Sediment-Body Geometry and Heterogeneity: Analogue Studies for Modelling the Subsurface

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Martinius, A. W., Howell, J. A. & Good, T. R. (eds) 2014. *Sediment-Body Geometry and Heterogeneity: Analogue Studies for Modelling the Subsurface*. Geological Society, London, Special Publications, **387**.

Jackson, M. D., Hampson, G. J., Saunders, J. H., El-Sheikh, A., Graham, G. H. & Massart, B. Y. G. 2014. Surface-based reservoir modelling for flow simulation. *In*: Martinius, A. W., Howell, J. A. & Good, T. R. (eds) *Sediment-Body Geometry and Heterogeneity: Analogue Studies for Modelling the Subsurface*. Geological Society, London, Special Publications, **387**, 271–292. First published online August 7, 2013, http://dx.doi.org/10.1144/SP387.2

GEOLOGICAL SOCIETY SPECIAL PUBLICATION NO. 387

Sediment-Body Geometry and Heterogeneity: Analogue Studies for Modelling the Subsurface

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2014
Published by
The Geological Society
London

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Published by The Geological Society from:
The Geological Society Publishing House, Unit 7, Brassmill Enterprise Centre, Brassmill Lane, Bath BA1 3JN, UK

The Lyell Collection: www.lyellcollection.org
Online bookshop: www.geolsoc.org.uk/bookshop
Orders: Tel. +44 (0)1225 445046, Fax +44 (0)1225 442836

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library.
ISBN 978-1-86239-372-1
ISSN 0305-8719

Distributors
For details of international agents and distributors see:
www.geolsoc.org.uk/agentsdistributors

Typeset by Techset Composition India (P) Ltd, Bangalore and Chennai, India
Printed by Berforts Information Press Ltd, Oxford, UK

Preface

Over the past 20 years there has been a major growth in efforts to quantify the geometry and dimensions of sediment bodies from analogues to provide quantitative input to geological models. The aim of this Special Publication is to examine the current state of the art, from both industry and academic perspectives. Contributions discuss both the challenges of extracting relevant data from different types of sedimentary analogue (outcrop, process models, seismic) and the application and significance of such information for improving predictions from subsurface static and dynamic models. Special attention is given to modelling reservoir properties and gridding issues for predicting subsurface fluid flow. As such, the volume is expected to be of interest to both the geoscience community concerned with the fundamentals of sedimentary architecture as well as geological modellers and engineers interested in how these characteristics are modelled and influence subsurface predictions.

This volume covers a number of themes:

- analogue analysis techniques, including outcrop, flume tank studies, seismic studies and data analysis;
- analogue studies from a wide range of depositional environments;
- application of analogues via geological models to reduce subsurface uncertainties;
- new geological modelling methods, such as process-based and hybrid process, and geostatistical methods.

An important message of this collection of papers is that static and dynamic models of (an) appropriate outcrop analogue(s) are used extensively in subsurface reservoir studies and provide crucial information for the understanding and prediction of flow behaviour. It is shown that describing and modelling sedimentary heterogeneity at carefully selected scale(s) in outcrop or reservoir, and by using flow-based local upscaling methods, the resulting porosity and permeability distribution at the reservoir and simulation model scales (the effective permeability architecture) is significantly different from the well scale. Further refinement and enhancement of these static and/or dynamic subsurface models is achieved and documented in this volume by using one or a combination of additional datasets and/or techniques, such as modern analogue data, LiDAR data, seismic modelling, a surface-based approach to model construction, or process-based forward-modelling.

We are sincerely indebted to the authors who have contributed to the volume and to the reviewers whose comments and insight invariably and significantly improved the quality and presentation format of the papers. Without the expertise, dedication and efforts of the reviewers this volume would not have been published. Finally, we thank the staff of the Geological Society, in particular Angharad Hills, Tamzin Anderson and Jo Armstrong, for their quality assurance, prompt technical assistance and patience.

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