

# **Third EAGE Workshop on Pre-Salt Reservoir 2022**

Rio de Janeiro, Brazil  
23-25 November 2022

ISBN: 978-1-7138-6363-2

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2022) by the European Association of Geoscientists & Engineers (EAGE)  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2023)

For permission requests, please contact by the European Association of Geoscientists & Engineers (EAGE)  
at the address below.

European Association of Geoscientists & Engineers (EAGE)  
PO Box 59  
3990 DB Houten  
The Netherlands

Phone: +31 88 995 5055  
Fax: +31 30 634 3524

[eage@eage.org](mailto:eage@eage.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## **SESSION I - OPTIMIZING PRODUCTION AND RECOVERY FACTOR - MODERATED BY NEELSH NEELAMANI**

Calibrating Rock Physics Models for the Brazilian Pre-Salt.....	1
<i>G. Vasquez, M. Morschbacher, J. Justen, E. Abreu</i>	

## **SESSION II - OPTIMIZING PRODUCTION AND RECOVERY FACTOR**

Insights into the Morphology and Seismic Facies of the Barra Velha Formation, Santos Basin Brazil.....	6
<i>S. Toledo, M. Basso, G. Chinelatto, L. De Carvalho Mendes, A. Campana Vidal</i>	
Pore Compressibility of Barra Velha Fm. Rocks.....	11
<i>M. Ceia, S. Fidelis, J. Moreira, R. Missaglia, V. Santos, M. Silva</i>	
En-Échelon Fault-Controlled Ridge Mounds in the Barra Velha Formation – Quantitative Conceptual Analogs for Field Development.....	17
<i>M. Zeller, D.W. Hunt, A.S. Chandler, L.E. Gomis-Cartesio, C. Aizprua, O.P. Wennberg</i>	

## **SESSION III -PRE-SALT E&A: LEARNINGS SINCE 2005 - (PART 1) - MODERATED BY IAN TROTH - PIERRE ALEXANDRE TEBOUL**

Machine Learning Techniques Applied to the Pre-Salt Facies Classification Using Well Logs Data .....	23
<i>L. Brelaz, G. Pinto, M. Martins, A. Souza, J. Campos Júnior, A. Vidal, R. Vilela, J. Silva, I. Borges, F. Pacheco</i>	
Regional Aspects of the Pre-Salt Interval on the Outer High, Santos Basin .....	28
<i>P. Coelho, F. Neves, C. Ribeiro, M. Arena, J. Santos, H. Santos, J. Favoreto, B. Valle, L. Borghi</i>	
Facies Classification & Modeling Methodology of the Pre-Salt Reservoirs in Cameia & Golfinho Fields, Angola.....	33
<i>M. Yamininia, V.R. Laville</i>	

## **SESSION IV - OPTIMIZING PRODUCTION AND RECOVERY FACTOR**

Evaluation of Discrete Fracture Network Modelling in a Brazilian Unique Pre-Salt Reservoir .....	39
<i>A. Chicuta, O.P. Wennberg, J.I. Tollesfsrud, A. Waldum, P.J. Valle, F. Oliver, L.E. Gomis Cartesio, A.P. Coura, A.C. Ribeiro e Silva Stevanato, D. Torres, O.P. Bjørlykke, P. Coutinho Duarte</i>	
Carbonate Rock Type Identification Using Pore Throat Size Distribution Clusters.....	44
<i>O. Karoussi</i>	

## **SESSION IX - DIGITAL INNOVATION - - MODERATED BY NEELSH NEELAMANI**

Unlocking the Potential in Your Core, Thin Section, and Image Log Data Through Image Processing.....	48
<i>J. Dietz, H. Wang, E. Jarvis, S. Hou</i>	
Delineating Structural Geological Using a Automation Focused, Data Driven, and Unsupervised Learning Approach for Signal Decomposition .....	53
<i>A.A. Aqrawi, A.A. Aqrawi</i>	
Upscaling Challenges of Heterogeneous Carbonate Rocks: a Case Study of Brazilian Pre-Salt Analogous.....	59
<i>R. Soltanmohammadi, S. Iraj, T. Rodrigues de Almeida, E. Ruidiaz Munoz, A. Campana Vidal</i>	

## **SESSION V - OPTIMIZING PRODUCTION AND RECOVERY FACTOR**

Subaerial Travertine Facies - A Pre-Salt Oasis .....	65
<i>M. Erthal, F.S. De Carvalho, L.C. Falcão, O.M. Gonçalves Jr, A.P. Da Silva</i>	
Laboratory and Numerical Examination of Oil Recovery in Brazilian Pre-Salt Analogues Based on CT Images .....	70
<i>S. Iraj, R. Soltanmohammadi, T. Rodrigues De Almeida, E. Ruidiaz Munoz, M. Basso, A. Campana Vidal</i>	

## **SESSION VI - DIGITAL INNOVATION (PART1) - CAMILA DE FRANÇA**

Towards Improved Reservoir Characterization in Pre-Salt Carbonates with Integrated Elastic Full Wavefield Inversion.....	76
<i>Y.H. Cha, P. Routh, D. Tang, V. Brytik, J. Barr, S. Nayak, R. Neelamani, R. Sain</i>	
An Approach to Seismic Facies Classification in Pre-Salt Carbonate Reservoirs .....	82
<i>F.J.D. Fernandes, W.M. Lupinacci</i>	
Deep Learning 4D Inversion: A Brazil Pre-Salt Case Study .....	87
<i>Y. Xue, D. Clarke, K. Wang</i>	

## **SESSION VII - POSTER SESSION**

Seismic, Well Logs and Cycles Patterns from Pre-Salt Carbonate Reservoir, Macabu Formation, Campos Basin, Brazil. ....	92
<i>M. Martins, I. Neves, L. Longhi, T. Santos, Y. Camargo, A. Monlevade, K. Conte, R. Alves, H. Bovolenta, F. Polessa, P. Coelho</i>	
Evidence of Reworked Deposits in Carbonate Reservoirs of the Brazilian Pre-Salt Section from Santos Basin, Brazil.....	97
<i>R.S. Paiva de Medeiros, M. Basso, S.L.V. Toledo, G.F. Chinellato, G.F. Matheus, A.C. Vidal</i>	
Karst Macro-Porosity Features and Control Factors on Their Development in a Pre-salt Carbonate Reservoir, Santos Basin .....	102
<i>L. Mendes, M. Basso, S. Toledo, J.P. Ponte, G. Chinelatto, A. Vidal</i>	

Image Segmentation and Pore Network Analysis of the Barra Velha Formation Carbonate Reservoirs, Santos Basin, Brazil.....	107
<i>G. Fernandes Matheus, M. Basso, J.P. Da Ponte Souza, A. Campana Vidal</i>	

A Data Driven and Unsupervised Learning Approach for Salt Segmentation Automating the Extraction of Salt Structures.....	113
<i>A.A. Agrawi, A.A. Agrawi</i>	

**SESSION VIII - OPTIMIZING PRODUCTION AND RECOVERY FACTOR - - MODERATED BY NEELSH NEELAMANI AND ROBERTO DE MELO DIAS**

Achieving Decision Support the Modern Way: Ensemble-Based Modelling of a Pre-salt Reservoir with Large Uncertainties .....	118
<i>A.S. Khan, N. Bastos, A.M. Lopes, M. Santos, J.A. Ferreira, F. Henriques, A. Phade, A. Skorstad</i>	

Bacalhau OBN: Equinor’s First Deep-Water Node Seismic.....	123
<i>P. Santos, E. Schwedersky, C. Hess, K. Sundøy, C. Franca</i>	

**SESSION X - PRE-SALT E&A: LEARNINGS SINCE 2005 (PART 2) GUSTAVO CATAO - PIERRE ALEXANDRE TEBOUL**

The Bacalhau Field: New Insights into Lacustrine Carbonate Platform Development, Santos Basin, Brazil .....	128
<i>D. Hunt, K. Virmond Juk, I. Troth, A. Guillien, C. Luna, I. Masiero, G. Matos, L. Jetlund Hansen</i>	

Deep Learning Techniques Applied to the Pre-Salt Facies Classification Using High Definition Well Core Images .....	132
<i>L. Brelaz, G. Pinto, A. Vidal, R. Vilela, M. Martins, J. Silva</i>	

**SESSION XI - OPTIMIZING PRODUCTION AND RECOVERY FACTOR - MODERATED BY ROBERTO DE MELO DIAS**

Stratigraphical Architecture of Itapema Sediments on Mero Field and Its Reservoir Implications.....	137
<i>E. Gorbenko, L. Kaucsar, Y. Painchaud</i>	

Least-Squares Migration for Improved QI Analysis, a Case Study from Buzios Field .....	142
<i>Y. Balabekov, S. Arasanipalai, N. Chemingui</i>	

Proposal for Formation Evaluation Based on Different Scenarios for Clay Volume Calculation in the Atapu Field .....	148
<i>C. Saraiva , G. Ribeiro, G. Santos, B. Silva, F. Freire, G. Stael</i>	

**Author Index**