 5×5 window environments: (a) by unique identifiers (as implemented in ILWIS GIS), (b) by row and column separation (in pixels) from the central pixel (as implemented in the ArcInfo GIS).

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3 The "Baranja Hill" case study

To enhance understanding of the algorithms, we advise you to use a small case study to demonstrate various data processing. In this way, you will be able to compare land-surface parameters and objects derived from different algorithms and software packages and thus more easily find the software best suited to your needs. The "*Baranja*

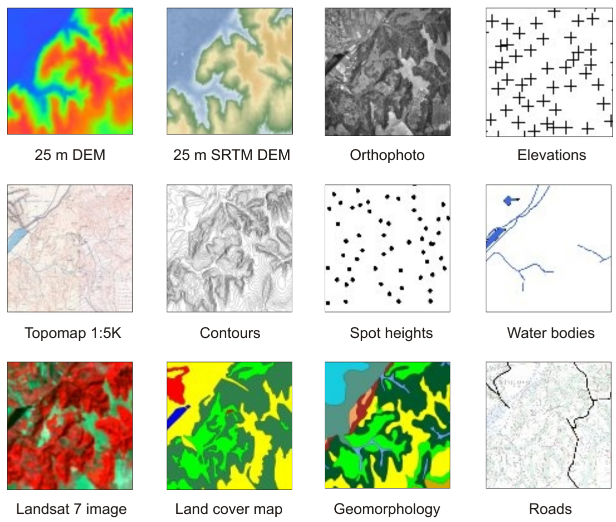

Fig. 2. The Baranja Hill datasets. Courtesy of the Croatian State Geodetic Department (`http://www.dgu.hr`).

hill" in eastern Croatia has been mapped extensively over the years and several GIS layers are available at various scales (Fig. 2). The study area is centered on 45°47'40"N, 18°41'27"E and corresponds approximately to the size of a single 1:20,000 aerial photo. Its main geomorphic features include hill summits and shoulders, eroded slopes of small valleys, valley bottoms, a large abandoned river channel, and river terraces (Fig. 3).

The Croatian State Geodetic Department provided 50k– and 5k–scale topographic maps and aerial photos (from August 1997). An orthorectified photo-map (5 m resolution) was prepared from these source materials by the method explained in detail by Rossiter and Hengl (2002). From the orthophoto, a land cover polygon map was digitised using the following classes: agricultural fields, fish ponds, natural forest, pasture and grassland, and urban areas. Nine landform elements were recognised: summit, hill shoulder, escarpment, colluvium, hillslope, valley bottom, glacis (sloping), high terrace (tread) and low terrace (tread).

Contours, water bodies, and roads were digitised from the 1:50,000 and 1:5000 topographic maps. Contour intervals on the 1:50,000 topographic map are 20 m in hill land and 5 m on plains, and on the 1:5000 map they are 5 m and 1 m respectively. From the 1:5000 contours and land-survey point measurements, a 5 m DEM was derived using the ANUDEM (TOPOGRID) procedure in ArcInfo (Hutchinson, 1989) and then resampled to a 25 m grid. For comparison, the 30 m SRTM DEM (15'×15' block) obtained from the German Aerospace Agency (`http://eoweb.dlr.de`) was resampled to 25 m (Fig. ??). The total area of the case study is 13.69 km^2 or 3.6×3.7 km. Elevation of the area ranges from 80 to 240 m with an average of 157.6 m and a standard deviation of 44.3 m. Both 25-m DEMs have been brought to the same grid definition with the following parameters: `ncols`=147, `nrows`=149, `xllcorner`=6551884, `yllcorner`=5070562, `cellsize`=25 m. We used the local geodetic grid (Croatian coordinate system, zone 6) in the Transverse Mercator projection on a Bessel 1841 ellipsoid (a=6377397.155, f^{-1}=299.1528128). The false easting is 6,500,000, central meridian is at 18° east, and the scale factor is 0.9999. Note also that, to have proper geographic coordinates, you will need to specify a user-defined datum of ΔX=682 m, ΔY=-199 m and ΔZ=480 m (Molodensky transformation). The projection files in various formats are available on the book's website. The complete Baranja hill dataset [3] consists of (Fig. 2):

- `DEM25m` — 25 m DEM derived from contour lines on the 1:5000 contour map;
- `DEM25srtm` — 25 m DEM from the Shuttle Radar Topographic Mission;
- `DEM5m` — 5 m DEM derived from stereoscopic images;
- `contours5K` — map of contours digitised from the 1:5000 topo-map;
- `elevations` — Point map (n=853); very precise measurements of elevation from the land survey;
- `wbodies` — Layer showing water bodies and streams;
- `orthophoto` — Aerial (ortho-rectified) photo of the study area (pixsize=5 m);
- `satimage` — Landsat 7 satellite image with 7 bands from September 1999;
- `landcover` — Land-cover map digitised from the orthophoto;
- `landform` — Polygon map of the principal landforms (facets);
- `fieldata` — Field observations at 59 locations are available in report form;

[3] You can access the complete Baranja Hill dataset from the `geomorphometry.org` website.

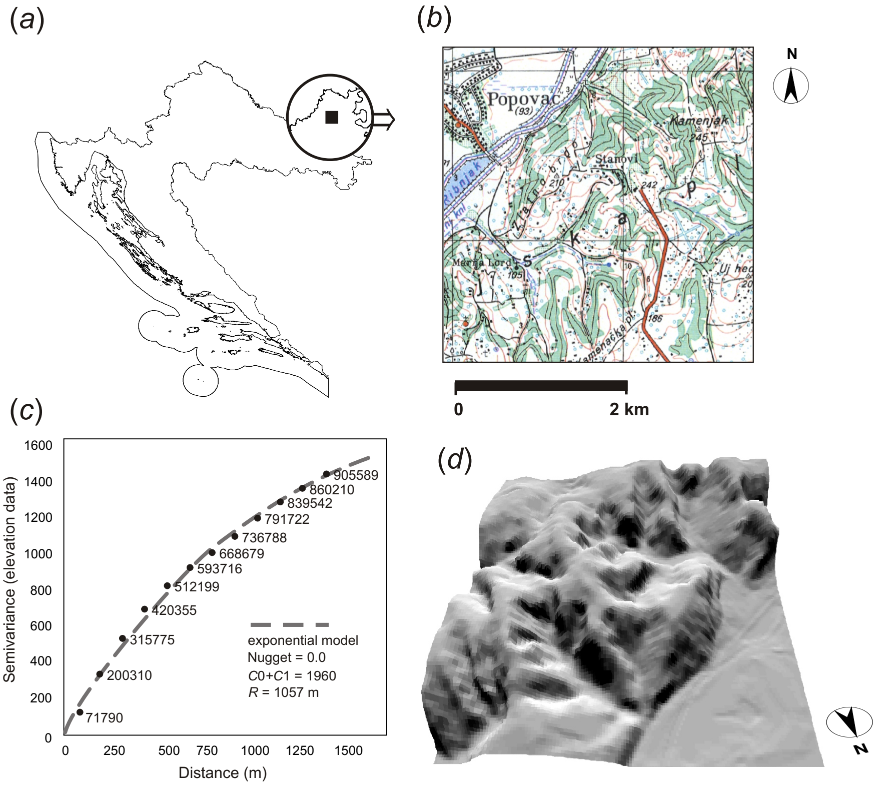

Fig. 3. Study area *Baranja hill*: (a) location in eastern Croatia; (b) 1:50,000 topographic map showing the main features; (c) omnidirectional variogram from the elevation point data; and (d) perspective view of the area. Courtesy of State Geodetic Administration of Republic of Croatia.

4 Conclusions

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We hope that the geomorphometry.org website and this digital journal will soon serve as a standard scientific/technical reference for the field of geomorphometry. On the other hand, we do not expect that you will be submitting your valuable research articles here instead of sending them to the commercial publishers. Our wish is not to compete with commercial publishers but to provide space for an exchange of scientific/technical information that is often too technical for research journal and that has a strong social components. In that sense, GEOMORPHOMETRY.ORG ARTICLES can be best compared with technical newsletters that are common for various computer development groups (e.g. R-News).

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