



A Fusion of GPR- and LiDAR-Data for Surveying and Visualisation of Archaeological Structures – a case example of an archaeological site in Strettweg, District of Murtal, Austria

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Strettweg is a small community located in Upper Styria in the valley of the Mur. It is seen as one of the most outstanding prehistoric archaeological sites in Austria. In 1851 the “Strettweger Opferwagen” (~ 600 BC) was discovered and is considered one of the most important Hallstatt find of Austria. More than 160 years later Airborne LiDAR and modern geophysical methods like Ground Penetrating Radar (GPR) and/or Magnetics have made it possible to find additional burial mounds and map the largest prehistoric settlement in the southeastern Alps (Falkenberg). These modern techniques have provided an auxiliary tool for the archaeological team’s project „Hallstattzeitlicher Fürstensitz Falkenberg/Strettweg“.

GPR allows for a fast and non-invasive surveying of structures and anomalies of the sub surface, by using electromagnetic radiation in the microwave range. The active remote sensing technique LiDAR (Light Detection and Ranging, also known as Laser Scanning), measures the runtime of discrete light pulses in order to map objects and structures on the surface of the earth.

In the course of this archaeological project GPR (Mala ProEx – 500 MHz antenna) and terrestrial LiDAR (Riegl LMS Z620) were applied by the University of Graz, Department of Geography and Regional Science, ALADYN work group (Univ.-Prof. Dr. Oliver Sass) to collect data of a testing site with 2500 m². The existence of archaeological structures was crucial for choosing this area. The area is surrounded by fine sediments, which originated by fluvial transportation, making the remnants of these archaeological structures easier to detect.

A standard GPR-processing-workflow does not allow for a 3-dimensional visualisation of the results and complicates the detection of archaeological structures. Unlike, LiDAR which does allow for a 3-dimensional visualisation. A fusion of both techniques, by using Python scripts and the software packages REFLEXW - Sandmeier Scientific Software and LASTools – rapidlasso, applies the advantages and specialities of LiDAR and GPR, and allows to get a high-resolution 3-dimensional pointcloud. This simplifies the identification of ancient man-made near-surface structures, which enables both in the field and lab quick post-processing. The LiDAR pointcloud, when coupled with the GPR pointcloud, act as reference datasets and improve the accuracy, classification, and filtering of the GPR data.