



GOATS - AS FAR AS THE EYE CAN SEE RECORDING ROCK ART IN THE SYUNIK HIGHLANDS (ARMENIA)

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SUMMARY

The volcanic highlands of the Armenian province of Syunik are extremely rich in rock art. Thousands and thousands of rock carvings decorate the dark basalt rocks of the high steppe, which would hardly have changed at all since the last volcanic eruption in the 3rd millennium BC. From 2012 to 2014, as part of a cultural preservation project to survey the prehistoric rock art of Armenia, two areas with rock carvings, measuring over two square kilometres and containing around 11,000 petroglyphs on 3,500 carved stones, were recorded in their entirety. The deserted, uncultivated nature of the landscape, lying above the treeline, meant it could be captured in an uninterrupted survey, produced to scale, using orthophotography. This data set offers an unprecedented opportunity to evaluate all the rock carvings within their landscape context.

RIASSUNTO:

L'altopiano di origine vulcanica della provincia Syunik, Armenia, è ricco di arte rupestre. Migliaia di immagini, incise su rocce scure di blocchi di basalto, distribuite nella steppa, che ripropongono la stessa disposizione e lo stesso paesaggio creato dall'ultima eruzione vulcanica, databile al III mill. a. C. Nell'ambito del progetto per la conservazione dell'arte rupestre in Armenia sono stati completamente documentati due areali con arte rupestre di più di 2 km quadrati recanti 11.000 petroglifi distribuiti su 3.500 rocce. Il territorio, al di sopra del limite della vegetazione arborea, oggi non coltivato, ha permesso una completa documentazione con l'aiuto dell'ortofotografia. I dati raccolti offrono l'opportunità unica di studiare le raffigurazioni nel loro contesto originale.

Scattered across the plateau of the South or Lesser Caucasus are countless areas of rock-art sites. Many of them are completely unexplored, while only small sections of others have been published. European localities with rock carvings have usually been extensively studied, sometimes over a period of centuries, but the study of rock carvings here has no such tradition. Reasons for this may be the often difficult political history of the region, and the poorly developed infrastructure of its remoter areas which is perhaps a consequence of that history.

One of the greatest concentrations of rock carvings is to be found in the south-east of Armenia, near to the border with Nagorni Karabach (Fig. 1). The site has been known at least since the late 1960s, when the National Academy of Sciences of Yerevan undertook a number of field trips to the region (KARAKHANIAN, SAFIAN 1970). 2009 saw the start of the first comprehensive survey of the rock carvings around Lake Ughtasar, which marks the southern boundary of this rock-art zone. Members of the National Academy of Yerevan are still working on this project, in collaboration with the UK's Landscape Research Centre¹.

An initial large-scale survey carried out in 2011 provided an overview of the area and showed that the rock carvings in the vicinity of the lake are scattered over an area of at least 10–15 km². Apart from a very selective presentation by S. Shaninyan (2010, pp. 66–82, 87), the area had never been the subject of closer study. The following summer a joint Armenian-German project was initiated, focussing on precisely these rock carvings². Two study areas (the “Naseli” area and the “Sepasar” area), each covering over a square kilometre, have been comprehensively surveyed and documented³. After three field trips to Syunik, each lasting several weeks, the on-site survey-work has now been completed, and the documentation methods and preliminary results are presented in this paper.

GEOLOGY AND VOLCANOLOGY

The South Caucasus Mountains were formed by Tertiary folding, like, for example, the Alps. The landscape was reshaped by glaciation, as can be seen from the lateral and terminal moraines, while the high mountain region, in particular, was refashioned by volcanic activity, dating mostly to the Pliocene and earlier

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1 For further information see WALKING, JAMES 2013 and www.ughtasarrockartproject.org. The rock carvings will be presented within the dissertation project of A. Danielyan, University of Paris 1.

2 The project to survey and document the prehistoric rock carvings in Armenia/Syunik is part of the cultural preservation programme of the German Foreign Office. The institutions responsible for delivering the programme are the State Office for Heritage Management and Archaeology of Saxony-Anhalt, the National Academy of Sciences of the Republic of Armenia, and the Martin-Luther-University Halle-Wittenberg.

3 For the geographical location of the study areas, see KNOLL *et al.*, 2013, p. 212.

Pleistocene epochs. More recent volcanic activity in the Karkar region continued late into the Holocene epoch (MELIKSETIAN 2013; KARAKHANIAN *et al.*, 2003, p. 3). Crater rims, volcanic cones and lava streams dominate the views over the high steppe today (Fig. 2).

The rock carvings are found on large blocks of basalt, created by ancient fissure eruptions before the last Ice Age, as shown by glacial polish on their surfaces. These block streams, the product of glacial erosion and displacement, are known as “chingils” and were the preferred ‘canvasses’ of the rock artists (Fig. 3). With their iron- and manganese-coated surfaces, they were particularly suitable for pecking. Depending on the components of the patina, its colour ranges from reddish-brown (predominantly iron) to blue-black (manganese). It could be pecked using a stone implement, leaving a lighter-coloured image which contrasted clearly with the rock surface. A detailed examination of the patina, also known as “desert varnish”, was carried out for a Bachelor’s thesis at the Martin-Luther-University Halle-Wittenberg. Thin-sections and elemental analysis revealed that the up-to-1mm thick crust is itself composed of up to ten wafer-thin layers (KRÜGER, BORG 2013). In a very few cases the pecked images have themselves become covered with an iron-manganese patina, but it is not yet possible to use these layers of “varnish” as a dating tool, since their development is very strongly dependent on the micro-regional climate, and the individual factors which cause it are still under discussion in the scientific community.

ROCK ART

In total, over 3,500 rocks with images were documented within the area of the study, with around 11,000 individual motifs. Approximately half the images were of animals, of which the largest percentage were Bezoar goats, as shown in Fig. 3. Other native species, including large cats (cheetahs, snow leopards), red deer and bears, were less frequently depicted.

The proportion of human representations is only around 8%. These can be subdivided into armed individuals, their weapons being usually staffs or spears or bows and arrows, worshippers with raised hands, and people with exaggeratedly large hands and/or feet. Of particular interest are the images of carts. Over 30 two- and four-wheeled carts were found in the study area – possible proof that vehicles were used for transport where gradients were not too steep, and at the same time a potential clue to dating. The *terminus post quem* for the earliest carts lies in the Neolithic period, while two-wheeled carts are known from wealthy barrows around Lake Sevan dating to the middle of the 2nd millennium BC (KNOLL *et al.* 2013, pp. 217-218).

Depictions of scenes are rarely found, and where they are, they are usually simple hunting scenes. There are only three examples of complex, narrative compositions. It seems that the prehistoric exploiters of the highlands chiselled in stone their immediate surroundings and way of life. The same is true of shep-

herds of recent times who came here in search of summer pasture. They immortalised themselves in a very similar way with simple designs or just with their initials (Fig. 4).

STRATEGY OF DOCUMENTATION

Today the miles and miles of open landscape betray hardly any sign of human impact. In this respect, the natural environment today must hardly differ from prehistoric times. From then until well into the last century, the high steppe was used only for summer pasture in the snow-free months between June/July and September. Unlike the rock-art zones in Valcamonica (Italy) and Tanum (Sweden), it remained untouched by such recent human interventions as construction, farming or forest management, or modern forestry plantation.

These exceptional topographical conditions offered a unique opportunity to test and establish a new surveying method. Without any of the usual obstacles to surveying and mapping, the surface of the terrain could be seamlessly recorded by orthophotography. To do this, each study area was surveyed on foot to establish its parameters. These were marked by GNSS (Global Navigation Satellite System) and imported into a GIS-supported software system. A grid of ground survey control points, 200 m apart, was constructed by computer and the control points identified on the ground using a total station instrument. When they had been pinpointed exactly, they were marked with large white plastic tarpaulins with a black cross in the middle. A drone was then used to fly over the prepared terrain at a constant height of 100 m above the surface of the ground, covering the area in pre-programmed strips and photographing it as it went. Planning the flight paths by computer meant that the camera’s regular automatic shutter release could function as a waypoint-definer. From the resulting photo-series, reproducing the terrain in widely-overlapping strips, orthophotographs were generated using the well-established photogrammetric procedure⁴. Finally, using the control points retained in the final image, the photographs could be georeferenced. The end product of this survey procedure are high-resolution colour photographs of the two selected study areas, covering over 2 km², which can be used as if they were a map.

The orthophotos were reproduced on a scale of 1:100 and printed in A3 format for use in the field; to the accurately-coordinated mappings of individual image-bearing rocks were added notes of natural-environmental indicators. These included glacial and geomorphological features, meltwater channels and lakes, ancient paths and artificial stone constructions such as folds for sheep or goats (Fig 5).

The rock carvings themselves were documented using a “rapid-survey” procedure. Since the panels are of manageable size, rarely over a metre in height or width, and usually contain only a few, easily visible motifs, they were recorded photographically. The standard-

4 AgiSoft was used for the main image computations.

ised photo-documentation of the rocks and rock carvings comprises, as well as general views, photos of the panel from all sides and a frontal view with a scale. Using Photoshop, these frontal views were redrawn to a uniform scale and reproduced with uniform captions (see Fig. 4a). These images were supplemented by hand-drawn sketches on which notes were made of possible interpretations or distinctive features such as superimposition of images or different phases/events. In addition, every basalt block with a carving was described using a pre-determined formula, corresponding to the database domains.

Where the pecked images were badly weathered, rubbings were also taken to help decipher what they represented. For certain complex images, 3D models were produced, using the SfM (Structure from Motion) imaging technique, in order to differentiate superimposed carvings and different pecking techniques.

To determine the exact position of each panel, the orientation and angle of inclination were read from a geological compass, so that visual relationships could be reconstructed in a later study.

The final result is a complete, scale copy of the whole landscape, including all the rock carvings it contains.

POTENTIAL OF THE DIGITAL RECORD FOR EVALUATION

It will also be possible to use scatter plots to generate three-dimensional models of the terrain from the aerial photographs, on to which the mapped picture-tiles can in turn be projected (Fig. 6). These models can be used, in particular, to study the visual relationships between the rock images.

A final step will be to use a GIS programme to link

information from the rock-carving database with the relevant rocks, so that it will be possible to search for and analyse individual motifs or styles according to their position in the terrain. For example, an initial trial showed that many representations of carts were indeed situated at the edge of tracks passable by vehicles, with a gradient of less than 10%, and that hunting scenes were often to be found at sheltered sites suitable for hides. The imagery of the Armenian highlands seems, at least from these examples, to relate in a very concrete way to the local way of life.

The evaluation of this unique database will begin next year, in the second part of the project. The rock images themselves may not yield any spectacular new insights, but evaluating them in the context of the natural environment and traces of human activity will offer a rare opportunity to sketch a comprehensive picture of the prehistoric landscape and way of life which they reflect.

ACKNOWLEDGEMENTS

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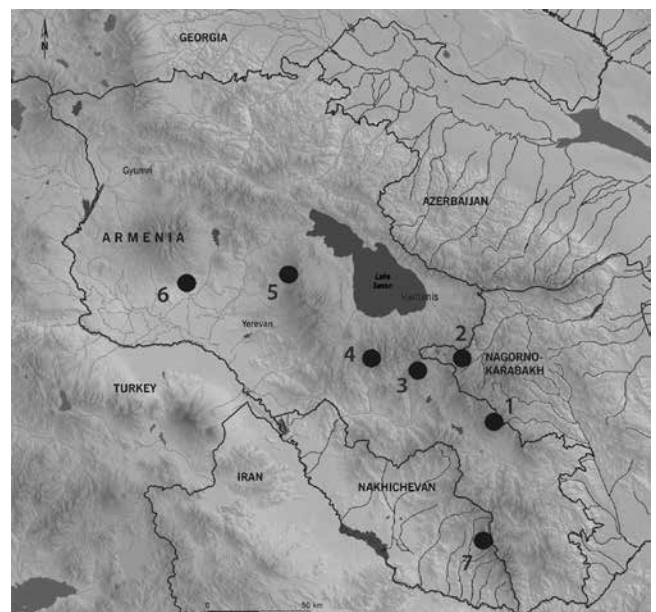


Fig. 1 - Main petroglyph sites of the Lesser Caucasus. 1 Syunik highlands, 2 Kəlbəcər, 3 Jermuk, 4 Vardenis mountain range, 5 Geghama mountain range, 6 Aragats/Ararat plateau, 7 Gemigaya/Navasar. (Map data: N. Seeländer, LDA Halle)

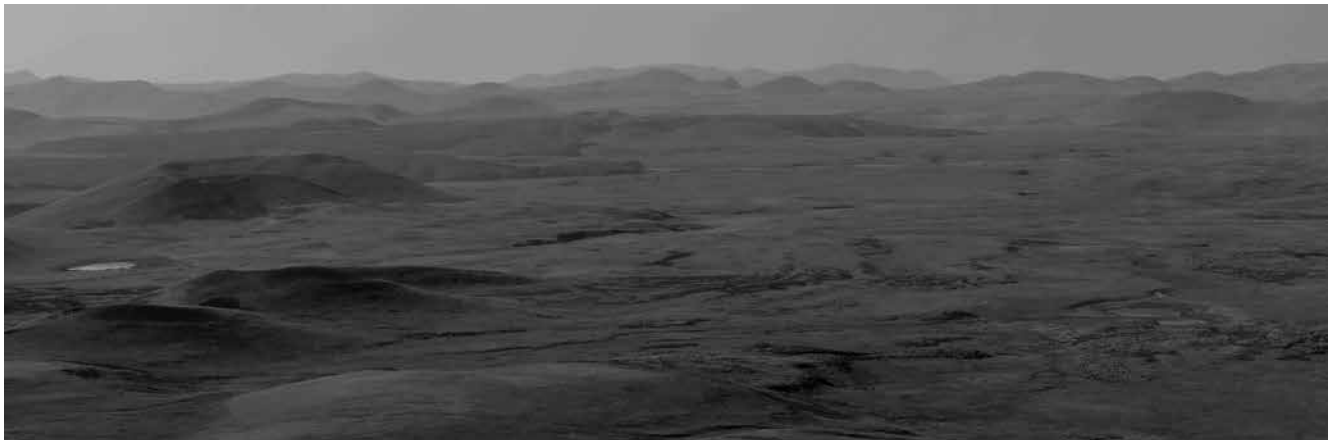


Fig. 2 - Panorama of the highlands of the province of Syunik, shaped by glaciation and volcanic activity. One of the areas selected for the study (the "Sepasar" area) surrounds the lake in the right-hand half of the picture.

(Photo J. Lipták)

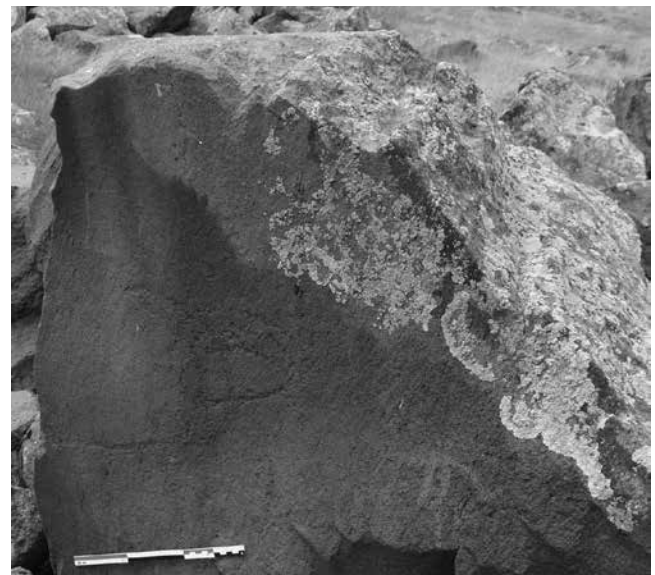
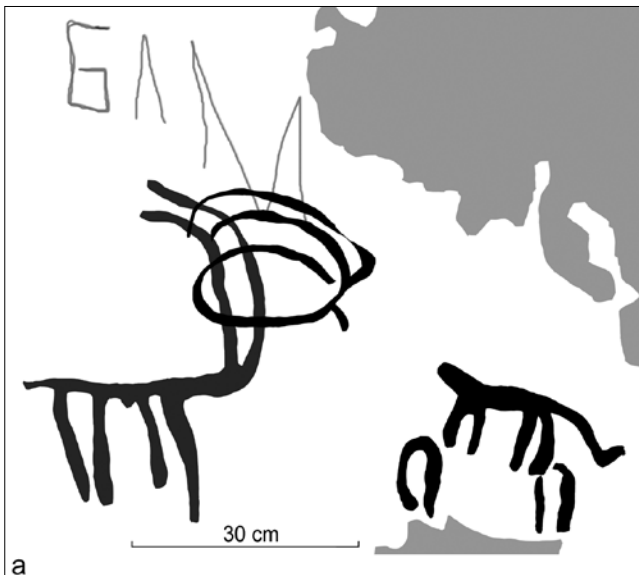
► Fig. 3 - A typical block stream of basalt rocks. The exposed surface of the stone is covered with a patina of iron and manganese. This crust has been removed by pecking and the images created stand out clearly against it. Native Bezoar goats were the "favourite" motif. Here they are superimposed in several stylistically distinct layers. Images of human beings with exaggerated hands (below right) and/or feet are also frequently found.

(Photo J. Lipták)



▼ Fig. 4 - Petroglyph no. 1814 from the "Sepasar" area with three phases. a. Reproduction of the images with distortions corrected. b. Photograph. The first image created by pecking was of a large goat (left). It was later overlaid (centre) with another, smaller image. The large cat on the right also belongs to this phase. The scratched inscription, above left, is a recent addition.

(Drawing M. Schulze, LDA Halle)



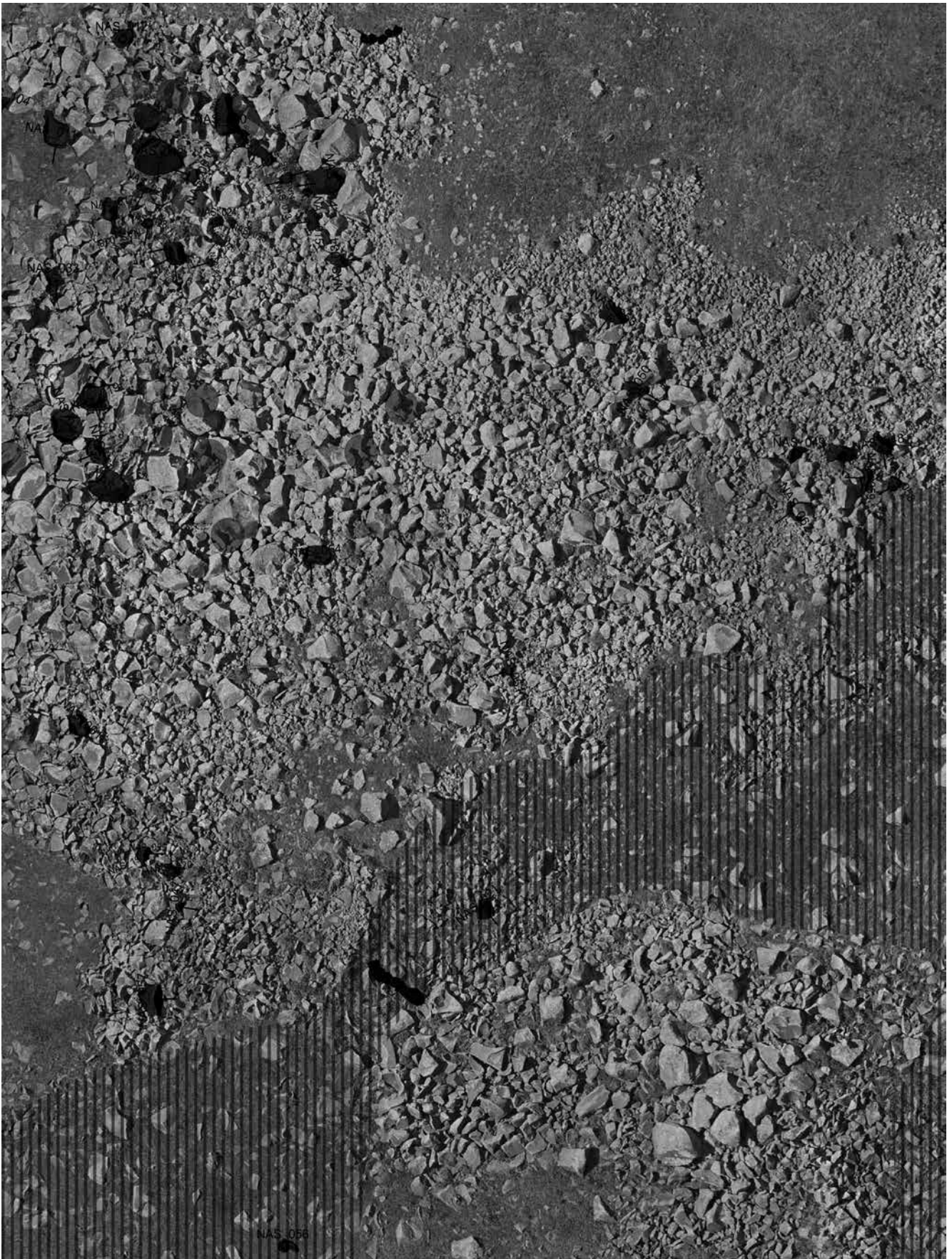


Fig. 5 - Section of rectified, north-oriented aerial map ("Naseli" area). The area shown corresponds with the north-western corner of the terrain modelled in Fig. 6. All the rocks with images (red) are mapped with their sequential numbers. The orientation of the panel on individual rocks is indicated with a line (vertical) or a circle (horizontal) and the direction in which it faces is shown with an arrow. Artificially positioned rocks are highlighted in purple. Cave-like spaces in the block stream are shown in orange and small depressions in yellow. Meltwater channels are indicated by hatching

(Mapping: M. Krüger, M. Schumann, LDA Halle)

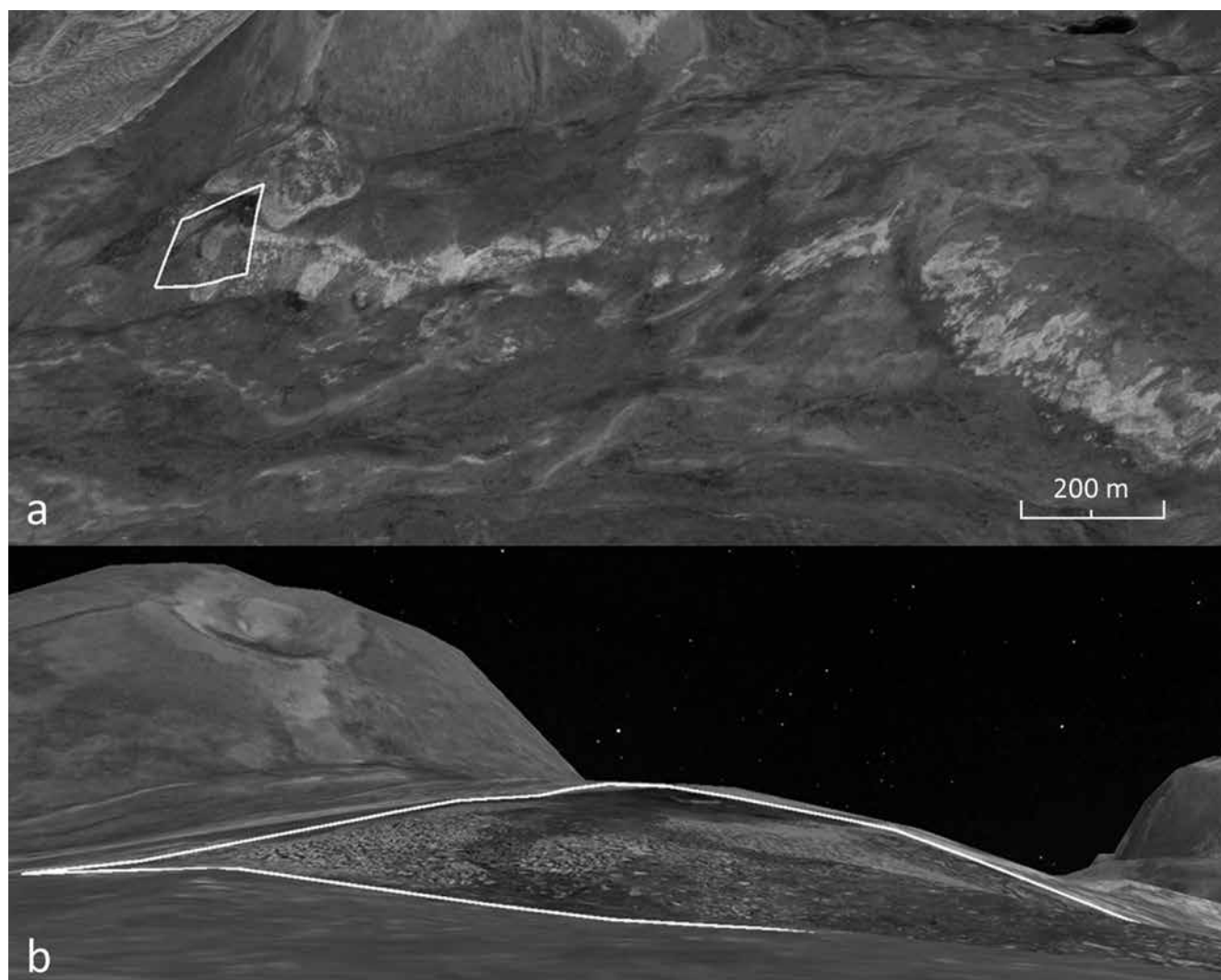


Fig. 6 - 180 x 180 m aerial photograph tile projected on to the terrain relief. a. Position of the tile within the area as a whole. Google Earth projection. b. View of the block stream from the west. The left half of the picture corresponds to the section shown in Fig. 5 (Map data © google earth, Digital Globe 2015)