

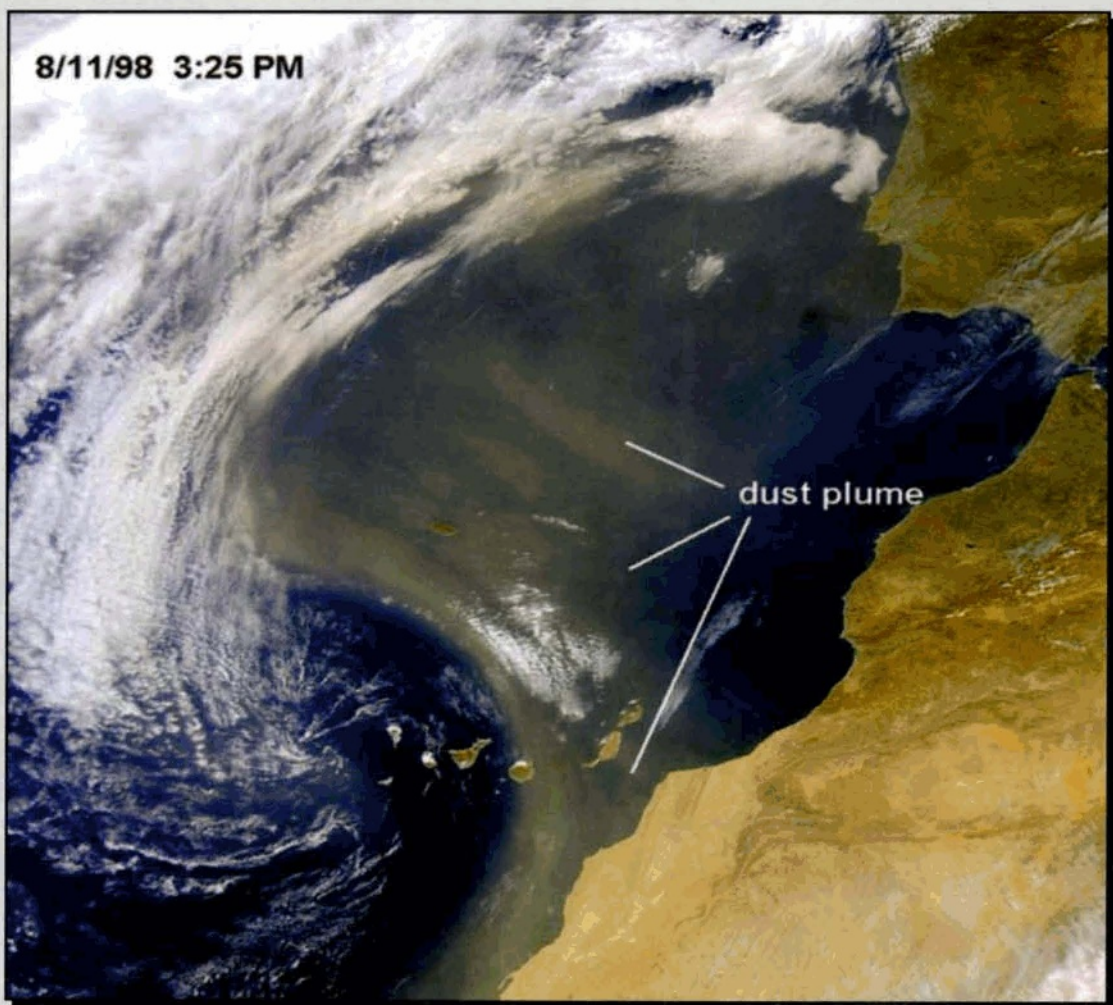
EMU NOTES IN
MINERALOGY

2

Environmental Mineralogy

Edited by

DAVID J. VAUGHAN
and ROY A. WOGELIUS



EUROPEAN MINERALOGICAL UNION
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MINERALOGY

UNIVERSITY TEXTBOOK

Edited by
David J. Vaughan
and
Roy A. Wogelius



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Foreword

The European Mineralogical Union (EMU) launched its series of Short Courses (or "Schools") and accompanying review volumes (The EMU "Notes") in 1997 with publication of *Modular Aspects of Minerals* (edited by S. Merlini). May 2000 sees the second such School (also, like the first, being held in Budapest); in this case on the subject of *Environmental Mineralogy*.

Events and publications such as this are only possible through the generous support of various organisations and of individuals who give freely of their time and energy. On behalf of all of those involved in the School, I should like to thank the Socrates/Erasmus Programme of the European Union, the Hungarian National Committee for Technical Development (OMFB) and other Hungarian higher education institutions for their financial support as well as the EMU itself for providing scholarships in order that certain students without other possible means of support could attend. In the overall organisation of the School, thanks are due to Tamás Weiszburg and his colleagues on the Local Organising Committee who have given tirelessly of their time.

This volume itself was produced against extremely tough deadlines by the efforts of the seemingly inexhaustible and endlessly patient Series Editors, Gábor Papp and Tamás Weiszburg. Both they, and the highly efficient and enterprising staff of Eötvös University Press have earned our sincere thanks for all of their efforts. All of the chapters were subjected to peer review, and I should like to acknowledge the help of S. Boulton, P.V. Brady, J. Macquaker, D.A.C. Manning, D.A. Polya, S. Stipp and J. Zussman in this process. At the same time, it should be emphasised that any such errors and imperfections that remain in this volume are the responsibility of the authors and editors.

Another aspect of the writing and production of this volume concerns its potential role as a textbook for courses in "Environmental Mineralogy", a field that calls on both core mineralogical skills and interdisciplinary understanding across chemical, biological and geological fields. It is an area ideally suited to development of advanced teaching that redefines the boundaries of mineralogy, one of the oldest of the sciences. In that context, this volume fulfils a need defined in the Socrates/Erasmus Programme of the European Union. Sponsorship from the EU in the development of a coordinated European curriculum in mineralogy has been important in bringing this project to fruition, and thus in creating materials for European courses in environmental mineralogy, specifically as an Intensive Programme (IP) which falls at the border between Erasmus CDI and CDA levels. Tamás Weiszburg, as Coordinator of the Erasmus IP on Environmental Mineralogy (and Chairman of the IMA Commission on History and Teaching of Mineralogy) is thanked for all his work on this aspect of the present project.

Personally, I should also like to thank my colleagues on the Council and Executive Committee of the EMU, particularly my immediate predecessors as President, Giovanni Ferraris and Wolfgang Müller, for their support in this venture.

In Manchester, the help provided in many different ways by my secretary, Ms. Pat Alder, is greatly appreciated.

Environmental Mineralogy is a new field, and one of great international importance, not least to the countries of Europe. It is my hope that this volume will contribute to the development of this field, and lead to collaborative ventures involving mineral scientists from European countries and beyond who are concerned with scientific solutions to our many environmental problems.

David J. Vaughan

Director of the EMU School on Environmental Mineralogy
President of the European Mineralogical Union

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Conventions, recommendations and standards used in this volume

Spelling: British English (except for sulfur *etc.*, according to IUPAC recommendations)

Mineral names: Recommendations of the IMA CNMMN

Crystallographic symbols: As used in the *International Tables of Crystallography, Volume A, Space-Group Symmetry*; edited by Th. Hahn; fourth, revised edition; Dordrecht: Kluwer; 1995.

Transcription of Cyrillic characters: British Standard 2979:1958

Notes on the usage of the References lists

Multiple references to an author are listed in the following order: (1) publications of the author alone, in *chronological order*; (2) publications of the author with a single co-author, in *alphabetical order of the co-authors*; (3) publications of an author with more than one co-author in *chronological order*.

Journal names are abbreviated according to the ISDS standards (with a few exceptions in the usage of capital letters and in the transcription of cyrillic characters).