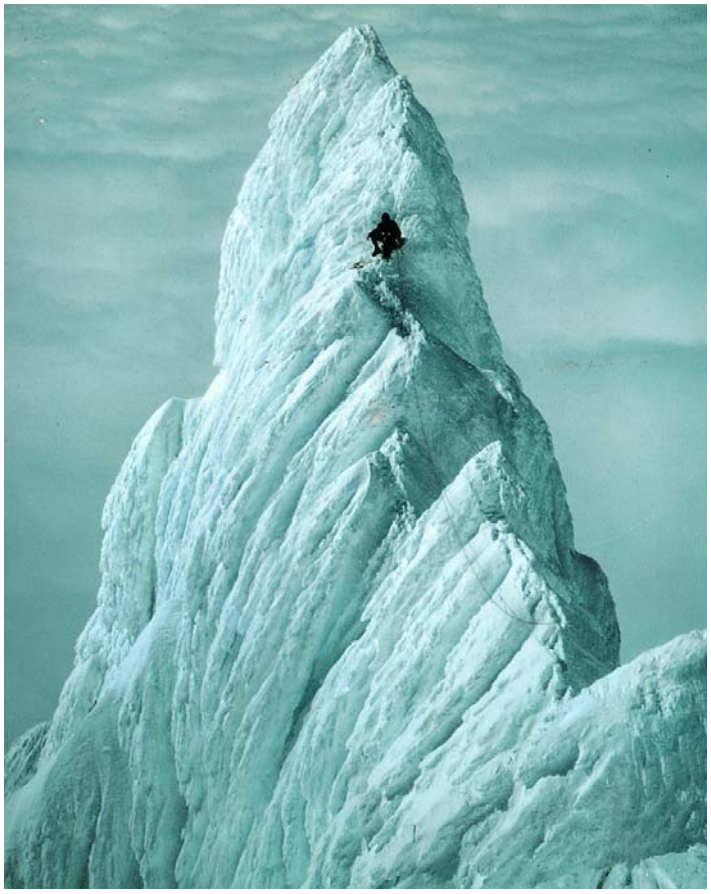
The Archaeology of Dangerous Places



Robert Paton

DRAFT ONLY
NOT FOR CITATION

June 2007

Abstract

Recording and interpretation of mountaineer camps at high altitudes show how humans adapt on the very edge of survival. My experiences in these places has brought into question how we might map and recognise changes in habitation patterns as people are put under high levels of stress. By interpretation of these places, and through analogy, I will consider whether this study can help us understand change at archaeological sites.

This talk will use observations from several high altitude mountain climbs in the Himalayas and the Andes, considering how these sites change as stress increases. The aim of the study is to help recognise and then explain change in the archaeological record. Although at a very early stage, this work shows some promise. It is hoped in the future that analogies can be made with some hunter gather sites from Australia where it is known, through previous research, that people were placed under extreme stress during European colonisation.

If this work is in fact seen to show some promise, the problem arises of how we might record or preserve these high altitude sites and analogous sites in similar dangerous environments. This is a significant problem, as such sites tend to only exist for short periods of time before they are swept away either by the harsh physical environment, or due to their fluid social matrix.

Introduction

Investigating change in archaeological cultures is the stuff of our discipline. While explanations of what causes change are varied, perhaps the most referred to reason is stress, often attributed to environmental factors. Stress is, however, a difficult thing to actually see in the archaeological record, and causal arguments can end up becoming somewhat circular and ad hoc. This is because researchers firstly see an archaeological change and only then look, most often to the environment, for cause. For instance, the move from hunter-gathering to agriculture is said to have been caused by environmental and population stress in the great river valleys of the Tigris and Euphrates, even though a direct link between events is tenuous. Environment related stress is also used to explain population shifts and changes in the Australian archaeological record, particularly associated with the drying of the vast Pleistocene inland lake and river system of the Willandra. Likewise the movement of people at various times into and out of the dry interior of the continent is said to be related to similar stresses. Some have also associated the broad lithic and artistic changes in Australia to stress.

Critics of this approach have questioned our understanding of the link between change and stress. They see the desire to make a scientifically testable and logical connection between stress and a causal factor such as environmental change as driving the explanations. Certainly, explanations for change which favour social laws, analogy and complex historical analyses have tended to have less impact, particularly over the past few decades. This has been largely a result of perceived failure of practitioners to develop and refine the promised "middle range theory" which would tie past changes to softer social laws. It is usually only when past change cannot be associated with a rational cause that explanations become somewhat more intangible. For example, we see such things as the development of Upper Palaeolithic art, the cessation of fish eating in Tasmania, and the trade of some goods as being events which took place in the shadow of religion or complex social systems - as well they may have.

It is the link between stress and change that is the subject of this research paper. Through an examination of "dangerous places" it is proposed to test if stresses (environmental and social) actually cause changes at archaeological sites, and how we might recognise when such changes occur. The research also investigates methods by which we may quantify the change, or chaos, that occurs as people react to stresses of different types. The data presented in the present paper relate only to recording and interpretation of mountaineer camps at high altitudes, in order to show how humans adapt on the very edge of survival during extreme environmental and physical stress. Future research is aimed at a similar analysis of sites where social stresses effect people, such as during colonisation of places like Australia, or in modern war zones. So the present paper is only part of a much wider study. The ultimate aim of the research is to put a case forward that at least hints that methods and theories can be developed using reasonably strong social laws to help firstly identify change in the archaeological record, and then begin to offer a way of recognising when stress has been a factor in causing change.

Archaeology and Altitude

Over a number of years I have climbed mountains around the world to very high altitudes, at the edge of where humans can survive. In these environments people are placed under enormous physical and mental stress, sometimes resulting in their death. This is a harsh physical environment, the equivalent of living at the cruising altitude of a passenger jet. Here, humans would die within minutes without weeks of careful acclimatization.

At high altitude, the amount of oxygen in the air is between 25 to 33 percent of what we breathe at sea level, temperatures can be consistently as low as minus 40-60 degrees, and jet stream winds of over 300 kilometres per hour are close enough to be heard. There are also the constant objective dangers of climbing: falling, hidden crevasses and avalanches. In this environment climbers have to physically exert themselves to the standards of high performance athletes for long periods without sleep. The effects of this combined with low air pressure and other biological

changes places the body under enormous stress. Breathing is extremely difficult, blood thickens as the body produces massive numbers of red blood cells to scavenge oxygen from the thin atmosphere, and low air pressure causes cells to burst in the lungs, eyes and brain. The outwards effects of this are mental and physical slowness, unrelenting headaches, blurred vision as the eyes bleed, lack of appetite, freezing of exposed skin, and oedema of the lungs and brain which after a short period will result in death. Longer term physical changes also occur as climbers bodies attempt to adapt. These include a decrease in white blood cells allowing uncontrolled infections, a massive decrease in fat and muscle mass as the body consumes itself in an attempt to preserve core functions, and a general slowing of mental facilities often including hallucinations.

For an investigator of material culture change, these conditions are interesting because the stress on most climbers is very carefully staged, or managed. That is, mountain climbers who attempt very high peaks most often plan and stage the climbs using a series of progressively higher camps which allows them to make a summit attempt with supplies and when the weather is best. As the climbers go higher on the mountain, setting up camps and ferrying loads, physical stress also increases close to the point of death. Most climbers who attempt mountains over 8000 metres are, on the last day of the summit attempt, within 24 hours of dying.

The progressive staging of higher camps and the associated increase in stress seemed to offer an ideal opportunity to investigate if stress could be recognised in the staged campsites on a mountain. Base Camp, for example, on most climbs is at a low altitude, there is plenty of food, medical care, telecommunications and often a bar for drinks and snacks. On larger mountains there are usually four to five higher camps staged at progressively higher altitudes above Base Camp. These camps are used as staging posts for ferrying supplies to higher camps, but they are also used for day to day living for climbers ascending or descending the mountain. The camps tend to become more Spartan as they increase in altitude, with the very highest camps containing just the bare essentials for survival for a single day.

The Problems of Site Recording

It was never my intention to work as an archaeologist on any of the climbs I have been on. It was only after several years observing the camps of climbers and watching the effects of stress that it occurred to me that a study of these places and people might be of some value for archaeology. This has clearly had a bearing on what I have observed and recorded over the years and thus on any conclusions I draw here. For this reason I shall explain further what data I have collected and some of the associated problems.

Just as increasing altitude and weather causes stress to climbers, it naturally has the same effects on an observer and recorder. For example, at high altitudes above 7000 metres I am usually unable to expose any skin to the air, my mental functions are slower than my normal slowness, I am wearing four pair of gloves, and I am

unable to carry more that a few kilograms of equipment, most of which is geared to survival rather than site recording. In these conditions, the only way I have to make a record is using photographs and what I am able to recall later from memory and my diaries. One cannot even go back later to make a record, as most countries now require climbers to "clean" a mountain after a climb. There are considerable monetary sanctions to enforce this – this is only one of the problems of site conservation and management in this environment.

This makes photographs, either taken by me or other climbers, probably the most objective and testable data I have. Unfortunately many of these pictures are taken using the cheapest cameras. This is because the cheapest disposable cameras are often the only ones that continue to work under extreme conditions. They are also lightweight and can be carried in a pocket, and thus they have become the camera of choice for many climbers. Heavier and more complex cameras either freeze (literally) or you simply can not operate the controls while wearing four pair of gloves.

Ideally any photographic record would be of the same climbers and taken using scales and from the same angle Again circumstances made this impossible. Any photographs I could take were largely fortuitous – when I had time, energy and was in a position to take a photo and reach my camera. Often I had two ice axes and a rope to deal with and so taking a photograph was difficult. And sometimes I was simply too exhausted or sick to take any pictures. For this reason I have been using any relevant photographs I have been able to get from other climbers and publications. Most of these photographs are surprisingly useful as they tend to contain descriptions of the conditions at the time, the exact location, and the altitude details. Most photographs also tend to be part of a series taken by members of a climbing team, recording their ascent, as they slowly make their way up a mountain.

Methods of Analysis

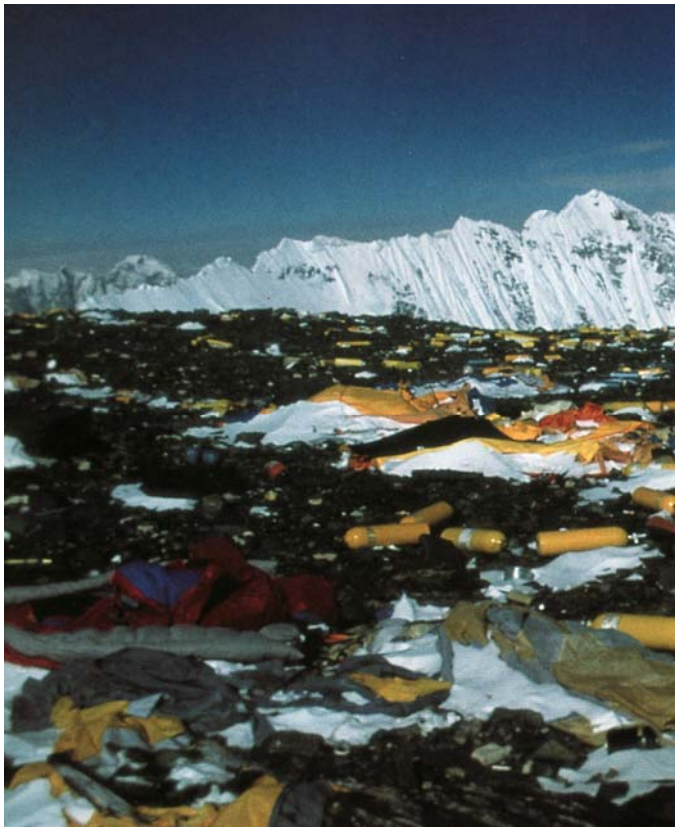
Given the type of data collected, the problem arose of how to compare a set of photographs from one location with another higher on a mountain. This is analogous to how we archaeologists compare differences between any two sites or within a site. There are statistical models which allow for a comparative assessment of the difference between two or more sites which take into account, for instance, variability in defined artefacts types, their placement within a site and most other categories that we care to make use of. However, these methods really require good quality data recorded at a high standard. For this present investigation, where my data is not of such a quality, I have been looking at using comparative methods from disciplines where photographic images are widely used.

In medicine when testing for tumour presence or growth, images are compared from different times, different machines and from different technicians. In these medical images there are also differences in exposure, angles of the shot, quality of the image and a variety of other factors. A major technique used in such comparative

work is "pyramid processing", in which images are broken down into a set of sub-images at different scales, viewed from different angles. In this case, scale and angle (although complex) become less important, and factors such as image contrast can be dealt with as “noise”. This highly complex technique provides an efficient means of homing in on regions of interest, that is regions of change. For medical researchers this then allows only those sets of images which show “significant” change to be selected out for closer hand examination by radiographers. A similar technique is used by astronomers who process many thousands of images of the same segment of sky to determine if changes have occurred.

Attempting to use this same technique on images of mountaineering camps, or any archaeological sites is still in its very early stages and is an important part of this research if it can be managed. To date, working with mathematicians, I am transcribing photo images to very simple computer imagery where defined categories of artefacts (i.e. tents) are shown in relation to other categories (i.e. oxygen bottles, human remains etc.). I am now examining if the “pyramid processing” technique can see changes in two such images in terms of the relationship in space within and between the categories. The aim is quite simply to give a measure of “chaos” or change. So far we have had some success, although it needs to be emphasised that the work is still very preliminary with only six images being tested.

PART A

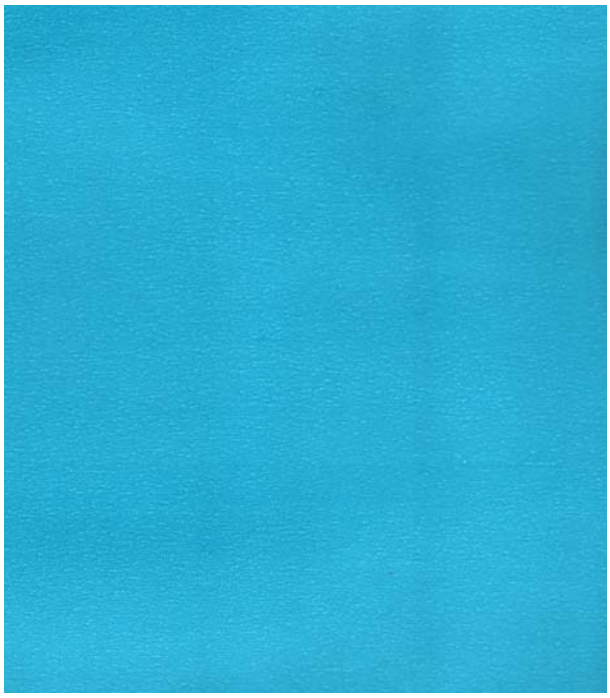


PART B

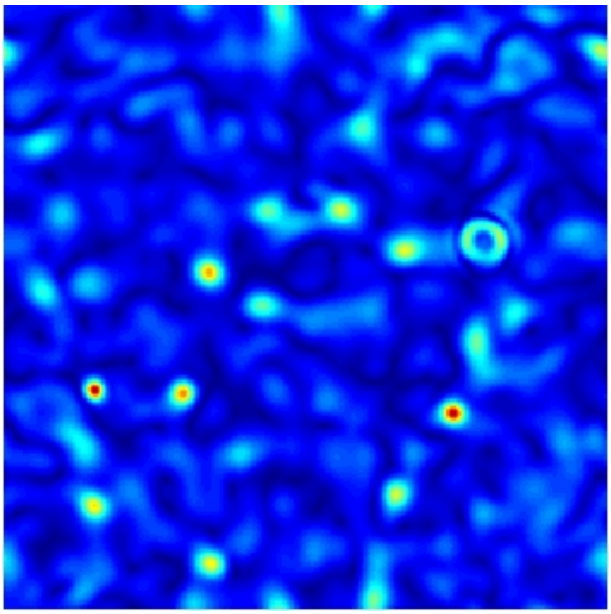
Figure 1 Illustrating the differences between a Base Camp (PART A) and a High Altitude Camp (PART B)

If successful, the level of change between the images should closely mirror the increase in stress at the sites. That is, as altitude increases and stress increases the measure of chaos should be greater. This is an ideal situation in which to test this method, as at these mountaineering sites the two factors – stress and chaos – are quite easy to relate. By simple observation we can see the causal relationship very clearly.

To illustrate using a very simple analysis we can see in Figure 1 a comparison of two camps on a high Himalayan mountain. To demonstrate the contrast most clearly, Part A of Figure 1 shows Base Camp where we can obviously see a well structured site with the different components of the site in a distinct pattern in relationship to one another. For example, the tents are in lines, and the image has a predominantly linear structure. In contrast, we can compare it to a very high altitude campsite at around 7-8000 metres (Part B of Figure 1). Here we can see clear chaos. The site components are generally similar to Part A, but they no longer have the same pattern or highly linear structure. There are also other components evident such as remains of dead climbers. It is these clear differences that the "pyramid processing" of the images seems, at this early stage, to be able to identify and highlight as significant. To illustrate, Figure 2 shows how the programme "sees" the differences between the images. Part A of Figure 2 shows the Base Camp image used as a baseline image for comparisons. As you can see, the image is seen as being homogeneous and in this illustration , one colour. Part B of Figure 2 shows the chaotic High Camp as being an explosion of colour and disruption. This difference between the images, has of course, a mathematical expression showing a significant difference between the two images. Clearly, we can see in these images a measure of change caused by stress.



PART A
The neutral Base Camp data, taken by the computer as being “normal” from which all change is generated



PART B
The computer generated “chaos” of High Altitude camps

Figure 2 Showing the computer generated “chaos” between the Base Camp (PART A) and the High Altitude Camp (PART B)

Conclusions

This work is at its very early stages. However, it does seem to show some promise in allowing us to clearly link changes at sites with known stress factors. The challenge now is to be able to look at archaeological sites in other contexts and see if we can detect change and relate this to forms of stress. To this end I have been working on some contact Aboriginal archaeological sites from the Northern Territory where, from my Masters research many years ago, I know people were under considerable stress. Fortunately, near these sites I also have a series of older archaeological sites which are pre-contact, that can be used as a baseline for comparison.

Certainly, I realise there are a myriad of problems associated with this research and comparison. To name only a few: how can we determine what is a "normal" site for comparative purposes?; do different types of stress produce different patterns of change?; what are the effects of taphonomic disturbance? Can we detect change caused by social disruption such as war? These and may other problems are certainly not being overlooked in my investigations.

Regardless of these difficulties, one of the main issues, particularly when dealing with mountaineering camps, is the issue of conservation. This is particularly pertinent, not so much because of my own research, but because many of these sites are highly significant in terms of human endeavour and achievement. One only has to think of the camps used by Edmund Hillary and Tensing Norgay. Obviously these sites are subject to enormous physical impact, particularly those at high altitude. They are blasted all year round by high velocity wind, subject to freezing temperatures and are always in danger of being wiped away by avalanches. But perhaps the greatest danger of all to these sites, are those efforts made by volunteers and governments to "clean up" the mountains.

In the last 15 or so years there has been a movement, particularly in the Nepal Himalayas, to clean away the remains of previous climbs. Several large scale clean up expeditions have been on Everest, for example, removing tonnes of "garbage". No real records have been kept by these clean up expeditions, except the weight of the material removed. One can only guess at the impact they have had on important sites by some of the observations in the weight records. You see the occasional reference to old style oxygen bottles "like those used by Hillary and Tensing". Governments have, unfortunately, forced the pace of this site destruction by making the removal of all gear from the mountains (plus extra) as a condition of a climbing permit. There are very high cash deposits at stake for any expedition that fails to arrive back in Kathmandu without tonnes of "garbage". While as a climber I can appreciate being in an environment cleansed of the garbage of others. But as an archaeologist it saddens me to see people destroying the very history that makes their own achievements relevant and important.

Bibliography