INTERPRETING SNOWPACK STRUCTURE

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Summary

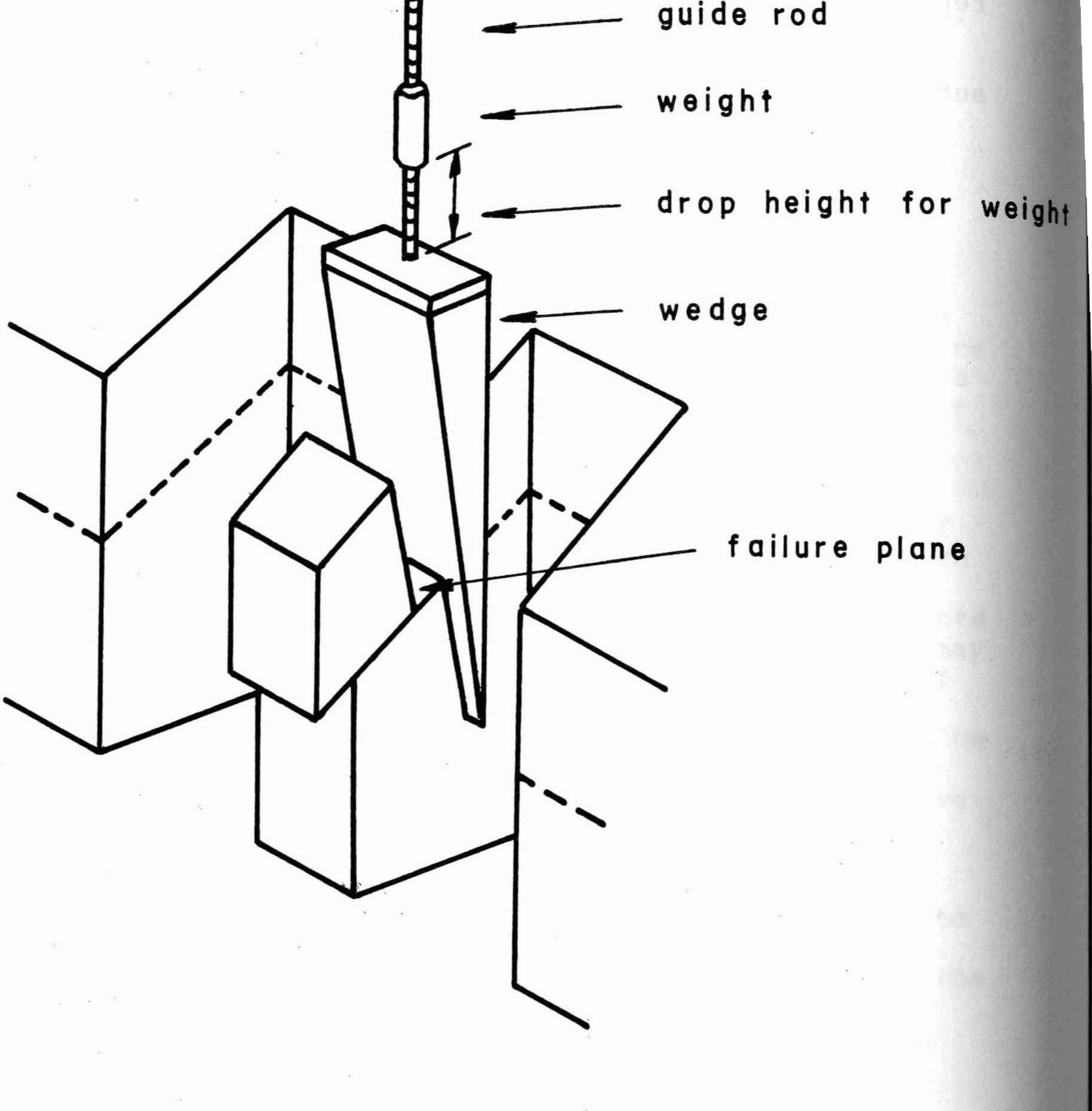
The traditional method of snowpack analysis by construction of a detailed snow profile is tedious, slow, and includes a large amount of data which is not directly relevant to snow slab stability evaluation. This paper suggests reorganizing field procedures by specifically emphasizing those features of the snowpack which are known to be prerequisites for slab avalanches. For example, there are two elements known to be features of all snow slabs: a cohesive slab of snow and a lubricating layer or weak layer over which the slab sits. A third element which must be considered is the bed surface roughness.

The snow stability problem, then, becomes one of understanding the relationship between these elements which produce slab avalanches. In a given geographical region there may be only a few basic combinations of these elements which produce the majority of slab avalanches. Thus, it may be possible to greatly simplify the forecasting problem if enough fracture line data are catalogued for the region. Also, it seems possible that simple instrumentation could be developed which could serve to rapidly illustrate the potential instability situations specifically for the above snow slab problem.

Figure 1 provides a possible example. In this case, a wedge is driven down through the slab forcing it to slide over any potential weak layers. Instead of a quantitative measurement of a property of one element of the problem, such as shear frame tests in weak layers, the emphasis here is upon the interaction of the slab and the weak layer as it must occur in some fashion in snow slab release. This test is rapid and is easily performed and interpreted. Such a test procedure, when combined with the previously mentioned simplified stratigraphy catalogue procedures, opens up the possibility that even relatively inexperienced personnel can participate meaningfully in a snowpack stability evaluation at some future point in time. Due to the overall complexity of the problem, however, it is

doubtful whether <u>all</u> of the difficult, rare, and subtle cases occurring in a given area could be included. In these cases, the experienced forecaster will be more difficult to replace.

Full length paper is available by writing to the author.


guide rod
weight
drop height for weight
wedge
failure plane

Discussion

Boyd:

Would you comment on the comparison--perhaps statistical--of success of the "wedge" with other field tools, for example, the shovel test?

Ferguson:

The "wedge" is still undergoing evolution. It seems to have success equal to or better than that of the shovel test performed by an experienced observer. However, this is not a statistical interpretation. The "wedge" is introduced as a method to quantify this type of observation.

Mears:

I like your contrasting slides; one showing the detailed fracture line with the temperature profiles and density profiles, the other a simplified diagram showing hard and soft or strong and weak layers in the slab. I would like to relate that to the acquisition of data in the field. You can stay in one point and collect a large amount of detailed information or you can collect less detailed information from several locations near the crown. I think that the second type of observation is also quite valuable because slab fractures do not necessarily occur at a point. Even if they do, we don't really know where that point is, but they release over large areas. If we can determine spatial distributions of slab characteristics, then I think that we extend our knowledge from the point.