

Analytics of a Historic Single Photo  
 K. Biethahn, K. Jacobsen, E. Kanngieser and W. Schuhr  
 Institute for Photogrammetry  
 University of Hannover  
 Federal Republic of Germany  
 Commission V/A

## 1. Introduction

This paper deals with the evaluation of historic terrestrial photography in connection with minimum additional ground control point information. In this case a 100 year old amateur photo of the discovery place of the almost 2000 years old so called "Hildesheim Silvertreasure" (Federal Republic of Germany) has been evaluated in combination with additional map data to derive precisely three dimensional coordinates of the position.

This information is valuable for the archeologists, to save at this point a commemorative stone, which sank into oblivion and to search within this area for future treasure investigations.

The importance of this treasure for the early German history is not completely clarified. It is not the intension of this paper, to participate in speculations circling around this discovery and differ extremely from a trader store until the "Nibelungen" treasure.

This investigation only belongs to the calculation of the proper position of this historic excavation place, where about 70 pieces of silver table plates successfully were safed in 1868.

Today the originals are exhibited in 2 separate rooms of the treasury of the museum of antics in Berlin (West).

The eye-catcher of this collection is the "Athena plate", see figure 1.



Fig. 1  
 Relieftondo  
 of the Athena plate

## 2. Initial data and methods

The most important data source to define the exact geographic position of the digging place is a report from 1870 of Col. v. Cohausen, which contains an authentic large scale map of the location, see figure 2.

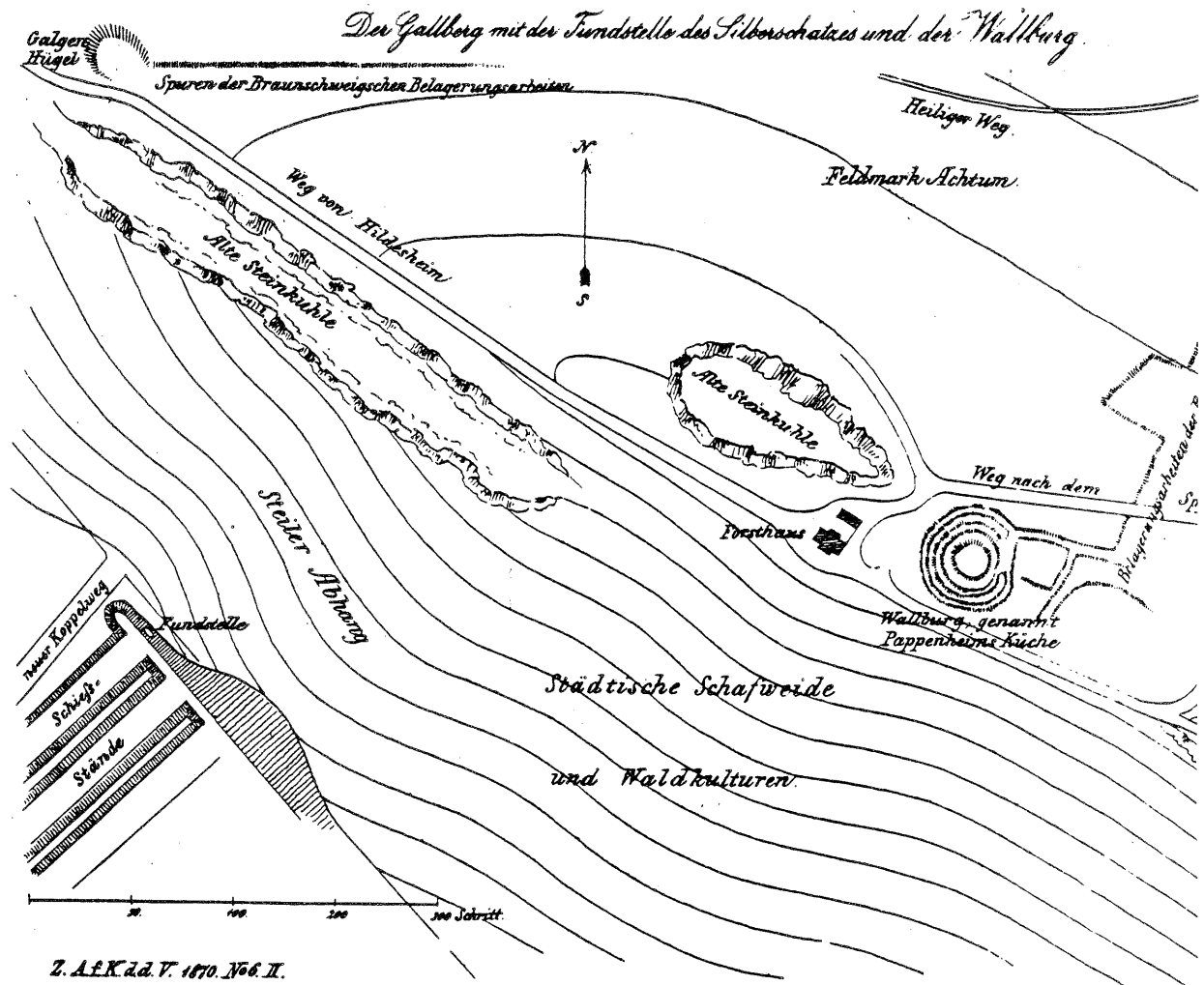


Fig. 2 Map of the "discovery-place" from 1869 (= "Fundstelle") (original scale about 1 : 2000)

As a matter of fact a correct enlargement of this map does not proper fit the actual cadastral map (scale 1 : 1000) of this area. There are some more reasons indicating this map as a raw drawing:

- The angles in the unchanged boarder system of both maps differ for some degrees.
- The digging place was rectangular but is recorded to be an ellipse.
- According to the historic map the distance of the location ("Fundstelle") from the street ("Koppelweg") is about 22 m (see figure 7 position 5), though v. Cohausen mentioned in his text "20 steps", equivalent to 15 or 16 m for this distance.
- The total length of the scale in figure 2 is 200 steps instead of 300 steps, according to the correct numeration 0, 50, 100, 150, 200 steps,

instead of 0, 50, 100, 200, 300 steps, which results sufficient into a step length of about  $160 \text{ m} : 200 = 0.8 \text{ m}$ , which also agrees with Buhlers and Huelsemann (1902).

- A contour comparison of the historic map (fig. 2) with the German basis map 1 : 5000 shows negliable correlation.

Fortunately an additional map (1 : 200) of this area from 1958 exists, containing important former topography, which has completely changed until today. The result of the fitting of the map of figure 2 with this reference map is shown in figure 7 (position 4).

From literature are known additional digging place informations:

- In 1901 Pernice and Winter published the map (1 : 6200) of figure 3 entitled "The situation of the silver treasure digging place", which is not of comparable authenticity as the map of figure 2.

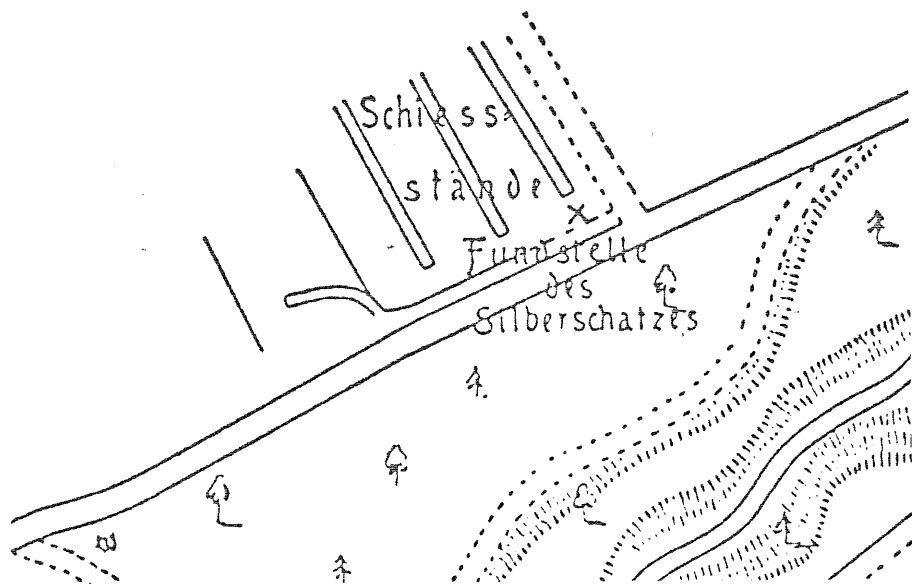


Fig. 3 Part of the map of the digging place after Pernice and Winter (1901)

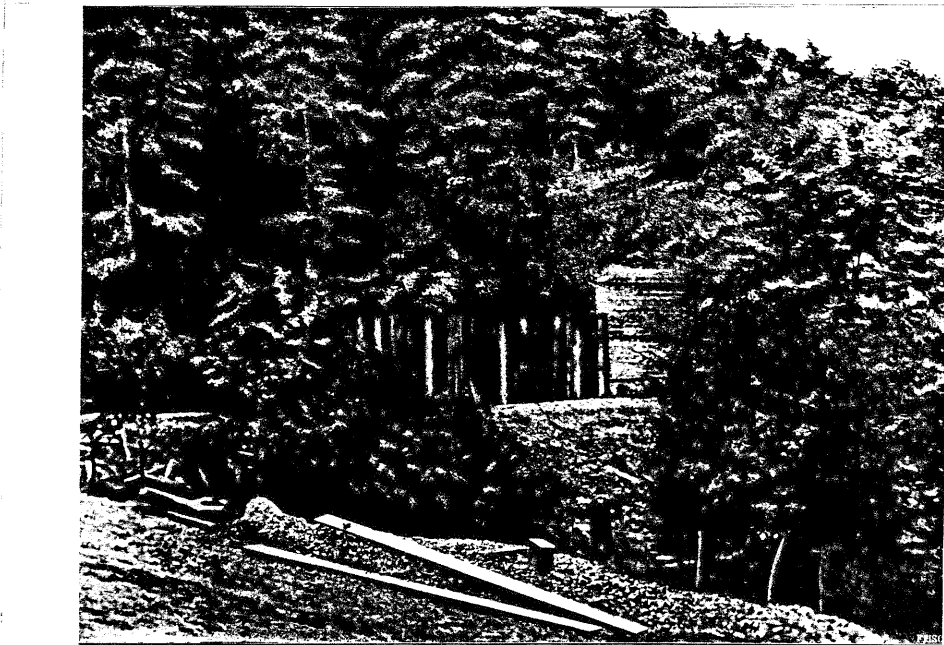


- Another sample (see fig. 4) is the painting of Prell, called "The handing over of the silver treasure near Hildesheim by Arminius to German priests in the year 9 a. Chr." which from the topographic point of view supposed to be out of consideration for this investigation.

Fig. 4

Glory-painting of the donation of the silver treasure near Hildesheim (19th century)

- Pernice and Winter in 1901 also published a historic photo of the digging place (see figure 5):

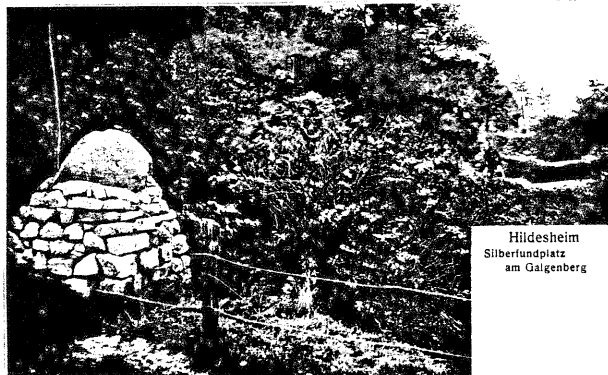


Die Fundstelle des Silberschatzes

Fig. 5 Photo of the excavation terrain from 1885

The man on the picture, who participated in the excavation, as a witness of the events, poses at the "exact" position of the digging place. This photo is an important document to verify the position coordinates. With high probability in the foreground it also shows a (sand-) stone block, just before burying it. This commemorative stone raised in 1885, which contains contemporary documents, sank into oblivion. A little bit more in the background but still on the way, in figure 5, an erratic block is imaged, prepared to put it into the former position of a second commemorative stone (position 6, fig. 7), compare figure 5 and 6. Today this stone is still visible at position 7 of figure 7. On this image, 7 points have been chosen and used as ground control points; see figure 5:

- 3 points on the wallstep in the background,
- 2 points on the person according to v. Jan (1966), who mentioned the distance of 7.7 m from the historic stone position



Hildesheim  
Silberfundplatz  
am Galgenberg

- 2 pales could be coordinated by evaluating the image of figure 6, showing the historic stone position, which coordinates are well known from a 1 : 1000 map of the year 1934.

Fig. 6

Historical view of the current commemorative stone

The MOR (= Multi Orientation) programpackage of professor Wester-Ebbinghaus (1984) has been applied to verify three dimensional position coordinates based upon recent local measurements and precisely map information in connection with the image coordinates.

The applied formulas are collinearity equations and constraints, using different a priori weights to combine image- and ground-data.

Though the focal length was very roughly estimated ( $190 \pm 100$  mm), the system converged normally.

### 3. Results

Figure 7 shows different positions belonging to the excavating place:

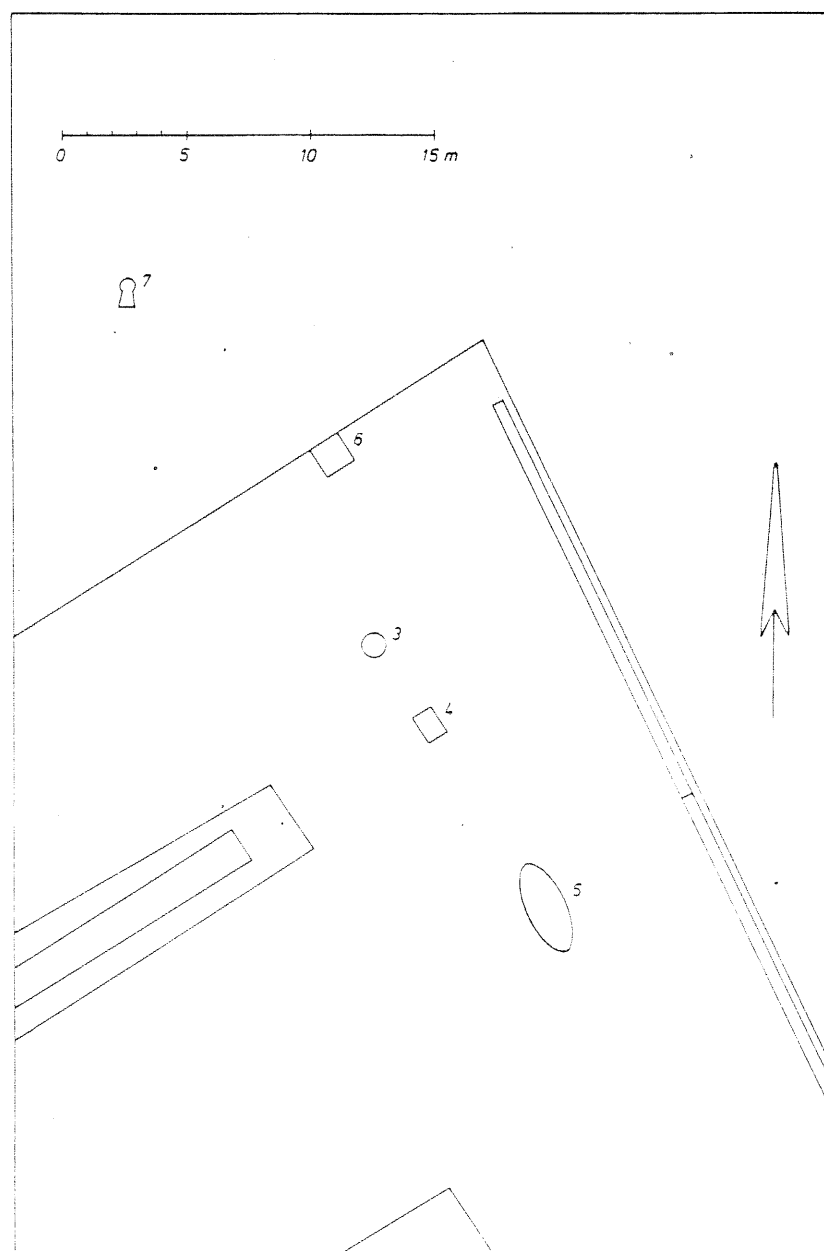


Fig. 7

Position of the silver treasure

- 7) Nowadays commemorative erratic block
- 6) Historic position of the erratic block
- 3) The position of the sand stone block
- 4) The excavating place
- 5) The excavating place after v. Cohausen's map

Summarizing resulted from this investigations

- (1.) The excavating place (fig. 7, pos. 4) and the position of the sand stone block (fig. 7, pos. 3) are not identic.  
The linear difference is more than 3 meters.
- (2.) Both positions can be verified local with an accuracy of  $\pm 0.5$  m in plan and height.
- (3.) For the evaluation of historic photos the focal length is not needed.
- (4.) In 1985 the commemorative sand stone block (fig. 7, pos. 3) containing contemporary documents, exactly 100 years lies in the earth. It would be of great interest to save it on the anniversary.

#### 4. Literature:

- Buhlers und Huelsemann: Geschichte des Infanterie-Regiments von Voigts-Rhetz, Hildesheim 1902, S. 7 u. 8
- Cohausen, A. v.: Die Fundstelle des Hildesheimer Silberfundes. Anzeiger für Kunde der deutschen Vorzeit, 17. Jahrgang, Nürnberg 1870, S. 155 ff.
- Jan, H. v.: Der Hildesheimer Silberfund und sein Echo in der wissenschaftlichen Welt. Alt Hildesheim, Jahrbuch für Stadt und Stift Hildesheim August Lax, Verlagsbuchhandlung Hildesheim 1968, S. 10 ff.
- Pernice, E. und Winter, F.: Der Hildesheimer Silberfund. Veröffentlichung der kgl. Museen zu Berlin 1901
- Wester-Ebbinghaus, W.: Ein allgemein formuliertes Konzept zur Bildtriangulation mit gemeinsamer Ausgleichung photogrammetrischer und geodätischer Beobachtungen. Presented paper, Comm. III, ISPRS Rio, 1984