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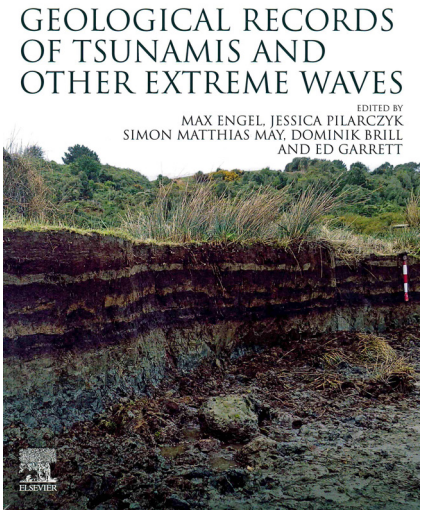
Book reviews

Geological records of tsunamis and other extreme waves, by M. Engel, J. Pilarczyk, S.M. May, D. Brill & E. Garrett (Eds.), 2020. Elsevier Inc., Amsterdam. 848 pages. Paperback: price €156,19, ISBN 9780128156865; e-Book: price €156,19, ISBN 9780128156872.



Extreme inundation events have dramatic impacts on coastal populations and infrastructure. Well-known examples include the 2004 Indian Ocean and the 2011 Tohoku (Japan) tsunamis, as well as Hurricane Sandy on the east coast of the United States in 2012 and typhoon Haiyan across the Philippines a year later. In recent year, the severe impact of extreme inundation events has intensified research into tsunami deposits in coastal depositional environments. The present broad-based, up-to-date compendium, devoted to geological records of tsunamis and other extreme waves, is a milestone based on research in a field that has systematically evolved as a subdiscipline of sedimentology over the last 30 years.

The present tome summarises the state of the art in palaeotsunami research at the crossroads between sedimentology and tsunami science, as provided by leading scientists in the field. This first systematic synopsis of palaeotsunami research includes discussions of sediment types and sources, field methods, sedimentary and geomorphological characteristics, as well as dating and modelling approaches. Focusing on operational workflows, methodological details, opportunities and limitations associated with specific proxies, this new compendium goes far beyond the book *Tsunamites*, edited by Shiki et al. (2008), which was the first compilation of geological aspects of tsunamis. By comparing and contrasting tsunami deposits with those of competing mechanisms in the coastal zone, such as storm waves and surges or long-term coastal processes, the present volume is also relevant to those readers who are interested in (palaeo)tempestology, coastal geomorphology, coastal sediment dynamics and coastal hazards in general.

The variety of relevant sedimentological, geochemical, geophysical and biological proxies typical of tsunami-induced strata is clearly the main focus of the present book. Its systematic, handbook-like character and its proxy-by-proxy structure may serve as a manual and will guide site- and goal-specific research designs. The comprehensive index, in combination with the use of clear and concise keywords at the beginning of each chapter, provides easy access to any application and proxy. The book offers advice on the most appropriate mapping, sampling and analytical approaches to researchers, which widely vary according to local coastal settings and depositional environments. At the same time, the chapters are designed and structured to work also as stand-alone, review-type contributions.

The present tome comprises a total of 36 chapters, which are grouped into five main sections. Section 1 (Introduction) provides an overview of palaeotsunami research (Chapter 1), emphasises the significance of historical records (Chapter 2) and explains different tsunami magnitude scales that help to quantify individual events (Chapter 3). Chapter 4 then summarises the most important triggers and hydrodynamic characteristics of tsunamis, before the main challenges in establishing palaeotsunami data bases are introduced (Chapter 5). Chapter 6 summarises the most promising onshore environments in the search for tsunami deposits.

Section 2 (Field methods) offers a comprehensive overview of state-of-the-art field methods applied within the framework of palaeotsunami (and pal-

aeostorm) research. Chapter 7 guides the reader in the prospection and sampling of offshore deposits. As the main body of the book is devoted to onshore tsunami deposits, this chapter also provides a brief overview of the main characteristics of offshore tsunami sediments and geomorphological impacts. Chapter 8 presents the application of ground-penetrating radar in mapping subsurface tsunami deposits, while Chapter 9 discusses the mapping of subaerial coarse-clast deposits dislodged by extreme-wave events. Suggestions of how to organise and conduct field surveys of the effects of recent tsunamis are provided in Chapter 10.

In Section 3 (Fine-grained deposits), the most important analytical methods and proxies for investigating and identifying fine-grained, extreme-wave deposits are presented and explained, covering the topics of sedimentologyand geometry (Chapter 11), foraminifera (Chapter 12), ostracods (Chapter 13), diatoms (Chapter 14), molluscs (Chapter 15), magnetic susceptibility and anisotropy of magnetic susceptibility (Chapter 16), X-ray tomography (Chapter 17), geochemistry (Chapter 18), microtextural analysis of quartz grains (Chapter 19) and ancient sedimentary DNA (Chapter 20). Further notable aspects of Section 3 include post-depositional changes of tsunami deposits (Chapter 21), erosional signatures and reorganisation in ridge-and-swale sequences (Chapter 22), as well as a review of experimental and numerical models of fine-sediment transport by tsunamis (Chapter 23).

Section 4 (Coarse-clast deposits) is dedicated to the coarse-clast record, comprising spatial patterns of coastal boulders and blocks (Chapter 24), megatsunami conglomerates (Chapter 25) and the impactof tsunamis on rocky coastlines and the post-depositional weathering of subaerial clasts (Chapter 26). The remaining three chapters in this section cover modelling approaches with experimental models of boulder transport (Chapter 27), inverse and forward modelling of boulder transport (Chapter 28) and Nott's and other formulas of incipient motion in reconstructing magnitudes of high-energy events from their boulder deposits (Chapter 29).

Finally, the most important dating methods are presented in Section 5, including radiocarbon dating for coastal stratigraphical sequences (Chapter 30), radiocarbon and U/Th dating applied to boulder deposits (Chapter 31), optically stimulated luminescence dating (Chapter 32), archaeological dating (Chapter 33), tephrochronology (Chapter 34), cosmogenic nuclide dating of boulder deposits (Chapter 35) and pioneering approaches into palaeomagnetic dating of boulders (Chapter 36).

In summary, I would recommend this book not only to researchers who are interested in geohazards and event deposits, but also to the larger community of sedimentologists as it sheds new light on many aspects of sedimentary research.

References

Shiki, T., Tsuji, Y., Minoura, K. & Yamazaki, T. (Eds.), 2008. *Tsunamites*. Elsevier, Amsterdam, 432 pp.

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