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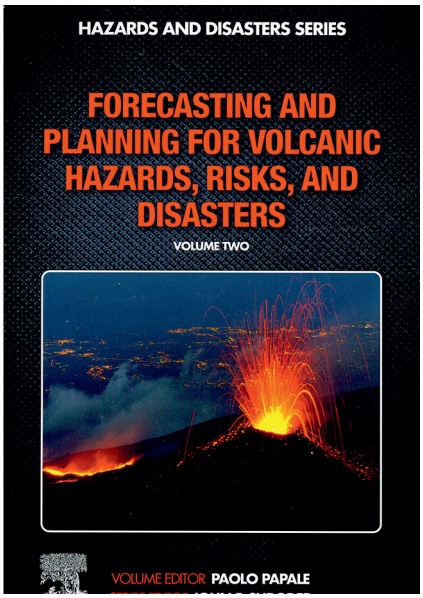
Forecasting and planning for volcanic hazards, risks, and disasters, by Paolo Papale (Ed.), 2020. Elsevier, London, 708 pages. Paperback: price $150.00, ISBN 9780128180822.



It is far from easy to present a brief summary of the contents of this voluminous and slightly heterogeneous book. First of all, it must be said that this is the second part of a project of which the first part (Volcanic hazards, risks and disasters, edited by Paolo Papale) was published in 2015. Together, the two volumes comprise over 1,200 pages and set out to be a point of reference amongst recent items of literature on volcanology. The editor considers this new tome not to be an update of, but rather a complement to, the first volume. There are primary hazards that associate with volcanic eruptions, such as pyroclastic currents, tephra fallout, lava flows, volcanic gases, seismicity and ground deformation. All of these topics were covered in the first volume. Unlike other types of sequels, however, the present volume leaves the reader longing for the original. In short, readers have to familiarise themselves with both volumes in order to obtain a complete idea of volcanic hazards and risks. What came as some surprise to me is the fact that, in spite of the title of the series referring to the application aspect of volcanology (i.e., assessment of hazards and volcanic risks), some chapters are dedicated to basic aspects of volcanology. It looks a bit as if the authors decided to produce an all-encompassing text so that the reader can start from volcanological processes and then fully grasp the application to volcanic emergencies and forecasts. In this sense, the present tome follows the archetype proposed by Blong in his outdated, but always enjoyable, book entitled, 'Volcanic hazards: a sourcebook on the effects of eruptions'.

The present book comprises 18 chapters that deal with various aspects of volcanological research, each chapter with its own list of references. The opening chapter introduces Papale's ideas about hazard forecasts and management of volcanic crises. Somehow, this represents a conceptual introduction of the tome. Topics such as uncertainties characterising volcanic processes, volcanic alert levels (all of us are now experiencing the consequences of alert levels during this pandemic period), forecasting size and impacted areas of a next eruption are discussed with useful references to chapters to follow. However, a very alarming point in this chapter is the revelation that the annual probability of occurrence of a volcanic super-eruption is 100 larger than the crash of an airplane. In other words, 'You should take 10,000 flights for the probability of a fatal accident to become comparable to that of a super-eruption'!

Chapters 2, 5, 6, 7, 9 and 10 discuss methodological approaches in various branches related to the science of volcanoes. Specifics regarding seismological investigations, mechanical properties of volcanic rocks, numerical modelling of volcanic conduit processes, field volcanology, petrology, dynamics of explosive eruptions and magma flow are outlined. These chapters, all well written and readable, break little new ground, because the topics discussed are covered to a lesser or greater detail in other recent textbooks on volcanology. The illustrated descriptions and models effectively summarise the recent literature in the field. A large section of the present volume includes chapters in which volcanic hazards are associated with a specific methodological approach: volcano geodesy (Ch. 3), geochemical

monitoring (Ch. 4), volcano lake dynamics (Ch. 11) and remote sensing (Ch. 12). Each chapter starts by illustrating the physical and chemical principles on which that specific methodology is based and then presents how geochemistry, ground deformation, gravity field thermal emission and infrasound emissions constitute the pillars of most volcano-monitoring programmes. Chapter 8 illustrates state-of-the-art research on volcanic risk assessment related to tephra (a collective term to indicate any airborne pyroclast) fallout hazards. Recent volcanic crises have demonstrated that moderate eruptions can paralyse huge areas for extended periods of time. The present book includes a checklist for crisis operations at volcano observatories (Ch. 13); this is specifically designed to ensure that the person(s) on duty do(es) not forget about some critical tasks, but is also important to explain how observatory personnel decide about any formal hazard warning or mitigation measures. The core of the present tome is probably Chapter 14, in which a risk reduction strategy is presented with the help of an exercise consisting of a simulated reactivation of the Campi Flegrei caldera near the populous city of Naples. A user-friendly, web-based volcanic hazard assessment system is illustrated in Chapter 15: the system's new URL https://volsimulation.org, which will be functional from February 25, 2021. In the remaining chapters authors focus on some case studies. Selected regions are Colombia (Ch. 16), Chile (Ch. 17) and Kagoshima Prefecture in Japan (Ch. 18). All these areas have many active volcanoes, some of which erupted in historical time. It is interesting to learn how monitoring of volcanic activity and volcanic hazard assessment are performed in these countries. As stated by Marta Calvache and co-authors, 'the Armero disaster left great lessons for worldwide volcanology, both from a technical and social point of view'.

One or two points are worth noting. Some authors are listed in the index of contributors by their first name, rather than by their surname (e.g., the famous Marta Lucia Calvache Velasco is placed after Lokmer). This could be considered a very minor problem, were it not limited to South American authors. The printed volume is different from what appears on the publisher's website (https://www.elsevier.com/books/forecasting-and-planning-for-volcanic-hazards-risks-and-disasters/papale/978-0-12-818082-2), in terms of pages, number of chapters and topics covered. The difference between these two (i.e., only half of chapters, but same number of pages) tells us a lot about the original intentions and the evolution during the editorial process. Discrepancies between the online and printed version should be resolved as soon as possible to allow readers (who see the online version) to see the real contents of this book.

This certainly is a timely publication, considering the progress that has been made towards our understanding of details of volcano dynamics, of additional methods related to volcanic hazard and risk and the role of scientists during volcanic crises. If, as I hope, there will be a third edition in future, I recommend that the editors include exercises into the various chapters to turn the book into more of a workbook. Who would I recommend this volume to? Well, I think it would be useful to researchers at the start of their scientific careers who wish to approach volcanic risk assessment methodologies. It is a resource for anyone who teaches or takes a course on volcanic hazards, and for volcanologists who actively work to reduce volcanic risks. This tome will appeal not only to volcanologists but also to people who manage all types of mitigation strategies.

Claudio Scarpati
University of Naples Federico II, Naples, Italy
e-mail: claudio.scarpati@unina.it