



## Archaeological mapping of the UNESCO World Cultural Heritage Site Birka-Hovgården: An outstanding international example for latest archaeological prospection technology

Since 2011 the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology (<http://archpro.lbg.ac.at>) and its Swedish partner Riksantikvarieämbetet UV Teknik is conducting a high-tech archaeological prospection case study at the UNESCO World Cultural Heritage Site Birka and Hovgården developing and using latest remote sensing and geophysical prospection technology.

- The Viking Age site of Birka-Hovgården has been investigated with state-of-the-art archaeological prospection methods in unprecedented detail.
- All accessible areas of Björkö and the southern part of Adelsö have been mapped through geophysical prospection and airborne laser scanning surveys. The result is a seamless digital map of the landscape and the contained buried archaeology.
- For the first time Sweden's largest accumulation of burial mounds on Björkö has been visualized in its entirety.
- Buried archaeological remains such as houses, fortifications, track ways, graves, as well as the development of the settlement clearly show in the geophysical prospection data.
- The new results contribute significantly to the understanding and preservation of this important World Cultural Heritage site.
- Not a single piece of turf was turned for this purpose. The entire investigation was conducted using latest non-invasive archaeological prospection methods and integrated ongoing interpretation of the generated data sets.
- The entire island of Björkö and the southern half of Adelsö have been mapped from the air and over 78 hectares (= 0.78 km<sup>2</sup>) of fields have been explored with magnetometer measurements and a novel georadar system developed by MALÅ Geoscience in Sweden.

### NON-DESTRUCTIVE ARCHAEOLOGICAL PROSPECTION METHODS

Newly developed **motorized geophysical prospection systems** allow for the efficient archaeological investigation of the subsurface across large areas in great detail.

- **Magnetic prospection** can detect postholes, pits, fireplaces and other structures that cause variations in the Earth's magnetic field. Magnetometer measurements result in two dimensional images of the subsurface. The magnetometer system is mounted on a cart built of fibre-reinforced plastics that is towed by a Quad bike.
- **Georadar prospection:** Stone structures, trenches, pits, layer interfaces, cavities and other three dimensional structures may be mapped by georadar. The georadar is an active sounding method that can provide detailed three dimensional information on the location, shape and depth of archaeological remains. It can see approximately two metres into the ground. The georadar system is pushed by a small tractor.
- **Airborne Laser Scanning** is used to generate a detailed digital model of the terrain across large areas. For the measurements the laser scanner is mounted below an airplane. With the use of specific software filters it is possible to visualize small topographical features, such as burial mounds, even in areas that are covered by forest.

### LBi ARCHPRO

The **Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology** (LBI ArchPro) is dedicated to the development and application of new and comprehensive non-invasive techniques and methodological concepts for landscape archaeology. The partner consortium of the LBI ArchPro consists of internationally leading teams in the professional application of archaeological prospection methods. The LBI ArchPro is a research institute of the Ludwig Boltzmann Gesellschaft.

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## FURTHER INFORMATION

<http://archpro.lbg.ac.at>

<http://lbi-archpro.org/cs/birka>

## LBI ARCHPRO EXHIBITION CREDITS

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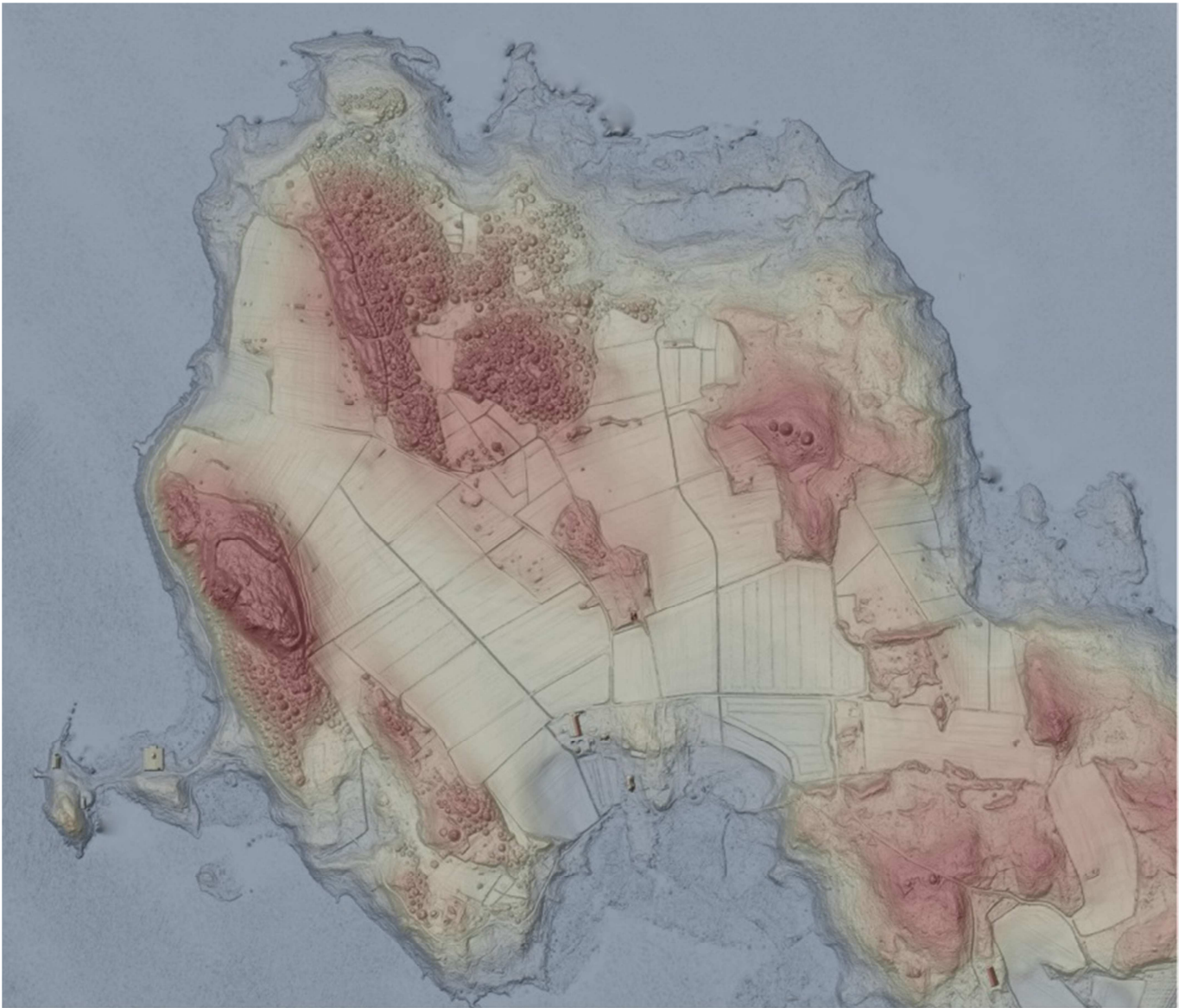


**Figure 1:** Motorized magnetic prospection at Birka southeast of the hill-fort. LBI ArchPro 2011.





**Figure 2:** High-definition georadar survey in Birka's Black Earth using the MALÅ Imaging Radar Array. LBI ArchPro 2011.



**Figure 3:** New digital model of the terrain surface of Birka based on latest airborne laser scanning measurements. This map shows the terrain of Birka in unprecedented detail, including the numerous burial mounds, hill-fort, rampart, coastline and Black Earth area where the settlement has been located. LBI ArchPro 2013.