

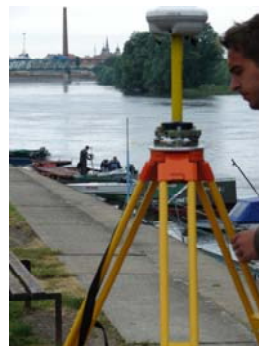
Multibeam and sidescan sonar application for determining the position and shape of the remains of Hadrian bridge on Drava River

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Introduction

- ▶ During archeological research on the Drava River in Osijek remains of stone bridge were documented
- ▶ It was found that it were the remains of Hadrian's bridge
- ▶ Hadrian was Roman emperor
- ▶ Antique building has historical value



Introduction

- ▶ 1938 - removal of the remains of the bridge due to the interference of bridge pillars of the right side to Drava waterway
- ▶ 1985 - further removal of the all pillars with dynamite and excavators



- ▶ Some remains of Bridge were stored in Museum of Slavonia



Introduction

- ▶ In 2008 statue of Jupiter was accidentally found during archaeological diving
- ▶ After that discovery archaeological site needed to be measured, especially information about position and shape of the bridge



Determining the position of the bridge

- ▶ Multibeam and sidescan sonar were used to survey this site
- ▶ Aim of this project was to create bathymetric map of archaeological site and to determine the real distance between pillars
- ▶ The project was done in collaboration Department of Underwater Archeology of the Ministry of Culture



Preparation and conducting of survey

- ▶ C-MAX sidescan sonar was used to determine the area of archaeological site



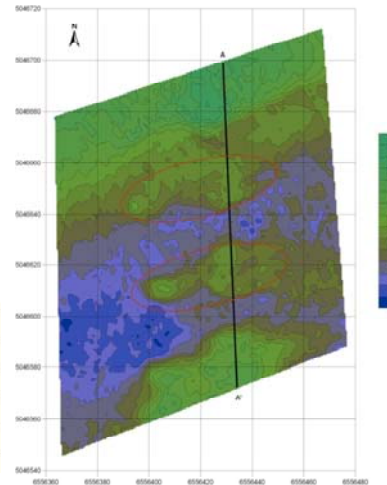
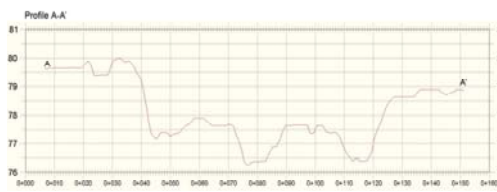
Preparation and conducting of survey

- ▶ After determining the area we could plan survey lines
- ▶ Odom ES3M multibeam echo sounder
- ▶ Complete system was set on a common adapter
- ▶ However it is important to be aware of limitation of the system



Analysis and results

- ▶ **HypackMax - Hysweep**
 - ▶ collecting and processing data
- ▶ **AutoCAD Civil 3D**
 - ▶ bathymetric map
 - ▶ longitudinal profiles



Conclusion

- ▶ The multibeam echosounder represents very powerful tool for exploration of underwater archeological sites
- ▶ It prove to be the best solution,
 - ▶ for the purpose of determining the location of the bridge remains, and
 - ▶ for documenting the archaeological site and thus creating the first map of the site
- ▶ Although it is not always accessible or appropriate for use in shallow waters, which is where the majority of underwater Roman structures are positioned.
- ▶ Due to strong currents and sandy composition of soil, water was muddy and full of particles that directly affected the accuracy and level of detail which came out to be less than expected but still satisfactory.
- ▶ Distance between the pillars can be roughly reconstructed from this series of measurements. New series of measurements is planned.
- ▶ A full scale geophysical research is planned.
- ▶ Preservation of archaeological site
- ▶ River Drava changes its configuration and soon will sand and high water level cover most of Hadrian bridge, and it is of great historical and cultural importance to conduct all interdisciplinary research and find out the truth about the stone bridge which according to legend, was one of the most beautiful roman bridges ever built.



Thank you