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Mountain Meteorology: Fundamentals and Applications

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Website of the new Mountain Research Initiative (MRI)

The newly launched Mountain Research Initiative (MRI) is an interdisciplinary project of IGBP (The International Geosphere-Biosphere Programme), IHDP (The International Human Dimensions Programme), and GTOS (The Global Terrestrial Observing System). MRI is an initiative for collaborative research on global change and mountain regions. It takes an integrated approach to observing, modeling, and investigating global change phenomena and processes in mountain regions, including their impacts on ecosystems and socioeconomic systems.

MRI is supported by the Swiss National Science Foundation (SNF), the Swiss Federal Office for Education and Science (BBW), the Swiss Federal Institute of Technology Zurich (ETHZ), the Swiss Academy of Sciences (SANW), and the Swiss Federal Institute for Forest, Snow, and Landscape Research (WSL). The Initiative is presented in IGBP Report #49, recently published as: Becker A, Bugmann H, editors, 2001: *Global Change and Mountain Regions—The Mountain Research Initiative* (Stockholm, Sweden: IGBP). Mel Reasoner has been appointed to coordinate MRI activities at the new coordination office in Berne, Switzerland.

Information about the initiative can be found on the following web sites:

- http://www.rereth.ethz.ch/fowi/selb.bugmann/bugmann/pj.06.html
- http://www.fowi.ethz.ch/pgw/MRI_main.htm

The second site describes the main objectives and activities of the MRI. These objectives are:

- To develop a strategy for detecting signs of global environmental change in mountain environments.
- To define the consequences of global environmental change for mountain regions as well as lowland systems dependent on mountain resources (highland–lowland interactions).
- To make proposals toward sustainable land, water, and resource management for mountain regions at local to regional scales.

Activities will be grouped according to 4 categories:

1. Long-term monitoring and analysis of indicators of environmental change in mountain regions.
2. Integrated model-based studies of environmental change in different mountain regions.
3. Process studies along altitudinal gradients and in associated headwater basins.
4. Sustainable land use and natural resources management.

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Books

Olympic Games as Performance and Public Event. The Case of the XVII Winter Olympic Games in Norway.

Edited by Arne Martin Klausen, Berghahn Books, Oxford, 1999. 272 pp. US$19.95, £UK 14.95. ISBN 1-57181-203-2.

This collection of essays reports largely on anthropological research carried out leading up to and during the XVII Olympic Winter Games in Lillehammer, Norway, in 1994. This event was the most expensive and complex event ever to take place in Norway. Arne Martin Klausen, the editor, suggests that perhaps the only other occasions in Norwegian history to attract so many spectators were the celebration of peace in 1945 and the return from exile of King Haakon the same year. Sporting, athletic, and economic aspects aside, with the scope of the Games formulated by the organizers as 'a showcase of modern Norwegian society,' the cultural dimension became critical to the debate about the importance of Norway as the host.

As the organization of both the Games themselves and the non-sporting events, such as artistic, musical, and theatrical performances as well as exhibitions and festivals proceeded, Norwegian culture and a sense of Norwegian identity and way of life became central. The Winter Olympics would help put Norway on the international map, and the country would have an opportunity to show the world that it was a dynamic modern, sophisticated nation yet one firmly rooted in tradition. The Lillehammer Games were thus ripe for study by anthropologists. Indeed, the modern/traditional dichotomy running through Norwegian political and cultural discourse is a recurring theme of this volume. As Klausen observes in one of his two contributions, the ceremonies and peripheral events and exhibitions relied heavily on Norwegian folklore and traditional symbols, yet the Games themselves were very much a part of the Norwegian desire for development as a modern industrial nation.

The book as a whole is the product of a team of researchers, who between them carried out fieldwork inside the local organizing committee, the International Olympic Committee, and during the Lillehammer Games themselves, and at the previous Winter Games in Albertville. Overall, the authors make a contribution to wider anthropological debates about modern identities, global spectacles and festivals, the invention of tradition, and sport and leisure, but they also

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demonstrate the importance of studying the Olympic Games in their own right. The Games (both summer and winter) contain within them enough to inspire the jaded anthropologist who has despaired of finding those exotic rituals, systems of classification, and colorful, dramatic events that seem to have all but disappeared from remote jungles and the tundra. Methodologically, too, the book shows how anthropology has responded to challenges posed by working in modern cultural settings and complex social contexts for which anthropologists have had to build up a new theoretical vocabulary.

The Olympics are all about flux, movement, modernity, and fleeting moments. One problem for the anthropologist is how to capture and represent all of this, especially if the traditional role of the anthropologist is as an interpreter involved in cultural translation. But anthropologists are suitably equipped for these challenges, as they are (and also have been) in a constant state of movement in the field as well, negotiating and interpreting shifts and changes in daily life. Rather than studying in communities, anthropologists study in networks (which makes the traditional method of participant observation almost redundant), and the Olympic Games seem an especially good example of how the researcher must be prepared to constantly shift between being an active participant in people's daily lives and keeping an eye on everything else going on at the same time.

Apart from their relevance to issues of generic anthropological interest and concern, the essays in this volume also offer an important insight into contemporary Norwegian culture. In parts, the tone, content, and style of the contributions verge more on sociology and even cultural studies rather than anthropology—with contributors discussing grand themes such as the Olympics as megadrama, the production of Norwegian culture for domestic and foreign gazes, gender images, and heroic masculinity. Two essays in particular stand out: Roel Puijk discusses the opening ceremony of the Games and remarks on the importance of this for national representation and promotion, while Eduardo Archetti explores the intermingling between individuality, gender, and masculinity at the previous Games in Albertville. While Puijk considers what images of Norway were presented at the opening ceremony (and compares the national and foreign media interpretations), Archetti's chapter examines Olympic ideologies and ideals but is concerned similarly with images (in this case, of masculinities). Both are concerned, in their own way, with national stereotypes—of both the host countries and of individual competitors.

Overall, this book has potential to be widely used, especially on undergraduate courses in sociology, anthropology, cultural studies, sports studies, and gender studies. Furthermore, it offers insight into the very nature of the Olympic Games and the International Olympic Committee as well as contested national versions of the benefits, virtues, and drawbacks of Olympism.

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Mountain Meteorology: Fundamentals and Applications.

By C. David Whiteman, Oxford University Press, New York and Oxford, 2000. xiii + 355 pp, hardback. UK£29.50, US$ 39.95. ISBN 0-19-513271-8.

MRD received a second review of C. David Whiteman's Mountain Meteorology: Fundamentals and Applications *(reviewed in Vol 21, No 1) by an experienced mountain meteorologist and former colleague. Ed.*

C. David Whiteman, Staff Scientist at Pacific Northwest National Laboratory in Richland, Washington, is one of the most respected scientists in the field of mountain meteorology and a brilliant teacher who is highly skilled at presenting complex material in an easily understandable way. He has been involved in mountain meteorological research projects in many parts of the world and has gained access to the essential early European work on mountain meteorology from the Alps, thanks to his wife Johanna, who speaks fluent German and translated key publications. She also worked behind the scenes to help make the book understandable to nonmeteorologists.

Whiteman realized the great potential for a textbook on mountain meteorology that would help students, lay people, and professionals interested in mountain weather. His plans to address the need for a training manual for aerial spraying operations in national forests were supported by the United States Department of Agriculture's Forest Service. In addition, the National Weather Service needed a reference and training manual for their weather forecasters and meteorologists involved in air pollution investigations and forest fire and smoke management. Whiteman was initially concerned about how to satisfy these various expectations. The solution offered in his book can be regarded as a success. He presents the fundamentals in a clear and understandable way that also makes this a perfect textbook for undergraduate courses. The chapter on fire weather and smoke management was written by Carl J. Gorski and Allen Farnsworth, and the one on aerial spraying was authored by Harold W. Thistle and John W. Barry. Reflecting his dedication to science, Whiteman uses metric units along with American

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measures throughout the book. Although most details and examples are from the Rocky Mountains, especially from Colorado, where he spent his early years as a scientist, he includes peculiarities and examples from the European Alps, the Southern Alps of New Zealand, and the Himalayas. The attractive layout and figures—mostly redrawn for clarity—stimulate the reader's interest.

The book consists of four Parts. Part I, on mountain climates, provides insight into the 4 very general factors that determine the Earth's climate (latitude, altitude, continentality, and regional circulation) as well as North American mountain climates. Part II presents the basics of boundary-layer and synoptic meteorology. There is no need to have an extra book about general meteorological knowledge at hand: this part of the book provides information concisely, emphasizing the points essential to mountain meteorology in order to show the reader where mountain meteorology differs from meteorology over idealized flat terrain.

Part III makes the mountain meteorologist's heart beat faster. Mountain winds are described in 2 chapters on terrain-forced flows and diurnal mountain winds. Over the course of 62 pages, the reader learns how the wind blows over or around isolated mountains or long mountain barriers such as the Rockies, how sand and blowing snow are transported by eddies and wakes, and on which side of the terrain obstacle they are deposited. Foehn and Chinook winds are explained; Whiteman describes how they can lead to large forest blowdowns, depending on how the local topography channels strong winds. The slope wind, along-valley wind, cross-valley wind, and mountain-plain wind systems are explained in the chapter on diurnal mountain winds. The scale of circulation, how wind is driven by the surface energy balance, and how it affects atmospheric stability and temperature distribution in valleys are important issues discussed here. The pooling of cold air in valleys at night and the Maloja wind that blows against the apparent local pressure gradient are explained in terms of the valley volume effect. This produces colder air at night and warmer air during daytime in deep and narrow valleys due to the much larger surface-to-volume ratio observed in valleys than over flat terrain.

Part IV deals with selected applications of mountain meteorology, organized in 3 chapters on air pollution dispersion, fire weather and smoke management, and aerial spraying. The 32 pages on air pollution dispersion provide the fundamental information needed to understand the uneven mixing of pollutants in a valley atmosphere. Although this chapter belongs to Part IV, it could just as well have been placed in a separate part, given the fundamental importance of the information it provides. Often, especially in the absence of clouds, it is smoke from chimneys and smokestacks that makes atmospheric circulation and thermal stratification visible. "Fire weather and smoke management" was specifically written for the needs of US fire fighters. But it provides much interesting and essential information that also applies to conditions in mountains of the world where prescribed fires are part of the agricultural system and where it is essential not to burn the land on the wrong side of the ignition lines. "Aerial spraying" similarly focuses mainly on US conditions, where the primary applications are pest or vegetation control, fertilization, defoliation, and control of diseases.

Although the author took great care not to focus only on the mountains of North America, the book does not discuss in detail how knowledge gained in mountains in the middle and high latitudes can be transferred to mountains in the equatorial zone. Although the fundamentals remain the same, it appears that there would still be room for a second volume dealing more explicitly with the specifics of tropical mountain ranges.

Nevertheless, this book can be recommended as a starting point to anyone interested in meteorology—especially mountain meteorology. It is carefully written for a wide audience and is offered at an affordable price despite its hard cover. It will most likely become a standard reference book on mountain meteorology.

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Tourism in the Indian Himalaya

By T. N. Dhar and S. P. Gupta. Indian Institute of Public Administration, Lucknow, in collaboration with SHERPA (Society for Himalayan Environmental Rehabilitation and People's Action), Lucknow, 1999. 292 pp. US$20.00.

Over the last 2 decades, a very substantial body of academic literature has appeared that discusses different aspects of tourism in the Himalaya. However, such literature is often very case orientated or regionally specific, and an overview of developments in the entire area is long overdue. In some ways, this book does perform this function since it catalogues the natural and cultural resources of the region and discusses how they are utilized in the tourism industry, but it fails to combine this with any discussion of the mechanics of tour operations or the travel industry. The result is part catalogue of resources, part hymn of praise to the beauty of the Himalaya, and part tourism promotion exercise.

The work is produced by the Indian Institute of Public Adminis-

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tration, based at Lucknow, and forms part of a series that examines different aspects of Indian public administration, development, and sustainability. It seems to have been written for an Asian audience, and many Westerners will be unfamiliar with units of weight and measure such as *crores* and *lakhs*. Moreover, despite the authors' undoubted familiarity with the tourism resources of the Indian Himalaya, little attempt is made to go beyond the descriptive, or to relate their comments on patterns of tourism activity in the different Himalayan states to the extensive literature of tourism planning and management. Indeed, the book contains very few text references and only a short bibliography. Much of its data is unsourced and outdated (some popular statistics are more than 30 years old), and nothing in the bibliography suggests that the authors have had access to the dozen or so top professional journals that have been publishing relevant material about this region for a considerable time. This gives the impression (probably misleadingly) that the writers are unfamiliar with, for example, the complex studies of the environmental and cultural impact of tourism in Ladakh. They skate over some difficult political issues (such as the status of Jammu and Kashmir) and seem unaware of others, commenting, for example, on the beauty of Arunachal Pradesh and its major Buddhist monastery at Tawang yet failing to note that the latter is off-limits to visitors and that international tourists to the State must negotiate a minefield of restrictions and Inner Line Permits.

The authors are to be commended for their attempt to provide an overview of tourism to this region in the face—one suspects—of very limited resources for both research and publication of this book. Much of the prose is rich and vibrant, extolling the beauties of the region, which goes a little over the top in places but conveys a genuine enthusiasm for the subject. Yet it is difficult to see who the book was written for. Is it intended to be a catalogue of tourism resources? If so, then chapter and verse are needed rather than brief florid descriptions. Is it intended for a domestic audience, to summarize and compare tourism development policies between the different states? If so, then it partially succeeds, but this is offset by the fact that its statistics are out of date and poorly referenced. Is it intended to summarize what efforts are being made toward the development of sustainable tourism policies? Here, again, it partially succeeds, but the lack of text references and nonexistent integration with Western literature is a major drawback. If it is intended as an overview of Himalayan tourism for Western readers, then it definitely fails, as coverage is patchy and little non-Indian literature is cited. It certainly succeeds as a resource book, but, this being the case, it is difficult to imagine that many copies will be sold. The authors are guilty of gross generalizations and producing descriptive, rather than critical or analytical, accounts of tourism development, which lessens the work's potential contribution to the literature of tourism planning.

The final chapter presented an opportunity to knit all the material together, but no attempt was made to create an integrated discussion of transport issues, for example, or the role of tour operators, although the authors comment sensibly about issues of seasonality and the special problems of pilgrim tourism. It seems possible that the writers did not have access to the wider literature on the subject. If they did, then the works are not cited. The result is a curiously dated book that makes references to pieces of tourism planning carried out decades ago but none to recent non-Indian projects that attempt to deal with Himalayan tourism, such as the Annapurna Conservation Area in Nepal. The work remains a catalogue, to be consulted and referred to rather than read, and its slightly antiquated style, combined with its authors' undeniable enthusiasm for the subject, gives it a great deal of charm. But it remains a wasted opportunity.

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Alpine Plant Life: Functional Plant Ecology of High Mountain Ecosystems.

By Christian Koerner. Springer-Verlag, Berlin, Heidelberg, New York, 1999. 338 + ix pp. US $64.95. ISBN 3-540-65438-0 (softcover). US $119.00. ISBN 3-540-65054-7 (hardcover).

Although plant physiology study has a history of more than 2 centuries, study of physiological ecology of alpine plants only started in the 1900s, with studies focusing on the measurement of photosynthesis, transpiration, and growth. After the 1950s, reproduction, solar radiation and UV effects, water relations, plant nutrition, and gas exchange became active areas of research in the physiological ecology of alpine plants. *Alpine Plant Life* is an up-to-date review of studies on the ecology of plants from most of the world's alpine regions. As acknowledged by Koerner, the approach of his book is influenced by the modern comparative and experimental approach founded by Arthur Pisek, the ecosystem approach introduced by Walter Larcher, and the author's own approach of using environmental physics to examine ecological processes of alpine zones.

The author begins by providing an historical overview of alpine plant ecology. He then describes

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the distribution of alpine environments around the world, the general characteristics (ie, climate, soils, and nutrient and water resources) of alpine environments, and the multitude of interactions between alpine plants and their environment. Next, he discusses not only how these interactions result in the plant structures (growth forms), growth, and development in alpine plant communities but also how alpine plants modify their microhabitats. Then the relative significance of clonal propagation and seed dispersal as the mechanisms of reproduction by alpine plants is evaluated. Finally, there is a brief discussion of how global change might affect the alpine ecosystem that is vulnerable and sensitive to disturbance due to thin soil cover and the long life cycles of plants.

The structure of the book and the approach in presenting information make it easy to read. Highlighted information throughout the chapters and summaries at the end of each chapter assist readers in recapturing important information. Color plates included at the end of the book serve as a good summary of the book's contents. While covering all the relevant aspects of a topic in detail is impossible, the author succeeds by either trying to inform readers of the aspects he is focusing on or referring readers to references that contain further information. The author's own research, as well as the research of others he discusses, provides the most up-to-date information about the ecology of plants at high altitudes. Thus, this book is aimed at a wide range of readers, from interested undergraduates and graduates to researchers who wish to enrich their knowledge or formulate research topics. Although the book does not deal strictly with physiological ecology, it would serve well as a textbook for an introductory field course on plant physiology using alpine communities as a specific example.

Future alpine biochemical and cellular research that looks at the interactions between plants and the environment at the molecular and cellular levels may provide new interpretations of alpine plant structure and function. Our current understanding points to the conclusion that alpine plants are small in order to cope with the often harsh alpine environment; their low stature serves to create their own climate, decoupling them from any unfavorable ambient climate. This conclusion is probably not new to many alpine researchers. However, the approach that Koerner takes to reach this conclusion will make this book comprehensible and appealing to readers. By synthesizing information from many single-factor studies (ie, studies that correlate a physiological process with a specific environmental factor) and cross-referencing among chapters, the author conveys the connectedness and relevance of various environmental factors and physiological processes in characterizing alpine plant life. His interpretations of the "complex, partly inherent restriction of growth that causes alpine plants to remain small" are inevitably speculative because more studies that directly examine the complexity of alpine plants' physiological processes are needed.

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