

REVIEW

ARMSTRONG, B., and WILLIAMS, K. 1986. *The avalanche book*. Golden, CO, Fulcrum Inc.

THE authors conceived this manual as a non-technical book in English, "a description of snow avalanche science, protection, survival and lore, written for anyone having a general interest in the subject". Its level is therefore adapted to address a broad public in North America, and the different topics are illustrated by a large number of case studies.

Taking up first the worst ski-area disaster in the United States (Alpine Meadows, 31 March 1982), the history of avalanche catastrophes in Europe, Asia, and North America is reviewed from antiquity to the turn of the present century, with detailed accounts of accidents that occurred near the end of this period in the mining regions of the Rocky Mountains. The authors then describe the structure of snow and its metamorphosis, the mechanical properties of this material, as well as avalanches and their movement. Several factors leading to avalanche formation are presented: terrain, weather, snow-pack, and weather patterns are discussed for different regions of North America.

After this analysis, elements are evaluated for the correct decision to be taken by the tourist: balanced risk-taking, improving the odds and choosing a safe travel route, as well as how to behave should things go wrong, and how to proceed to a rescue situation. Statistical data are provided

for casualties over the last 35 years in the United States; passive and active measures for avalanche control are discussed in detail. A chapter is devoted to the juridical aspect of avalanches, as it has developed since World War II in Switzerland, France, Norway, British Columbia, and the United States, extending from prevention by the production of hazard maps and avalanche zoning to questions of responsibility and liability in cases of accident. The last part of the book treats avalanche studies as they have been conducted since the Middle Ages in Europe, with special mention of their development in the United States since 1945, and a description of both old and new techniques for various investigations, ending with consideration of the future of research, land-use planning, forecasting, and education.

This work complements previous books published 10 or more years ago on the same topic, and the authors have achieved their goal defined in the preface by presenting well-articulated and documented information written both clearly and fluently. However, a few minor errors ought to be mentioned: several foreign proper nouns are misspelt; the cited annual fatality rate for Switzerland is not 35-40 but 26 (p. 19); and the wind speed corresponding to a 60 mph powder avalanche is 104 and not 180 mph (p. 71). A systematic use of SI units would also have improved the educational value of this book.

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