

Automated Extraction of 3-D Features from Georadar Data for Interpretation and Visualisation

Georadar is now an established method for archaeological prospection and the advantages and limitations are known. If properly processed and migrated, 3D georadar data can very accurately estimate the depth and size of structures in the underground. The potential of this 3D mapping technique has not yet been fully exploited. The data are normally represented in the form of profiles (vertical slices), time- or depth-slices or a combination of these. Unfortunately these procedures allow only limited insight into the true 3D structures. Attempts to overcome this problem by manual or semi-automatic interpretation are very time-consuming. The proposed solution to reveal the full 3D structure is the automatic calculation of isosurfaces. This new method is robust and efficient and reduces the amount of data substantially, which makes it suitable for surveys of large areas. The information contained in the isosurfaces can be readily exported to GIS-, CAD- or virtual reality systems for further analyses and/or display. With these tools the results can be viewed from any angle to aid the imaging and interpretation, the dimensions of the structures can be extracted directly, and the results can be rendered to make them understandable even for non-specialists.

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Aerial Archaeology in Bavaria

Bavaria is the largest state in Germany. In the last twenty years aerial archaeology has been practiced. For reasons of costs, the pilot has to also act as navigator, archaeologist and photographer. This method has proven to be the most successful and at the same time the least expensive. The beginning years were, for an eager pioneer visionary, very busy and with little time devoted to systematic research and the detailed processing of the aerial photographic material received. At that time flying activities were concentrated on regions which were suspected to yield many new finds. So much photographs were taken that large amounts of the pictures lay unattended for a long time in non-functional archives.

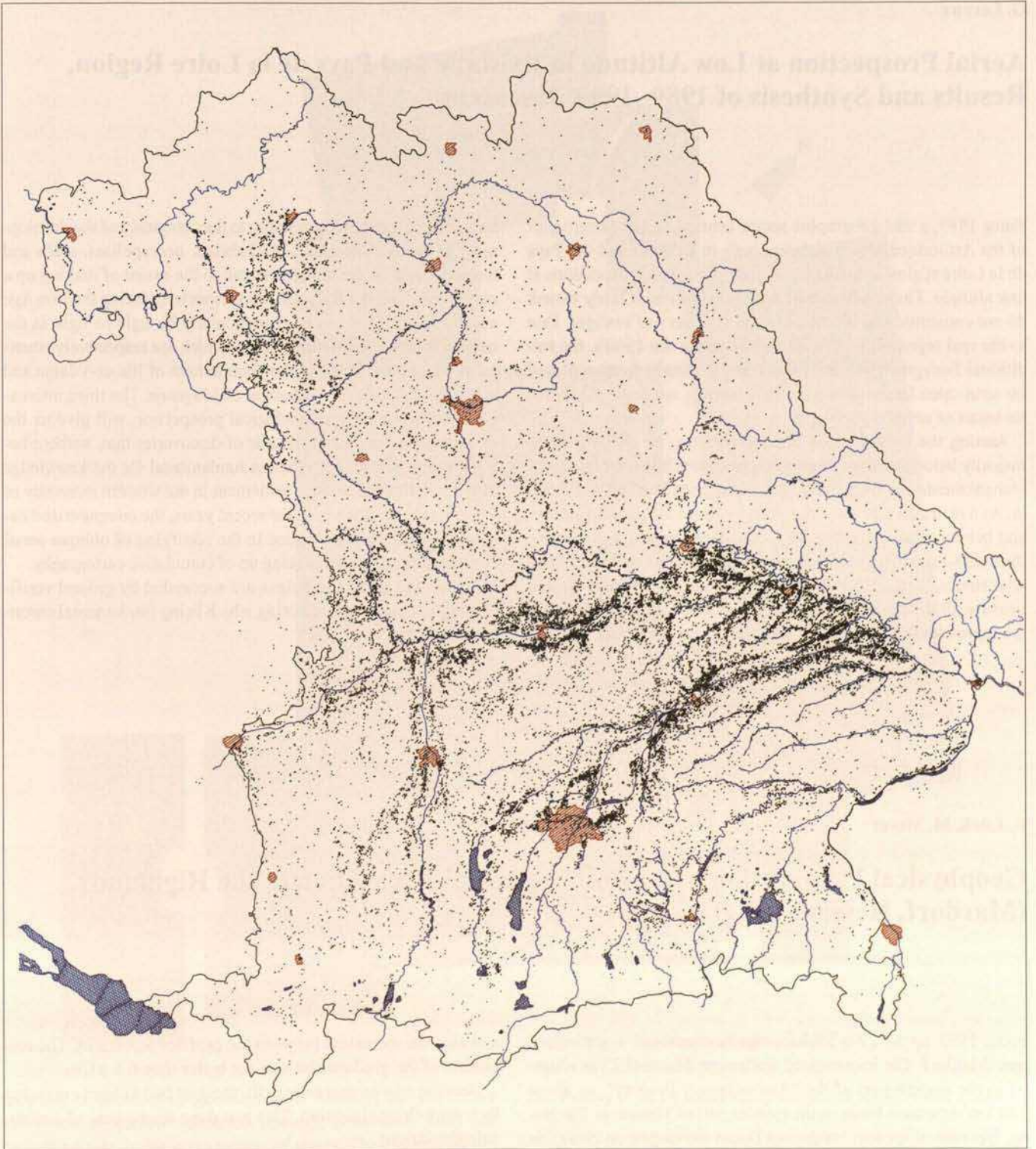
In the meantime, without losing the effectiveness of detail, many improvements were instituted. It was realized that the amount of aerial photographs alone were no criterion for the quality of aerial photograph prospection methods. Only when a usable amount of photographs were made available to the archaeologists in a short time was one able to speak of effective aerial archaeological photography. For that a well supplied archive with properly trained personnel and necessary equipment is most important. Qualified personnel are extremely necessary in order to have an error-free and properly functioning archive.

Geophysical Characterization of a Sugar Mill on St. Croix, U. S. Virgin Islands

Whim Plantation on St. Croix in the U. S. Virgin Islands was the site of a sugar mill operation from the early 17th to the late 19th centuries, and now houses the St. Croix Historical Society. In the spring of 1999 a multidisciplinary group from Michigan Technological University conducted geophysical surveys over the site of the sugar mill complex to highlight promising areas for a planned archeological dig to be conducted in the summer of 1999. Ground penetrating radar, total field magnetics and earth resistivity were used. This area contains both subtle anomalies of buried foundations and small metallic objects as well as massive anomalies caused by very large buried and surface metallic objects. Interest lies not only in the easily identifiable anomalies but also in smaller anomalies hidden within the data. The complexity of the data required advanced processing and interpretation. The site was not only well suited to multiple geophysical methods, but required them. Each geophysical method could pick out large anomalies well, but confidence with subtle anomalies could only be gained through comparison with all three geophysical methods.

Wrong archiving often leads to the temporary loss of photographs which often are found suddenly after a long period of time. Continuous communication between the archaeologists on the ground and the aerial archaeologist is very important in order to fulfill a concrete need for aerial photography in a very short time. The advance preparations for the prospection flight have been very much improved in recent years. Meanwhile some of the flight projects have been mapped from known archaeological sites seldom flown over where many new sites have been located. This tiresome project over not so promising regions does not indicate a large amount of new findings like those that appeared in the beginning years, but do give a large amount of scientific and other important information.

In addition to the project intense flying always indicates enough possibilities to control already known finds and document any changes in their condition. Even with all of the preparatory work on the ground, a little luck is always needed in aerial photographic prospection due to different factors like weather, flying route, time of day, viewing direction, shape and changes in growth of land characteristics. Many of these factors must correspond with each other for new finds to be of value to all concerned.



The distribution of Aerial Photographs at Bavaria