

The prehistoric settlement of the inneralpine valley of Montafon in Vorarlberg (Austria)

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SUMMARY - *The prehistoric settlement of the inneralpine valley of Montafon in Vorarlberg (Austria)* - The influences of prehistoric settlement on the development of landscape and vegetation as well as on cultural processes in an inneralpine settlement area are examined in an interdisciplinary research project, using the Montafon in western Austria as an example. Since the year 2000, data on early settlement history has been obtained from new archaeological excavations, archaeometallurgical investigations, as well as research on landscape development. Until a few years ago, the Montafon was not thought to have been settled until the High Medieval period. Results of recent botanical findings and archaeological excavations, however, demonstrate that the use of the area first occurred in the 3rd millennium during the Late Neolithic period. Thereafter, in the Early and Middle Bronze Age and the earlier Iron Age settlement activities of varying intensity are attested. Scientific investigations of several moors very clearly show the different phases and intensity of use of this habitat. In the context of a working hypothesis, it is assumed here that mining and processing of copper ores was an important motivation for the Bronze Age settlement of this inneralpine valley.

RIASSUNTO - *Il popolamento preistorico della valle alpina di Montafon nel Vorarlberg (Austria)* - Le influenze del popolamento preistorico sullo sviluppo del paesaggio e della vegetazione e sui processi culturali in un'area insediativa interna alla catena alpina sono esaminati in un progetto di ricerca interdisciplinare, prendendo come esempio l'area di Montafon nell'Austria occidentale. A partire dall'anno 2000 sono stati ottenuti dati sulla storia del primo popolamento attraverso nuovi scavi archeologici, indagini archeometallurgiche, così come dalla ricerca sullo sviluppo del paesaggio. Fino a pochi anni fa, si pensava che Montafon non fosse stato popolato fino al periodo alto medievale. I risultati di recenti ritrovamenti botanici e scavi archeologici dimostrano invece che il primo utilizzo dell'area avvenne nel III millennio a.C., durante il Tardo Neolitico. Successivamente, negli insediamenti dell'antica e media età del Bronzo e della prima età del Ferro sono attestate attività di intensità variabile. Indagini scientifiche effettuate in diverse brughiere mostrano molto chiaramente le differenti fasi e l'intensità d'uso di questo habitat. A questo stato della ricerca è ipotizzabile che l'estrazione mineraria e i processi di lavorazione del minerale di rame fossero un'importante motivazione per gli insediamenti dell'età del Bronzo di questa valle alpina.

Key words: Austria, Montafon, settlement, environment, metallurgy

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1. NATURAL SETTING AND FUNDAMENTAL PRINCIPLES OF SETTLEMENT

The exploration of the peripheral areas of human settlement activities is considered one of the interesting topics of settlement archaeology (Jankuhn 1965). Namely, its aim is to examine settlement processes that can be attributed to different incentives and motivations of the population and that in pre- and early historic periods ultimately led to the utilisation of marginal areas beyond the habitat and into the mountains (Primas 1999; Della Casa 1999). In this respect,

the Alps offer diverse and closely situated settlement areas and habitats, from lower lying foothills, valley-scapes and inneralpine basins to submontane areas to heights beyond the tree line. The history of human settlement in the Alps is intimately related to the landscape, the climate and glaciers. There are various features, which from today's point of view, would in principle render the Alps as an advantageous habitational and commercial area: favourable climatic and ecological factors, new or modified economic systems, settlement pressure due to an increase in population in core zones outside of the Alps as well as

prospection for and exploitation of ore deposits (Eibner 1982; Wyss 1993).

Permanent or seasonal settlements at the habitat's uppermost boundaries are important sources for studying the interaction between climate, economy and settlement processes (Aerni 1990: 37 et seqq.; Egli 1990: 54 et seqq.). An increased usage of the Alpine environment, which is manifested in the numerous settlements, single finds and hoards (von Uslar 1991: 93 et seqq.; Neubauer & Stöllner 1994; Kossack 2002), as well as long-term settlement activity, as indicated in pollen profiles (Oeggl 2003), can be noted in the Early Bronze Age starting at the turn of the third to the second millennium BC. In addition, there are numerous finds from higher elevations and mountain passes (e.g. Vonbank 1966), which confirm an intensive traversing and usage of higher elevations (pastures?), even above the tree line (Bortenschlager 1992; Wahlmüller 2002). They as well are an indication of active exchange and communication between the inneralpine valleys. In view of the sharp increase of finds and sites in contrast to the Neolithic, René Wyss has even spoken of "Bronze Age man's conquest of the Alps" ("Eroberung der Alpen durch den Bronzezeitmenschen", Wyss 1971).

Three different explanatory models for the usage of the Alpine habitat stand out in particular (Primas 1998: 355 et seqq.: 1) the Alpine and upland pastoral economy as a model of a seasonal change of pastures (transhumance) (Spindler 2005), 2) the traffic crossing the Alps in the course of large-scale exchange as well as intra-Alpine travel between valley communities (Staufner-Isenring 1983: 135 et seqq.) and 3) the prospection and exploitation of copper ores.

2. THE ARCHAEOLOGICAL TOPOGRAPHY OF MONTAFON

Situated to the west of the Arlberg and in the south of the state of Vorarlberg (Fig. 1), Montafon was, until the discovery of the first fortified, prehistoric hilltop settlement in 1999, thought to have been an uninhabited inneralpine valleyscape in ancient times (Krause 2001: 49 et seqq.; Krause 2005b). This view presided despite the evidence gained through previous pollen analyses from two high moors in Montafon, that attested a continuous settlement of this valley community from the

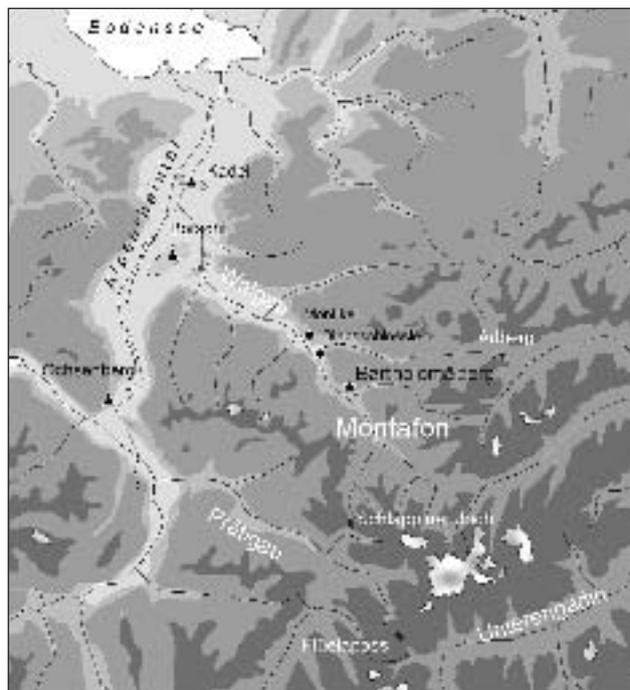


Fig. 1 - Map of the Alpine Rhine Valley with the Walgau and Montafon, showing the major settlements of the Early and Middle Bronze Age (excluding Graubünden). Also indicated are mountain passes in the area of Montafon that were important crossings within the inner Alpine region.

Fig. 1 - Carta della valle alpina del Reno con Walgau e Montafon, con i principali insediamenti dell'antica e media età del Bronzo (escluso Graubünden). Sono indicati anche i passi alpini nell'area del Montafon che furono importanti crocevia con la regione alpina centrale.

Bronze Age onwards (Kostenzer 1996). This evidence was further supported archaeologically by Bronze and Iron Age finds from the Schrunser basin and from the Gargellen valley as far as the pass over the Schlappner Joch (2203 m), thus confirming at least that the valley was traversed in prehistoric times (Vonbank 1966). Ultimately, in 1999, the first prehistoric hilltop settlement was discovered at Bartholomäberg in the Friaga Wald on the Platta (Fig. 2). There primary archaeological excavations were carried out by the Institute of Prehistoric Archaeology of the Free University in Berlin from 2000 to 2003, revealing Bronze and Iron Age cultural layers of several settlement phases.¹ At the same time excavations of medieval wall remains at the Diebschlössle (Fig. 3, no.7), located at the beginning of Montafon, brought forth evidence of Bronze and Iron Age settlement phases.

¹ The excavations in Friaga Wald on Bartholomäberg were concluded after four campaigns in August 2003. 12-15 students of the universities in Berlin, Vienna, Freiberg/Saxony, Tübingen, Oxford (GB) and Moesgard (DK) participated in each campaign. We are very grateful to the property owners Family Bitschnau and Family Fritz from Platta on Bartholomäberg for their cooperation and patience: without their generosity, we could not have carried out our work.



Fig. 2 - Aerial view of the Montafon landscape seen from the east to the west. In the background are the Raetikon mountains with heights between 2700 to 2900 metres; in the foreground, the valley and Schruns basin with the confluence of the Ill and Litz rivers. The settlement at Bartholomäberg is located on a terrace in the upper right. Photograph by Otto Braasch.

Fig. 2 - Vista panoramica del paesaggio del Montafon da est verso ovest. Sullo sfondo si vedono le montagne retiche che raggiungono quote di 2700- 2900 m. In primo piano, la valle e il bacino dello Schruns con le confluenze dei fiumi Ill e Litz. L'insediamento di Bartholomäberg è dislocato su un terrazzo in alto a destra. Foto di Otto Braasch.

The results of archaeological excavations as well as of landscape studies by Klaus Oegg (Institute of Botany, University of Innsbruck) have shown that prehistoric settlement in Montafon began around 3000 BC (Krause *et al.* 2004; Oegg *et al.* 2005; Oegg *et al.* in press for 2007). Passage through and settlement of Montafon can probably be linked to its easy access to the Walgau and its connections across high passes to other inneralpine settlement areas in the south, further, to the prospection for and mining of copper ores, and perhaps iron ores later in the Iron Age.

2.1. The Diebschlössle near Lorüns and Stallehr

The Diebschlössle is situated at the entrance to Montafon, above the confluence of the Alfens and Ill rivers (Fig. 3, no.7), just beyond Lorüns and Stallehr at the eastern end of the Walgau, where the Klostertal leads eastwards to the Arlberg pass (Krause 2006). There topographically distinctive rock formations shape the western foothills of the Davenna Massif into several cliffs and terraces, atop of which the remains of the walls of a small medieval castle are still present. From there the view of the eastern Walgau and the rock ridge

of the Montikel above Bludenz with its Bronze Age pottery is optimal. In the context of investigating the ancient history of Montafon excavations were carried out at the Diebschlössle between 2001 and 2003². The aim was to clarify the age and purpose of the medieval walls atop the rock.

Surprisingly, several hundred sherds from the Middle Bronze and the earlier Iron Age came to light, which are interpreted as settlement deposits and signs of use of this “rock nest” for its strategically advantageous location (Fig. 4). All finds were located in a relatively thin humus layer or in the clay between the stones and had been secondarily displaced by later use of the site during the Middle Ages. No evidence such as stone placements for houses or hearths was found, so that no specifications can be made regarding the form and appearance of the settlement structures.

The prominence of the rock formations with their steep faces and the absence of a hinterland for potential agricultural use give reason to assume that the site was more likely to have been a location of strategic importance above the two valleys and travel routes, rather than a normal rural settlement (a homestead or group thereof). Of the many hundred, mostly small pottery

² Karsten Wink, Firma Arcis in Innsbruck, was contracted by the administrative council of Montafon to carry out the excavations.

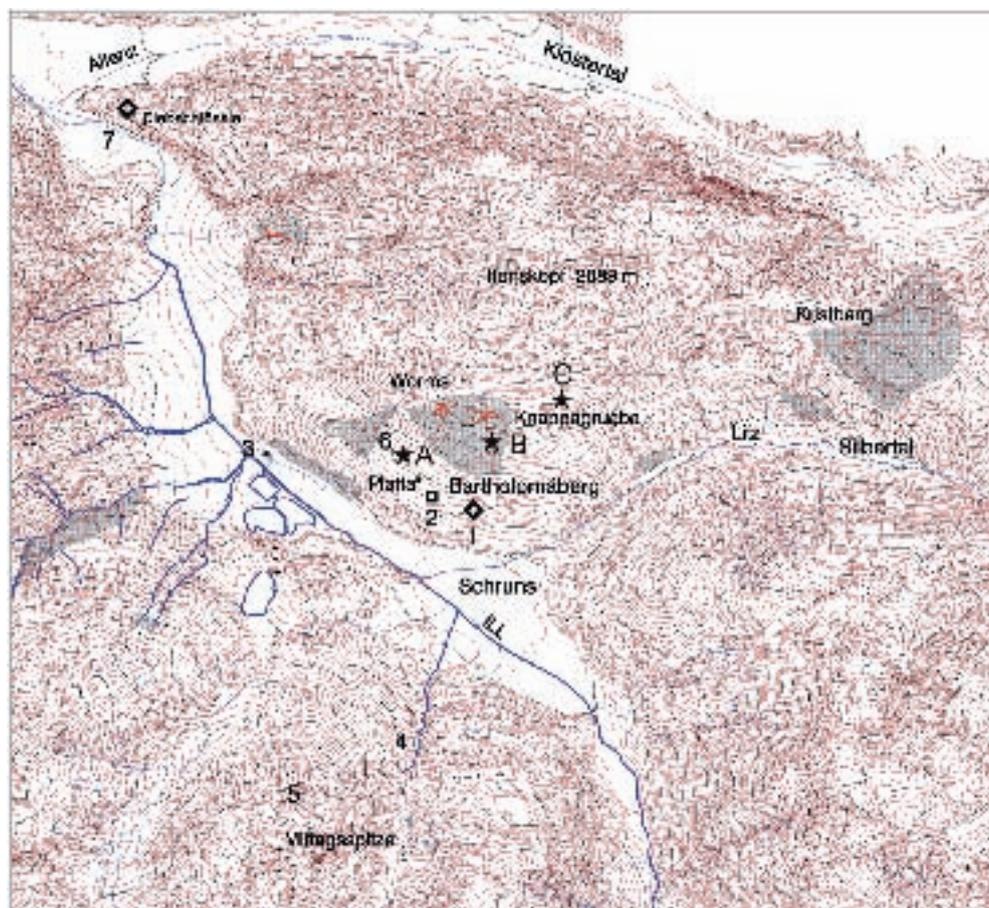


Fig. 3 - Oro-hydrographic map of the southern Montafon with the Bronze Age sites of Diebschlössle (7), the prehistoric hilltop settlement Friaga Wald (1) and a second site on the Platta (2) on Bartholomäberg. Also indicated (shaded areas) are zones of medieval mining debris in the parish Knappagruaba and Worms on Bartholomäberg as well as the Kristberg in Silbertal. Stars (*) with A, B and C denote three moors from which samples for pollen analyses were taken. Numbers 3, 4 and 5 mark the sites of occasional finds, among them a flanged celt of the Langquaid type from Hosensee (3). This map is based on the cataster map from the *Bundesamt für Eich- und Vermessungswesen*, Wien, and of the communal administration (*Stands*) of Montafon in Schruns.

Fig. 3 - Carta oro-idrografica del Montafon meridionale con i siti dell'età del Bronzo di Diebschlössle (7), l'insediamento preistorico in posizione dominante di Friaga Wald (1) e un secondo sito sulla Platta (2) del Bartholomäberg. Sono indicate (aree ombreggiate) anche le zone medievali di scarto dell'estrazione nella parrocchia di Knappagruaba e Worms sul Bartholomäberg, così come sul Kristberg nella Silbertal. Gli asterischi (*) con A, B e C denotano tre brughiere da cui sono stati presi campioni per analisi polliniche. I numeri 3, 4 e 5 indicano siti con ritrovamenti occasionali tra i quali un'ascia a margini rialzati del tipo Langquaid dal Lago di Hosen (3). La carta è basata sulla mappa catastale del Bundesamt für Eich- und Vermessungswesen di Vienna e dell'amministrazione comunale (*Stands*) del Montafone nello Schruns.

fragments, found in different excavation trenches, the majority of the sherds can be attributed basing on their structure to the inneralpine Bronze Age and, in particular, to the Middle Bronze Age (16th to 14th century BC). Amongst the pottery finds are c. twenty sherds, some decorated, which according to typological features can be assigned to the Iron Age. As in the case of the settlement at Bartholomäberg in Friaga Wald, there are sherds from the Iron Age Alpine-Rhine valley group as well as the inneralpine Fritzens-Sanzeno group (cp. Fig 12).

2.2. The prehistoric hilltop settlement in Friaga Wald at Bartholomäberg

The prehistoric hilltop settlement in Friaga Wald at Bartholomäberg is situated at 940 m above sea level, approximately 240 m up from the valley floor above Schruns and the confluence of the Litz River flowing out of the Silbertal and the Ill issuing from inner Montafon (Fig. 3, no.1). The now wooded knoll (Fig. 5) is located at the edge of the Platta, a large mountain terrace facing south, upon which the scattered settlement

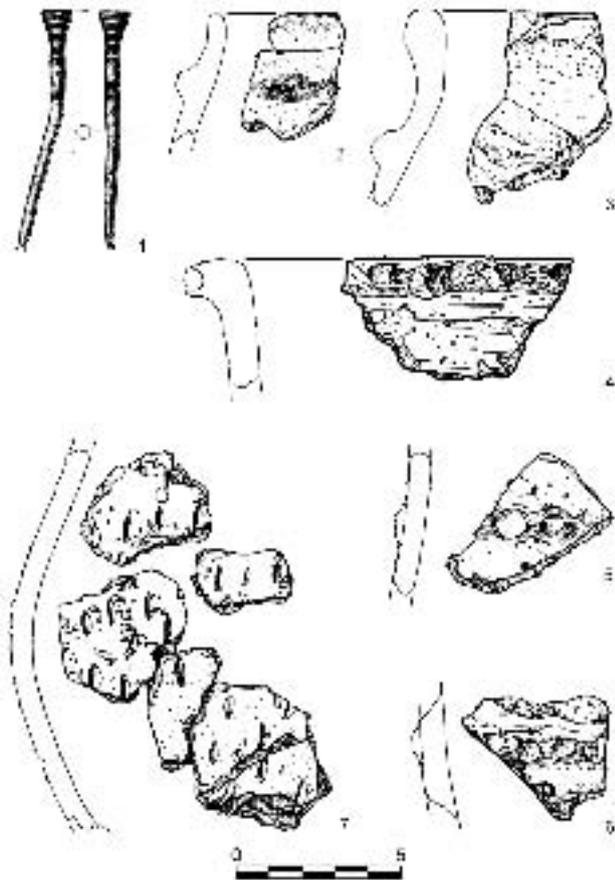


Fig. 4 - Middle Bronze Age pottery and a decorated bronze needle from the settlement in Friaga Wald.

Fig. 4 - Ceramica dell'età del Bronzo medio e punta in bronzo decorata dall'insediamento di Friaga Wald.

of Bartholomäberg is situated. The eponymous chapel of St. Bartholomae, a well-known landmark, is 1087 m a.s.l. This strategically and topographically exposed point affords extensive views into the distant and surrounding valleys and of the Silvretta Mountains to the south (Krause 2001; Krause *et al.* 2004).

The Platta once had a hinterland with economical and agricultural areas.

The moderate elevation and the terrace's orientation towards the south are conducive for agriculture. Due to the favourable climatic factors and intensive sun, the location at the Bartholomäberg is described by the modern tourist industry as the "Sunny Balcony of the Montafon". A further aspect of prehistoric topography is that travel routes at that time, like those in historical times, would hardly have run along the valley floor, which was at risk of flooding, but rather along the slopes.

Located atop a rocky spur, the settlement area (Fig. 6) falls off sharply on the valley side and at first view is reminiscent of the topography and inner structure of a small medieval castle site. The spur is connected

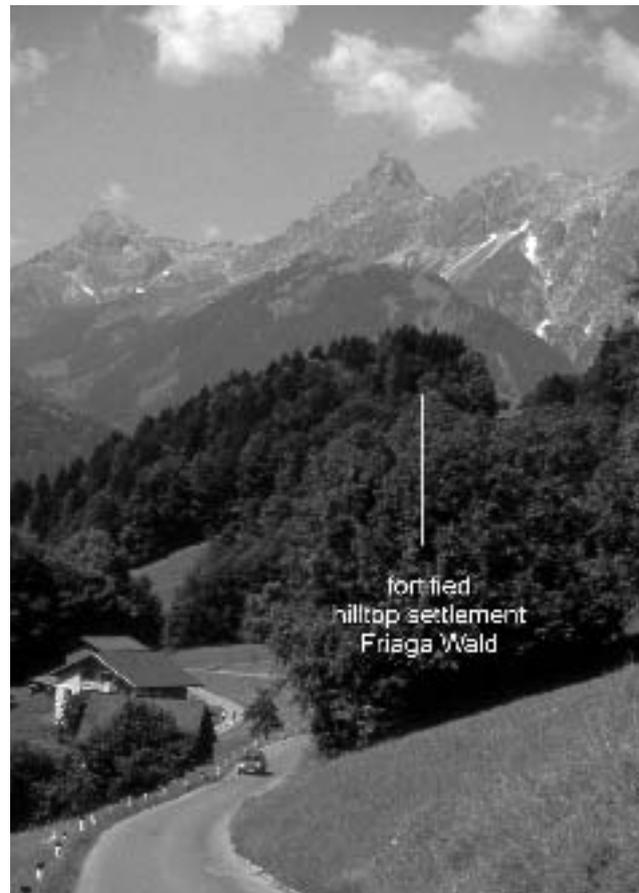


Fig. 5 - Bartholomäberg, Montafon. In the foreground, the forested mountain with the prehistoric settlement Friaga Wald at the edge of the Platta. View towards the west with the pointed peak of the Zimba Mountain in the background (2643 m asl).

Fig. 5 - Bartholomäberg, Montafon. In primo piano, la montagna alberata con l'insediamento preistorico Friaga Wald sull'angolo della Platta. Vista verso ovest con la vetta aguzza del Monte Zimba sullo sfondo (2643 m s.l.m.).

to the hinterland only by a narrow ridge. A trench, very much in the style of a medieval castle's ditch, was hewn into the rock and cuts off the connection at this point. Behind it a steep bank rises 2.5 - 3 m to its highest point, where a stone wall marks the course of the wall (Figs 6, 9).

The location of the settlement area on a promontory and the relief of the terrain show that the settlements were built in a protected position. Covering approximately 90 x 50 m, the whole complex is spread over three levels or plateaus, which are between 920 and 940 m above sea level (Fig. 6). The settlement mound itself was notably modified by artificial terracing in the Bronze Age (Fig. 7). The planed area thus created is covered by cultural layers amounting to 1.4 m in thickness (Fig. 8). The lowest layer dates to the Early Bronze Age (Fig. 8, no. 6.7), followed next by a

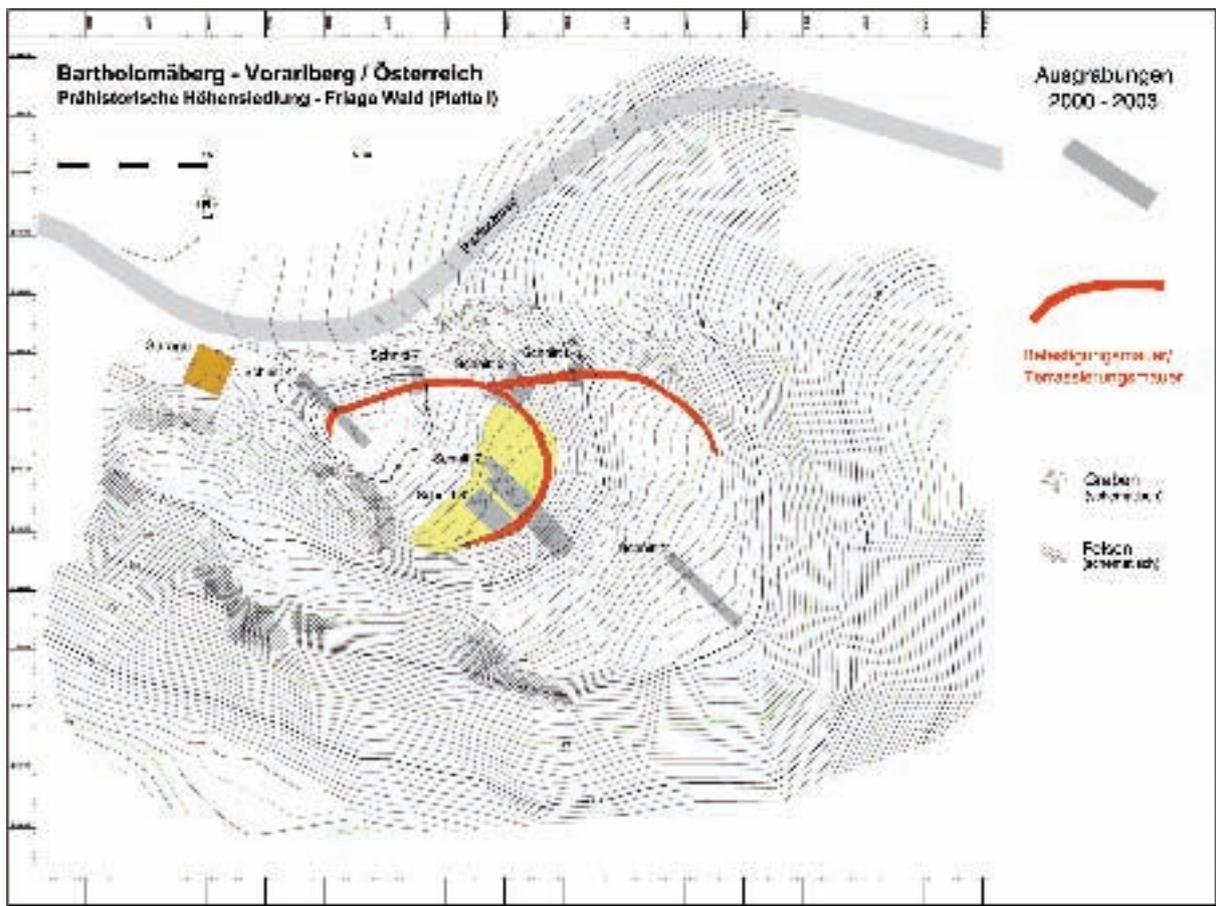


Fig. 6 - Bartholomäberg, Montafon. Topographic plan of the prehistoric hilltop settlement Friaga Wald. The promontory is characterised by terraces and plateaux. Designated are the excavation trenches 1-6 (*Schnitt 1-6*), the fortification wall encircling the hillfort and the course of the adjoining terrace wall on plateau 2. Digital documentation by the firm ArcTron, Alenthann.

Fig. 6 - Bartholomäberg, Montafon. Pianta topografica dell'insediamento preistorico in posizione dominante di Friaga Wald. Il promontorio è caratterizzato da terrazzi e plateau. Sono disegnate le trincee di scavo 1-6 (*Schnitt 1-6*), il muro di fortificazione che circonda il castelliere e il corso del muro di terrazzamento sul plateau 2. Documentazione digitale della ditta ArcTron, Alenthann.



Fig. 7 - Bartholomäberg, Montafon. The Institute of Prehistoric Archaeology of the Free University in Berlin conducted excavations in the fortified hilltop settlement Friaga Wald on the Platta in 2000-2003. The photograph shows investigations on the middle terrace, which was intentionally levelled for settlement (cf. Fig. 6, *Schnitt 2 and 3*).

Fig. 7 - Bartholomäberg, Montafon. Scavi condotti dall'Istituto di Archeologia Preistorica della Libera Università di Berlino nell'insediamento preistorico in posizione dominante di Friaga Wald sulla Platta nel 2002-2003. La fotografia mostra le ricerche sul terrazzo intermedio, che fu livellato intenzionalmente per l'insediamento (cf. Fig. 6, *Schnitt 2 e 3*).

cultural layer from the start of the Middle Bronze Age (Fig. 8, no. 4.10) and the latest layer from the earlier Iron Age (Fig. 8, no. 3.5). By contrast, no traces of settlement were found on the lowest and uppermost plateaus (s. Fig. 6).

2.2.1 The Bronze Age settlement in Friaga Wald at Bartholomäberg

According to radiocarbon dating, the first settlement occurred in the 18th/17th century BC at the end of the Early Bronze Age³. Massive layers of reddish brown clay, measuring up to 0.4 m in thickness between the rock cliffs were leveled in order to create flat surfaces (podiums) for houses. Some of the rock was hewn and stone rows laid out (Fig. 8, no. 7), which served as the foundations upon which wooden buildings were erected. However, very little can be stated concerning the size and construction of the houses. The le-



Fig. 8 - Bartholomäberg, Montafon. Stratigraphy of the habitation layers on the middle settlement terrace in trench 2 (cf. Fig. 6, *Schnitt 2*). Beneath a cover of forest humus and a sterile horizontal level (1, 2) are an Early Iron Age layer (3, 5) and a distinct layer marking the horizon of the Middle Bronze Age (4) with the terrace wall (10) on the left. Below these are the Early Bronze Age horizon (6) with a row of foundation stones (7), and finally the natural bedrock (8).
 Fig. 8 - Bartholomäberg, Montafon. *Stratigrafia dei livelli abitativi dell'insediamento sul terrazzo intermedio nella trincea 2 (cf. Fig. 6, Schnitt 2). Sotto una copertura di humus forestale e un livello di orizzonte sterile (1, 2) sono presenti un livello dell'antica età del Ferro (3, 5) e un livello distinto che marca l'orizzonte della media età del Bronzo (4) con un muro di terrazzamento (10) sulla sinistra. Sotto si trovano gli orizzonti dell'antica età del Bronzo (6) con un allineamento di pietre di fondazione (7) e, infine, il substrato roccioso naturale (8).*

veled layers contained pottery from the Early Bronze Age, the majority of which are body sherds which evade a more exact typological classification. Therefore, samples of charcoal from this oldest cultural layer were taken for radiocarbon dating (see above).

In the 16th century BC, at the beginning of the Middle Bronze Age, the area was enlarged extensively, more artificial terraces were created and a fortification wall was erected (Fig. 9). The central plateau has a terrace wall, clearly discernible in the terrain, that created an up to 30 m wide surface of 12-13 m depth. The dark to blackish brown cultural layer measuring 0.3 m contained many finds. In this reference, two fire places and a 5 m long foundation of the stone slabs for a house wall are of importance. The back wall of the block buildings was formed by the terrace wall. This type of foundation is typical of block buildings in the Alpine area (cf. Rageth 1986). The artificially secured terrace offered enough space for about six to eight houses (measu-



Fig. 9 - Bartholomäberg, Montafon. Profile of the fortification wall in trench 4 (cf. plan in Fig. 6). The outer shell (lower left in photo) of the wall was constructed with large stone blocks, while the inner side was built of smaller rocks that are now mostly dislodged. The wall is 3 m wide; its original height was probably 2-3 m. The course of the wall can be followed across the terrace (background).

Fig. 9 - Bartholomäberg, Montafon. *Profilo del muro di fortificazione nella trincea 4 (cf. la pianta in Fig. 6). La struttura esterna (in basso a sinistra nella foto) del muro fu costruita con grandi blocchi di pietra, mentre il lato interno con pietre di dimensioni inferiori che ora sono per la maggior parte smosse. Il muro è largo 3 m; la sua altezza originale era probabilmente di 2-3 m. Il corso del muro può essere seguito attraverso il terrazzo (sfondo).*

³ Eight selected samples of charcoal were analysed in the VERA laboratory in Vienna with the AMS radiocarbon dating method (VERA-3024 – VERA-3030). Cp. Krause 2005.

ring about 5 x 4 m in size), which were aligned along the terrace wall.

The northern flank of the settlement area was protected towards the mountainside by an approximately 80 m long stone wall (Figs. 6, 9), the collapsed rubble of which can still be recognized in the shape of a flat wall today. The wall was of the dry stone shell type and has a width of 3 m at the top and 2 m on the side (Fig. 9). The adjoining cultural layers show that it was built after the first Early Bronze Age settlement at the beginning of the Middle Bronze Age in the 16th century BC (Krause *et al.* 2004, 7 fig. 11). This massive fortification wall that protected the settlement on the mountainside characterises the complex as a fortified Bronze Age settlement or hillfort (Krause 2005a).

2.2.2. The Iron Age settlement in Friaga Wald at Bartholomäberg

The Middle Bronze Age settlement in the Friaga Wald is likely to have existed for about one to two centuries. This was followed by a break of nearly a thousand years, until the site was finally resettled in the earlier Iron Age in the 6th/5th century BC. Fire places, ash pits, foundation remains and post-holes of former wooden buildings were found in the cultural layer on the settlement terrace (Fig. 10). A remarkable feature is the stone door socket made from a 70 x 50 cm stone slab with a conical hole (Fig. 11). Underlying stones and foundations made from stone blocks, for the purpose of planing, are an indication of wooden buildings. Four stone slabs placed upon one another formed a point foundation (Fig. 10). The findings show that the small buildings stood at least one meter inwards from the terrace edge and the Bronze Age supporting wall. Due to the small area excavated little can be stated regarding the size and construction of the buildings.

It was important during the course of the excavations to clarify whether the nearly 1000 year older fortress wall of the Middle Bronze Age settlement had been reused as fortification later on. However, no clues were found that would throw light on this question. Thus, it is to be assumed that the Iron Age settlement was no longer fortified in the same way. Further, it must be assumed, basing on the small settlement area, that as in the Bronze Age only a few families and therefore at the most two to three dozen people lived at this site. Yet, the intensity of the settlement and the cultural indicators in pollen profiles emphasise that the population settled at Bartholomäberg during the Iron Age was considerably larger and that there must have been many more settlements, for example, in the form of compounds or individual homesteads.



Fig. 10 - Bartholomäberg, Montafon. The Iron Age cultural layers in trench 3 (cf. Fig. 6 Schnitt 3) with the Bronze Age terrace wall (below in photo) and various stone alignments that represent the foundations of wooden structures.

Fig. 10 - Bartholomäberg, Montafon. I livelli culturali dell'età del Ferro nella trincea 3 (cf. Fig. 6 Schnitt 3) con il muro di terrazzamento dell'età del Bronzo (in basso nella foto) e vari allineamenti di pietre che rappresentano le fondamenta di strutture in legno.



Fig. 11 - Bartholomäberg, Montafon. Flat stone of c. 70 cm diameter with conical hole for a door-hinge. Found in the Early Iron Age layer in trench 2 (cf. Fig. 6 Schnitt 2).

Fig. 11 - Bartholomäberg, Montafon. Pietra piatta del diametro di 70 cm circa con foro conico per cardine di porta, trovata nel livello della prima età del Ferro nella trincea 2 (cf. Fig. 6 Schnitt 2).

The Iron Age cultural layer at Bartholomäberg contained pottery from different inneralpine cultures, in addition to whetstones, loom weights and fragments of bronze fibulae. The finds show that settlement spanned a time of well over 100 to 150 years from the 6th to the 5th century BC. Some of the Iron Age pottery exhibits the influence of various inneralpine groups. Amongst the finds are sherds of Taminser ware, dated to the late Hallstatt period of the Alpine-Rhine valley (Rageth 1992: 178, fig. 5) and, in addition, so-called Schneller ware (Fig. 12, no. 2.3) from the Alpine-Rhine valley, which, distributed between Graubünden, Liechtenstein and Vorarlberg in the south, forms a regional, inneralpine cultural group of the late Hallstatt and early Latène period (Rageth 1992: 186, fig. 9). Eastern influence is constituted by the Fritzeners shallow bowls of the Fritzens-Sanzeno group (Fig. 12, no.1) (Marzatico 1992; Lang 1992), decorated with s-shaped stamps, that are typical of the eastern Alps, South and North Tirol as well as the Inn valley; the bowls date to the early Latène period.

2.3. *A second Bronze Age settlement at Boda Weg at Bartholomäberg*

An important objective of archaeological research and field studies was to locate other prehistoric settlements at the Bartholomäberg and farther in Montafon, for, as mentioned above, results from archaeobotanical research on the moors (Oeggli 2003; Oeggli *et al.* 2005) have shown that settlement density at Bartholomäberg must have been much greater in the Bronze as well as the Iron Age than evidenced by the archaeological findings thus far. However, initial soundings on exposed knolls on Bartholomäberg have not produced any findings and have shown that it will be difficult to find further settlement locations. Field surveys and systematic drillings with a one-meter drill piece have, nevertheless, yielded an initial, promising result.

At the centre of the Platta's large mountain terrace there are several terraces in the vicinity of Boda Weg (Fig. 3, no. 2; Fig. 13), where in the summer of 2003 during the course of the prospecting the terrain students made several drillings. In different locations over an area of 20-40 meters, drill cores were retrieved that contained remains of black cultural layers with charcoal. It was possible to carry out radiocarbon dating on two charcoal samples and calculate absolute calendar dates based on the dendrochronological curve of annual growth rings. These samples date to the 14th/13th century BC, that is, the Middle or Late Bronze Age.

The topography of the second settlement site shows evidence (Fig. 13) of an open, presumably unforti-

fied settlement. This finding is indeed of great interest with regard to the development of the Bronze Age settlement; for apparently after the abandonment of the Middle Bronze Age habitation area, a new settlement was established at another place, yet within sight of the hillfort in Friaga Wald. This could be interpreted as a case of small-scale settlement relocation in the course

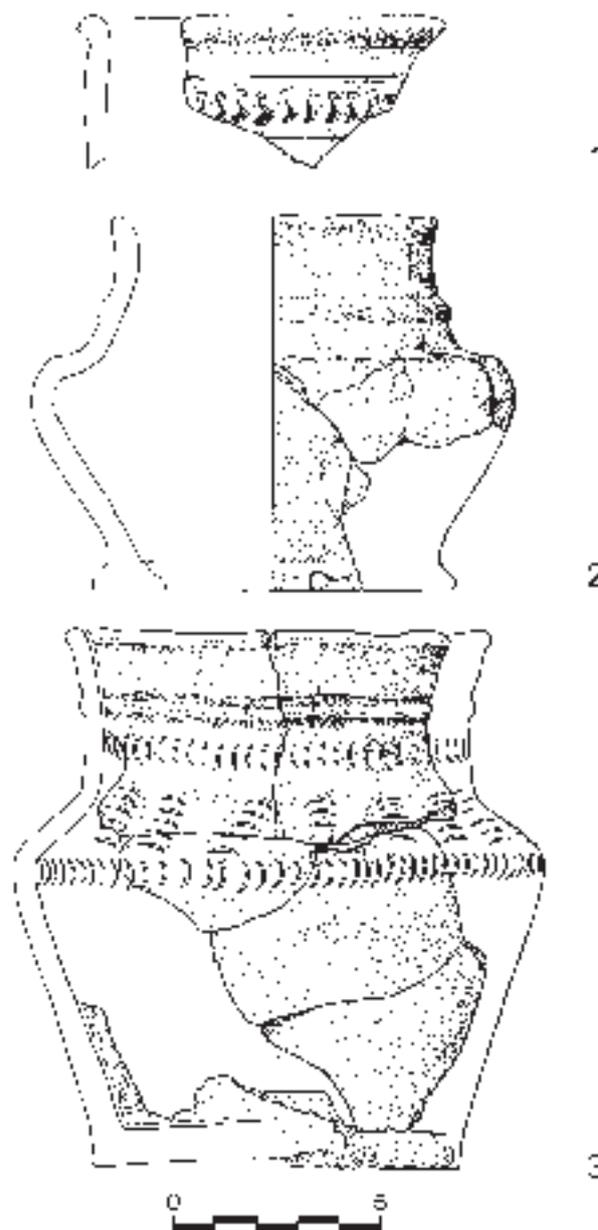


Fig. 12 - Bartholomäberg, Montafon. Early Iron Age ceramics from the hilltop settlement in Friaga Wald, showing typical Schneller pottery of the Rhine Valley (2, 3) and rim sherds from so called Fritzeners bowls (1).

Fig. 12 - Bartholomäberg, Montafon. Ceramiche della prima età del Ferro provenienti dall'insediamento preistorico in posizione dominante di Friaga Wald, che mostrano la tipica ceramica di Schneller della Valle del Reno (2, 3), e frammenti di orlo di scodelle della Cultura di Fritzens (1).



Fig. 13 - Bartholomäberg, Montafon. The terrace slope known as Platta in the vicinity of the Bodaweg and a second Bronze Age settlement site (cf. Fig. 3, no. 2). Drillings were made and samples for radiocarbon dating were taken from this area in the summer of 2003. The photograph shows geophysical prospection being conducted by the firm Terrana Geophysik. View to the west: left to right the Golmerjoch, Kreuzjoch (2261 m), the Rells valley and the Zimba mountain (2643 m).

Fig. 13 - Bartholomäberg, Montafon. Il terrazzo inclinato noto come Platta nelle vicinanze del Bodaweg e un insediamento della seconda età del Bronzo (cf. Fig. , no. 2). In quest'area sono stati eseguiti sondaggi e presi campioni per datazioni al radiocarbonio nell'estate del 2003. La fotografia mostra prospezioni geofisiche condotte dalla ditta Terrana Geophysik. Vista verso ovest: da sinistra a destra il Passo di Golmerjoch (2261 m), la Valle del Rells e il Monte Zimba (2643 m).

of the Bronze Age occupation of the Platta. Archaeological investigations there have been continued in the summer of 2005 (Krause 2006).

3. RESEARCH ON LANDSCAPE DEVELOPMENT AT BARTHOLOMÄBERG

In the course of research on the landscape development in prehistoric times in Montafon by Klaus Oegg, three new pollen diagrams were made from moors (Fig. 14) along a transect in the settlement area at Bartholomäberg (Fig. 3A-C). Together with the two older pollen profiles from the surroundings of the Schrunser Becken (Kostenzer 1996), the diagrams display the changes brought about in the vegetation and landscape in Montafon by human beings since the late Neolithic (Oegg 2003; Oegg *et al.* 2005).

The oldest traces of human settlement originate from around 3000 BC (Fig. 15). They bear testimony to clearing activities that were carried out in the mixed deciduous woods of the valley, which consisted of oak, lime, elm and hazel. From there human influence successively expanded to higher elevations, where it is registered in pine and fir forests at moderate elevations at the turn of the Neolithic to the Bronze Age. The first

settlement at Bartholomäberg is likely to have been established at the same time, at 1200 m a.s.l., although thus far it has not been located.

Montafon was settled continuously from around 2500 BC onwards (Fig. 15), whereby several phases in settlement are attested in the pollen diagrams: moderate settlement from the Copper up to the early Bronze Age is followed by an intensive expansion of agricultural areas during the Middle Bronze Age. In the Late Bronze Age there is a notable drop in human activities. The forest clearings are again expanded as of the 6th century, the earlier Iron Age, and this activity continues until Roman times. Finally, medieval land-seizure takes place between 800 and 1000 AD.

3.1. Grain cultivation and gathering economy of settlers in Montafon

In the course of excavations of the hilltop settlement in Friaga Wald on Bartholomäberg soil samples were systematically taken and sieved on site in order to analyse charred plant remains from cultural layers of the Early and Middle Bronze Age and Iron Age. The analyses provide important information about food plants and agriculture of the prehistoric inhabitants of Montafon (Schmidl *et al.* 2005). Analytical research on the char-



Fig. 14 - Bartholomäberg, Montafon. The Tschuga moor (1200 m; cf. Fig. 3,B) on Bartholomäberg supplied important information about the history of vegetation and settlement in Montafon. To the left, the Hochjoch (2620 m); in the background, the Sylvretta Mountains of the main Alpine ridge.

Fig. 14 - Bartholomäberg, Montafon. La brughiera di Tschuga (1200 m; cf. Fig. 3,B) sul Bartholomäberg ha fornito importanti informazioni sulla storia della vegetazione e degli insediamenti nel Montafon. A sinistra, lo Hochjoch (2620 m); sullo sfondo, i Monti Sylvretta della Catena alpina principale.

red remains is being carried out by Alexandra Schmidl in the Institute of Botany at the University in Innsbruck (Schmidl *et al.* 2005). Initial important results show that spelt barley (*Hordeum vulgare*) was the predominant grain in all three settlement phases. Emmer (*Triticum dicoccum*) and spelt wheat (*Triticum spelta*) were used in small amounts for breadstuffs. Einkorn (*Triticum monococcum*), naked wheat (*Triticum aestivum*) and millet (*Panicum miliaceum*) appear sporadically in the soil samples and play only a minor role as food plants. Peas (*Pisum sativum*) and broad beans (*Vicia faba*) were important providers of protein. They were found in all cultural layers of the hilltop settlement. In addition to cultivated plants, the inhabitants were also dependant upon wild fruits as a dietary supplement. Hazelnut (*Corylus avellana*), blackthorn (*Prunus spinosa*), wild rose (*Rosa* sp.), red-berried elder (*Sambucus racemosa*), black elder (*Sambucus nigra*), bramble (*Rubus fruticosus*) and raspberry (*Rubus idaeus*) have been identified. These fruits and seeds were gathered from hedges and forest clearings in the immediate surroundings of the settlement.

Assumptions as to the location and condition of prehistoric fields are enabled by seed stores of identi-

fiable weeds, which today occur as arable weeds and ruderals (*Chenopodietea* and *Secalietea*). These agricultural weeds are indicators of cultivated land in a mountainous environment, which is nutrient-rich, has a good supply of nitrogen and is moderately moist, conditions that still can be found today on the large mountain terrace at Bartholomäberg.

4. ORE DEPOSITS AND MINING IN MONTAFON – THE QUESTION OF PREHISTORICAL AND MEDIEVAL MINING ACTIVITIES

The question as to the possible exploitation of copper and iron ore deposits in prehistory takes on important dimensions in research on the prehistoric settlement in Montafon. Occasional finds as well as settlements of the Bronze Age on Bartholomäberg have also been considered an indication that, in addition to agriculture and animal husbandry, the inhabitants in the 2nd millennium BC were active in mining and processing copper ores.

Based on the mention of nine smelting furnaces in the “Churrätisches Reichsurbar”, it is assumed that me-

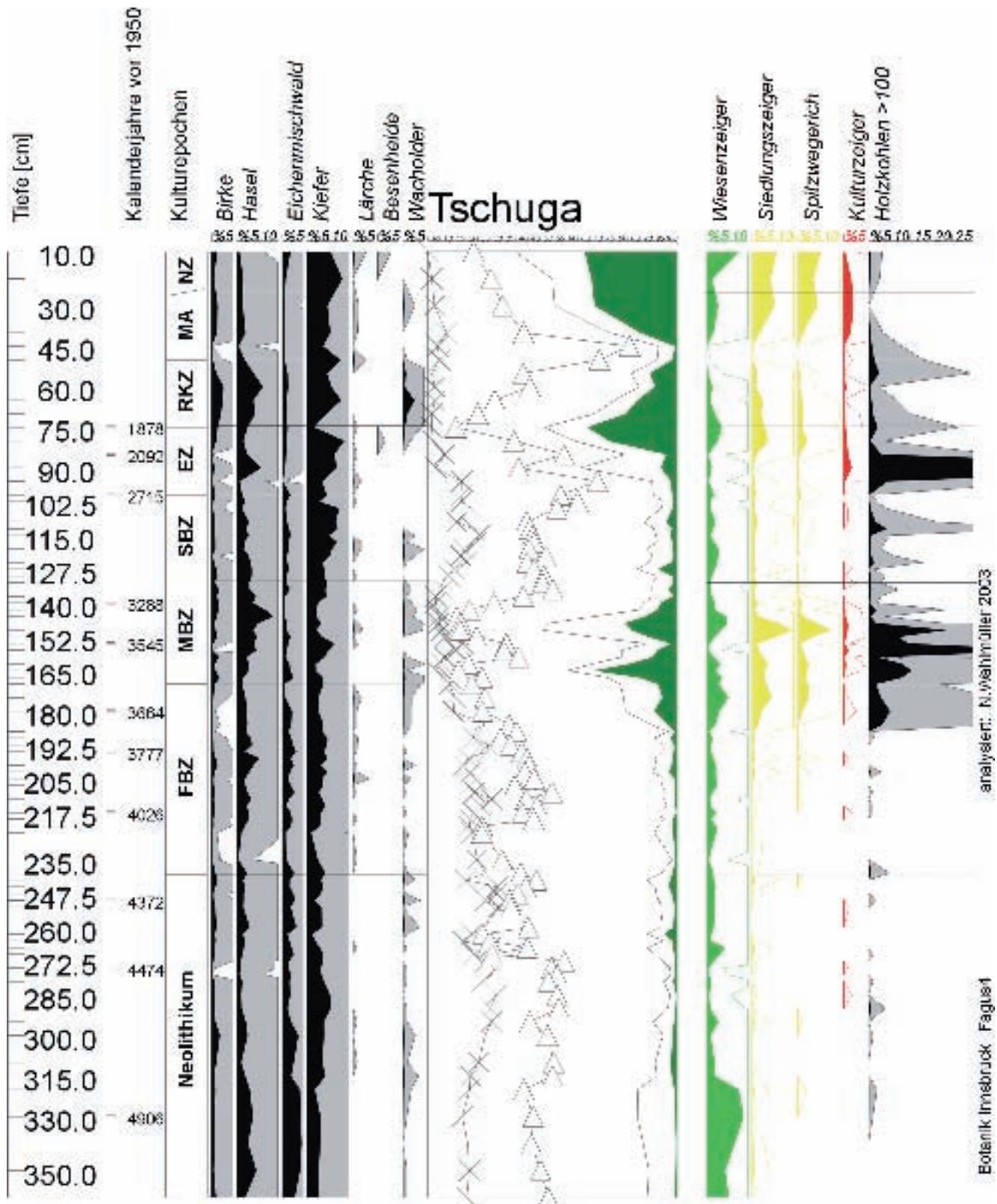


Fig. 15 - Bartholomäberg, Montafon. Simplified pollen profile from the Tschuga moor (cf. Fig. 14) with settlement and cultural indicators, which testify the use and occupation of this valley since late Neolithic times (after Klaus Oeggl, Innsbruck).

Fig. 15 - Bartholomäberg, Montafon. Profilo pollinico semplificato dalla brughiera di Tschuga (cf. Fig. 14) con l'insediamento e gli indicatori culturali, che testimoniano l'uso e l'occupazione di questa valle a partire dal tardo Neolitico (da Klaus Oeggl, Innsbruck).



Fig. 16 - Bartholomäberg, Montafon. Overgrown waste heaps in the area of medieval mining activities in the parish Knappagruaba (cf. map Fig. 3).

Fig. 16 - Bartholomäberg, Montafon. Cumuli di rifiuti ricoperti di vegetazione nell'area delle attività estrattive medievali nella parrocchia di Knappagruaba (cf. carta Fig. 3).

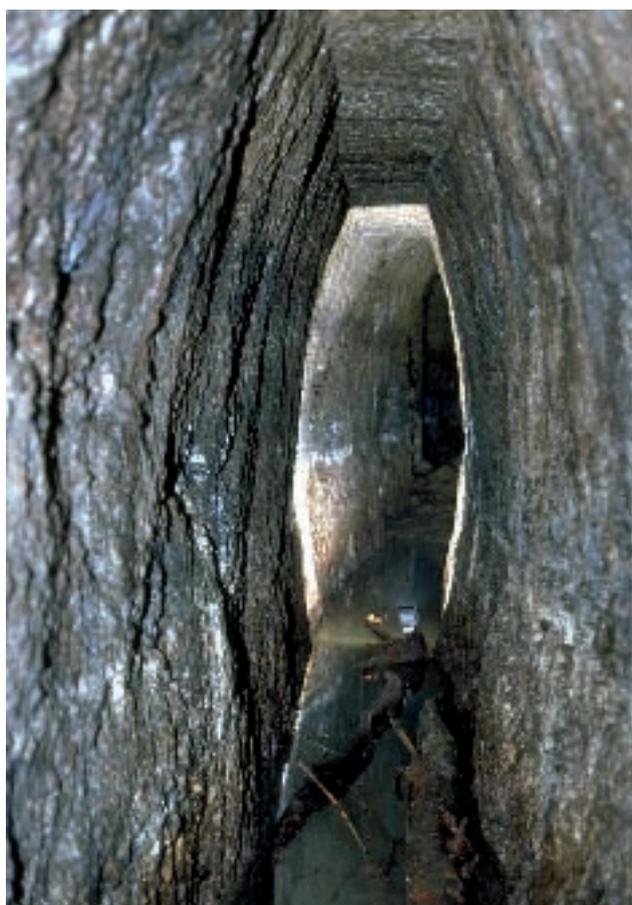


Fig. 17 - Bartholomäberg, Montafon. View of an adit (Schrämmstollen) hewn into the bedrock in the area of medieval mining activities, Knappagruaba parish (cf. map Fig. 3).

Fig. 17 - Bartholomäberg, Montafon. Vista di una galleria di accesso a una miniera (Schrämmstollen) tagliata nel substrato roccioso nell'area delle attività estrattive medievali nella parrocchia di Knappagruaba (cf. carta Fig. 3).

dieval mining began as early as Carolingian times. Mining in the High and Late Middle Ages has left distinct traces in the landscape such as heaps, mining debris and numerous mentions in historical sources (Scheibenstock 1974, 1996). Many remains of mining activities can be found between St. Anton and St. Gallenkirch, the most abundant being in the mining areas of *Knappagruaba* and *Worms* on Bartholomäberg and on the *Kristbergsattel* in Silbertal (Fig. 3). They include heaps (Fig. 16), mining debris and galleries (Fig. 17), collapsed and filled mine shafts and adit entrances. Common to all is the fact that, thus far, it has not been possible to place them in a more precise chronological order, and that in only very few cases can they be placed in context with traditional mining activities (Scheibenstock 1996: 41 et seqq.). It is still unclear as to whether some are the remains from mining in prehistoric times.

4.1. *Archaeological research on mines in the Gafuna valley in Silbertal*

In 2003 initial archaeological investigations of mines were carried out in the Gafuna valley (Krause *et al.* 2004: 16 et seqq.) in the locality *Kupfergruba*, which resulted in the discovery of a subterranean mine. A short tunnel, only c. 6-7 m in length had been driven under a large rock (Fig. 18). The hall-shaped tunnel expanded to 3 meters' width and exhibited typical traces of fire setting in the shape of irregular, rounded recesses and bulges in the rock.

Two burnt timbers, which can be linked to the fire setting, were salvaged from the mine's fill. Two radiocarbon datings established that the timbers stem from the time between 1470 and 1660 AD.⁴ Therefore, in all likelihood this is a case of iron ore mining from the late Middle Ages and early modern times.

4.2. *Archaeometry – results of the ore and artefact analyses*

Within the framework of archaeometalurgical research, the journey of metal, from the ore deposit to the finished product, that is, the archaeological metal artefact, can be tracked, based on trace elements and the isotopic ratio of lead. Archaeometalurgical analyses of ores from the Montafon and Bronze Age metal artefacts from the southern part of Vorarlberg are being conducted by Ernst Pernicka at the University in Tübingen (Krause *et al.* 2004: 14 et seqq.). Thereby, advantage is taken of the fact that lead occurs as

⁴ This concerns the beta measurements: 183714, 3080 ± 40 BP = cal. 1420 – 1260 BC and Beta – 183715, 3040 ± 40 BP = cal. 1400 – 1190 BC.

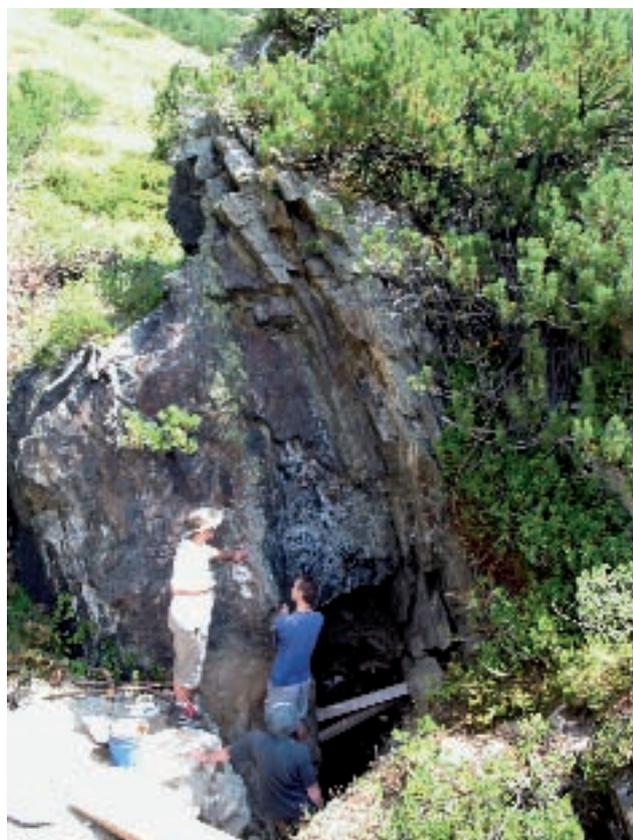


Fig. 18 - Silbertal, Montafon. Traces of mining activities in Gaftuna at c. 1750 m height. Pictured are two lines of mine shafts (Pingen) and a small subterranean shaft as well as several small waste heaps. Excavations in August 2003.

Fig. 18 - Silbertal, Montafon. Tracce di attività estrattive a Gaftuna a circa 1750 m di quota. Sono disegnate due linee di gallerie minerarie (Pingen), una piccola galleria sotterranea e diversi piccoli cumuli di rifiuti. Scavi nell'agosto 2003.

an impurity in copper and features an isotope composition, which is variable and typical of an ore deposit. The trace element pattern in copper and the isotopic ratios of lead were compared to ores in Montafon and to Bronze Age metal objects. In the case of a correlation between both source parameters, it may be assumed that the analysed ore constituted the base material for the objects. However, this evidence is not incontestable until all ore deposits from one region are analysed.

Twenty samples of Bronze Age metal finds from the area of Montafon to Feldkirch in the Rhine valley were analysed by means of fluorescent X-ray analysis and their chemical composition determined. Lead was chemically isolated in a clean room and the concentrations and isotope ratios were measured in a mass spectrometer. Ores from deposits in Bartholomäberg and from Kristbergsattel in Silbertal were analysed for comparison. Copper minerals from sections rich in

copper were selected, extracted under a stereo microscope and prepared. This method ensures the greatest similarity to the assumed preparation of ores by prehistoric miners, who processed much richer ores.

The analyses of the ores and artefacts have shown that some of the ores from Bartholomäberg and Silbertal overlap with artefact samples in lead isotope ratios and in trace elements, so that they could, in the first instance, be regarded as the source material for Bronze Age copper artefacts (Fig. 19). This, however, cannot be considered as conclusive, until ore deposits from larger regions such as the eastern Alps are better known. At present, the use of ores from the Montafon during the Bronze Age cannot be ruled out. The question as to Bronze Age mining can be answered by further field studies and more evidence of copper processing through slags and mining debris.

5. HISTORICAL CONCLUSIONS: THE ROLE OF THE BRONZE AGE HILLFORT AT BARTHOLOMÄBERG

Hilltop settlements in exposed locations on knolls, promontories or rock ridges, not uncommonly built at elevations of up to 1500 meters, represent the prevalent settlement type in the Alps in the earlier Bronze Age. In spite of their strategic positions, these locations were in general additionally secured, a few even with massive walls, thus rendering the impression of distinguished, strongly fortified places (Krause 2005a).

In view of its fortification the settlement in the Fria-ga Wald on Bartholomäberg is addressed here as a hillfort and, hence, as a fortification complex (Figs 6, 9). The timeframe of the expansion and the building of the fortification and terrace wall are archaeologically and stratigraphically well documented and can be dated to the 16th century BC, the start of the Middle Bronze Age. This date places the site among the oldest Bronze Age hillforts in the Alps. It is comparable only to a few, similar settlements in the Alps: the prominent settlements on the Klinglberg at St. Veit (Shennan 1995), on the Gschleirsbühel at Matri on the Brenner (Zemmer-Planck 1978) and at Patsch below the Europa Bridge (Kneußl & Kneußl 1965) of the Brenner highway. The complex of Mutta at Fellers on the Hinterrhein in Graubünden is the best suitable comparison to Bartholomäberg. Excavations there in the 1940s uncovered sections of a fortified settlement (Burkhart 1940-41), located upon a knoll, which was fortified by an enclosure wall measuring two meters in width; it dates to the late Early Bronze Age or transition to the Middle Bronze Age (see also Krause 2005a).

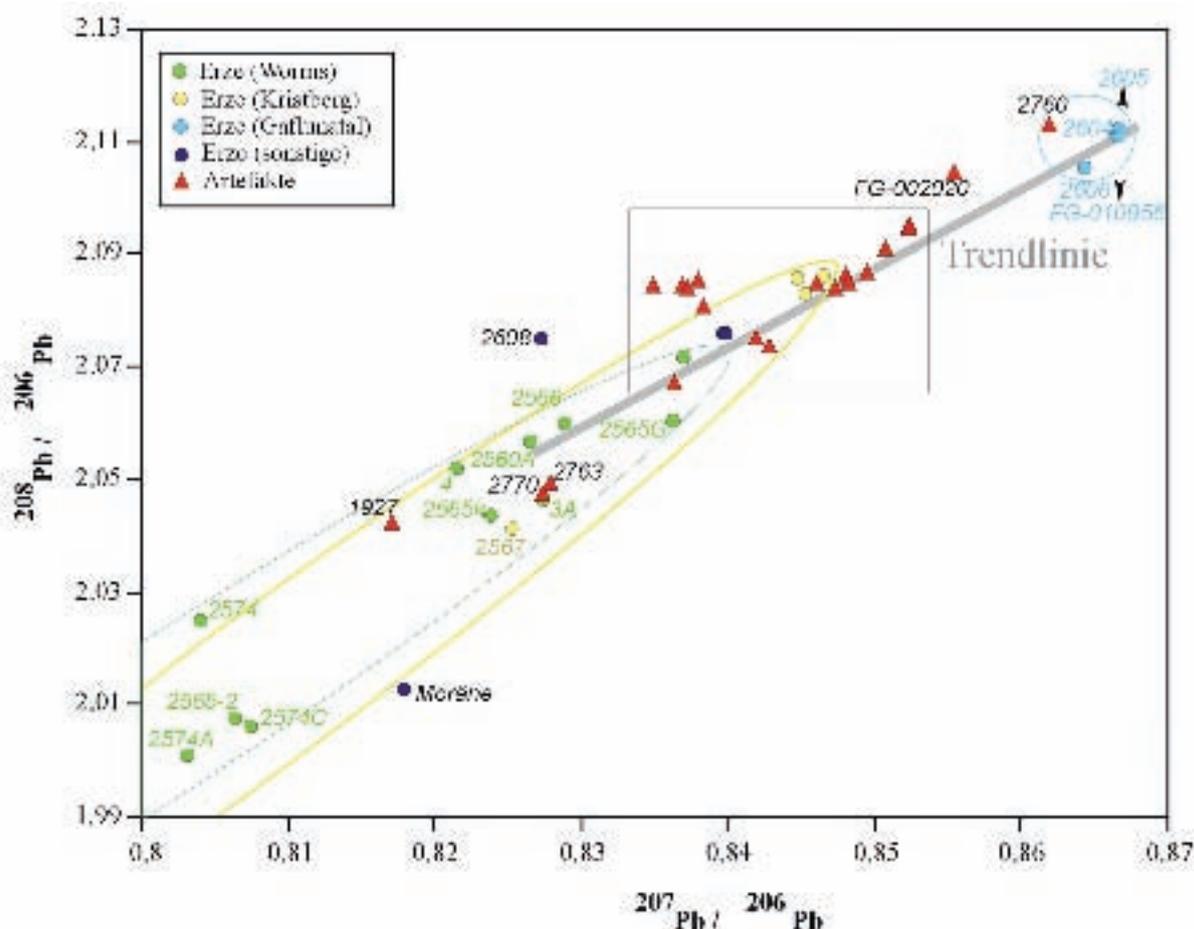


Fig. 19 - Ratio of the lead isotopes $^{208}\text{Pb}/^{206}\text{Pb}$ to $^{207}\text{Pb}/^{206}\text{Pb}$ in copper ores from Montafon and artefacts from the southern Vorarlberg. The graph shows the differences among various ore deposits and the groups of artefacts that correlate with them as well as those that do not. Investigations thus far by Ernst Pernicka have shown that there are indeed copper ores in Montafon that could have been exploited during the Bronze Age.

Fig. 19 - Rapporto degli isotopi del piombo $^{208}\text{Pb}/^{206}\text{Pb}$ a $^{207}\text{Pb}/^{206}\text{Pb}$ in minerali di rame dal Montafon e prodotti artistici dal Vorarlberg meridionale. Il grafico mostra le differenze fra vari depositi minerali e gruppi di manufatti ad essi correlati o meno. Indagini portate avanti da Ernst Pernicka hanno dimostrato che nel Montafon sono presenti minerali cupriferi che potrebbero essere stati sfruttati durante l'età del Bronzo.

The fortress wall at Bartholomäberg, with an original height of two to three meters, was massive and surely did not serve only as a fortification, but also manifested the prestige and status of its inhabitants (Fig. 20). One can hardly assume that it was erected by a small group of people operating on the basis of self-subsistence. Such a well fortified establishment in a central location is only imaginable against the background of copper ore exploitation. Hence, it becomes apparent that there was a hierarchy of Bronze Age settlements in Montafon, which indicates a structured society with a governing leadership (s. Krause 2002) that probably held control over mining and metal production.

6. FUTURE PROSPECTS

Archaeological excavations, archaeometallurgical investigations and studies on the history of the landscape on Bartholomäberg and in Silbertal will continue in the summer of 2005. The line of inquiry will follow further research on Bronze and Iron Age habitation sites in the inner Alpine areas as well as the development and dynamics of settlements. Excavations at a second Bronze Age site on Batholomäberg are particularly directed towards understanding inner settlement structure (Krause 2006). More archaeological investigations will be conducted in the search for traces of ore exploitation and prehistoric mining, with the aim

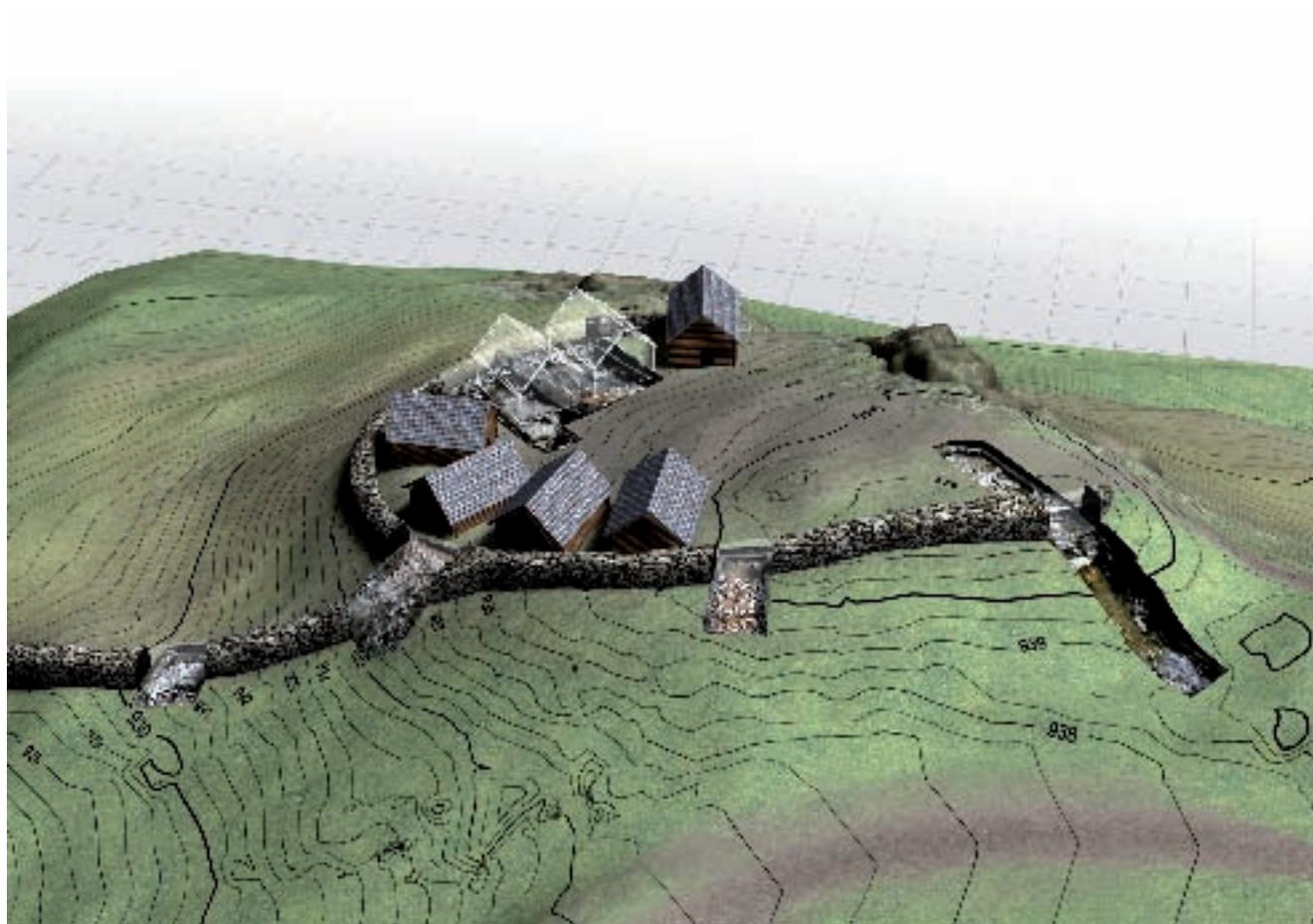


Fig. 20 - Bartholomäberg, Montafon. Reconstruction of the Middle Bronze Age settlement in Friaga Wald, based on the digital topographic map and archaeological findings (cf. Fig. 6). In the foreground is the fortification wall that encloses the complex on the mountain's incline. Behind it is the settlement terrace, formed by the terrace wall, with 6-8 reconstructed block houses, each with a ground plan of c. 4 x 5 m. The 3D-model by Martin Schaich, ArcTron Dokumentation.

Fig. 20 - Bartholomäberg, Montafon. Ricostruzione dell'insediamento della media età del Bronzo di Friaga Wald, basata sulla carta topografica digitale e ritrovamenti archeologici (cf. Fig. 6). In primo piano il muro di fortificazione che racchiude il complesso situato sulla pendenza montuosa. Dietro si nota il terrazzo dell'insediamento formato dal muro di terrazzamento, con 6-8 ricostruzioni di blocchi abitativi, ognuno con una base di circa 4 x 5 m. Modello 3D di Martin Schaich, ArcTron Dokumentation.

of determining the function of copper and iron ore deposits and the role that they played in the prehistorical settlement of Montafon.

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