GIS and Geomatics in Ancient History

Geomatic Methods Supporting The Investigation Of Ancient History

Mark Vetter, Boris Dreyer
Agenda

1.) Why geomatics in ancient history sciene?
2.) Aims of the Metropolis project
3.) Aims of the VARUS battle reconstruction
4.) Results VARUS research
5.) Outlook and desiderata
1.) Introduction - Background

*Why geomatics in ancient history?*

- Geomatics – the complete process from survey, mapping, manipulation, analysis and presentation of geodata.
- Why using a GIS as a database for historic documents? Because in most cases this data is spatial related.
- GIS: a powerful tool for documentation, but as well as analysis of (paleo-) spatial related questions.
2.) Aims of Metropolis project

- Survey of already existing 3D-spatial structures
- Bringing these structures in a location based, geodatic projection with a GIS
- Thematical categorisation of geodata according time period/importance
- 2D maps of building structures of Metropolis
- Reconstruction and 3D presentation of buildings
- Basics for geoprocessing with the aim of acquisition of scientific knowledge for archeological purposes in order to understand historical structures and connectivities
2.) Study area Metropolis / Ionia

- Foundation of city in 725 BD
- Prosperity time in hellenistic epoque in 3rd century BD
- Higher level of construction activities in roman time (Stoa, Bath) round Augustus
- Earth quake in 17th century AD witch caused enormous damages
- In byzantine epoque in 14th century AD constructions of fortification walls
“Low-cost approach for a 3D-visualization of historical structures in Metropolis“
Presentation of Sebastian Lemstra on Thursday 11.00 – 11:15
• Unifying different sources of material documents and ancient and recent geodata in a GIS

• **KARL BURESCH: Aus Lydien, 1898**
Karl Buresch: Aus Lydien, 1898
- Map of KIEPERT (1880)
- Map of MERIC (1985)
First prototype: Open source ancient history Webmaps/GIS of Ionia

Leaflet realisation based on OSM and Mapbox, coded by MARIUS OSTER
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2.) Aims of VARUS battle reconstruction project

- Development of a GIS-Work-Flows in order to clarify the development of and ancient historic event, like the VARUS battle
- What is the best probability for the route the VARUS tooked?
- Calculated possible old land surfaces in GIS in order to get knowledge about the alterations in the last 2000 years (like changes of fluvial courses, relief, changes of wetlands, etc.)
- Calculation of cost path analysis for possible movements of the VARUS with its troops 9 AD.
- Over all aim is to give the ancient historians new possible locations to search with tradtional methods for material evidences
Landuse

Calculations and visualisations by LUKAS SCHABER, HSKA
GIS Workflow

DTM --> slope

New DTM

Calculations and visualisations by LUKAS SCHABER, HSKA
### Relieve energy

#### Slope in %

<table>
<thead>
<tr>
<th>Slope in %</th>
<th>Cost unit</th>
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<tbody>
<tr>
<td>0-5</td>
<td>1</td>
</tr>
<tr>
<td>5-10</td>
<td>2</td>
</tr>
<tr>
<td>10-20</td>
<td>4</td>
</tr>
<tr>
<td>20-40</td>
<td>6</td>
</tr>
<tr>
<td>40-60</td>
<td>8</td>
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<tr>
<td>&gt;60</td>
<td>10</td>
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#### Landcover

<table>
<thead>
<tr>
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<th>Cost unit</th>
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<tbody>
<tr>
<td>Forest</td>
<td>6</td>
</tr>
<tr>
<td>Free terrain</td>
<td>3</td>
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Calculations and visualisations by LUKAS SCHABER, HSKA
### River flows

<table>
<thead>
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<th>River size</th>
<th>Cost unit</th>
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<tbody>
<tr>
<td>1</td>
<td>5</td>
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<tr>
<td>2</td>
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<tr>
<td>5</td>
<td>50</td>
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<tr>
<td>6</td>
<td>100</td>
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Calculations and visualisations by LUKAS SCHABER, HSKA
Results

Calculations and visualisations by LUKAS SCHABER, HSKA
Results

Calculations and visualisations by LUKAS SCHABE, HSKA
Results

Calculations and visualisations by LUKAS SCHABER, HSKA
5.) Outlook and Desiderata

Completion of geodata base
- Especially more and more detailed altitude data necessary to calculate a valuable DTM

Completion/reconstruction of the city structure/3D-Data necessary
- Further Scanning of remains with Laserscanner/Kinect or other photogrammetric methods necessary
- Automatisation of the process
- Validation of geodetic instruments and methods
- Real (Geo-)visualisation (georeferenced) in a 3D-Model integrated in a GIS

More geoprocessing in ancient history with GIS
- Networking analysis, best-location, routing reachability, accessibility of construction material, water, transport and trade routes,
- All what helps to know more about former living conditions

Giving the Archeologist hints where to search (dig)
Thank you very much for your attention!

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