ShaleXenvironmenT
Maximizing the EU shale gas potential by minimizing its environmental footprint

H2020-LCE-2014-1
Competitive low-carbon energy

D12.7
DCO and Doha international conferences 1

WP 12 – Dissemination

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Disclaimer

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History of the changes

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1. Overview of the event

1.1 General context

Texas A&M at Qatar hosted shale gas experts from Qatar, Europe, the United States and Australia for a daylong symposium to present results of ShaleXenvironmentT, a multidisciplinary international research project funded by the European Commission under the Horizon 2020 program.

Securing abundant, affordable and clean energy is a critical scientific and technological challenge. Shale gas has emerged as a crucial piece of the energy puzzle, but exploitation of shale gas is challenging and its environmental footprint is poorly quantified. The ShaleXenvironmentT project aims to assess the environmental footprint of shale gas exploitation in Europe and suggest ideas for approaches on managing shale gas exploitation, impacts and risks in Europe — and eventually worldwide.

About 80 people from Qatar’s local industry and academic institutions and SXT representatives attended the symposium, which was chaired by Dr. Ioannis G. Economou, associate dean for academic affairs and a Professor of chemical engineering at Texas A&M at Qatar.

Economou said that shale gas and shale oil technology is transforming the energy industry worldwide, yet despite the growing interest for such technologies, there are still major challenges to be addressed at various levels.
Economou said, “During this event, world-leading researchers presented state-of-the art developments in chemical engineering, petroleum engineering and geosciences related to the topic. There has been a great exchange of ideas that will hopefully lead to new R&D projects for the benefit of the country, the region and the world.”

Texas A&M at Qatar Dean Dr. César O. Malavé said, “Texas A&M University is in the forefront of new breakthrough developments in shale technology through research performed in its research centers and institutes. At Texas A&M at Qatar, we are proud to have strong partnerships with academic institutions and industry — in Qatar and around the world, and we aim to play a key role in creating sustainable solutions to real-world challenges by generating new knowledge through research and collaborative partnerships. We hope that this symposium provided a platform for creating synergy in the scientific communities in Qatar, Europe and elsewhere to forge new collaborative research initiatives for the future.”
### 1.2 Affiliations of attendees

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<tr>
<td>Baker Hughes, a GE Company</td>
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<td>Beijing FRAC Technology Development Co.</td>
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<td>ConocoPhillips Qatar Ltd.</td>
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<td>Engineering.com</td>
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<td>ExxonMobil</td>
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<td>Geological Society</td>
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<td>Gulf Times</td>
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<td>Ministry of Defense</td>
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<td>NTUA and Texas A&amp;M Qatar</td>
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<td>Occidental Petroleum of Qatar</td>
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<td>Public Works Authority (Ashghal)</td>
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<td>Qatar Chemical Company (Q-Chem)</td>
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<td>Qatar Environment &amp; Energy Research Institute</td>
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<td>QatarGas</td>
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<td>Texas A&amp;M at Qatar University</td>
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2. Communication and Dissemination

Texas A&M University at Qatar’s research emphasis areas include, amongst others, environmental issues, advanced water treatment technologies, chemical process safety, petroleum reservoir studies, mathematical modeling, machinery and controls, chemistry, and physics. The university has a large network of academic and industrial partners in these fields, and it was a great opportunity for ShaleXenvironmenT consortium to present the results of the research to the peers in the Middle East and exchange ideas. The event at Texas A&M has been largely advertised through university’s usual communication channels. After the event, a press release was published on Texas A&M at Qatar and Qatar Foundation websites. The presentations can be accessed through the ShaleXenvironmenT website here.
3. Program

Sunday, 18 March 2018
Lecture Hall 238
Texas A&M Engineering Building
Education City
Doha, Qatar
WELCOME FROM THE CHAIR

DEAR COLLEAGUES –

Welcome to this symposium designed to present results of the ShaleXenvironmentT, a multidisciplinary international research project funded by the European Commission under the Horizon 2020 program. The primary objective of ShaleXenvironmentT is to assess the environmental footprint of shale gas exploitation in Europe in terms of water usage and contamination, induced seismicity, and fugitive emissions. Using experiments and modeling activities synergistically, ShaleXenvironmentT achieves its objective via a fundamental understanding of rock-fluid interactions, fluid transport, and fracture initiation and propagation, via technological innovations obtained in collaboration with industry, and via improvements on characterization tools.

ShaleXenvironmentT maintains a transparent discussion with all stakeholders, including the public, and suggest ideas for approaches on managing shale gas exploitation, impacts and risks in Europe, and eventually worldwide. In this respect, this dissemination event has been scheduled. Challenges associated with the shale gas technology worldwide will be discussed and future activities will be outlined. The event features speakers from Qatar relevant to the topic.

We are pleased you have joined us for today’s event, and we hope this symposium provides a platform for future collaborations.

Sincerely,

DR. IOANNIS G. ECONOMOU, Symposium Chair
Associate Dean for Academic Affairs, Texas A&M University at Qatar
# PROGRAM

SholeX Dissemination Event  
18 March 2018  
Lecture Hall 238  
Texas A&M Engineering Building  
Education City, Doha, Qatar

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<th>Time</th>
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<tr>
<td>7:30-8 a.m.</td>
<td>REGISTRATION AND COFFEE</td>
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<td>8-8:20 a.m.</td>
<td><strong>WELCOME REMARKS</strong></td>
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<td>Dr. César O. Malavé, Dean, Texas A&amp;M University at Qatar</td>
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<td>Dr. Ioannis G. Economou, Associate Dean for Academic Affairs, Texas A&amp;M University at Qatar</td>
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<td>8:20-8:40 a.m.</td>
<td>“Global Partnerships of Texas A&amp;M Engineering Experiment Station”</td>
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<td>Dr. Eyad Masad, Texas A&amp;M Engineering Experiment Station, USA</td>
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<td>8:40-9 a.m.</td>
<td>“SXT: Assessing the Environmental Impacts of Shale Gas Exploration and Production”</td>
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<td>Dr. Alberto Striolo, University College London, UK</td>
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<td>9-9:25 a.m.</td>
<td>“Shale Gas Exploration and Production”</td>
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<td>Dr. Hari Menon, Halliburton, USA</td>
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<td>9:25-9:50 a.m.</td>
<td>“Multi-scale 3D and 4D Imaging of Shale Reservoirs: Quantifying Pore, Pore Networks and Fractures”</td>
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<td>Dr. Kevin Taylor, University of Manchester, UK</td>
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<td>9:50-10:15 a.m.</td>
<td>“Uncertainty Assessment of Volumetric of Original Hydrocarbons in Place for Oil and Gas Shales”</td>
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<td>Dr. Dominique Guérillot, Texas A&amp;M University at Qatar</td>
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<td>10:15-10:35 a.m.</td>
<td><strong>COFFEE BREAK</strong></td>
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## PROGRAM

### SESSION II

**Chair:** Dr. Alberto Striolo

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| 10:35-11 a.m. | “Engineering Research in Texas A&M University”  
**Dr. Dimitris Lagoudas**, Texas A&M University, USA |
| 11-11:25 a.m. | “Current Progress in the Development of Green Formulations for Shale Gas Extraction”  
**Duccio Tatini and Filippo Sarrì**, Center for Colloid and Surface Science, Italy |
**Dr. Andrey Kalininchev**, ARMINES/Subatech, France |
| 11:50 a.m.-12:15 p.m. | “Multi-scale Fluid Transport Modeling in Complex Porous Networks: Advantages and Disadvantages of Stochastic vs. Deterministic Approaches”  
**Maria Apostolopoulou**, University College London, UK |
| 12:15-1:30 p.m. | **LUNCH** |

### SESSION III

**Chair:** Dr. Andrey Kalininchev  
*Lecture Hall 238*

<table>
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<th>Time</th>
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| 1:30-1:55 p.m. | “Modeling of Adsorption and Diffusion in Dual-porosity Materials: Applications to Shale Gas”  
**Dr. Martin Lisal**, Institute of Chemical Process Fundamentals, Czech Republic |
|               | “Addressing the Risks of Induced Seismicity in Sub-surface Energy Operations”  
**Dr. Richard Porter**, University College London, UK |
## PROGRAM

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<th>Time</th>
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| 1:55-2:20 p.m. | *“Fluids Under Confinement in Shale Formations: A Molecular Modeling Approach”*  
                        **Dr. Loukas Peristeras,** National Center for Scientific Research “Demokritos,” Greece  
                        *“Modeling Hazardous Consequences of an Accidental Blowout of Shale Gas Well”*  
                        **Dr. Sergey Martynov,** University College London, UK |
| 2:20-2:45 p.m. | *“Molecular Modeling of Fluids in Confinement”*  
                        **Dr. Mirella Santos,** Texas A&M University at Qatar  
                        *“Approaches to the Regulation of Shale Gas Exploitation in the Public Interest”*  
                        **Christine Trenorden,** University College London, Australia |
| 2:45-3:10 p.m. | *“High-pressure Gas Sorption Studies on Shales”*  
                        **Dr. Ronni Pini,** Imperial College London, UK  
                        *“Lateral Heterogeneity in Mudstone: A Case Study from the Bowland Shale”*  
                        **Dr. Jabraan Ahmed,** University College London, UK |
| 3:10-3:30 p.m. | **COFFEE BREAK**                                                                                             |
| 3:30-4 p.m.   | **OPEN DISCUSSION**  
                        *Lecture Hall 238*  
                        Future Collaboration in the Area of Energy and Sustainability |

ShaleX Dissemination Event
INVITED SPEAKERS

DR. EYAD MASAD
Texas A&M Engineering Experiment Station, USA

Dr. Eyad Masad is the executive director of global partnerships in the Texas A&M Engineering Experiment Station (TEES), and a professor in the Mechanical Engineering Program at Texas A&M at Qatar and in the Zachry Department of Civil Engineering at Texas A&M University. He is a fellow of the American Society of Civil Engineers. He previously was vice dean of Texas A&M at Qatar where he was responsible for providing leadership to the academic, research, and outreach missions of the campus, as well as to its administrative and financial functions. Before becoming vice dean, Masad was assistant dean for research and graduate studies, during which he supervised the tremendous growth in research funding, as well as the development of strategic areas and centers.

DR. ALBERTO STRIOLO
University College London, UK

Since 2013, Dr. Alberto Striolo has been professor of molecular thermodynamics within the Department of Chemical Engineering at University College London, London’s global university. Prior to this position, Striolo was the Lloyd and Joyce Austin Presidential Associate Professor in the School of Chemical, Biological and Materials Engineering at the University of Oklahoma, USA. During his career, Striolo has applied an arsenal of modeling and simulation techniques to characterize the structure of fluid at solid-liquid interfaces. He held visiting positions at Lawrence Berkeley National Laboratory, USA, and at Princeton University, USA, to verify the theoretical predictions using experimental observables and to correlate the interfacial fluids structure to their transport. Striolo is interested in quantifying interfacial effects, especially those that can be related to practical applications, such as water desalination, management of hydrates in flow assurance problems, separations, self and directed assembly, and many others, including shale gas.
INVITED SPEAKERS

HARI MENON
Halliburton, USA

Hari Menon is chief technical professional with Halliburton Global Technical Solutions. He provides expertise in unconventional shale and tight-gas reservoirs, as well as enhanced oil recovery, heavy oil, and carbon capture and storage. Hari has more than 30 years of global experience working with operators, consultants, and technology companies, including development and implementation of integrated workflows that identify sweet spots and production fairways. Menon’s work for Halliburton integrates geology, geophysics, petrophysics, and reservoir engineering with drilling and completion methods to yield optimal production. He has decades of experience with unconventional resources, and currently focuses on hydraulic fracture designs and how they interact with natural fractures and rocks, as well as performance analysis of assets.

DR. KEVIN TAYLOR
University of Manchester, UK

Prof. Kevin Taylor is a professor in the University of Manchester and is currently head of the School of Earth and Environmental Sciences. His research has applied standard petrographic and geochemical analysis (e.g., optical and electron microscopy, XRD, stable isotope analysis) and novel mineralogical analysis (e.g., CL, Raman, synchrotron X-ray analysis) to modern and ancient sediment and systems. He has been instrumental in integrating field- and basin-scale observations with pore-scale analysis, which has had significant implications for predicting shale and sandstone oil and gas reservoir properties. His recent and current research has been integrating multi-scale sedimentological and diagenetic analysis in major mudstone successions and shale-gas reservoirs. He is currently collaborating on research initiatives in shale-reservoir structure using high-resolution X-ray CT scanning and experimental mechanical analysis of shales, with links to petrophysical data.

ShaleX Dissemination Event
INVITED SPEAKERS

DR. DOMINIQUE GUÉRILLOT
Texas A&M University at Qatar, Qatar

Dominique Guérrillot is a professor at Texas A&M University at Qatar. His research focuses on numerical modeling for oil and gas exploration and production, including unconventional and CO₂ storage. After earning a Ph.D. in applied mathematics, he joined IFP and his research addresses challenges in compositional reservoir simulators for enhanced oil recovery, geostatistics, fridding, history matching, upscaling, and uncertainty assessments.

DR. DIMITRIS LAGOUDAS
Texas A&M University, USA

Dimitris C. Lagoudas is the associate vice chancellor for engineering research, senior associate dean for research, TEES deputy director, the inaugural holder of the John and Bea Slattery Chair in Aerospace Engineering, and a Distinguished Professor at Texas A&M University, USA. He has served as interim and permanent department head of the Department of Aerospace Engineering at Texas A&M and also the inaugural chair of the materials science and engineering graduate program at Texas A&M. He has also served as an associate vice president for research at Texas A&M and director of two TEES research centers. Lagoudas' research involves the design, characterization, and modeling of multifunctional material systems at nano-, micro-, and macro levels with averaging micromechanics methods developed to bridge the various length scales and functionalities, including mechanical, thermal, and electrical properties of nanocomposites. His research team is one of the most recognized internationally in the area of modeling and characterization of shape memory alloys. He has been co-author of more than 450 scientific publications in archival journals and conference proceedings, and co-author of one of the most widely used books on shape memory alloys. He has published extensively on the subject of shape memory alloys with his students, postdoctoral associates, and colleagues, and several of his journal papers are now considered classic papers in the field. The theoretical models that his research group developed have been implemented and integrated into finite element analysis software, which have been used by academic institutions around the world and also by industry and government.
INVITED SPEAKERS

DUCCIO TATINI
Center for Colloid and Surface Science, Italy

Duccio Tatini currently works at the Center for Colloids and Surface Science at the University of Florence as an early-stage researcher in the European-funded research project, “ShaleXenvironment.” He obtained a Ph.D. position from the University of Florence with the project, “Green formulations for European shale formations.” The aim is the formulation of environmentally friendly, multifunctional fluids that can find application in hydraulic fracturing for shale gas extraction. He is author of three publications and his main research interests include material and polymer chemistry, materials characterization, formulation technology and thermodynamics.

FILIPPO SARRI
Center for Colloid and Surface Science, Italy

Filippo Sarri is third-year Ph.D. student in chemistry at CSGI and the University of Florence. He is involved in the European project “Shale for Environment” and he works on innovative fracturing fluid formulations targeted to reduce the environmental footprint. He graduated from the University of Florence in chemistry with a study based on innovative solar systems (DSSC) combined with OLED technology. In the course of his studies and laboratory apprenticeship, he has acquired expertise in chemistry of the polymers and the nanosystems.

DR. ANDREY KALINICHEV
ARMINES/Subatech, France

Prof. A.G. Kalinichev is one of the leading experts in atomistic computational modeling of clays, cement, and other inorganic nanomaterials. He was one of the first researchers worldwide to employ such computer simulation methods in geosciences and one of the co-developers of ClayFF, a highly successful model for atomistic simulations of clay minerals and their aqueous interfaces. Since 2017 he has also been a chief research fellow at the International Laboratory for Supercomputer Atomistic Modeling and Multi-scale Analysis in the National Research University “Higher School of Economics” in Moscow, Russia.
INVITED SPEAKERS

MARIA APOSTOLOPOULOU
University College London, UK

Maria Apostolopoulou is a final-year Ph.D. candidate at University College London’s Department of Chemical Engineering working with Prof. Alberto Striolo. Her current research, supported by Halliburton, focuses on the transport of fluids in porous media and utilizes stochastic and deterministic computational methods. She has devoted her time and efforts to generating smart image processing algorithms that can accurately calculate the permeability of shale rock samples from CT-scan images. She is an active member of the department’s postgraduate committee and is involved in regular undergraduate teaching. She received her bachelor’s and master’s degrees from National Technical University of Athens in 2015. During the last year of her graduate studies, she joined the chemical engineering department of the Petroleum Institute in Abu Dhabi, where she completed her master’s thesis on the catalytic process of n-Butane cracking in fluid catalytic cracking units filled with nanosynthesized zeolites.

DR. MARTIN LÍSAL
Institute of Chemical Process Fundamentals, Czech Republic

Prof. Martin Lísal is senior scientist and head of the Department of Molecular and Mesoscopic Modeling in the Institute of Chemical Process Fundamentals of the Czech Academy of Sciences in Prague, Czech Republic. He is also professor in the Department of Physics of J. E. Purkinje University in Ústí nad Labem, Czech Republic. His current research focuses on atomistic modeling of confined fluids and fluids at interfaces, and on mesoscopic modeling of self-assembly in polymeric systems, including polyelectrolytes.
INVITED SPEAKERS

DR. RICHARD PORTER
University College London, UK

Dr. Richard Porter is a senior research associate and teaching fellow in the Department of Chemical Engineering at University College London. Porter graduated with a Ph.D. in combustion kinetics from the University of Leeds in 2007. Since then he has worked on a range of energy related research topics with an emphasis on carbon capture and storage. He currently works on the ShaleXevironment project, developing predictive models for induced seismicity risk analysis during hydraulic fracturing.

DR. LOUKAS PERISTERAS
Center for Scientific Research “Demokritos,” Greece

Dr. Loukas Peristeras is a researcher in the Molecular Thermodynamics and Modeling of Materials Laboratory (MTMML) at the National Center for Scientific Research “Demokritos” in Athens, Greece. He holds a diploma in chemical engineering from the National Technical University of Athens, Greece (1996) and a Ph.D. in polymer chemistry from the University of Athens (2003). He worked as senior research scientist in a scientific software high-tech company (Sienomics SARL) from 2006 to 2014 where he was in charge of the development of various tools integrated in the main software solution of the company. He is the creator of “Amorphous Builder,” software for the creation of initial configuration for molecular modeling, integrated in MAPS® commercial software, and he has contributed to the development of open source scientific projects (LAMMPS, MCCCS, TOWHEE). His main scientific interest is the application of available schemes, their improvement and the development and new approaches for the calculation of material properties by means of molecular and thermodynamic modeling.
INVIDED SPEAKERS

DR. SERGEY MARTYNOV
University College London, UK

Dr. Sergey Martynov received his M.Sc. in physics from Moscow Power Engineering University and his Ph.D. for “Computational Modeling of Hydrodynamic Cavitation” from the University of Brighton, UK. Martynov is currently a senior research associate and teaching fellow in the Chemical Engineering Department at University College London, working on projects funded by the EC and Qatar National Research Foundation. His research interests belong to the mathematical modeling of multiphase flows and hazard assessment of gas wells and high-pressure transportation pipelines and storage tanks.

DR. MIRELLA SANTOS
Texas A&M University at Qatar

Mirella Simões Santos is currently a postdoctoral research associate and visiting lecturer at Texas A&M University at Qatar. Her work focuses on the use of molecular simulations to describe confined fluids, with an emphasis on systems relevant for the oil and gas industry. Her research interests also extend to applied thermodynamics for the description of interfacial and colloidal phenomena and electrochemistry. She obtained her doctoral degree at the Federal University of Rio de Janeiro with an exchange period at Massachusetts Institute of Technology.

CHRISTINE TRENORDEN
University College London, Australia

Christine Trenorden has a background in law and governance, having been a legal practitioner, the senior judge in the specialist Environment, Resources and Development Court in South Australia, and involved in international aid projects in relation to the governance of natural resources in the Asia-Pacific region. For the past five years, Trenorden has been a visiting professor at UCL Australia, teaching law and governance in relation to the sustainable development of energy resources. She is now looking forward to semi-retirement.

ShaleX Dissemination Event
INVITED SPEAKERS

DR. RONNI PINI
Imperial College London, UK

Ronny Pini is a senior lecturer in the Department of Chemical Engineering at Imperial College London (ICL) and co-i of the Qatar Carbonates and Carbon Storage Centre at ICL. His research combines experiments and models at the laboratory scale to investigate fundamental physical mechanisms in complex and heterogeneous porous media. He has 10 years of experience in working in the area of carbon capture and storage applications, where his interests lie in gas storage and recovery operations in deep geological formations.

DR. JABRAAN AHMED
University College London, UK

Primarily, Ahmed's research concerns the sedimentology and petrophysical properties of hydrocarbon bearing mudstones. This is driven by his desire to understand the geological processes responsible for shaping these rocks which in turn, can be applied to better evaluate their resource potential. Recently, he completed a Ph.D. in the Earth Sciences Department at University College London where he investigated the lateral heterogeneity of the Bowland Shale Formation from a morphological, mineralogical, and geochemical perspective using a variety of analytical techniques. He is excited to join the SXT project and extend this work further, this time with an experimental focus on permeametry and fluid-flow experiments.
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 640979.