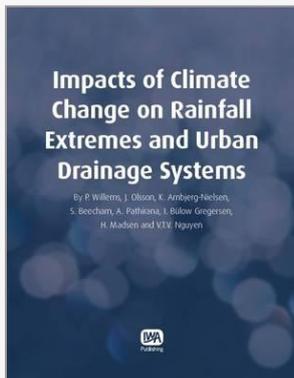




# Impacts of Climate Change on Rainfall Extremes and Urban Drainage Systems

A book review



Edited by P. Willems, J. Olsson, K. Arnbjerg-Nielsen, S. Beecham, A. Pathirana, I. B. Gregersen, H. Madsen, V.-T.-V. Nguyen

IWA PUBLISHING

238 pages | Paperback  
1<sup>st</sup> edition | September 2012  
ISBN 978-1-78-040125-6

Price: €120.15

[Impacts of Climate Change on Rainfall Extremes and Urban Drainage Systems](#) deals with an interesting and practical area of climate science: its effect upon rainfall in urban areas. It is commonly difficult to assess the impact of this, as it requires increased downscaling of global climate models, which are typically of a much coarser resolution than that needed for fine scale urban applications.

There are seven contributing authors, all professors and lecturers from various global institutions, for example Patrick Willems of the University of Leuven and Jonas Olsson of the Swedish Meteorological and Hydrological Institute. Their main intention is to provide both a review of current methods of assessing climate change impact upon urban rainfall extremes, and a practical guide on these methods. The volume is comprised of eleven chapters, progressing from technical methods used to analyse a problem to ways of addressing them in future developments.

It is suited primarily to scientists and researchers in hydrology, but is also applicable to practitioners in the field of urban drainage, engineers and designers, for example. It is highly technical in nature, but does a good job of reinforcing key ideas with the reader, so that those unfamiliar with the subject matter would be able to grasp the core concepts after the first few chapters. In this respect it is suitable for students of climatology, meteorology and statistics.

The first part of the book takes a look at the current methods of determining rainfall extremes, from stochastic generation to multifractal processes. It then puts this into a temporal context, to account for the fact that rainfall patterns follow trends over time. Following this is a discussion into global and regional climate models and how these models can be downscaled to fit into non-stationary models, used for more localised rainfall predictions. Accompanying these are numerous examples where such analyses and processes

have been applied to real datasets in various locations throughout the world.

The discussion of multi-decadal oscillations and the issues facing researchers in distinguishing climate change trends from them was particularly interesting. This has an impact for urban drainage design as although a particular phase of an oscillation pattern may cause there to be less frequent rainfall events, the effects of climate change may mean the rainfall extremes for these few events are higher. Designing an urban drainage system based on a cumulative rainfall average (as predicted by a model that accounts for climate oscillations) could underestimate extreme values and lead to increased runoff and flooding during a storm. This is just one of the many complications faced by modellers in dealing with integrating climate change and urban issues.

The statistics on combined and parallel drainage systems and their use per country provides food for thought. Parallel systems, where storm runoff and wastewater is treated separately, are now increasing in use, but many cities are still built on the older combined system, which has implications for health and sanitation should overflow become a problem.

There is also something to be said for the adaptive approach to design solutions, which are often used in ecology, an area that typically has high levels of uncertainty. This approach advocates a gradual departure from large drainage infrastructures to more compartmentalised, easily altered and more responsive infrastructures. The book gives numerous examples of possible design solutions for the practitioner to incorporate.

Finally, the authors make a point that climatology is a rapidly updating field of study, recommending the aforementioned adaptive, flexible approach to future urban design, and advising against relying on one method alone. Re-evaluating techniques and progressing the science even further is necessary as opposed to merely upgrading technical solutions.

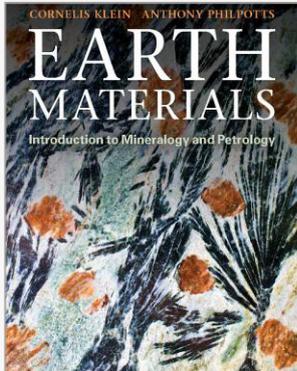
All in all, this is a very thorough volume and worth having on the shelf, especially if you deal with the practical side of weather modelling for urban applications. Again, it is very heavy on the technical side and is highly process oriented, but it does provide some important insights into the field.

*Holly Ferrie*

*Geosciences student, Department of Environment,  
Earth and Ecosystems, Open University, UK*

# Earth Materials: Introduction to Mineralogy & Petrology

## A book review



By C. Klein and A. Philpotts

CAMBRIDGE UNIVERSITY PRESS

552 pages | Paperback  
1<sup>st</sup> edition | September 2012  
ISBN 978-0-52-114521-3

Price: £40 (~€47)

It is increasingly common, particularly in introductory undergraduate and graduate courses, to have to cover a wide variety of contents within the area of petrology and mineral sciences in the same module. [Earth Materials](#) is a high quality textbook and the ideal resource for such courses. This profusely and beautifully illustrated book offers an even balance of the most fundamental concepts in mineralogy, crystallography and petrology and concentrates in a single volume what would otherwise only be found in several handbooks of these disciplines.

The book is authored by two individuals who, in addition to a professional career teaching mineralogy and petrology, have a wealth of experience authoring some of the most relevant textbooks in both these disciplines. Cornelis Klein, Emeritus Professor at the University of New Mexico is co-author of the latest five editions of the notorious [Manual of Mineral Science \(Manual of Mineralogy\)](#) after J.D. Dana, a modern classic textbook in mineralogy. Similarly, Anthony Philpotts, Emeritus Professor at the University of Connecticut, has authored reference textbooks in petrology such as [Principles of Igneous and Metamorphic Petrology](#) and [Petrography of Igneous and Metamorphic Rocks](#).

The book gathers this experience authoring textbooks on mineralogy and petrology and provides a concise but comprehensive introduction to these foundational topics for any geosciences student. Furthermore, the book is not a mere juxtaposition of textbooks on mineralogy and petrology, but a handbook which is well framed into the wider picture of Earth sciences as it highlights the relationships between these disciplines and tectonics, environmental sciences and economic geology.

The contents of the book are shown in a clear and sequential way. After two general introductory chapters, chapters 3 to 6 constitute

the core mineralogy part of the book, including a comprehensive look into crystal structures and crystallography in addition to a complete description of optical crystallography and polarising optical microscope methods and observations. Descriptive mineralogy is interwoven with the petrological contents in chapters 7 to 14, highlighting the link between both disciplines. These chapters describe minerals and rocks, following, for each wide rock group (igneous, sedimentary and metamorphic) the sequence: 'rock-forming minerals', 'how do rocks form' and 'classification and plate tectonic significance'. The last chapters (15-17) focus on economic minerals and rocks, environmental issues, human health and risks derived from the use of Earth materials.

Text boxes in each chapter highlight complementary information related to the main body of the chapter, such as historical notes or analytical techniques. Some of these boxes refer to web resources, such as the one in chapter 6 on the US National Institutes of Health [ImageJ free software](#), which can be used to make modal analysis of thin sections. This information, the possibility of viewing crystal structures in 3D with [CrystalViewer](#), a free software available from the book's website, and the online resources provided at the end of each chapter constitute, in my opinion, an added value to the textbook. However, in future editions of this book, it would be nice to see this information on web resources and online tools extended.

The 'Summary and review questions' sections at the end of each chapter are especially relevant from the point of view of teaching. This is where students can find excellent bullet-point summaries of the main concepts in each chapter and test their knowledge after studying.

This book is, therefore, a highly recommendable textbook for the amplitude of its contents (shown in a very structured and interconnected way), the amount of learning resources and the use of a simple but accurate and engaging language. These characteristics make it useful not only to geology students but also to students from other disciplines within geosciences and beyond. The book is also attractive and very useful for the senior Earth scientist who wants to have a clear and concise reference text covering the most fundamental concepts in mineralogy, crystallography and petrology.

*Miguel Gomez-Heras*

*Researcher in stone decay at the Universidad Politécnica de Madrid and the Institute of Geosciences, Spain*

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