

## AVALANCHES IN EXPEDITION MOUNTAINEERING

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### Introduction

This short paper will describe incidences from three recent expeditions to major Himalayan peaks. The scenes are, respectively: the 1973 American Expedition to Dhaulagiri (8170 m) in the Nepal Himalaya, the 1974 American Expedition to Pik Lenin (7320 m) in the USSR Pamirs, and the 1976 Indian-American Expedition to Nanda Devi (7800 m) in the Garhwal region of India. The Pik Lenin incident is discussed further in Lev (1975).

### Dhaulagiri

After travelling for a month through the lower mountains, the Dhaulagiri expedition finally reached the toe of the Myagdi Glacier and was brought into first contact with avalanche hazard. Upon entering this realm for the first time, the Sherpa porters halted and began praying in earnest and throwing rice over their shoulders, a bid to the gods for safe passage, we were told. On questioning, most of the Sherpas expressed the opinion that the contact of avalanches and man was a matter of fate, which itself is ruled by the gods.

The intensity of the Sherpa porter's ritual was a little unnerving at that particular time and place. However, safely through the day, quite a bit of discussion was generated among the sahibs that evening regarding avalanche hazard. A couple of expedition members expressed the opinion that, since these mountains were so huge, so extraordinary, and so little was known about avalanches anyway, we might as well take our chances, consider the phenomena an "act of God" and get about the business of climbing the mountain. This attitude led to the placing of the first camp on the glacier in a spot possibly exposed to a large ice cliff avalanche. Fortunately, most of the expedition members became possessed with a sense of due concern and the camp was subsequently moved to a safer location. We were later to observe avalanches descend and cover the former campsite.

It soon became evident to the sahibs that correct route selection was of paramount importance in avoiding avalanche hazard. Observation also indicated that avalanche activity increased with increasing snowfall, not surprisingly. So, for example, when a decision had to be made as to when to pass under the 1200 m steep rock face of the "Eiger"

(a prominent feature on the north side of Dhaulagiri named by the early Swiss expeditions), most readily agreed not to go during or immediately after periods of precipitation.

Later in the expedition, Pasang, a wise High Altitude Sherpa of 45 years and a veteran of several Himalayan expeditions, including one with the Argentinians to Dhaulagiri in 1954, quietly informed me and my companion at Camp IV (elevation 7850 m) that we should go down because the impending storm would be severe and produce avalanche hazard. Pasang descended. My companion and I chose to stay. Our eventual descent through many avalanches was only possible due to the original route being well located. Pasang, a good Buddhist, was apparently not prepared to trust purely in fate, and indulged in a little meteorology.

### Pik Lenin

In the Soviet Pamirs, a northwestern-most extension of the Himalaya chain, I found myself forced to make decisions, without the benefit of knowing anything about the area, the mountain, or the history of the slopes leading up to Krylenko Pass -- the route we needed to ascend to reach the East Face of Pik Lenin.

There was no doubt that a potential avalanche condition had developed. And, by all known standards, it developed impossibly fast. We had, however, just descended to our camp over a portion of the slopes in question, and it appeared that slab conditions had not yet reached a critical state. It seemed to me that the ameliorating factor was the absence of any increased weight in the form of new precipitation. The weather had been good; we hoped that it would continue to be so. We thought we were still ahead of the problem. I wanted to observe the situation by digging more snow pits on the following day. One of the team wanted to go down; the others were divided. Descent and evacuation from our camp was considered with reluctance. Probably without being fully aware of it, some of us may have thought: How can we turn back, after coming all this way -- to the USSR, especially with the English climbers already over the Pass, at the base of the East Face of Lenin?

That evening, the altimeter began to rise, i.e., the atmospheric pressure began to fall. We shouldn't have been surprised because we all saw the "mares' tails" streaming up from the southwest when we were on the south side of the Pass earlier in the day. At about 2:00 a.m., my tent companion woke me up and said it was snowing. I stuck my hand out the tent door and twirled my finger around. A few centimeters of

new snow, very light density. I said, "15 cm of new snow and we retreat to a lower and safer camp". My companion said: "Are you sure?" Back to sleep ... ZZZZZZZ.

Early the following morning, 7:00 a.m., 5 cm of new snow, very light density. It was clear, but the barometer was still low. Blowing snow from a 10 m/s northeast wind. Could the wind be transporting enough new snow to bring the slab to a critical state? Then the wind abated and it became warm as in previous days.

The trigger was unexpected -- a major earthquake. We were lucky; we had enough time to jump into a nearby crevasse just before the avalanche passed over.

After the Krylenko avalanche, snow began to fall. The storm lasted on into the night. On nearby Peak 19, another American contingent was camped at the bottom end of a huge steeply tilted saucer-shaped snow face. The avalanche from the accumulation of new snow came down about 1:00 a.m., burying the group in their tents, killing one of the four. With great difficulty, the others survived the night, crawling up a few hundred feet to the shelter of a serac where they dug a snow cave for protection.

The stage of disaster was set. Competition with other climbers participating in the International Camp kept us all in the danger zone.

### Nanda Devi

The mountain is named after the goddess, Nanda, and is considered by the local inhabitants to be a holy mountain. The mountain presented itself to us seductive and powerful, like the sirens who lured the sailors to their deaths on rocky coasts. This mountain seemed to draw out many of the worst traits of the members of the Indian-American Expedition. To illustrate with one example: a 3000 m avalanche path needed to be crossed mid-track in order to reach advanced base camp. This was the monsoon time, and avalanches were observed to run most often during precipitation periods. There were those who maintained that, statistically, the chances of being in the path when an avalanche released, even during precipitation periods, were still relatively low. Several close-call crossings were made under the encouragement of individuals armed with this theory. In this case the statisticians guessed correctly. Next time ....?

### Reflections

I must surely count myself fortunate to have been a member of these expeditions. My application to participate

was strengthened by my experience in avalanche forecasting and control at Jackson, Wyoming, and Alta, Utah. Thus, I often found myself in the role of an avalanche specialist discussing avalanche problems with other members of the expedition. (I was not always proud of the avalanche decisions that I helped effect.) In these discussions, I noticed the diversified statements expedition members made about potential hazards. The statements ranged from complete mysticism -- avalanches are a matter of fate or an act of God -- to dogmatic remarks that avalanches could (or could not) be expected due to a "scientific" observation. It was clear, at least on the basis of these responses, that members of an expedition do not share a common view of the problem. It was also clear that, regardless of their other qualifications, many expedition members do not realistically evaluate the avalanche hazard. Unfortunately, this opinion is supported by the numerous avalanche tragedies that have claimed some of the world's greatest mountaineers. Perhaps, miscalculations were due to a lack of training in depth, but it is also possible that in the severe environment of expedition mountaineering, one is totally involved solving immediate technical problems, so that more distant, subtle problems are set aside.

#### Reference

Lev, P. 1975. Anatomy of an avalanche. American Alpine Journal, Vol. 20, No. 1.

#### Discussion

GEISLER: In deep powder, do you observe skiers to have momentary loss of judgment due to enthusiasm?

LEV: Yes, it is human nature.

MCCLUNG: What is the minimum avalanche forecasting equipment that you would take on a high altitude ascent?

LEV: Thermometer and hand-lens. A slop inclinometer would be handy. A shovel is essential, and is usually available on expeditions.

PERLA: Do you take avalanche rescue transceivers on Himalayan expeditions?

LEV: It has been considered, but not done yet. Experience shows that avalanche encounters are of a scale where a transceiver would be of minimum help.

PERLA: Are there major differences between the structure of snow slabs on high Himalayan slopes and slabs you have observed in the Rockies and the Interior Ranges of B.C.?

LEV: At high elevations, slab conditions appear to develop very rapidly.