books. I am glad to see a chapter on geochemical cycles in this book and the author refers the reader to this chapter when discussing the ozone loss by nitrogen oxide radicals in chapter 10. There are thirteen chapters in the book, all of which have been carefully chosen and written. The chapters on simple models, atmospheric transport, continuity equation and aerosols will be very useful to those with a general chemistry background to understand the intricacies of atmospheric chemistry.

Another observation made by Johnston[1] in his review was about how the history of global ozone balance gives an excellent example of the scientific method: observation, postulate, test of postulate, etc. As the author points out in the preface, atmospheric chemistry is very much an observational science. The issues involved, such as acid rain, ozone depletion by commercial products such as halons and freons, smog formation by pollutants, etc. have large social, business and political implications. A scientist should avoid sensationalism and report the observation and postulates and the results of the tests of postulates. The chapter on greenhouse effect is a very good example of writing science. Figure 7.2 adapted from another source[2], shows the effect of global warming by greenhouse gases with the surface temperature increasing by 0.6 K in the last 150 years. It also shows how the surface temperature has been fluctuating by almost 6 K over the past 150,000 years. The author concludes by saying that 'our best understanding from climate models is that the warming is in fact due to increase in greenhouse gases'.

Atmospheric chemistry is an active field of research and it is likely to continue in that way. While the book discusses the Antarctic ozone hole, there are recent reports on Arctic ozone loss as well[3]. Also, a group of scientists has discovered that a new molecule identified in the atmosphere, SF_5-CF_3, may be the most potent greenhouse gas, though its concentrations are still very small[4]. There are several good books, monographs and treatise available on atmospheric chemistry (for example refs 5–7). However, the book under review really fills a void that exists in the literature: a suitable textbook on atmospheric chemistry.

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The Earth in Turmoil: Earthquakes, Volcanoes, and their Impact on Humankind. Kerry Sieh and Simon LeVay. W.H. Freeman, New York, USA. ISBN 0-7167-3151-7. 1998. 324 pp. $ 24.95.

Although most earth-processes have impact on the evolution and survival of the human race, these are rarely illustrated in ways that can be appreciated by layman. There may be excellent illustrations of these processes in the visual media, but when it comes to books, most of them are too technical that even an inquisitive reader may be unwilling to take a plunge. Of late, there have been some changes in this approach, resulting in a few off-beat books that are enjoyable to both technical as well as non-technical readers.

The book under review belongs to the latter class of books, that treats science with the kind of sensitivity that might impress even the most dispassionate reader. The sensitivity is so absorbing that an attentive reader can almost feel the pulse of the earth as he reads through this book. In the process, he may also learn to comprehend the varying moods of the earth and the inevitability of its outbursts. This book deals with two of the most awesome and devastating natural processes – earthquakes and volcanic eruptions – based on examples from the United States.

A major part of this book is devoted to a virtual field trip across the United States, visiting sites of some devastating earthquakes and volcanic eruptions during the last century. Portraying the impact of earthquakes and volcanoes on America's landscape and its inhabitants, the journey starts from the Pacific Northwest, takes us through California to the Mississippi Valley, the Atlantic coast and finally, to Hawaii. The sites are carefully chosen, to explain varied tectonic processes at work in the plate boundaries, far from them and in the heart of volcanoes. Earthquake mechanisms at converging boundaries, subduction zones and along sliding plates are also illustrated at these sites. At the Cascadia subduction zone, we learn about how a decade of research has dug up giant, unknown earthquakes from the past. Travelling further south, we visit the San Andreas fault, which has given us a wealth of information on earthquakes and remains the basis for many fundamental theories on their origin and recurrence. Three chapters of this book are devoted to this structure. Relatively less understood inland processes are explained at New Madrid and Charleston, both of which have experienced devastating earthquakes during the 19th century. During this cross-country trip, we also get to see snapshots of spectacular landforms caused by earthquakes and learn about their evolutionary secrets.

This book is a careful blend of scientific expositions, interesting anecdotes and eyewitness accounts. Accounts of people who have been through these disasters portray their human side – some of them very moving. The image of the California highway patrol officer who drove off to death on the collapsed highway during the 1994 Northridge earthquake leaves an unsettling image of urban devastation (this picture of the highway is on the cover of the book). The experience of the two geologists who flew out of the erupting Mt. St. Helens (and out of death), in a matter of microseconds is a gripping account of human encounters with the forces of nature. An earthquake can save lives too – like that of the elk that

escaped, as the perplexed hunters watched the rupture of the 1983 Borah Peak earthquake develop before them.

Kerry Sieh must have developed a great attachment to the San Andreas fault, to which this book accords a celebrity status. He has spent nearly a quarter of a century, digging into it, reconstructing its history and attempting to forecast its future. Sieh began his studies of the infamous fault from Carrizo Plain that he later named as Wallace Creek (in honour of Robert Wallace who had encouraged Sieh's project). His efforts starting with trenching at Wallace Creek and Pallet Creek, looking for the predecessors of 1906 earthquake laid the foundations for palaeoseismology, which has later emerged as a powerful tool to reconstruct earthquake history of a fault. In these trenches we can learn how seismically-induced features are formed and how they are used, to explore the history of a fault. We can measure the slip produced by earthquakes in the past and use them to develop models of recurrence. The adventure of the Sieh's field exploration, combined with the excitement of unravelling the secrets of the earth can be very motivating to students of geology.

All through this book, there is an emphasis on how to interpret the histories of faults and volcanoes and how to use patterns of past behaviour to predict what lies ahead. That is one way of increasing our ability to face them and minimize their effects. The discussion on mitigation strategies is brief, the main point being strengthening unreinforced masonry buildings. There is a brief discussion on costs and benefits.

Perhaps, this book is not intended to be a textbook, but there are many things that students can learn and teachers can refer to in their lectures. It is most useful for to those who are keen to learn about the working of the earth and have the patience to go over a few basic ideas that are essential to understand the grand scheme of things. To the relief of the popular readers, the basics are done without much complication. Science journalists specializing on natural disasters would find it particularly useful.

There are several colour plates – among them are locations of California faults visited in this book, scarps formed during earthquakes, trench sections, sand-blows and aerial photographs. In the brief appendix, the authors explain earthquake magnitudes and techniques of Global Positioning System and radiocarbon dating. An enthusiastic reader may need to search standard textbooks to follow up on some concepts introduced in this book, but there is a glossary to give a quick grasp. In summary, this is a thoroughly enjoyable and exciting book, both for the general reader as well as for the students and practitioners of earth sciences.

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Science of Field Crop Production. Gururaj Hunsigi and K. R. Krishna. Oxford and IBH Publishing Co Pvt Ltd, 66, Janpath, New Delhi 110 001, India. ISBN 81-204-1287-7. 1998. 433 pp. Price: Rs. 190.

Global food production has shown significant improvement in the past few decades due to major breakthrough in agricultural science and helped in meeting the challenges of food and nutrition security. However, the world still faces an increasingly complex challenge of feeding its growing population while assuming the sustainable use of its natural resources. Hence maximizing the agricultural crop production and productivity is the major goal of the scientists across the world. Agricultural research in the national and international research organizations and universities has helped in evolving improved crop varieties, appropriate crop production practices and post-harvest technologies. The wealth of knowledge generated needs to be compiled and disseminated for the use of scientists and farmers.

Science of Field Crop Production by Gururaj Hunsigi and K. R. Krishna is a concise compilation of the current accumulated knowledge on the production of important crops, including cereals, legumes, oilseeds, fibre crops, sugar and starch crops and narcotics. There is information on 31 field crops with greater emphasis on aspects such as global distribution, climatological requirements, morphological and physiological features, land preparation and crop establishment practices, crop protection practices, availability of improved varieties and post-harvest technology. The information emanating from the international research institutes, leading agricultural universities and related organizations has been used extensively. Although the focus is on global crop production practices, the Indian agriculture perspective has also been highlighted.

In 'Principles of crop production' the authors have discussed the various agronomic practices which influence the process of yield formation. This includes seed viability, early seedling emergence and establishment, plant density, improved genotype with a desired architecture, balanced nutrition of both macro and micro plant elements, protection and post-harvest technologies. Since the yields of many important food crops have plateaued, it is imperative to understand the mechanism of yield formation so that the yield barriers can be broken. This raises a fundamental question as to what is the theoretical upper limit or the production potential of both biomass and grain yield of a crop in a particular environment? Can we define a plant type or an ideotype with a higher yield potential and direct the breeding efforts towards this goal. This is being done for major field crops, including rice, brassica, etc. Crop simulation models can be also used for defining a desired plant type, calculate potential productivity, understand the adaptation of field crops to adverse climatic conditions, including biotic and abiotic stresses, optimize complex cropping systems and understand crop nutrient dynamics in order to effectively manage soil fertility and fertilizer usage. Similarly biotechnological techniques can help us to break the yield barriers, improve the crop quality and develop disease-resistant transgenic plants. Transgenic cotton carrying the *Bt* gene for resistance to lepidopterous pests is already under cultivation. The importance of molecular marker methodology for identifying and tagging