NIGEL SHEPHERD

The Glacial Recession

An overview of the diminishing glaciers of the Alps

(Plates 19, 20)

During the last months of 1689 the inhabitants of the vale of Chamouny, nestling in the shadow of Mont Blanc, gathered to discuss the continuing threat posed by the mighty glaciers that intruded into their valley. For nigh on two centuries they had been subservient to the mockery imposed by this tyrant who, devoid of all compassion towards the settlers, had been consistently and steadily destroying their most noble efforts to eke out a fragile existence from farms that clung tenuously to precipitous mountainsides.

The time had come to put an end to this imposition and the misery it wrought. The solution, it was decided by the elders and the church, would be to exorcise the devil living deep within the glacier, destroying all his powers and causing the glaciers to shrivel up and die. Accordingly, a renowned exorcist, Jean d'Arenthon, Bishop of Geneva, was called upon to perform the task and over a period of some weeks the following summer 1690 he set in motion the spells that would destroy the threat for ever.

And how effective it was too. Today the snout of the Bossons glacier, for example, rests some 2km from its position at the turn of this century and is retreating at a rate of more than 50m per year. So too are the Argentière and Tour glaciers. The Bossons is no exception. There are many glaciers throughout Europe that have retreated dramatically in the last 30 years or so and some that are vanishing so quickly at the present time that they will be lost for ever within our own lifetime.

Why? Why is it that suddenly it seems that we are in danger of losing a foreboding yet beautiful part of mountain architecture? Why is it that the pristine white ice faces of yesteryear are now blackened as if by soot and the remaining ice is hard as rock? Why is it that during the summer season of 1988 the freezing level rarely dropped below 4000m? Global warming of course! It's obvious, isn't it? The 'greenhouse effect' and all that ...

The truth of the matter may indeed have something to do with global warming, but that is not the whole truth. It may only be a very small part of the truth. Geologists tell us that as recently as 7000 years ago we had glaciers in Great Britain. Furthermore, what we now know as the Alps was a massive complexity of glaciers with only a few peaks standing above the ice pack. More than that, the entire planet was once covered by ice but gradually, over the millenia, the ice has retreated and permanent snow and ice of the European Alps accounts for something like one thousandth of that found outside Greenland and the Antarctic.

It is mere common sense, therefore, to presume that the melt continues to the present day and, barring drastic climatic changes, will continue to do so until there is no ice left on this planet. It is possible that in a thousand years' time crevasse rescue technique will be a thing of the past – confined to the annals of mountaineering history.

This sad though inevitable fact is, of course, of great concern. However, what is of most concern at the present time is the dramatic speeding up of the melting process which will result in the loss of some glaciers and ice faces we are all familiar with and that some of us may have climbed. But lots of things can happen between now and then.

The most comprehensive research into the current glacial recession in Europe is being conducted by the Swiss. In recent years this research has gathered momentum owing to the important part played by glaciers in the generation of hydroelectricity. Records have been kept annually since 1880 which show that the total surface occupied by the glaciers of the Alps in 1991 was 1342 square kilometres, ie 25% less than the year of the first record.

The responsibility for this research lies with the Commission des Glaciers which was founded in 1893. Information on some 120 glaciers is gathered annually by designated observers and is assimilated at the Ecole Polytechnique Fédérale de Zurich. The information collected concerns movement of glaciers and annual variations, the volume and mass of the ice at certain points and the general topography and altitude of each glacier. The bulk of the more intensive research is concentrated on twelve glaciers that attain a surface area greater than ten hectares. These glaciers include the Aletsch, Corbassière, Trient and Rhône.

The information gathered over the years proves that the advance and retreat of the glaciers can be loosely categorised as cyclical and that the events of the recent past are not new occurrences in the grand scheme of things.

The research conducted takes into account a number of climatic factors that influence the overall behaviour of the glaciers at any one time. Observations over the last ten years or so have shown a dramatic climatic change that has never been more apparent than in the late eighties and early nineties. Winters have generally become drier and colder, with a particularly cold spell and little precipitation during the months of December and January. The latter part of the winters and the early part of the spring have seen particularly high levels of snowfall at all altitudes and regions. Though this snowfall has been higher than average it has come at a time when the ambient air temperature has risen with the change of season; and the mantle of snow, both on the high névés and lower slopes and on the steep faces, has not lingered long. Summers have become uncharacteristically hot for prolonged periods of time. There has been higher than average snowfall in June but, as with the spring snowfall, the ambient temperature is that much warmer, so that the snow does not stay around long enough to become a part of the permanent snowpack but simply melts into the atmosphere or runs off in swollen glacial rivers.

19. The Argentière glacier photographed in 1896. (*Gay Couttet*) (p27)

20. The same view photographed in 1993, showing the recession of the glacier and prolific vegetation. (*Nigel Shepherd*) (p27)

These climatic changes are significant and manifest themselves in reduced glacier movement, decreasing névés and a lack of snow and ice buildup on big faces.

The movement of a glacier is perhaps the most commonly used yardstick by which the layman measures change. Every glacier moves at a different rate depending upon a number of factors. For example, the Aletsch glacier, which is the largest in the European Alps, moves on average per year: 30m on the névés of the Jungfraujoch, 200m at the Konkordiaplatz, 60m at Silbersand and 10-20m at the snout. (This example disproves conclusively the popularly held belief that a glacier moves fastest at its snout.)

The variation in forward movement annually is determined by a number of factors, but in times of heavy precipitation and lower than average temperatures the advance will generally be greatest. Conversely, in warmer climes and lower precipitation, such as in recent years, movement will diminish. In its worst case, such as at the present time, no advance takes place and a general retreat is set in motion.

An example of this can be shown by a comparison of records over the last 20 years. During the years 1965-1970, a period of cold and heavy precipitation, the average speed of movement of the glaciers of the Alps increased by 10%. There followed a period that conformed to the average and then, in the years 1977-1981, the movement increased by about 40%. In some cases, such as the Corbassière glacier below the Grand Combin, the average speed increased by 75%. This corresponds with a period of intense cold and high snowfall in the Alps and is testified by the vast upsurge in the popularity of winter sports in Europe, particularly the sport of skiing and the growth of a lucrative package holiday market and associated business.

The general retreat of the glaciers is now well established and has increased dramatically since 1987. Within Switzerland, the Commission des Glaciers records that out of 110 glaciers observed in 1987 there were 27 advancing and 74 in retreat. In 1990 there were 90 glaciers in retreat and 14 advancing. Taken over the whole number of glaciers observed, the average retreat was 5.1m in 1987 and a massive 9.8m in 1990.

These figures are the quantifiable ones – the ones that are obvious to the casual observer and that can be seen at glacier termini all over the Alps. Other evidence is not quite so apparent. At annual intervals the thickness and density of the glaciers is also measured. To the visitor this decrease is less obvious, though in the case of the Griess glacier, any *habitué* of that area could not fail to notice the dramatic reduction between the years 1988 and 1990, when the thickness of the ice diminished by a massive 227cm overall. This can be compared to the Aletsch at 115cm and the Silvretta glacier at 65cm during the same period. Taken over a term of 20 years, the annual reduction of the Swiss glaciers comes out at 9 million cubic metres per year, though in some years it has reached a high of 16 million cubic metres.

Enough of the figures! What does all this mean to us poor climbers – those of us who hope to preserve the hard-won skills of crevasse rescue and safe glacier travel. In my own short experience of the Alps since the mid-seventies, I have noticed a few significant differences that I am quite sure others have also observed. I remember distinctly the coldness of the nights in early forays to the Alps around 1975. Even camping in the valleys, the water would freeze in billy cans outside the tent and it was almost unheard of to walk out to a climb in the small hours without being wrapped snugly against the cold bite of the crisp air.

I remember, too, being able to walk onto the Bossons glacier along the path leading from the entrance to the Mont Blanc tunnel – a feat totally impossible today, though nonetheless attempted by many tourists. Often the retreat is drastically accentuated; for, once a glacier retreats to steeper ground, gravity plays its part in the overall recession and a miserly retreat of ten metres per year rapidly amounts to many tens of metres as vast amounts come crashing down. The Glacier du Trient which until 1988 had seen very little retreat has now begun to recede with alarming rapidity. This is nowhere more apparent than on the descent from the Cabane de Trient on the Chamonix to Zermatt traverse.

Glacier retreat on the faces is equally alarming. The Welzenbach route on the Grands Charmoz no longer exists, having been reduced to a sliver of ice high up on the face. The lower part, which was testimony to the perfection of the art of stepcutting, is reduced to a grotesque and suicidal heap of rubble. Gone also are the magnificent mixed face routes on Mont Blanc de Cheilon in the Pennine Alps. The sparse grey ice clinging tenuously to the rock is a trivial remnant of a past era.

More striking changes can be seen when comparing old photographs with new scenes taken from the same vantage point. Photos of the Argentière glacier are a remarkable example of this. In the Couttet photo of 1896 (Plate 19) the snout of the glacier encroaches to within a kilometre or so of the village. The rock feature immediately left of the church spire in the recent photo (Plate 20) is clearly evident in the old picture. In comparing the two, the aspect I find most remarkable of all is the prolific way in which the vegetation has established itself in the 97 years between the two photographs. How different the mountains must have been 500 or 1000 years ago ...

Earlier in this study I stated that the changes taking place in the European Alps can be regarded as cyclical in that similar events to those currently taking place have occurred at other times during the last 100 years. The early 1920s was one such period. Statistical analysis of ice samples from other regions of the world shows that there have been mini ice ages in between ice ages; there have been periods of extreme cold lasting as little as 200 years, but enough to give the global ice cover a bit of a boost.

From a core sample taken from near Camp Century in northern Greenland in the early 1970s (a core, incidentally, 4500ft long), scientists were able to ascertain by measuring the weight of oxygen present, that if

the patterns of the past were to repeat themselves, we would be at the beginning of another ice age by the 1980s. Current trends disprove this then popularly held opinion which was expostulated convincingly by Nigel Calder in his BBC series *The Weather Machine and the Threat of Ice.*

There is a tendency to become obsessed with blaming the climatic changes and ultimately the glacial retreat and lack of snow in the Alps in recent years on the 'greenhouse effect'. For the time being, though, we can only bide our time to see if it is a short-lived period of warming or if indeed it is a continuing trend. That the glaciers are generally in retreat and have been that way for a couple of centuries cannot be denied. We can only hope that the process of melt will slow down for a while and give us back the pristine white mountains of yesteryear. If not, we will have to change our Alpine seasons to a different time of the year ... or maybe we could just call the present incumbent of the post of Bishop of Geneva to reverse the spell.