Change in settlement positions regarding some major Holocene climate events
Case study of two sites in Drava region

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Strategic use of landscape (IP-11-2013-3700)

study of use of landscape in various time segments and data concerning natural resources (water, woods, arable land etc.) in a wider region of Našice in the middle Drava valley (Botić 2016a; Marković et al. 2016)

Stipanovci – Planina 1 site
field survey
Spring 2016

Marković, Botić 2017;
Botić 2017
Strategic use of landscape (IP-11-2013-3700)

Gronenborn 2009: 98, Fig. 1

Weninger et al. 2014: 11, Fig. 5

8.2 ka
4.2 ka
1.4 ka
5.9/6.0 ka
2.8/3.0 ka
late Iron Age (1st c. AD)
final Neolithic / early Eneolithic (4500-4000 BC)
early Bronze Age (2400-2200 BC)

Roman optimum
(McCormick et al. 2012; Botić 2017)
Donji Miholjac – AN 3 Mlaka/trafostanica site
Strategic use of landscape
(IP-11-2013-3700)

WORKSHOP EX-AQUA 2019
PALAEOHYDROLOGICAL EXTREME EVENTS: EVIDENCE AND ARCHIVES
26-29th September 2019, Zagreb, CROATIA
rescue excavation
Spring 2015

Botić 2016b

<table>
<thead>
<tr>
<th>AMS 14C Lab Code</th>
<th>Conventional 14C age (yrs BP) (± 1σ)</th>
<th>Calibrated calendar age (cal BC) (1σ)</th>
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<td>DeA- 83357</td>
<td>3938 ± 25</td>
<td>2480 - 2350</td>
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Europe in the XIX. century
- 3 positions on Stipanovci – Planina 1 site:

1. lowest position (currently very wet Spring conditions) - late Iron Age (1st c. AD), occupied during the so-called Roman optimum **predating 1.4 ka BP (Bond 1) event**
2. somewhat elevated position – late Neolithic / early Eneolithic (4500-4000 BC), slightly predating **5.9/6.0 ka (Bond 4) event**
3. elevated position – early Bronze Age (2400-2200 BC), occupied during the **4.2 ka (Bond 3) event**

- position of pits in a lowland area in the case of the Early Bronze Age finds from Donji Miholjac site suggests earlier temporal occupation of the site in comparison to the Stipanovci – Planina 1 site (confirmed by one radiocarbon date) and could be placed **at the very end of the 4.2 ka BP (Bond 3) event**; late Iron Age features can be dated to the same period as the finds from Stipanovci – Planina 1 site (**predating 1.4 ka BP (Bond 1) event**)  

- on both sites in wider Drava region link between paleohydrological condition changes and site position changes can be presumed, spanning over various time segments
Project: TransFER (2017-2021)

Proizvodnja željeza uz rijeku Dravu u antici i srednjem vijeku: stvaranje i transfer znanja, tehnologija i roba

Iron production along the Drava River in the Roman period and the Middle Ages: Creation and transfer of knowledge, technologies and goods

Leader: Phd Tajana Sekelj Ivančan, Institute of Archaeology, Zagreb, Croatia
Funded by: Croatian Scientific Fundation

In order to define the meaning of iron production in the context of ancient and medieval societies, the following tasks were set:

- To specify the source of the iron ore and the other necessary resources (clay, water, wood);
- To define the technology of processing the iron ore throughout the historical periods and the intensity of production;
- To define the impact of iron production in the context of socio-cultural relations and interaction of people and goods

http://transfer.iarh.hr/index.php/hr/
Topographic map of the Drava River basin with positions of archaeological sites with recorded smelting features (slag) (made by: T. Brenko, Univ. of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Department for Minerology, Petrology and Mineral sources; Valent et al. 2017: 7)
Europe in the XIX. century
Geologic map of the Drava River basin with positions of archaeological sites with recorded smelting features (slag) (made by: T. Brenko; Valent et al. 2017: 8; map: Hećimović 1994)
Pedological map of the Drava River basin with positions of archaeological sites with recorded smelting features (slag)

(made by: T. Brenko; Valent et al. 2017: 9; map: Republic of Croatia, Soil suitability map for cultivation, 1:300000, 1996)
Bacteria *Leptothrix* (better iron deposition) goethit oolitic iron ore layer (Valent et al. 2017: 11) is naturally renewed by regular flooding
clayey silt

silt with occasional traces

silt with orange traces of middle intensity

silt to clay transition with clear traces

clay

silt with clear traces

silt with occasional traces

silt with traces of low intensity

silt, sandy silt

silt with orange traces

silt with traces of low intensity

sand with the occasional gravel
Virje – Volarški breg 2007, surface finds (photo: T. Sekelj Ivančan)

Sekelj Ivančan 2017; Tkalčec, Sekelj Ivančan 2017; Sekelj Ivančan, Hrovatin 2017; Valent 2018
A. Deforestation during the last 2500 years; B. Reconstruction of rainfall (April-June) and temperature (June-August) in the last 2500 years. Gray vertical bands mark key events in European history (Buntgen et al. 2011: 580, Fig. 2; 581, Fig. 4; Lubick 2011: Fig. 1)
Renaissance Festival, Koprivnica 2019

experimental smelting of bog iron ore

photo: K. Botić

photo: Town Museum Koprivnica

source: https://www.facebook.com/964813090202797/photos/a.1305692906114812/2954960474521372/?type=3&theater
- change in paleoenvironment (paleohydrology):
  • past populations adaptability to natural change and change caused by small scale human intervention in the landscape
  • extinction of old crafts (small scale iron production) after more than 2000 yrs of continuity – caused by modern extensive intervention in the landscape and other causes