The Frozen Tombs of the Altai Mountains

Survey and inventory of archaeological sites and permafrost occurrence in the Dzhazator Valley

Report on the Belgian-Russian expedition in the Altai Republic, Russia

(8 July – 18 August 2005)

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Introduction

Ghent University has an already long tradition of archaeological research in the Altai Republic. In 1995, it joined a Belgian-Russian team (together with the Royal Museums of Art and History of Brussels and the Free University of Brussels) in a project financed by the National Fund for Scientific Research (FWO-Vlaanderen). This project allowed us to finance excavations in Kizil (Tchungur area) (1995), Sebistey and Kalanegir (1996-1997). The last year was more devoted to survey and inventory of archaeological sites, as excavations in this area became clearly at that moment a hot item. A smaller project financed by the Flemish Ministry of Education allowed us to continue the survey and inventory of archaeological structures in the Ujmont Steppe (1999) and in the Maima area (2000). I. Bourgeois J. Bourgeois, Unexplored valleys, potential frozen kurgans and heritage management. Belgian archaeological research in the Altai Republic (Russian Federation): survey and inventory 1996-2000, in: Papers of the XIVth UISPP congress on Archaeology, British Archaeological Reports, International Series, to be published (2005).
Meanwhile, the Department of Archaeology of Ghent University started a second project on the use of satellite imagery (CORONA) for mapping and localisation of archaeological features. A result of this first research is a double university paper. A scientific paper about this research has been published in the international archaeological journal Antiquity. Another one, more focused on the problems of the use of satellite images has been accepted for publication by the Journal of Archaeological Science and will be published in 2006.

Based on the positive results of this case study, both the Department of Archaeology and the Department of Geography of the University of Ghent decided to apply for a grant to the Research Council of our University. This project has been granted for two years (2003 and 2004).

The first research campaign within this project took place from July 6th to August 15th in the western part of the Chuya Steppe (Altai) (figure 1). Four parallel valleys to the South of the Steppe were chosen as research area: Sebistey, Ozëk, Irbistu and Elangash.

During the first 10 days of the fieldwork the research was concentrated on topographical measurements with a GPS receiver, needed for the georeferencing of the CORONA satellite imagery and the making of a DEM. A total of 43 ground control

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points have been localised, spread over the whole area from Sebistey to Elangash. The processing of the topographical data and the satellite imagery in a digital photogrammetric platform\(^6\) provided us a good, trustable topographic map in a 1/20.000 scale (figure 2: orthophoto map).

![Orthophotomap of the South-Western border of the Chuya Steppe (Altai), subject of the inventory of 2003. The 136 archaeological sites are indicated as red triangles.](image)

In a next phase, the archaeological survey of the area yielded an inventory of 751 structures from 136 different sites. 152 structures have been localised by using GPS, 599 other structures by simple topographical sketching (azimuth and distance, starting from localised structures). Function, period and cultural attribution of the archaeological structures are based on morphologic elements and on comparisons with other sites and regions, and structures are found dating from the Bronze Age to the present.

The second campaign during the summer of 2004 was executed in the Valley of Yustid, in the East of the Chuya Steppe (see figure 1). The fieldwork there added 291 sites to the archaeological database, following the same methodology as described above (see figure 3). Although the surveyed area was quite limited (some 8 x 3 km or 24 km\(^2\)), more than 2300 different structures were recorded. We estimate that at least one and very probably two more survey campaigns would be necessary to survey exhaustively the whole Yustid Valley area. Also 47 Ground Control Points were measured with differential GPS, in order to generate the geographical information out

\(^6\) We use the software VirtuoZo 3.2. (Supesoft Inc.)
of the satellite imagery. This last campaign was largely financed by the Belgian department of Science Policy.

Figure 3. A) An overlay of the orthophotomap, DEM and contour map of the Yustid Valley, with an indication of the located sites (yellow dots) and of some of the GCP’s (Ground Control Points, measured with GPS). B) A 3D model of the research area, with an indication of the sites (red dots).

The presentation of this work and some consecutive meetings with UNESCO representatives and ambassadors of the countries in question (Russia and Kazakhstan) during the year 2004, yielded in an application by the UNESCO Direction of Culture, together with our Department of Archaeology, for a Flemish Trust Fund grant. It was approved in the beginning of 2005 and would cover the years 2005 and 2006.

The main goal of this project is the preservation and conservation of the frozen tombs of the Scythian culture, that lie scattered in the Altai Mountains across Russia, Kazakhstan, Mongolia and China. These ancient Scythian tombs, so-called *kurgans*, contain outstanding cultural relics and the unique remains of the once-flourishing
Scythian civilization, which influenced many other civilizations in the area and had contacts with the neighbouring civilizations of China, India, Iran, Mesopotamia and Greece. The unique frozen condition of the graves has permitted the conservation of all organic materials, including the mumified body of the deceased, sacrificed horses, harnesses, saddles, furniture, textiles, and carpets, etc. However, these relics are now endangered by various factors, including a lack of knowledge about how many such tombs exist and their exact location and description, as well as global warming, which is melting the permafrost that has guaranteed their preservation over the millennia.

Although the ultimate objective of the project will be the preservation of the frozen tombs, taking into account the enormous size of the region and the scale of the work involved, project activities will be carried out on a step-by-step, phase-by-phase basis. Therefore, the first phase of the project will carry out the accurate mapping of two research areas in the Russian or Kazakh part of the Altai Mountains. The present project concerns only this First Phase, a two-year programme of work composed of two modules, consisting of two main field campaigns of data-gathering.

This report is the result of the first campaign, executed from July 8th to August 18th 2005 in the valley of Dzhazator, to the south of the Chuya Steppe (figure 1). The actual fieldwork has been realised from July 14th to August 13th7.

**Satellite imagery and mapping**

Corona satellite images are old (made from 1960 to 1972) American photographs and can now freely be afforded on Internet ([http://earthexplorer.usgs.gov](http://earthexplorer.usgs.gov)). For the Altai region, images from series KH4, KH4A en KH4B are available. The main difference between these three series is the resolution of the images (KH4: 25 feet; KH4A: 9 feet; KH4B 6 feet). Especially KH4A and KH4B are useful for mapping as well as for archaeological purposes.

We use the images as the basis for detailed topographic mapping of the research area, as adequate civil maps are not available. In order to make georeferenced maps, it is necessary to localise as precisely as possible a series of points in the landscape (Ground Control Points). For this, the use of Global Positioning Systems (GPS) is necessary. In the 2005 campaign, we used a differential GPS receiver, the C-Nav (C&C Technologies), for the measuring of the GCP’s. The device gives us accuracies in real time up to 10 cm. Bridges, farms, crossroads, clearly defined natural features and big archaeological monuments appeared to be most suited for measuring GCP’s, as they were clearly visible on the satellite imagery (see figure 4). 110 points were measured in this way, to guarantee the high quality processing of the satellite imagery, both Corona (for the geographical mapping) and ASTER (for the mapping of permafrost).

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7 Due to several external factors, the project was approved quite late, in April 2005. The campaign during the summer faced substantial financial difficulties, as the Russian partner in the project (GASU) did not receive the necessary funds in due time (a result of slow transfer between international accounts). Although the expedition started early July, the transfer of funds from UNESCO to GASU was only realised on July 20th. At the end of the expedition, August 15th, the money was still not yet available to GASU.
In a second phase, the C-Nav was installed in the camp as a permanent reference station for smaller GPS receivers (Leica SR 20) that were used as rovers. This was done during the actual archaeological survey, for several purposes. The Leica receivers are small devices (comparable to a palmtop), very handy to be used in the field and with long-life battery power. They are also much cheaper, so we had two receivers at our disposal. This means we could work with two archaeological survey teams, that worked parallel (staying in contact with Walkie-Talkies). Although the Leica devices are less precise when used in a stand alone configuration, the link with the fixed C-Nav reference station in the base camp gave us a relative precision between 10 and 20 cm, after post processing in the base camp (see figure 5, middle).

As the Leica SR 20 is very quick and precise, we decided to localize not only every site, but also every individual structure within one site. This method proved to be very time effective (we did not longer have to do measurements with compass and measuring rod) and resulted in detailed plans of intra-site level. The point file with GPS measurements can easily be transformed into a site plan in AutoCAD (figure 6 a and b)
Figure 6. A) Plot of all the points measured with the Leica SR20 within one site, in the Valley of Dzhazator; B) Finished plan of the same site, with interpretation of all structures. It concerns a Scythian burial site with 10 kurgans (green), some stone circles (blue) and stone platforms (purple) to the west and steles (grey) to the east. There are also several Turkic ogradki (red) with accompanying balbals or small steles (grey).

Frozen contexts

As the main goal of the project is to locate the permafrost areas and the frozen tombs of the Altai Mountains, part of the expedition was focussed on the use of geomorphological and geological techniques to determine the areas where frozen contexts can be expected. The team of geographers worked in the field during the first three weeks in order to define good GCP’s for the Aster and Landsat satellite images and to make measurements of the soil and subsoil temperature, through augerings (figure 7) and test pits (figure 8). The main idea of this field work is to use the Landsat thermal band for defining areas where permafrost is estimated very probable (details of the methodology were presented at the EARSeL-conference in Porto8). This research and fieldwork was realised within the Dzhazator and the Tarchata valleys.

8 GOOSENS, R., GHEYLE, W., BOURGEOIS, J. & DE WULF, A. (in press), Estimation of the Permafrost Area in the Altai Mountains (Russia) in the Framework of the Preservation of the Frozen
In total, 28 pedological augerings were done in different geographical contexts, spread over the Valleys of Tarkhata and Dzhazator. In 10 cases, permafrost was discovered at a depth varying between 45 cm and 215 cm. As it was very difficult to execute borings on the alluvial terraces because of the gravel and bigger stones in the filling, we also made a test pit in the neighbourhood of archaeological sites (that tend to be constructed on the terraces, see figure 8). All augerings and test pits were localized with the C-Nav GPS. Interestingly, though the processing of the results is still very initial and in progress, we discovered in the higher parts of the Dzhazator valley several areas where, even in mid summer, the subsoil was cold enough to maintain permafrost conditions. Especially pingos and other wet contexts (valley
areas) had frozen subsoil from a depth of some decimetres already. All results of this research are now being studied in the Geography department, a report will follow soon. The work with the satellite data (ASTER, Landsat) will be done by the student that took part in the expedition, in his Masters thesis (foreseen May 2006).

Archaeological Survey

The valley of Dzhazator was selected for this first part of the project for different reasons. First, the valley is located between the area where the Belgian-Russian team worked in previous years (Elangash, Irbistu, Ozék, Sebistey and Yustid, see above) and the area where the team of the Russian Academy was active (Ukok); secondly, the area is known as a rich area for archaeological structures; thirdly and finally, the higher parts of the valley go up to more than 2000m altitude, which is clearly an altitude where frozen conditions can be expected.

The survey consisted first of the localisation of all archaeological sites and structures with GPS (see above). The structures were described, measured and photographed. (Figure 8) A tentatively date of each structure is given, based on morphology, literature and comparisons with other sites and regions. A description of the geographical context and especially indications for permafrost occurrence (periglacial phenomena like pingos, soliflucti on etc.) are noted. All sites were added to the Altari database (Altai Archaeological Inventory) that will be linked to the resulting cartographic material in a GIS (Geographic Information System).

During this field survey, 1687 different structures spread over 192 sites were located and described, spread over an area of 284 Km² (figure 10). The whole upper valley of Dzhazator (from 2304 m above sea level (asl), the highest site, to altitude 1569 m asl, the lowest site) has been surveyed. Several terraces on the left and the right bank of the river yielded monuments. For the lower valley (east of Lake Tsjugur, from an altitude of ca. 2050 m asl on) to less than 3 km East of the village of Dzhazator/Beliashi, we had to focus on the terrace of the right bank. It was not possible to cross the river, except for a bridge in the village of Dzhazator, which
would take a long time and would add administrative problems, as we were working in areas controlled by the Russian army. Moreover, as we are there in the lower altitudes, the chance to discover areas of permafrost is quite low. In the higher part of the valley, we also surveyed the tributaries of Dzhazator (Ayut and Tara) and the valley of Usai where frozen contexts are very present.

It is not the place here to go into detail about the archaeological results, but one can already mention that there is a clear distinction between the higher and the lower valley of the Dzhazator. In the higher parts, only Scythian and Turkic monuments have been recorded. In the lower parts, from an altitude of ca. 1950 m, the terraces yield monuments of late Neolithic and Bronze Age, as well as Scythian, Hunno-Sarmatian, Turkic and Altaic periods. The distribution of the archaeological structures is very different here than in the neighbouring valleys, and a detailed comparison will certainly form the subject of future research.

![Figure 10. The Dzhazator Valley (Chuya) on the CORONA images (2 horizontal negatives) from the 70's: an indication of the research area 2005 (blue polygon), and of the terrain that was interesting to be thoroughly surveyed by intensive line walking, mostly river terraces (red area).](image)

### Overview of the archaeological heritage in Dzhazator

The 1687 different structures spread over 192 sites can be divided in several structure types and are constructed in a time span stretching from the 3rd mill. BCE (Late Neolithic) to very recent periods (Historic periods, up to 18th Century CE). The following table gives an overview:

<table>
<thead>
<tr>
<th>Structure type</th>
<th>Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kurgans</td>
<td>369</td>
</tr>
<tr>
<td>Ogradki</td>
<td>112</td>
</tr>
<tr>
<td>Kereksurs</td>
<td>2</td>
</tr>
<tr>
<td>Steles</td>
<td>75</td>
</tr>
<tr>
<td>Balbals</td>
<td>508</td>
</tr>
<tr>
<td>Stone circles</td>
<td>305</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Structure type</th>
<th>Chronology</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Late Neolithicum</td>
</tr>
<tr>
<td></td>
<td>Bronze Age</td>
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<tr>
<td></td>
<td>Iron Age</td>
</tr>
<tr>
<td></td>
<td>Historic period</td>
</tr>
<tr>
<td></td>
<td>Undefined</td>
</tr>
</tbody>
</table>
Stone platforms | 219  
Petroglyph sites | 4  
Other structures | 97

The oldest recorded structures go back to the **Late Neolithic** (3rd mill. BCE). We found 12 sites that possibly date to this very early period. The sites are all burial monuments, consisting of a round or oval setting of large stones, with a central grave, mostly rectangular. We do not have much information on these graves, and it is the first time we discover them during one of our surveys. They are generally dated to the Afanashevo period.

Only 9 structures could be attributed to the **Bronze Age** (3rd-2nd mill. BCE). It was very strange to see that Bronze Age *kereksurs*, big structures that consist of a quite large and high central mound, enclosed by a circular or quadrangular bank, were nearly absent in Dzhazator. Only 2 possible examples were found, but they are very small and unclear – the photos do not show much of the structures, as they are covered by grasses. In all other research areas in the past years, large concentrations of big *kereksurs* dominate parts of the valleys and steppes. The diameter of these mounds varies from some meters up to 25 or 30 meters, the height from 0.3 to 2 meters. Mound and bank are sometimes linked by several spokes. The banks have diameters from 10 to 95 meter (figure 11). They are surrounded by small stone circles: in some cases it concerns only one or two circles; in other cases we located more than 60 of these circles. In Dzhazator, these circles were absent.

![Figure 11. A typical Bronze Age kereksur with circular stone setting and spokes. Yustid Valley, Altai.](image)

These monuments are generally considered to be ritual structures. The stone circles seem to confirm this interpretation, as they are considered to be small fire and/or offering places. It is worth mentioning, however, that on the left bank of the River Yustid, the Russian archaeologist Kubarev\(^9\) excavated two of these monuments and discovered some burials. Also in Mongolia there were found some *kereksurs* with human remains buried inside, but most of the time, they are found empty.

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A second type of monument is the large stele. At least 7 steles can be related to the Bronze Age, most of them being big steles that stand isolated in the landscape, with or without stone setting (see figure 12).

Figure 12. Bronze Age steles, Dzhazator Valley, Altai.

We recorded 1072 structures dating to the Iron Age (roughly 1st Mill. BCE). Among these, Scythian cemeteries are maybe the easiest sites to discover and record (9th - 4th Century BCE). Their North-South orientation, the possible presence of steles in the East and stone circles in the West is well known. We recorded more than 1020 Scythian structures (burial mounds, balbals or small stelae, stone circles and small stone platforms) in the research area. The Scythian kurgans (burial mounds) (figure 13) have a diameter varying from 5 to 15 meter and are characterised by the presence of a central depression, due to the collapse of the burial chamber and/or robbing.

Figure 13. A Scythian site, consisting of 4 burial mounds, Dzhazator Valley, Altai.
In almost all cases, these cemeteries are surrounded by balbals in the East (figure 14) and stone circles or small stone concentrations (stone platforms) in the West (a total of 508 balbals, 305 stone circles and 219 ritual stone concentrations were recorded). For the more isolated mounds, the dating is based on the presence of the central depression. Again, only excavations can confirm this chronology.

![Figure 14. Some examples of Scythian kurgans with very clear row of steles or balbals to the East, Dzhazator Valley, Altai.](image)

The situation of the Hunno-Sarmatian monuments is more problematic. During our survey in 2003 we discovered a lot of relatively small stone heaps (2x1m, 3x2m etc.); in a first chronological attribution we estimated that these sites were possibly of Hunno-Sarmatian date. It is however clear now that this attribution cannot be generalized: small stone heaps seem to appear in a lot of cases together with stone circles related to burial monuments, especially Scythian. They can then be considered as ritual structures, as the stone circles are (see above). Taking into account this new interpretation, Hunno-Sarmatian monuments are very rare in the Valley of Dzhazator: only 8 monuments could for certain be attributed to this period, 13 other structures are very unclear and difficult to date. The many other stone heaps were interpreted as of Scythian date.

The Turkish period is very well represented in the Valley of Dzhazator, and there are very exceptional monuments to be found there. In total, we recorded 112ogradki with accompanying rows of balbals, with up to 90 standing stones in a straight line to the East, sometimes over 200m long. Sometimes, the balbals have petroglyphs or are even sculptured. In some cases, theogradki seem to be isolated, whilst in other cases, they appear in clusters of 3 to 5. In the valley, there are some very special types ofogradki, with rectangular ditch and bank, or with very nice steles. These steles in the form of human figurines are called “isvijanje” or remembering monuments (see figure 15).
Figure 15. Some nice examples of Turkic steles (figurines), called “Isvijanje”. The level of detail in the depiction can tell us something of their precise date. One can see the depiction of the face (eyes, nose, mouth, moustache), neck and shoulders on the simple statues, while the second example, in the middle, clearly shows two arms (with in one hand a vase), a belt, sword, dagger etc...

It is the first time we recorded this type of structure during our surveys, and in Dzhazator there were dozens. Most of them were broken, fallen or deliberately destroyed: buried, thrown down or decapitated (see the central example in figure 15).

We recorded ethnographic structures in the whole valley of Dzhazator, but this is certainly not systematically. In many cases, it concerned additions and perturbations on older structures. Examples are the ritual stone heaps on Scythian kurgans, mostly with the offering (?) or burial of a sheep (bones still visible). It is quite difficult to assess a date for these remnants, but they are certainly quite recent. In the lower part of the valley (ca. < 2000m asl), we recorded several Ethnographic burial sites, of different types (figure 16).

It is worth mentioning that not all monuments could be recorded in detail. During the work of inventory, we found some zones with a very high density of small structures as uncommon circular and rectangular stone settings, alignments of buried stones, etc. Some of these structures were very hard to identify, and mostly the chronology is unknown. As these structures were not easily describable without identifying and drawing all individual stones (hundreds!) on a very detailed plan – a process that would take several days per concentration – we had to limit the recording of these zones to a generalised description. We located theses zones by multiple GPS measurements and made dozens of photographs for illustration. Also we found some structures that could not be attributed to one or another period, because of their isolated position or because of their “special” form.
Conclusion

The expedition of 2005 finally seems to have been a success. A lot of information has been gathered and we expect to be able to produce, within some months, the necessary topographical and geomorphological maps to add the archaeological information.

Moreover, our research into the frozen contexts showed that some areas are very ‘suitable’ for good conservation of the tombs; this is especially clear in the higher parts of the surveyed area (above 2000m). A detailed report on this will follow.

The continuing cooperation with the Gorno-Altaisk State University showed fruitful, although we had to face some financial problems (see above) that were solved and did not endanger the project itself. Other aspects of the project (as the two scheduled meetings and the exchange of personnel) will be realised in the next months.

Until now, there is no definitive choice about the area to be surveyed during the next campaign, in the summer of 2006.
Acknowledgements

The project was realised thanks to the cooperation and collaboration of many institutions and persons. We first would like to thank the people involved in the field campaign (especially A. V. Ebel and his team and the Belgian, Dutch and French researchers, students and volunteers). Our thanks also go to the UNESCO (in Paris and in Moscow), the Russian embassies in Brussels, Paris and The Hague and finally the Belgian embassy in Moscow.

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