Romain Chassagne

Contact Information
Institute of GeoEnergy and Engineering
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Positions

-Research and Development Project Manager for Subsurface Digital Twin- since 2022
Data assimilation for Geothermal and subsurface related
BRGM (French Geological Survey), France

-Advisory Board- since 2022
Edinburgh Time-Lapse Project industry (ETLP) consortium

-Deputy Director of the Edinburgh Time-Lapse Project consortium- 2021 - 2022

-Research Fellow (Research Assistant Professor)- 2017 - 2022
Geophysical data assimilation within Geophysical Monitoring Group
Institute of GeoEnergy and Engineering, Heriot-Watt University, UK

-JSPS Visiting Professor- (Three months) 2019
Data Assimilation methods for a CO2 storage case study
Computer Science Department of Tsukuba University, Tsukuba, Japan

-Visiting Researcher- (One month) 2018
Uncertainty analysis with 4D seismic history matching
Mathematical department of Uni Research CIPR, Bergen, Norway

-Research Associate- 2014 - 2017
Seismic history matching for Geophysics Reservoir Characterisation group (ETLP)
Institute of Geoenergy and Engineering, Heriot-Watt University, UK

-Research Engineer- 2012 - 2013
Multiphase flow modelling within the Department of Applied Mathematics
IFP Energies Nouvelles, Rueil-Malmaison, France.

-Postdoc Research Associate- 2010 - 2012
Multiphase multiscale flow modelling within the Department of Fluids Mechanics
Schlumberger Cambridge Research, Cambridge, UK

Themes

Dynamic geophysical characterisation for Subsurface (CO2 storage, geothermal, hydrogeology, groundwater, oil and gas), environment

Methods

Data assimilation: Optimisation, stats/machine learning, uncertainty quantification, sensitivity analysis, reduced order model

Education

PhD in Computational Geosciences, Bordeaux University, France 2010
title: *Numerical study of biogenic species into porous media variably saturated in inter-tidal area, Truc vert beach applications*

Master of Research in Applied Mathematics, Bordeaux University, France 2006

Bachelor in Applied Mathematics, Bordeaux University, France 2004

Grants, Awards *PI: Principal Investigator; Co-I: Co-investigator*

Decision Pending - Call, Highlight Topics - Natural Environment Research Council (NERC) - , Co-I (Heriot-Watt PI); £384k (2022-2026) /De-risking City-Scale open-loop geothermal development for heating/cooling through smart hydrogeophysical assessment and monitoring/

ANR (Agence Nationale de la Recherche), PI ; 783 847€(2022-2026) / Integrative multiscale investigation of heat and lithium source and pathways in Deep Geothermal System in a rift context: Focus on the Upper Rhine Graben.

Sasakawa Foundation, PI ; £4k (2016) /Archaeological data integration and hypothesis testing of the conceptual foundation of the Anthropocene/

Industry, Edinburgh Time-Lapse Project (ETLP) Consortium, Co-I £1.5M (2021-2024) /Geophysical characterisation, monitoring and forecasting/

French council and Poitiers Region, Co-I ; £484k (2020-2023) /MEdical Data Intelligent Analysis, Interpretation, Reconstruction and Manipulation in 3D (MEDIA - IRM 3D0/

Industry, TAQA, PI ; £70k (2019-2024) /PhD Studenship (part-time)/

Japanese Society for Promotion of Science, Long term (3 months) fellowship, PI ; £20k (2019) /Enhanced data assimilation methods for a CO2 storage and case study/

British council, GSIKE Joint Academic Development, PI ; £20k (2018) /CO2 seismic monitoring feasibility on a Qatar field case study/

Industry, Statoil (now Equinor), Co-I ; £548k (2016-2018) /in-house development of Well2seis/

French council, LEFE, INSU, Co-I ; €10k (2017) /Passive source for coastal topology determination/

Sasakawa Foundation, PI ; £2k (2016) /Travel Grant to develop a multi-stream optimisation platform/

Sasakawa Foundation, PI ; £2k (2015) /Travel Grant to develop collaboration with Tsukuba University, Japan/

Edinburgh Society for Industrial and Applied Mathematics (SIAM) Student Chapter; £1k (2014) /Collaboration invitation/

French research council, PhD scholarship (Agence National de la Recherche, ANR) (2008-2010) /Numerical study of biogenic species into porous media variably saturated in inter-tidal area, Truc vert beach applications/

Industry links Geothermal: Landsvirkjun, TownRock Energy, British Geological Survey (BGS)
CO2 storage: Equinor, Shell, PGS, ADNOC
Hydrogen: ENGIE

Water contaminant Ford, SUEZ
Oil and Gas: Total, AkerBP, BP, CGG, Chevron, CNOOC, ConocoPhillips, ENI, Equinor, Exxonmobil, Halliburton, OMV, Petrobras, Shell, Taqa, Woodside, as a deputy director and Co-I for the Edinburgh Time-Lapse Project (ETLP) Consortium (https://etlp.hw.ac.uk)

International Collaboration

2020 - ongoing / Dr Pierre Polsenaere (Research Scientist, IFREMER, France)
2021 - ongoing / Prof. Hernan Aguirre (Professor, Shinshu University, Japan)
2020 - ongoing / Dr Rafael Almar (Senior Research Scientist, IRD, France)
2020 - ongoing / Dr. Jean-Christophe Comte (Senior Lecturer, Aberdeen University)
2015 - ongoing / Dr. Julien Dambrine (Assistant Professor, Poitiers University, France)
2014 - ongoing / Dr. Claus Aranha (Assistant Professor,Tsukuba University, Japan)
2018 - 2019 / Prof. Dominique Guerillot (Professor, Texas AM at Qatar, Qatar)
2017 - 2018 / Dr Rafael Almar (Research Scientist, IRD, France)
2015 - 2018 / Dr. Dean Oliver (Principal Researcher, CIPR, Norway)
2014 - 2015 / Dr. Alex Fukunaga (Associate Professor,Tokyo University, Japan)

Teaching

Mentoring of postdocs:
Zhen (David) Yin (2017)
Gustavo Corte (2021-ongoing)
Bernardo Gato (with Tsukuba University, 2020-2021)

Supervision of PhD students:
Paul Mitchell (in progress), first supervisor
Rasool Amiri (in progress), second supervisor
Ignacio Guridi (with Bordeaux University, in progress) second supervisor
Antony Hallam (writing up), first supervisor
Qi Zhang (writing up), first supervisor
Samarth Bachkheti (writing up, second-supervisor)

Gustavo Corte (**completed** in 2020), second supervisor
Cheng Gong (**completed** in 2018), first supervisor
Niki Obiwulu (**completed** in 2018), second supervisor
Zhen (David) Yin (**completed** in 2017), second supervisor
Dennis Obidegwu (**completed** in 2015), second supervisor

Supervision of MSc students:
2021: Aziza Elmanghush, Tanisha Sadeque Ziasa, Chinwe Chukwurah, Pierre Kostyrka (with Sorbonne University and IFREMER)
2020: Pieterjan Clinckemalie, Kareem Basha
Master's project as a marker: since 2018 for Petroleum Engineering MSc
Bachelor's project supervision: Debajoy Mukherjee, Marie Fonda

Course Leader 2020
Geophysical forecasting, in the Master Subsurface Energy System (25 hours), Heriot-Watt University, Edinburgh.
Description: Fundamentals of Geo-Energy systems monitoring, geothermal, CO2 storage, as storage are reviewed in the perspective of 1) Characterisation and monitoring and 2) Inform and derisk.

Course Leader 2017
Data assimilation, a Real World Approach, Masters and PhD students, National Insti-

tute for Mathematical Sciences, Ghana, (15 hours).
Description: Introduce students to data assimilation problems, with time-lapse seismic data, simulation models along with optimisation methods.

Course Leader 2007
Differential equations and probability for undergraduate student in the BSc of Science and Technology, course and practise at Bordeaux University - Course Leader (30 hours).
Description: Give the students necessary tools for basic modelling and probability.

Academic Service

PhD examiner

- Nagoor Kani - Multi-fidelity deep residual recurrent neural networks for uncertainty quantification 2018
- Valeriy Rukavishnikov - Updating the Simulation Model Using Dynamic Clusters Extracted From 4D Seismic Data 2016
- Ilya Fursov - Quantitative application of 4D seismic data for updating thin-reservoir models 2015

PhD first year examiner
Francois Portaluri (2022) Boshora Merghani (2021) Mohamed Hatab (2021), Goni Mustapha (2021), Ambuj Tyagi (2019)

Reviewer for Research councils
Newton Fund 2020
Japanese Socciety for Promotion of Science (JSPS) 2021
Swiss Data Science Center (SDSC) (affiliated with EPFL and ETH) 2022

Committees

- Co-chair the Strategic Advisory Board for the Edinburgh Time-Lapse Project since 2021
- Chairman Reservoir geophysics characterisation at European Association of Geoscientists and Engineer (EAGE) 2021
- Technical Committee for EAGE Workshop on Well Injectivity & Productivity in Carbonates (WIPIC), Doha, Qatar 2021
- Deputy project director for the Edinburgh Time-Lapse Project since 2020
- Chairman (twice a year) at ETLP sponsors' meeting since 2014
- Member of the well-being team at Institute of Geo-Energy and Engineering since 2019
- Technical Committee for EAGE Workshop on Well Injectivity & Productivity in Carbonates (WIPIC), Doha, Qatar 2019
- Chairman for interview for Lyell Center recruitment in Geophysics 2018
- Member of the committee EAGE Young professionals 2015 - 2018

Journals
Associate Editor in *Computers & Geosciences Journal* 2020 - currently

Reviewer in : *IEEE Transactions on Systems, Man and Cybernetics — Journal of Recent Advances in Electrical & Electronic Engineering — Computers & Geosciences Journal — Hydrogeology Journal — Computational Geosciences — Arabian Journal for Geosciences — EAGE and SPE EUROPEC Technical Programme— Journal of Natural Gas and Engineering*

Language skills

French:
Mother tongue
English:
Full professional proficiency

Journal Publications (Peer-reviewed)

*** denotes a student (PhD or master) under my supervision**

1. CANTON M, ANSCHUTZ P, **CHASSAGNE R**, DEBORDE J, SAVOYE N. The Buffering Capacity Of A Small Estuary On Nutrient Fluxes Originating From Its Catchment (Leyre Estuary, SW France). Estuarine. Coastal and Shelf Science, 99, 171-181, 2012.

2. **CHASSAGNE R**, LECROART P, BEAUGENDRE H, ANSCHUTZ P. Silicic acid flux to the ocean from tidal permeable sediments: a modelling study. Computers and Geosciences, 43, 52-62, 2012.

3. **CHASSAGNE R**, HAMMOND P. Simulation of Drilling Fluid Filtrate Invasion Near an Observation Well. Society of Petroleum Engineers Journal, 154014-PA, 2012.

4. MITCHELL J, STANILAND J, **CHASSAGNE R**, FORDHAM E J. Quantitative in-situ enhanced oil recovery monitoring using nuclear magnetic resonance. Transport in porous media, 2012.

5. MITCHELL J, STANILAND J, **CHASSAGNE R**, MOGENSEN K, FRANK S. FORDHAM EJ. ?Mapping oil saturation distribution in a limestone plug with low-field magnetic resonance. Journal of Petroleum Science and Engineering, 108, 14-21, 2013.

6. YIN***** Z, AYZENBERG M, MACBETH C, FENG T, **CHASSAGNE R**. Enhancement of dynamic reservoir interpretation by correlating multiple 4D seismic monitors to well behavior. Journal of Interpretation, 3(2), SP35-SP52, 2015.

7. ARANHA C, TANABE R, **CHASSAGNE R**, FUKUNAGA A. Optimization of Oil Reservoir Models Using Tuned Evolutionary Algorithms and Adaptive Differential Evolution. Institute of Electrical and Electronics Engineers Congress on Evolutionary Computation, peer reviewed paper, 2015.

8. YIN***** Z, MACBETH C, **CHASSAGNE R**, VAZQUEZ O. Evaluation of inter-well connectivity using well fluctuations and 4D seismic data. Journal of Petroleum Science and Engineering, 2016.

9. **CHASSAGNE R**, OBIDEGWU***** D, DAMBRINE J, MACBETH C. Binary 4D Seismic History Matching, a Metric Study. Computers and Geosciences, 96, 159-172, 2016.

10. OBIDEGWU***** D, **CHASSAGNE R**, MACBETH C. Seismic Assisted History Matching Using Binary Maps. Journal of Natural Gas Science and Engineering, 2017.

11. ESSOUAYED E., VERARDO E, PRYET A., **CHASSAGNE R.**, ATTEIA O., An iterative strategy for contaminant source localisation using GLMA optimization and Data Worth on two synthetic 2D Aquifers, Journal of Contaminant Hydrology, 2019.

12. **CHASSAGNE R**, DAMBRINE J, OBIWULU***** N, A New Geometrical Approach for Fast Prediction of Front Propagation. Computers and Geosciences Journal, 2020.

13. **CHASSAGNE R**, ARANHA C, A Pragmatic Investigation of the Objective Function for Subsurface Data Assimilation Problem. Operations Research Perspectives Journal, 2020.

14. HALLAM* A, MUKHERJEE* D, **CHASSAGNE R**, Multiple imputation via chained equations for elastic well-log imputation and prediction. Applied Computing and Geosciences 14, 100083, 2022

15. HALLAM* A, **CHASSAGNE R**, ARANHA C, HE Y, Comparison of seismic maps metrics as fitness input for assisted history matching. Journal of Geophysics and Engineering 19 (3), 457-474, 2022

16. HE Y*, ARANHA C, HALLAM* A, **CHASSAGNE R**, Optimization of Subsurface Models with MultipleCriteria using Lexicase Selection. Operations Research Perspectives 9, 100237, 2022.

Conference Publications

*** denotes a student (PhD or master) under my supervision**

1. EDWARDS J, FORDHAM E, STANILAND J, **CHASSAGNE R**, MITCHELL J, CHERUKUPALLI P, WILSON O, FABER R, BOUWMEESTER R. Quantitative Remaining Oil Interpretation Using Magnetic Resonance : From the Laboratory to the Pilot. (Proceeding) SPE EOR Conference in Muscat, April 2012.

2. **CHASSAGNE R**, HAMMOND P. Simulation of Drilling Fluid Filtrate Invasion Near an Observation Well. Society of Petroleum Engineers Journal, 154014-MS 2012.

3. OBIDEGWU* DC, **CHASSAGNE R**, MACBETH C. Using 4D Seismic Surveys and History Matching to Estimate Critical and Maximum Gas Saturation. International Petroleum Technology Conference, 18027-MS, 2014.

4. OBIDEGWU* D, **CHASSAGNE R**, MACBETH C. Seismic Assisted History Matching Using Binary Image Matching. Society of Petroleum Engineers EUROPEC, Madrid. SPE-174310-MS, 2015.

5. YIN* Z, MACBETH C, **CHASSAGNE R**. Joint Interpretation of Interwell Connectivity by Integrating 4D Seismic with Injection and Production Fluctuations. Society of Petroleum Engineers EUROPEC, Madrid. SPE-174365-MS, 2015.

6. OBIWULU* N, MACBETH C, **CHASSAGNE R**, Monitoring of Water Injector Performance Using 4D Seismic Data. N101 06, European Association of Geoscientists and Engineers, Madrid, 2015.

7. OBIWULU* N, MACBETH C, **CHASSAGNE R**, Comparative analysis of Binary and Conventional Seismic Assisted History Matching. LHR2 14, European Association of Geoscientists and Engineers, Vienna, 2016.

8. FENG T.,YIN* Z., AYZENBERG M, MACBETH C, **CHASSAGNE R**.Well2seis correlation for enhancing 4D seismic interpretation and model updating. Workshop on 4D seismic and history matching, IRIS, Stavanger April 28, 2016.

9. MACBETH C., GENG* C., **CHASSAGNE R**. A fast-track simulator to seismic proxy for quantitative 4D seismic analysis. SEG Conference 2016, Dallas, US, 2016.

10. **CHASSAGNE R**, ARANHA C. and MACBETH C. An analysis of the Seis-

mic History Matching Objective Function. Conference Paper to the Third Integrated Reservoir Modeling Conference in Kuala Lumpur, Malaysia, 2016.

11. MACBETH C, GENG* C. and **CHASSAGNE R**. A practical fast-track solution for seismic history matching. Conference Paper to the Third Integrated Reservoir Modeling Conference in Kuala Lumpur, Malaysia, 2016.

12. GENG* C., MACBETH C, and **CHASSAGNE R**. Seismic History Matching Using a Fast-Track Simulator to Seismic Proxy. Accepted to SPE EUROPEC conference 2017, Paris.

13. ZHANG* Q., **CHASSAGNE R.** and MACBETH C., European Conference on the Mathematics of Oil Recovery, Seismic History Matching Uncertainty With Weighted Objective Functions, 2018.

14. ZHANG* Q., **CHASSAGNE R.** and MACBETH C., SPE-EAGE conference, Combining seismic and well production in a single objective function, London 2019.

15. MITCHELL* P., **CHASSAGNE R.**, EAGE conference, 4D Assisted Seismic History Matching using a Differential Evolution Algorithm at the Harding South Field, 2019.

16. BRUYELLE J., GUERILLOT D., **CHASSAGNE R.**, A Synthetic Study of a CO2 Storage Seismic Monitoring Based on a Qatar Field, 81st EAGE Conference and Exhibition 2019.

17. MITCHELL* P, **CHASSAGNE R**, Quantitative Seismic History Matching on Harding South Field, Seismic 2019, Aberdeen.

18. HALLAM* A., MACBETH C., **CHASSAGNE R**., AMINI H., 4D seismic study of the Volve Field - an open subsurface-dataset. First Break, invited paper for special topic on reservoir monitoring, 2020.

19. HALLAM* A., MACBETH C., AMINI H., **CHASSAGNE R**., Analysis of the 4D Signal at the Volve Field NCS-An Open Subsurface Dataset. 82nd EAGE Annual Conference and Exhibition 2020.

20. P. POLSENAERE, E. LAMAUD, J.M. BONNEFOND, J. GERNIGON, J. DEBORDE, P. GEAIRON, P. KOSTYRKA* , J. MAYEN, M. ARNAUD, **R. CHASSAGNE**, T. LACOUE-LABARTH, Greenhouse Gas Dynamics in the Coastal Ocean - Emerging Trends and Future Directions. ASLO 2021 Aquatic Sciences Meeting, 22–27 June 2021, Virtual Meeting. Aquatic Sciences for a Sustainable Future: Nurturing Cooperation.

21. CORTE* G, **CHASSAGNE** R, MACBETH C, Seismic History Matching in the Pressure and Saturation Domain for Reservoir Connectivity Assessment. 2nd EAGE Annual Conference & Exhibition 2021 (1), 1-5

22. RA KOLAJOOBI*, C MACBETH, J LANDA, **R. CHASSAGNE**, Efficient Dimensionality Reduction and Localized Sensitivity Analysis for 4D Seismic History Matching Parameterization. 83rd EAGE Annual Conference & Exhibition 2022 (1), 1-5.

Invited Talks & Panels

1. January 2022 - Guest lecture to Society of Exploration Geophysicists University of Delhi Student Chapter, Sustainable Geosciences and GeoEnergy, inform and react, University of Delhi, India.
2. June 2021 - Keynote speaker and chair of the Workshop on Uncertainty Formulation for Subsurface Problems, co-organised with Shinshu University and Tsukuba University.
3. January 2021 - Guest Lecture for Geowebinar organised by the Italian Geological Society, Dynamic Reservoir Characterisation for subsurface problems.
4. October 2020 - Guest lecture for Workshop on ensemble-based 4D seismic History-Matching at the National IOR Centre of Norway, The main locks within 4D seismic history matching.
5. June 2020 - Webinar at Institut de Physique du Globe de Paris (IPGP), Surveillance and Risks Analysis, Under the Hood of Predictions.
6. September 2019 - Guest lecture at Workshop at the International Associated Laboratory Frontiers in Massive Optimization and Computational Intelligence (LIA-MODO) in Shinshu University, Japan - A multi-sources multi-scale optimization problem.
7. August 2019 - Guest lecture at the Computer Science department of Tsukuba University (Japan) - An Introduction of Data Assimilation Techniques for the Subsurface
8. February 2019 - Guest lecture at I2CNER (CO2 session) workshop at Kyushu University, Reservoir Characterisation and seismic monitoring techniques, a CO2 perspective., Fukuoka, Japan.
9. March 2019 - Seminar at the Department of Computer Science, Centre for Mathematical and Computational Biology. Surrey University, UK, on Optimisation methods for subsurface problems.
10. December 2018 - Guest lecture on history matching at China Petroleum University, Seismic History Matching, Qingdao, China.
11. October 2018 - Invited for a seminar to Texas A&M University at Qatar, Seismic History Matching, Why it is still unsolved, Doha, Qatar.
12. May 2018 - Guest lecture Edinburgh society for industrial and applied mathematics (SIAM) student Chapter, Mathematics and Data - Behind The Scene of Data Integration. Edinburgh, UK.
13. April 2018 - invited for a seminar at Middlesex University London in the Artificial Intelligence Research Group, "How to Characterize the Embedded Uncertainty within processed data, A real-world example.
14. February 2018 - Seminar at the Department of Mathematics at Bergen University in Norway, Data Assimilation Problem, A Practical Example.
15. October 2017 - Guest lecture at Tokyo University (Japan) - Insights on Data Integration
16. September 2017 - Keynote speaker at Tsukuba University (Japan) - Science for global Innovation Forum - Challenges in Oil and Gas, a data integration problem
17. September 2017 - Keynote speaker at Tomsk University (Russia) - Workshop on Prediction of Complex Reservoir Systems under Uncertainty: Multi-scale and Multi-physics Challenges. Under the hood of the Seismic Assimilation: Toward a Practical Seismic History Matching
18. July 2017 - Seminar at Poitiers University (France) - Data Assimilation Challenges, a Practical Example with Seismic History Matching.

19. June 2017 - Seminar at the French Institute of Petroleum, IFPEN (France) - Data Screening Before History Matching
20. June 2017 - Speaker at 79th EAGE Conference and Exhibition 2017 (France) - Workshops, Constraining the history match using 4D seismic data: how far can we go?
21. February 2016 - Seminar at Geosciences Research Center, TOTAL Aberdeen, UK - Beyond Binary Seismic History Matching.
22. Sponsors meetings, twice a year since 2013.
23. September 2015 -Guest lecture at Tokyo University (Japan) - A glimpse of Petroleum Engineering.
24. June 2012 - seminar at the French Institute of Petroleum, IFPEN (France) - Invaded zone behaviours around an observation well
25. April 2011 - Seminar at Schlumberger clamart technology center (France - Relation between hysteresis and capillary diffusion.
26. February 2010 - Seminar at Paris VI University (France) - Silicic acid, Organic matter and Oxygen evolution into porous media submitted to a tidal forcing and residence time estimation.
27. January 2010 - Seminar at Utrecht University (Netherland) - Silicic acid, Organic matter and Oxygen evolution into porous media submitted to a tidal forcing and residence time estimation.
28. December 2007 - Seminar at institut de Mécanique des fluides et des solides de Strasbourg (France - Mathematical modeling of runoff in porous media variably saturated?