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# Evaporites



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John K. Warren

# Evaporites

A Geological Compendium

Second Edition

 Springer

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ISBN 978-3-319-13511-3      ISBN 978-3-319-13512-0 (eBook)  
DOI 10.1007/978-3-319-13512-0

Library of Congress Control Number: 2015959844

Springer Cham Heidelberg New York Dordrecht London  
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*For my wife, Jennifer  
my sons,  
Matthew and Tristan*

*Eppur si muove  
(And yet, it does move)  
Galileo Galilei after recanting Copernican beliefs*



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## Preface

So here it is, most of the way through 2015, 8 years after my last effort on this topic, and I am writing yet another preface to yet another edition on evaporites. Once again, my aim is to give you, the reader, a timely overview of our current understanding of all matters evaporitic. That is why the reference list is now the length of a novella and I have added three new chapter topics compared to the 2006 incarnation. And, to massage my ego, I have included the word compendium in the title.

For the first time, the publishers have allowed me to compile an all-colour version, rather than grey-scale. As the use of paper copy for scientific publishing recedes, publishers are finally moving into the digital world, sometimes scratching and screaming. Then again, copyright and intellectual property issues related to information and intellectual property on the internet will be an earner for the legal profession for decades to come. A digital base to any scientific compilation allows a breadth of coverage in the topics and an accessibility to information that is unprecedented, as in all other scientific fields. You can see this evolution in information access in the page lengths in each of my four books on evaporites. The first, in 1989, was a few hundred pages long; the second in 1999, was over 500 pages; the penultimate effort, published in 2006 was over 1,000 pages long; and this current effort runs to more than 1,800 A4 pages.

Yet I now store and access the hi-res digital version of the complete volume, along with numerous other volumes, as a side issue of the use of my smart-phone. On the same device I can link to, search, review and download copies of all related digital information anywhere in the world I can access the net. Needless to say, this is one old-fart scientist who is impressed by this technology. It is a far cry from the 128k Mac that in the mid-1980s I lugged to a house on the coast of Denmark, along with three shipping cases of photocopied references in order to write the first book. On the downside, open internet access has led to a plethora of cacography, prattle and unsubstantiated opinion given as fact.

In this volume I make much more use of online sources, outside the various libraries and subscribed publishing websites. This makes many of the issues and data compilations discussed in this book, both more current and perhaps more relevant but also more readily dated and updatable at the same time. As I sift through much of the unscientific chaff that is presented as fact on the internet, I am very aware of both the strengths and current weaknesses of science conducted on the internet. Outside of the mainstream literature from subscribed publishers and some democratic government bodies, much online material is opinionated and/or uploaded with minimal peer review. As with much educational policy in the Western world these days, the internet approach is by its nature multicultural, largely non-judgemental, non-authoritarian and unfortunately, in terms of science, often phrased in terms of political correctness.

As a rationalist and a non-theist, I welcome the vast increase in freely available knowledge the internet brings. But I worry that logic and rationalism, which underpin all valid science is being lost in many places of education across the developed world. It is swamped in a tsunami of opinionated quasi-superstitious information. In science, not all points of view are equally valid, there are testable hypotheses and then there is opinionated bumpf. One expects the latter from politicians and religious zealots, unfortunately it has entered

matters that should be science-based, such as much of the current climate change discussion, as well as environmental discussions related, for example, to aforesaid climate change, hydrofracing in shale gas exploration, and other low-cost energy-recovery methodologies, as well as the relative merits of vaccinating children and the use of genetically modified crops. It says something about one's intellectual approach to a scientific problem if you tend to use the term skeptic as a pejorative.

Besides the scientific effort involved in writing this book, in order to give the volume broad utility and consistency, a good proportion of the blood, sweat and tears that I put into this volume involved preparing numerous colour illustrations and tables. I hope I have given improved value to the various authors listed, in my converting, compiling and revamping what were mostly their grey-scale and line drawings into Bezier-based colour outputs (all scaled figures with north to top, unless denoted otherwise). For this, thanks also to Saltwork Consultancy Pte Ltd for giving me permission to publish aspects of their evaporite GIS datasets as figures in this volume. In the digital form of this volume, figures should be extractable through any PDF reader and I hope will make a useful teaching and research resource for presentations and writings for anyone interested in matters evaporitic.

I would like to thank the various companies: Chevron Thailand, PDO, PTTEP, SaltWork Consultants Pte Ltd; Shell Brunei, Shell Oman and Statoil, who for the last 20 years have paid my salary allowing me to work as a company-sponsored academic in universities in interesting regions of the world where academic bureaucracy is subjugated to the peoples' thirst for education. So thanks as well, to my host universities of the past two decades: Universiti Brunei Darussalam, Sultan Qaboos University of Oman and Chulalongkorn University, Bangkok. This support has meant my academic teaching for the past 20 years has been based in developing world, in various places where you can be a full-time academic, publish and do research without being involved in the petty bureaucratic politics and political correctness that today plagues the efficiency of most federally and state-funded universities of the Western world.

Most importantly and most completely, my thanks to my wife Jennifer, who even after more than 40 years of marriage still manages to live with her at times abstracted other half.

Bangkok, Thailand

John K. Warren



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