

David J. Byrne

Phone: +447702594779

E-Mail: david.byrne@univ-lorraine.fr

Website: djbyrne.com

[Google Scholar profile](#)

[ResearchGate profile](#)

Centre de Recherches
Pétrographiques et Géochimiques
15 Rue Notre Dame des Pauvres
Vandoeuvre-lès-Nancy
54500
France

Education

University of Oxford

2014-2019

PhD in Earth Sciences: *Noble gas isotope investigation of unconventional hydrocarbon reservoirs and related subsurface environments*

University of Cambridge

2010-2014

MSci, BA (1st class) Natural Sciences

Employment

Postdoctoral researcher - Centre de Recherches Pétrographiques et Géochimiques

2019-Present

ERC-funded (PHOTONIS) postdoc investigating isotopic fractionation in the early solar system, using laser-ablation noble gas mass spectrometry of chondritic meteorites.

Geochemistry Intern - ExxonMobil Upstream Research Company

2018

4-month internship working on applications of organic biomarker geochemistry to petroleum exploration and development. Worked using gas chromatography, GCMS, Rock-Eval techniques to interpret source-rock to oil correlations and thermal histories.

Publications

24. **Byrne D. J.**, Broadley M. W., Füre E., Tissandier L., Zimmermann L., Almayrac M. G., Bekaert D. V., Barrat J.-A., and Marty B. (2022) Noble gas and nitrogen investigation of the unique andesitic achondrite Erg Chech 002: Degassing, cosmic ray exposure and radiogenic ingrowth histories. *Geochimica et Cosmochimica Acta* (in review)
23. Okazaki R., et al. (2022) Noble gases and nitrogen in Ryugu grains - Records of its past and recent geological activity. *Science* (in review)
22. Okazaki R., et al. (2022) First asteroid gas sample delivered by the Hayabusa2 mission: A treasure box from Ryugu. *Science Advances* (in review)
21. Ardoin L., Broadley M. W., Almayrac M. G., Avice G., **Byrne D. J.**, Tarantola A., Lepland A., Saito T., Komiya T., Shibuya T., and Marty B. (2022) The end of the isotopic evolution of atmospheric xenon. *Geochemical Perspectives Letters* **20**
20. Broadley M. W., **Byrne D. J.**, Ardoin L., Almayrac M. G., Bekaert D. V. and Marty B (2021) High precision noble gas measurements of hydrothermal quartz reveal episodic loss of Xe from the Archean atmosphere. *Earth and Planetary Science Letters* (in review)
19. Bekaert D. V., Curtice J., Meier M. M. M., **Byrne D. J.**, Broadley M. W., Seltzer A., Barry P., Kurz M. D. and Nielsen S. G (2021) Noble gas cosmic-ray exposure ages of 23 meteorites: ordinary and CV chondrites, ureilites, eucrites and a diogenite. *Meteoritics and Planetary Science* (in review)

18. Wade J., **Byrne D. J.**, Ballentine C. J. and Drakesmith H. (2021) Temporal variation of planetary iron as a driver of evolution. *PNAS* **118**:51
17. Tyne R. L., Barry P. H., Karolytè R., **Byrne D. J.**, Kulongoski J. T., Hillegonds D. J. and Ballentine C. J. (2021) Investigating the effect of enhanced oil recovery on the noble gas signature of casing gases and produced waters from selected California oil fields. *Chemical Geology* **584**, 120540.
16. Mtili K. M., Kazimoto K., Kimani C., Kasanzu C., Tyne R. L., **Byrne D. J.**, Hillegonds D. J., Ballentine C. J. and Barry P. H. (2021) The origin of high helium concentrations in the gas fields of southwestern Tanzania. *Chemical Geology* **585**, 120542
15. Kimani C., Kasanzu C., Mtili K. M., Kazimoto E., Tyne R. L., **Byrne D. J.**, Hillegonds D. J., Ballentine C. J. and Barry P. H. (2021) He, Ne, Ar and CO₂ systematics of the Rungwe Volcanic Province, Tanzania: Implications for fluid sources and dynamics. *Chemical Geology* **586**, 120584
14. Tyne R. L., Barry P. H., Lawson M., **Byrne D. J.**, Warr O., Xie H., Hillegonds D. J., Formolo M., Summers Z. M., Skinner B., Eiler J. M. and Ballentine C. J. (2021) Rapid microbial methanogenesis during CO₂ storage in hydrocarbon reservoirs. *Nature* **600**, 670-674
13. Cheng A., Sherwood Lollar B., Warr O., Ferguson G., Idiz E., Mundle S. O. C., Barry P. H., **Byrne D. J.**, Mabry J. and Ballentine C. J. (2021) Determining the role of diffusion and basement flux in controlling ⁴He distribution in sedimentary basin fluids. *Earth and Planetary Science Letters* **574**, 117175
12. Barrat J.-A., Chaussidon M., Yamaguchi A., Beck P., Villeneuve J., **Byrne D. J.**, Broadley M. W. and Marty B. (2021) A 4,565-My-old andesite from an extinct chondritic protoplanet. *PNAS* **118**:11
11. **Byrne D. J.**, Broadley M. W., Halldórsson S. A., Ranta E., Ricci A., Tyne R. L., Stefánsson A., Ballentine C. J. and Barry P. H. (2021) The use of noble gas isotopes to trace subsurface boiling in Icelandic geothermal systems. *Earth and Planetary Science Letters* **560**, 116805.
10. Marty B., Almayrac M., Barry P. H., Bekaert D. V., Broadley M. W., **Byrne D. J.**, Ballentine C. J. and Caracausi A. (2020) An evaluation of the C/N ratio of the mantle from natural CO₂-rich gas analysis: Geochemical and cosmochemical implications. *Earth and Planetary Science Letters* **551**, 116574.
9. Broadley M. W., Barry P. H., Bekaert D. V., **Byrne D. J.**, Caracausi A., Ballentine C. J. and Marty B. (2020) Identification of chondritic krypton and xenon in Yellowstone gases and the timing of terrestrial volatile accretion. *PNAS* **117**, 13997-14004.
8. **Byrne D. J.**, Barry P. H., Lawson M. and Ballentine C. J. (2020) The use of noble gas isotopes to constrain subsurface fluid flow and hydrocarbon migration in the East Texas Basin. *Geochimica et Cosmochimica Acta* **268**, 186-208.
7. Tyne R. L., Barry P. H., Hillegonds D. J., Hunt A. G., Kulongoski J. T., Stephens M. J., **Byrne D. J.** and Ballentine C. J. (2019) A Novel Method for the Extraction, Purification, and Characterization of Noble Gases in Produced Fluids. *Geochemistry, Geophysics, Geosystems* **20**, 5588-5597.
6. **Byrne D. J.**, Barry P. H., Lawson M. and Ballentine C. J. (2018) Determining gas expulsion vs retention during hydrocarbon generation in the Eagle Ford Shale using noble gases. *Geochimica et Cosmochimica Acta* **241**, 240-254.
5. Barry P. H., Kulongoski J. T., Landon M. K., Tyne R. L., Gillespie J. M., Stephens M. J., Hillegonds D. J., **Byrne D. J.** and Ballentine C. J. (2018) Tracing enhanced oil recovery signatures in casing gases from the Lost Hills oil field using noble gases. *Earth and Planetary Science Letters* **496**, 57-67.

4. **Byrne D. J.**, Barry P. H., Lawson M. and Ballentine C. J. (2018) Noble gases in conventional and unconventional petroleum systems. *Geological Society, London, Special Publications* **468**, SP468.5.
3. Barry P. H., Lawson M., Meurer W. P., Danabalan D., **Byrne D. J.**, Mabry J. C. and Ballentine C. J. (2017) Determining fluid migration and isolation times in multiphase crustal domains using noble gases. *Geology* **45**, 775–778.
2. Barry P. H., Lawson M., Meurer W. P., Warr O., Mabry J. C., **Byrne D. J.** and Ballentine C. J. (2016) Noble gases solubility models of hydrocarbon charge mechanism in the Sleipner Vest gas field. *Geochimica et Cosmochimica Acta* **194**, 291–309.
1. Turchyn A. V., Antler G., **Byrne D. J.**, Miller M. and Hodell D. A. (2016) Microbial sulfur metabolism evidenced from pore fluid isotope geochemistry at Site U1385. *Global and Planetary Change* **141**, 82–90.

Invited Talks

- 2020 Goldschmidt conference, Hawaii (virtual) *Determining hydrocarbon generation and migration using noble gases*

Research Experience

- Member of the volatile analysis team for the JAXA-led HAYABUSA2 mission
- Development of laser ablation technique for noble gas analysis of extraterrestrial samples using ESI 213nm Nd:YAG laser and Helix MC noble gas mass spectrometer
- Purification and high precision analysis of noble gas isotopes in volcanic gas samples collected in Giggenbach flasks using Helix MC and VG 5400 mass spectrometers
- Protocol development, vacuum line construction and operation of noble gas mass spectrometers ARGUS VI and Helix SFT at the noble laboratory, Oxford, for measurement of He, Ne, Ar, Kr & Xe isotopes
- Noble gas sample collection, preparation, introduction for isotope measurement.
- Extraction and purification of sulfate from seawater, and pyrite from ocean sediments, for combined S and O isotope analysis
- Modelling using *Python, MATLAB, QGIS, Crunchtopo*
- Working with large datasets from IODP databases
- Presenting experience at LPSC 2022, Goldschmidt conference 2015, 2017-2021, AGU 2017, Developments in Noble Gas Understanding & Expertise (DINGUE) conferences 2016, 2017, 2019, 2021 NERC CDT in Oil & Gas conferences 2015 & 2016, and Postgraduate Research in Marine and Environmental Sciences (PRMES) 2013.
- Member of the Natural Environment Research Council Centre for Doctoral Training in Oil and Gas (NERC CDT). Attended 20 weeks of bespoke training of broad relevance to energy science, policy issues and communication.

Field Research Experience

- South Texas 2015 – Noble gas sampling from producing natural gas wells
- East Texas and Louisiana 2016 – Noble gas sampling from producing natural gas & oil wells

- Iceland 2017 – Noble gas sampling of fumaroles, seeps and geothermal wells
- Yellowstone 2019 - Noble gas sampling of fumaroles in geothermal areas

Teaching Experience

- Demonstrator - Oxford Earth Sciences 2nd year Mathematics & Statistics (2015-2017)
- Demonstrator – Oxford Earth Sciences 1st year Thermodynamics (2016-2017)
- Demonstrator – Oxford Earth Sciences 3rd year Spain field trip, (2015 & 2016)
- Lecturer, demonstrator - ENSG Nancy 2nd year Geochemistry - introduction to mass spectrometry (2019-2021)
- Academic mentor to Oxford Earth Sciences PhD student Rebecca L. Tyne (2017-) and CRPG Nancy PhD student Matthieu Almayrac (2019-). Co-supervisor of Master's students Raphael de Miceli (2020) and Delphine Contamine (2021).

Awards

- AGU 2017 – Outstanding student paper award - \$100
- St Peter's College conference travel grant 2017 - £150
- Clare College scholar's award 2014 - £100
- Wort's travelling scholar's fund 2012 - £500
- Clare College travelling scholar's grant - £200

Community service

- Session convener - Goldschmidt 2019
- Reviewer - *Geochimica et Cosmochimica Acta*, *Planetary and Space Science*, *Earth and Planetary Science Letters*, *AAPG Bulletin*, *Chemical Geology*, *Advances in Space Research*

References

Professor Chris Ballentine – PhD supervisor
Head of Dept
Dept of Earth Sciences
University of Oxford
chris.ballentine@earth.ox.ac.uk

Professor Bernard Marty - Postdoc supervisor
Professor of Geochemistry
CRPG-CNRS
Université de Lorraine
bernard.marty@univ-lorraine.fr