

Technical Programme

9th Euroconference on Rock Physics and Geomechanics

MONDAY 17 OCTOBER

Session 1: Rocks at Depth

- 118 **KEYNOTE:** Sau-Wai Wong* (Shell International E&P, USA), Peter Schutjens
20 Years of Geomechanics Technology - Integrating Laboratory Development, Numerical Modelling and Field Observation
- 74 Elli-Maria Charalampidou* (GFZ, GERMANY), Stephen A. Hall, Sergei Stanchits, Gioachino Viggiani, Helen Lewis
Shear Enhanced Compaction Band Identification at the laboratory scale
- 16 Bo-Hyun Kim* (Mirarco, CANADA) Peter Kaiser
Numerical investigation on confinement dependent rock mass strength at depth
- 52 Pamela Tempone* (BP Exploration Operating Company, UNITED KINGDOM), Erling Fjær
Overburden shear wave splitting due to a compacting reservoir above a rigid basement
- 33 Rob van Eijs* (Shell-NAM, THE NETHERLANDS), Antony Mossop, Dirk Doornhof
Fracture pressure estimation in Dutch depleted gas reservoirs

Session 2: Near surface rock & soil

- 120 **KEYNOTE:** Eiliv Skomedal* (Statoil, NORWAY), Kenneth Duffaut
Shallow water flow investigation with multicomponent seismic
- 93 Thomas Benz, Anteneh Biru Tsegaye (NTNU, NORWAY)*, Omid Pourhosseini
A thermodynamically motivated approach to dilatancy in rocks and rock masses
- 11 Vikas Thakur (Statens vegvesen, NORWAY)*, Cino Viggiani, Steinar Nordal
Formation and Propagation of Localized Deformation in marine clays under plane strain condition
- 7 R Durgaryan (GEORISK, ARMENIA), M Avanesyan, M Gevorgyan, S Babayan, G Simonyan
Evaluation of ground conditions and occurrence of local site effect in the territory of Dvin ancient settlement

Session CO2: Subsurface CO₂ storage

- 88 Sietse de Vries* (Shell Global Solutions International, NETHERLANDS), Joel Ita, Ashok Shinde, Rob van Eijs, Mark Davison
Geomechanical aspects of the injection of CO₂ in an underground depleted gas reservoir
- 57 Bjarne Almqvist* (ETH Zurich, SWITZERLAND), Lukas Aschwanden, Karl Ramseyer, Alba Zappone, Philip Benson
Physical and chemical properties of the Upper Muschelkalk aquifer in Northern Switzerland
- 69 Suzanne Hangx* (Shell Global Solutions International, NETHERLANDS), Christopher Spiers, Alwin ten Hove, Anne Pluymakers
Effects of composition and texture on strength of anhydrite caprock and implications of lateral variations for long-term CO₂ storage

Poster Session 1

- 56 Tran Thi-Thu-Hang* (Ales School of Mines , FRANCE), Stephanie Mahe, Frederic Dubois, Marc Vinches, A Chauvet
Methodology for tunnel excavation modeling in a fractured rock mass using a discrete element approach: application to the Saint-Béat tunnel - France
- 80 Santanu Sinha* (NTNU, Norway), Alex Hansen
Two-phase flow in porous media: Multifractality in flow distribution
- 75 Elin Skurtveit* (NGI and CIPR, NORWAY), Reza Alikarami , Anita Torabi
Deformation pattern and mechanical properties of Navajo Sandstone and their impact on CO₂ storage
- 99 Fedora Quattrocchi, Sergio Vinciguerra* (Istituto Nazionale di Geofisica e Vulcanologia, ITALY), Claudio Chiarabba, Mauro Buttinelli, Barbara Cantucci
The remaining gaps for a "safe" geological storage of CO₂: The CO2GAPS vision challenges of "learning by doing"
- 68 C.S. Vishnu* (Indian Institute of Technology, Kharagpur, INDIA), Manish Mamtani, Arindam Basu
Application of Anisotropy of Magnetic Susceptibility and Microcrack Quantification by Fractal Methods in Rock Mechanics
- 65 Suzanne Hangx* (Shell Global Solutions International, NETHERLANDS), Arjan van der Linden, Andreas Bauer, Fons Marcelis
Mechanical weakening of sandstone by carbonate cement dissolution - CO₂ injection into the Captain Sandstone, Goldeneye
- 96 Alexandra Rolland* (EOST Strasbourg, FRANCE), Renaud Toussaint, Patrick Baud, Jean Schmittbuhl, Nathalie Conil
A model to estimate paleostresses from stylolite morphologies and its application on stylolites from the Bure Underground Research Laboratory
- 110 Guido Musso* (Politecnico di Torino, ITALY), Renato Maria Cosentini, Gabriele Della Vecchia, Sebastiano Foti, Cesare Comina
Use of ultrasonic data to generate pseudo logs for the verification of rock integrity
- 130 Ahmad Zarei* (The University of Tehran, IRAN), Hamed Nekooee
Effect of Blasting on Stability of an Open Pit Mine Bench
- 122 Jørn Stenebråten* (SINTEF Petroleum Research, NORWAY), Rune M Holt
Laboratory simulations of geomechanical effects of relevance for monitoring of CO₂ injection into the subsurface
- 48 Claudio Rabe* (Baker Hughes, USA), Jose Cherrez
Application of Thermal Rock Physics on Heavy Oil Project

TUESDAY 18 OCTOBER

Session 3: Computational rock physics

- 108 **KEYNOTE:** Karen Mair* (University of Oslo - Dept Geosciences, NORWAY), Steffen Abe
Breaking up: Modelling fragmentation processing in faults
- 13 Carlo Vinci* (Ruhr-University Bochum, GERMANY), Jörg Renner, Holger Steeb
Hydraulic fracturing: Towards a numerical modeling approach
- 89 Antony Mossop* (Shell / NAM, NETHERLANDS)
An explanation for generalized failure criteria
- 95 Amélie Neuville* (Dpt of Physics, University of Oslo, NORWAY), Eirik G. Flekkøy, Renaud Toussaint, Jean Schmittbuhl
Hydrothermal exchanges in rough fractures using Lattice-Boltzmann methods
- 84 Cathrine Ringstad* (Numerical Rocks, NORWAY), Pål-Eric Øren, Thomas Ramstad
Pore-scale modelling of macroscopic rock properties
- 125 Liming Li* (SINTEF Petroleum Research, NORWAY), Idar Larsen, Rune M. Holt
Grain scale modelling of rock mechanical and petrophysical behavior

Session 4: Fractures, Faults and Localized Damage

- 127 **KEYNOTE:** Gioacchino Viggiani* (Laboratoire 3SR, FRANCE), Pierre Bésuelle, Stephen Hall
Insights on localized deformation in rock using 2D and 3D digital image correlation
- 71 Alan Baird* (University of Bristol, UNITED KINGDOM), Doug Angus, Michael Kendall
Frequency dependent seismic anisotropy due to fracture related fluid flow versus scattering
- 62 André Vervoort* (KULeuven, BELGIUM), Bjørn Debecker
Fracture behaviour of slate: combined analysis of experiments and simulations
- 54 Anita Torabi* (Uni CIPR, Uni Research, NORWAY)
Deformation of porous sandstone and its effect on fluid flow
- 104 Olivier Lengliné* (IPGS-CNRS, FRANCE), Johann Valentin, Jean Schmittbuhl, Michel Bouchon
Acoustic monitoring of a rupture nucleation
- 90 Erika Tudisco* (Laboratoire 3S-R, FRANCE), Stephen A. Hall, Philippe Roux, Giulia M.B. Viggiani
Full-field characterization of localized deformation and damage in soft granular rock

Session 5: Laboratory experiments – influenced by temperature

- 86 **KEYNOTE:** Sergio Vinciguerra* (Istituto Nazionale di Geofisica e Vulcanologia, ITALY), Silvio Mollo, Michael J. Heap, Philip Benson
Changes of geophysical signatures and thermo-mechanical properties of volcanic rocks: What can we learn from active volcanoes?
- 102 Jackie E. Kendrick* (Ludwig Maximilian University, GERMANY), Yan Lavallee, Kai-Uwe Hess, Asher Flaws, Michael J. Heap
Deformation mechanisms in crystalline magma
- 103 Yan Lavallee* (LMU-Munich, GERMANY), Thomas Mitchell, Michael Heap, Jackie Kendrick, Ben Kennedy
Magma failure and frictional processes in volcanic settings
- 35 Xiaoqiong Wang* (Laboratory of geology ENS, FRANCE), Alexandre Schubnel, Yves Gueguen, Jerome Fortin, Hongkui Ge
Fracture in Thermally Cracked Granite: Physical and Mechanical Properties Evolutions
- 17 Alireza Hassanzadegan* (GFZ - German Research Centre for Geosciences, GERMANY), Guido Blöcher, Harald Milsch, Günter Zimmermann
The Effect of Temperature on Poroelastic Parameters and Transport Properties of Flechtinger Sandstone
- 66 Andreas Bauer* (Shell Global Solutions International, NETHERLANDS), Christian Lehr, Frans Korndorffer, Arjan van der Linden
Temperature dependence of acoustic velocities in gas-saturated sandstones

Poster session 2

- 19 Günther Kampfer* (Weatherford Petroleum Consultants, NORWAY), Yves M. Leroy
Fracture spacing limited by delamination in unconfined layers, based on experiments and FE-calculations
- 20 Günther Kampfer* (Weatherford Petroleum Consultants, NORWAY), Yves M. Leroy
Competition between fault-propagation folding and thrusting based on the maximum strength theorem
- 22 Günther Kampfer* (Weatherford Petroleum Consultants, NORWAY), Florian K. Lehner
A new experimental device for studying the development of joints in layered rocks
- 25 Martin Stanek* (Institute of Geophysics, ASCR, CZECH REPUBLIC), Yves Géraud, Stanislav Ulrich, Ondrej Lexa
Petrophysical Properties of Granite Intended for Radioactive Waste Stocking

- 27 Anzar Syed* (Schlumberger, UNITED KINGDOM), Carys Thomas, Mereke Akshayeva
Evaluation of critically stressed fractures in North Sea Basement reservoir
- 26 Sebastien Haffen* (University of Strasbourg CNRS IPGS, FRANCE), Yves Geraud, Marc Diraison, Chrystel Dezayes
Determination of fluid flow levels in a sandstone geothermal reservoir from thermal conductivity and temperature logs
- 44 Lucas Pimienta* (CSIRO, AUSTRALIA), Joel Sarout, Lionel Esteban, Claudio Delle Piane
Prediction of rock thermal conductivity from mineral composition, elastic wave velocities and microstructure
- 61 Philipp Siebert, Nikolai Weber, Rainer Schött, Martin Feinendegen, Karen Willbrand* (Chair of Geotechnical Engineering, RWTH Aachen, GERMANY)
Development of a design tool for HDR fracture systems
- 101 Siegfried Maiolino* (CETE de Lyon (min. Ecology), FRANCE)
Computational elastoplasticity of rocks: new theoretical and numerical framework
- 133 Sigmund Hope* (NTNU, NORWAY), André Auto Moreira, José Soares Andrade Jr., Alex Hansen
Reservoir Mapping by Global Correlation Analysis
- 107 Vahidoddin Fattahpour (The university of Tehran, IRAN), Mahdi Moosavi, Mahdi Mehranpour
A numerical investigation for sand production based on strain hardening and softening models
- 114 Fatemeh Sadat Rassouli, Mohammad Hadi Mehranpour, Mehdi Moosavi (Tehran University, IRAN)
A comparison between compression and impression creep techniques using finite element method
- 58 Adeline Pons* (Laboratoire de Géologie - CNRS/école normale supérieure, FRANCE), Yves M. Leroy
Predicting fluid over-pressures for the stability of accretionary wedges
- 100 Nicholas Thompson* (Statoil, NORWAY), Peter Zweigel
Analysis of slip perturbation development in scenarios of intersecting faults through distinct element analysis
- 6 Alexander Rozhko* (M-I Swaco, a Schlumberger Company, NORWAY)
Capillary pressure and apparent rock strength during drainage and imbibition
- 130 Agust Gudmundsson* (Royal Holloway University of London, UNITED KINGDOM), Ingrid F. Lotveit, Trine H Simmenes, Magnhild Sydnnes, Adelina Geyer
Using field, analytical, and numerical results for realistic fault-zone models

WEDNESDAY 19 OCTOBER

Session 6: Improved understanding from novel laboratory techniques

- 30 **KEYNOTE:** Maxim Lebedev* (Curtin University, AUSTRALIA), Andrej Bóna, Roman Pevzner, Boris Gurevich
3 component laboratory experiments by laser interferometry: Anisotropy estimations using polarization of quasi P-waves and S-waves
- 12 Guido Blöcher* (GFZ German Research Centre for Geosciences, GERMANY), Thomas Reinsch, Harald Milsch, Alireza Hassanzadegan, Günter Zimmermann
The application of fibre optic sensors in laboratory experiments
- 73 Idar Larsen* (SINTEF Petroleum Research, NORWAY), Jørn F. Stenebråten, Audun Bakk
Stress dependent dynamic anisotropy in shales
- 53 Erik Hallberg* (Statoil, NORWAY), Olav-Magnar Nes, Eyvind F. Sønstebø, Rune M. Holt
Using a Punching Technique on Small Samples for Evaluation of Temperature Dependent Shale Strength
- 78 Nicola Tisato* (ETH Zurich, SWITZERLAND), Madonna Claudio, Erik H. Saenger
Measurements and mechanisms investigation of seismic wave attenuation at low frequencies

- 29 Maxim Lebedev* (Curtin University, AUSTRALIA), Vassili Mikhaltsevitch, Boris Gurevich
An experimental study of wave dispersion and attenuation in water saturated sandstone at seismic and teleseismic frequencies

Session 7: Rock mechanical characterization

- 81 **KEYNOTE:** Christian DAVID* (Universite de Cergy-Pontoise, FRANCE), Lisa Casteleyn, Philippe Robion, Pierre-Yves Collin, Beatriz Menendez
A study of the petrophysical, microstructural and geomechanical properties of oolitic limestones from the Paris basin
- 40 Yves Gueguen* (Ecole Normale Supérieure, FRANCE), Audrey Ougier-Simonin, Jerome Fortin
Permeability of cracked rocks and glass
- 32 Alexandre Dimanov* (Laboratoire de Mécanique des Solides, FRANCE), Mathieu Bourcier, Eva Hériché, Michel Bornert, Wolfgang Ludwig
Mechanisms of plastic deformation of synthetic halite polycrystals: Experimental and computational approaches
- 14 Nguyen Van Hung* (IFP Energies nouvelles, FRANCE), Jean Guélard, Nicolas Gland, Jérémie Dautriat, Christian David
Compaction, permeability evolution and stress path effects in unconsolidated sands
- 105 Vahidoddin Fattahpour* (The university of Tehran, IRAN), Mahdi Moosavi, Mahdi Mehranpour
An experimental investigation on the effect of different parameters on the high apparent stability of perforations in sandstones
- 47 C Rabe* (Baker Hughes USA), J O Cherrez
Dynamic and Static Rock Mechanical Properties of Heavy Oil Sandstones
- 97 Alexandra Rolland* (EOST Strasbourg, FRANCE), Patrick Baud, Michael Heap, Marion Nicolé, Thomas Ferrand
Deformation and failure in limestone surrounding the ANDRA Underground Research Laboratory at Bure
- 9 Nikolai Bagdassarov* (University Frankfurt am Main, GERMANY)
Constraints on magnetotelluric inversion from laboratory measurements of xenolith electrical impedance
- 31 Øistein Johnsen* (Norwegian Geotechnical Institute, NORWAY), Fabrice Cuisiat
Effects of loading rate and saturating fluid on chalk mechanical behavior
- 119 Erling Fjær* (Pontifical Catholic University, BRAZIL), Anna M. Stroisz
Stress sensitivity of non-elastic processes in a weak sandstone
- 60 Srutarshi Pradhan (SINTEF, NORWAY)
Hydraulic fracturing in reservoir rocks: experiment & simulation
- 85 Elli-Maria Charalampidou* (GFZ, GERMANY), Sergei Stanchits, Thomas Goebel, Georg Dresen
Monitoring induced micro-seismicity from fluid injection experiments.

Poster session 3

- 18 Louis Zinsmeister, Jérémie Dautriat* (IFPEN, FRANCE), Michel Bornert, Nicolas Gland, Alexandre Dimanov
Effects of chemical alteration on mechanical and flow properties of a limestone, a multi-scale approach
- 28 Min Li* (MIT, USA), Yves Bernabe, Wenlian Xiao
Non-linear effective pressure law for permeability: Experimental methods and applications
- 64 André Vervoort* (KULeuven, BELGIUM), Abbass Tavallali
Evaluation of Brazilian tensile strength and fracture pattern in schistose sandstone

- 83 Christian David* (Universite de Cergy-Pontoise, FRANCE), Laurent Louis, Petr Spacek, Teng-fong Wong Jérôme Fortin
Elastic Anisotropy of Core Samples from the Taiwan Chelungpu Fault Drilling Project (TCDP): Direct 3-D Measurements and Weak Anisotropy Approximations
- 87 Sergio Vinciguerra* (Istituto Nazionale di Geofisica e Vulcanologia, ITALY), Pierdomenico Del Gaudio, Alessandro Iarocci, Christian David, Piergiorgio Scarlato
Physical properties of Campi Flegrei tuff from variable depths 87
- 50 Philip Benson* (ETH Zurich, SWITZERLAND), Michael Heap, Yan Lavallee, Asher Flaws, Kai Hess
Laboratory simulations of tensile (hydro) fracture via cyclical fluid pressurisation
- 70 Silvia Loaiza* (Laboratoire de Geologie Ecole Normale Supérieure, FRANCE), Jérôme Fortin, Alexandre Schubnel, Sergio Vinciguerra, Yves Guéguen
Mechanical behavior and localized failure modes in a porous basalt from the Azores
- 82 Claudio Madonna, Nicola Tisato* (ETH Zurich, SWITZERLAND), Erik H. Saenger
Low frequency measurements of seismic wave attenuation
- 92 Jérôme Wassermann, Yves Le Gonidec, Christophe Nussbaum, Christophe Barnes, Christian David* (University of Cergy-Pontoise, FRANCE)
Damage mechanisms during gallery excavation in Opalinus clay formation at the Mont Terri Underground Rock Laboratory
- 36 Celine Mallet* (Laboratoire de Geologie de l'Ecole Normale Supérieure, FRANCE), Jerome Fortin, Yves Gueguen
Behaviour of intact and damaged glass under triaxial compression
- 124 Mohammad Hossain Bhuiyan* (NTNU, NORWAY), Rune M Holt
Techniques for laboratory measurement of the anisotropic parameter δ

THURSDAY 20 OCTOBER

Session 8: Shales & Clay

- 129 **KEYNOTE:** Manika Prasad* (Colorado School of Mines, USA), Patricia Castillo, Piya Dechongit, Saeed Zargari
Reinventing Source Rocks as Reservoirs: Rock physics and Petrophysics of Organics, Carbonates, cLays, Sands and Shales (O-CLASSH)
- 37 Maya Kobchenko* (Physics of Geological Processes, University of Oslo, NORWAY), Hamed Panahi, Francois Renard, Olivier Galland, Dag Kristian Dysthe
Experimental studying of shale fracturing caused by internal gas generation
- 51 Ida Fabricius* (DTU, DENMARK)
High kinematic viscosity of air may cause dry clay to be stiffer than water saturated clay
- 112 Guido Musso* (Politecnico di Torino, ITALY), Enrique Romero, Gabriele Della Vecchia
Double structure effects on the chemo-hydro-mechanical behaviour of a compacted active clay
- 4 Maxim Khramchenkov* (Kazan Federal University, RUSSIA)
Some peculiarities of rock consolidation and underground fluid mechanics
- 91 Diansen Yang* (Laboratoire de Mécanique des Solides, FRANCE), Michel Bornert, Serge Chanchole
Experimental investigation of the hydric and delayed behavior of unsaturated argillaceous rocks by means of multiscale full-field measurement techniques
- 34 Dave Dewhurst* (CSIRO, AUSTRALIA), Claudio Delle Piane, Ben Clennell, Claudio Madonna, Erik Saenger
Impact of Saturation on Shale Strength and Stiffness
- 38 Aminul Islam* (NTNU, NORWAY), Pål Skalle
Poisson's ratio values for Shale

- 109 Olav-Magnar Nes* (SINTEF, NORWAY), Ole Kristian Søreide, Jørn Stenebråten
Experimental and numerical investigation of the effect of shale anisotropy on borehole stability
- 24 Joel Sarout* (CSIRO Earth Science & Resource Engineering, AUSTRALIA), Lionel Esteban, Claudio Delle Piane, Bruce Maney, Dave Dewhurst
Elastic, mechanical, petrophysical and micro-structural anisotropy of shales under in situ conditions
- 55 Claudio Delle Piane (CSIRO, AUSTRALIA), Bjarne S.G. Almqvist*, Mark Raven, David Dewhurst
Shale anisotropy: linking mineral fabric and elastic properties
- 46 Mohsen Kalani* (Department of Geosciences, University of Oslo, NORWAY), Nazmul Haque Mondol, Jens Jahren, Jan Inge Faleide
Petrophysical properties of clay dominated stratigraphic units in the Egersund and Norwegian-Danish Basins
- 15 Anders Samstad Gylland* (NTNU, NORWAY), Hans Petter Jostad, Steinar Nordal
Strain localization in the presence of excess pore water pressure under quasi static conditions
- 67 Andreas Bauer* (Shell Global Solutions International, NETHERLANDS), Arjan van der Linden, Frans Korndorffer
Thermal Rock Physics of Shales: Laboratory Experiments under undrained conditions
- 98 Anthony Siggins* (CSIRO Earth Science & Resource Eng., AUSTRALIA), Rune M Holt, David Dewhurst
The visco-elastic response of two shales at ultrasonic frequencies
- 121 Rune M Holt* (NTNU & SINTEF, NORWAY), Morten I Kolstø, Erling Fjær
Physical Mechanisms controlling Effective Stresses for Wave Velocities in Clays and Shales

Poster session 4

- 63 Rolf Bruijn, Bjarne Almqvist* (ETH Zurich, SWITZERLAND), Phil Benson
High temperature and pressure re-compaction of Rochester Shale: Texture and magnetic fabric development
- 23 Priscilla Paniagua* (NTNU, NORWAY), Annika Bihs, Steinar Nordal
Interpretation of cone penetration test in clay by finite element simulations
- 132 Pavel Golikov* (NTNU, NORWAY), Per Avseth, Alexey Stovas, Ran Bachrach
Rock physics templates for interpretation of turbidite reservoirs
- 79 Nicola Tisato* (ETH Zurich, SWITZERLAND), Stefano Marelli
Seismic wave velocities of compacted bentonite: an experimental study
- 45 Aminul Islam* (NTNU, NORWAY), Pål Skalle
An experimental investigation of shale characterization using drained and undrained test mechanisms