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Dynamic Knowledge Representation in Scientific Domains

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and Dmitry Mouromtsev

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A volume in the Advances in Web Technologies and Engineering (AWTE) Book Series

IGI Global
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Published in the United States of America by
IGI Global
Engineering Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: http://www.igi-global.com

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Library of Congress Cataloging-in-Publication Data

Names: Pshenichny, Cyril, 1973- editor. | Diviacco, Paolo, editor. | Mouromtsev, Dmitry, editor.
Title: Dynamic knowledge representation in scientific domains / Cyril Pshenichny, Paolo Diviacco, and Dmitry Mouromtsev, editors.
Description: Hershey PA : Engineering Science Reference, [2018] | Includes bibliographical references.
Identifiers: LCCN 2017038363| ISBN 9781522552611 (hardcover) | ISBN 9781522552628 (ebook)
Subjects: LCSH: Communication in science. | Communication of technical information. | Information technology--Social aspects.
Classification: LCC Q223 .D95 2018 | DDC 501/.4--dc23 LC record available at https://lccn.loc.gov/2017038363

This book is published in the IGI Global book series Advances in Web Technologies and Engineering (AWTE) (ISSN: 2328-2762; eISSN: 2328-2754)

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

For electronic access to this publication, please contact: eresources@igi-global.com.

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Chapter 7
Formation of Faden Quartz Druses in Mid-Carboniferous Sandstones of the Donetsk Basin

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ABSTRACT

The chapter addresses the mechanism of growth of druses of faden quartz in a tectonically deformed sandstone. A peculiar feature of this type of quartz, the so-called "white tape" represented by fine sub-parallel cracks with fluid inclusions, appears highly informative about the genesis of the mineral and tectonic regime of its growth. Two stages of formation of druses of faden quartz are recognized. The suggested mechanism is checked for contradictions by means of the event bush method. The proposed event bush model appears to describe a wider range of quartz formation environments and therefore may serve as a conceptual framework for various models of quartz growth in sedimentary rocks.

INTRODUCTION

Quartz is one of the most common minerals in the earth's crust. It is abundantly present in sedimentary rocks and occurs, inter alia, in vein mineral assemblages. Its perfectly shaped aggregates in druses of rock crystal, smoky quartz, amethyst and other coloured quartz varieties are desirable specimens for any mineralogical museum. Still, the most valuable at present are considered faden quartz crystals. Quartz with "white tape", or faden quartz, is a quartz crystal with a through white nebulous tape.

The formation of faden quartz has long been debated by mineralogists. Recent studies have brought us close to a solution that seems to stand the test of time. Nonetheless, as is common in geology, this idea, supposedly general in application, was informed mainly by the scientists' intuition, and now we are

DOI: 10.4018/978-1-5225-5261-1.ch007

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Chapter 15
First Results of Formalization of Drilling Knowledge by the Event Bush Method

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ABSTRACT

Geological drilling, being one of the key methods of investigation of the earth's interior and extraction of hydrocarbons and groundwater, represents a highly promising, urgent, yet virtually uncovered area for dynamic knowledge representation. In one sense, it favors some straightforward solution; in another, it brings serious challenges – such as interdisciplinarity and difference in reasoning by formulae and by concepts. Most importantly, existing conceptual models developed in the static knowledge representation paradigm generally do not reflect the dynamic character of the process of drilling. This chapter aims only to start paving this road by examining whether, and how, the principal method of dynamic knowledge representation, the event bush, may work in the interdisciplinary domain of drilling.

INTRODUCTION

Drilling, being one of the key methods of investigation of the earth's interior and extraction of hydrocarbons and groundwater, represents an interdisciplinary domain, which brings together geological and technical, qualitative and quantitative, well-understood and purely intuitive knowledge. Specialists from different fields (engineers, geologists, geophysicists, economists) perceive the issues of drilling differently, and understanding may be readily hampered by discordance of personal perceptions of collaborators or a teacher and student. To efficiently plan and manage drilling campaigns, support teamwork, handle

DOI: 10.4018/978-1-5225-5261-1.ch015

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Dynamic Knowledge Representation in Scientific Domains

The main approach to understanding and creating knowledge engineering concepts is static knowledge. Currently, there is a need to approach knowledge through a dynamic lens and address changing relations on an elaborated syntactic and semantic basis.

Dynamic Knowledge Representation in Scientific Domains provides emerging research on the internal and external changes in knowledge within various subject areas and their visual representations. While highlighting topics such as behavior diagrams, distribution analysis, and qualitative modeling, this publication explores the structural development and assessment of knowledge models. This book is an important resource for academicians, researchers, students, and practitioners seeking current research on information visualization in order to foster research and collaboration.

Topics Covered

- Behavior Diagrams
- Collaborative Research
- Decisions Support
- Distribution Analysis
- Event Bushes
- Graph Visualization
- Petri Nets
- Qualitative Bayesian Reasoning
- Qualitative Modeling

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701 E. Chocolate Avenue
Hershey, PA 17033, USA
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ISBN 978-1-5225-5261-1
90000
9 781522 552611