JUNE 2024

Nancy School of Geology
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54500 Vandœuvre-lès-Nancy, France
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**www.ring-team.org**

# NEWSLETTER

## Research for Integrative Numerical Geology

## WELCOME

*to the 2024 edition of the RING newsletter! It will give you an overview of the last months' activity & events, as well as our team life.*

## IN THIS EDITION



## UPCOMING

***2024 RING Meeting***
***17-20 September***
***Nancy School of Geology***

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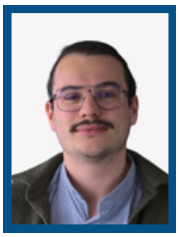
# ARRIVALS



**Bastien MORIN**
**PhD student (*BRGM - RING*)**
*2024-2026*

After graduating with an engineering degree from the Nancy School of Geology, specializing in hydrogeology, Bastien worked for a year and a half at BRGM as a hydrogeologist modeler, focusing on groundwater rise issues in post-mining management contexts. Since April 2024, he has been pursuing a PhD in collaboration with BRGM and GeoRessources-RING, focusing on the return to equilibrium of the geochemical conditions in the Gardanne coal mine reservoir.

**Lois LETELLIER**
**PhD student (*ASGA*)**
*2024-2026*

Loïs obtained an engineering degree in Numerical Geology at Nancy School of Geology in 2023.
He has a professional experience as an intern at BRGM, where he took part in the restructuring of the BRGM's modeling tools by developing an open-source python package (krigeo) that allows for easy integration of fault models when kriging.
He joined the RING team in April 2024 for a PhD thesis on assisted borehole interpretation and multi-well correlation for geothermal modeling.

# NEW MEMBERS OF THE CONSORTIUM

Eliis

***Industrial Sponsor***

Eliis joined the Consortium in April 2024. Eliis provides sustainable subsurface interpretation solutions to the Energy industry for a better understanding of the subsurface. This new partnership will bring great opportunities for collaboration with the RING community, through the development of projects, among others the research on CO2 storage, and the supervision of students.

ETH zürich

***Academic Sponsor***

ETH became a member of the Consortium in January 2024. Researchers from its Institute of Geochemistry and Petrology are working on the geothermal field - with scientists also members of the Consortium - and have the prospect to develop more projects in partnership with RING.

**Welcome!**

**COMBINING GEOSCIENCES, APPLIED MATHEMATICS, AND COMPUTER PROGRAMMING, WE DO METHODOLOGICAL RESEARCH TO DESCRIBE THE GEOMETRY AND HETEROGENEITIES OF THE SUBSURFACE CONSISTENTLY WITH OBSERVATIONS AND GEOLOGICAL CONCEPTS.**

# UPCOMING PHD DEFENSES

**Enrico SCARPA**
**(*ASGA*)**
*Defense: Autumn 2024*

Hydrodynamic connectivity of channelized sedimentary deposits: analysis and reproduction.

**Fabrice TATY MOUKATI**
**(*ASGA*)**
*Defense: Autumn 2024*

Stochastic seismic structural interpretation of geological faults.

**Marius RAPENNE**
**(*CCR - ASGA*)**
*Defense: Winter 2024-25*

Adaptive Homogenization of Sedimentary Basin for the Estimation of Seismic Risk.

**Augustin GOUY**
**(*RING - BRGM*)**
*Defense: Winter 2024-25*

Discrete karst network simulations: application to the Barrois limestones.

# DISTINCTIONS

**Guillaume CAUMON**
**Professor, Head of RING**

Guillaume was nominated 2023 Senior member of the Institut Universitaire de France (IUF) in the innovation Chair, Sciences of the Earth and Universe discipline, Numerical Geology specialty.

**Pauline COLLON**
**Professor**

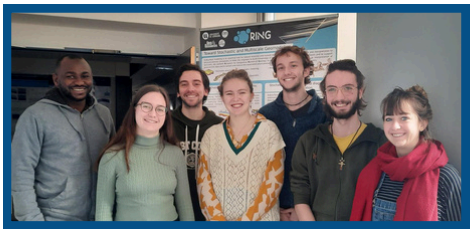
In 2023 Pauline obtained the title of Professor of the Université de Lorraine. She teaches Geomodeling, Hydro(geo)logy, C++ Programming, GIS and (Geo)Statistics.

**Nicolas CLAUSOLLES (BRGM)**
**RING PhD student 2017-2020**

Nicolas and his co-authors Pauline COLLON, Modeste IRAKARAMA & Guillaume CAUMON received the SEG Honorable Mention for Best paper In Interpretation in 2023.

***Congratulations for these achievements!***

# INTERNSHIPS



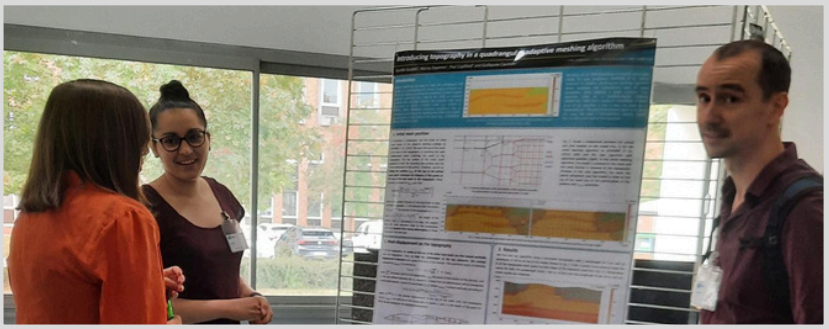
**Abdrahamane BERETE, Noémie BOUCHE,**
**Juan Sebastian OSORNO BOLIVAR, Laurine ANDRES,**
**Rémi LEBLOND, Romain BAVILLE and Louise HOUBRE**
**Master students (*Nancy School of Geology*)**

This year we welcomed seven ENSG Master students (Numerical Geology cursus), for a 3-months internship. They generated interesting results as part of their respective projects. Several of them will present their work at the 2024 RING meeting.

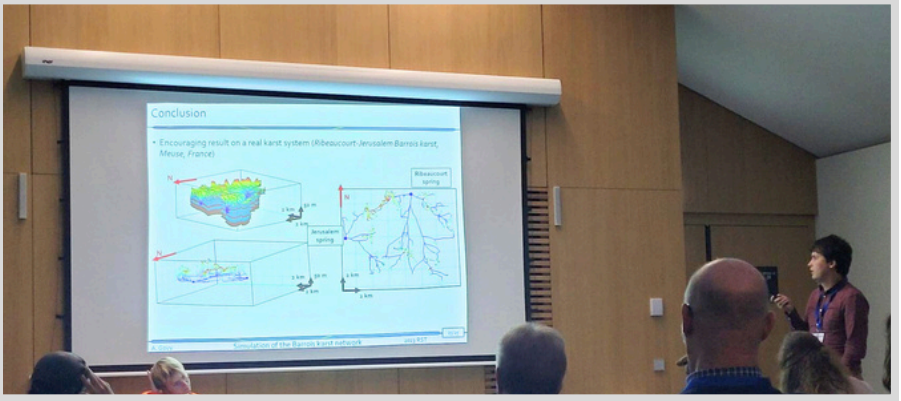
**Stefano CASIRAGHI**
**Erasmus PhD intern**
**(*University Milano-Bicocca*)**

Stefano is doing an internship as part of his PhD in Chemical, Geological and Environmental Sciences, under the supervision of Andrea BISTACCHI.
Stefano is working on fracture network characterization using stochastic simulation of marked point process and Bayesian inference.

# CONFERENCES, FIELD TRIPS & EVENTS

**RING Meeting, Nancy School of Geology**
**RING team**
**September 2023**




**Réunion des Sciences de la Terre, Rennes**
**Augustin GOUY**
**October 2023**

**Field trip, Provence**
**IAMG Student Chapter**
**October 2023**

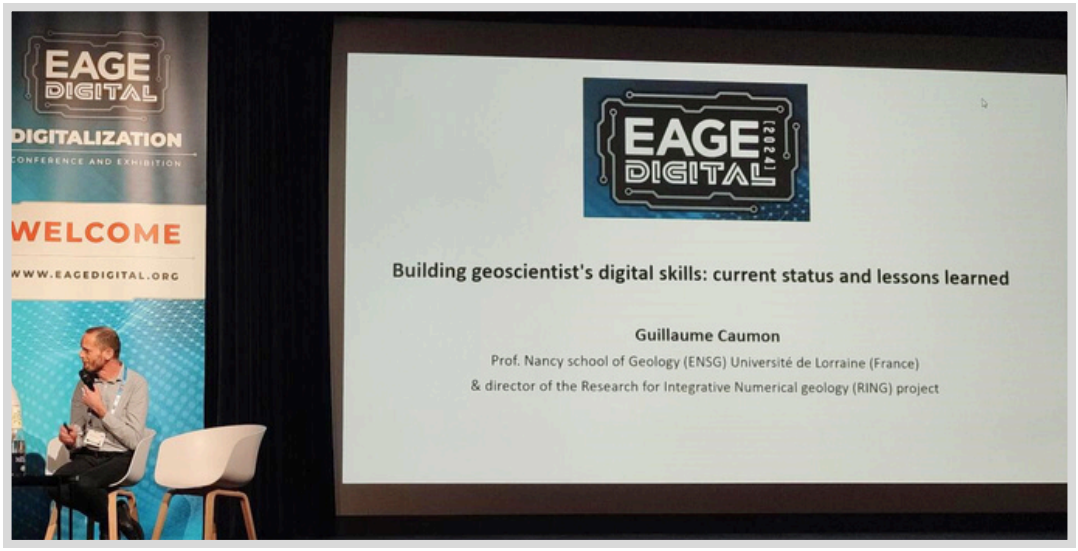
THE PAST YEAR WAS RICH AND EVENTFUL, AS AFTER THE ANNUAL RING MEETING, THE TEAM CO-ORGANIZED OR ATTENDED SEVERAL CONFERENCES, FIELD TRIPS AND EVENTS, IN FRANCE AND ABORAD. MANY GREAT OPPORTUNITIES TO SHOW THEIR WORK AND RESEARCH!

**Schauinsland mine, Oberried (Germany)**
**Paul MARCHAL**
**October 2023**


**GEOLOGIA, Centre Prouvé, Nancy**
**RING team**
**November 2023**


**EAGE Conference, Porto (Portugal)**
**Guillaume CAUMON, Julien HERRERO, Fabrice TATY MOUKATI and Enrico SCARPA**
**November 2023**

**Institut Universitaire de France awards, Paris**
**Guillaume CAUMON**
**Novembre 2023**

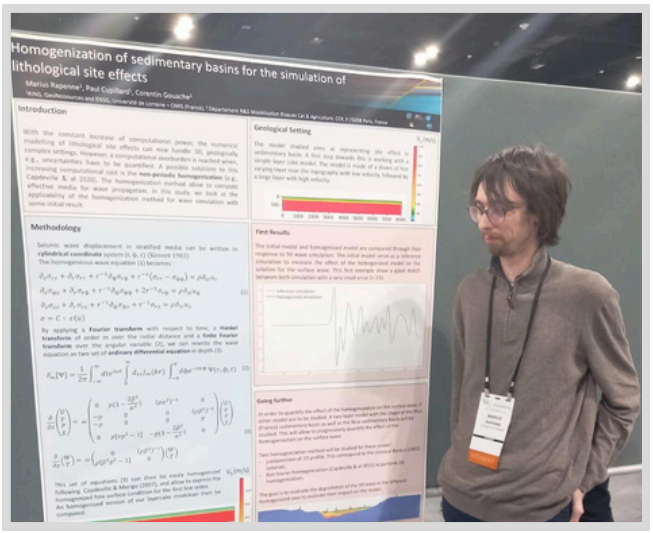



**EAGE Digitalization, Paris**
**Guillaume CAUMON, Amandine FRATANI and RING Master interns**
**March 2024**

## SSA Conference, Anchorage (Alaska)

**Paul CUPILLARD and Marius RAPENNE**

**May 2024**

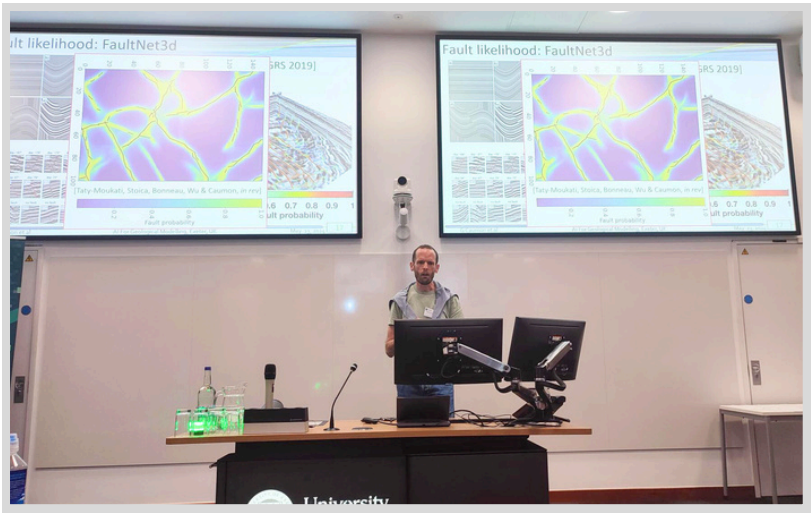


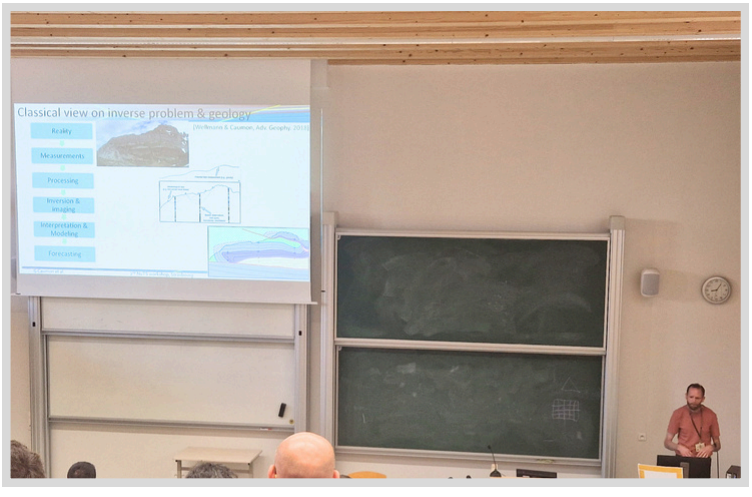
## A.I. for Geological Modelling and Mapping Conference

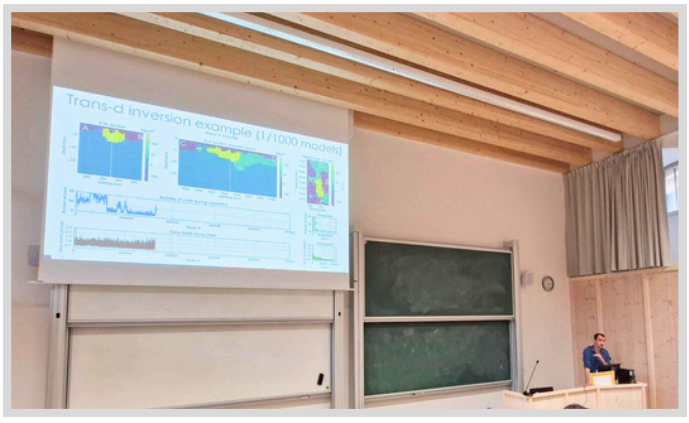
**University of Exeter (UK)**

**Guillaume CAUMON and Amandine FRATANI**

**May 2024**


## NuTS Conference, Strasbourg

**Guillaume CAUMON, Paul CUPILLARD, Mustapha ZAKARI, Giusi RUGGIERO, Julien HERRERO & Jérémie GIRAUD**

**May 2024**

# RESEARCH HIGHLIGHT

### TiFlow

*Software developed by Julien HERRERO, PhD student (ASGA)*

TIFlow (transdimensional inversion of flow data) is a software entirely developed in Python for stochastic inversion aimed at characterizing the uncertainties of parameters in a geological model. The algorithm operates on two-dimensional stratigraphic layer geological models with a transdimensional inversion, meaning that the number of layers in the model is variable, and thus the number of parameters is an unknown of the problem. TIFlow includes parameterizations of more or less complex models, and can perform inversions using either individual types of data such as well logging, seismic, and dynamic flow data, or through joint inversions combining these data types. The outputs are statistics and uncertainty maps of accepted (i.e., likely) realizations from all the generated models.

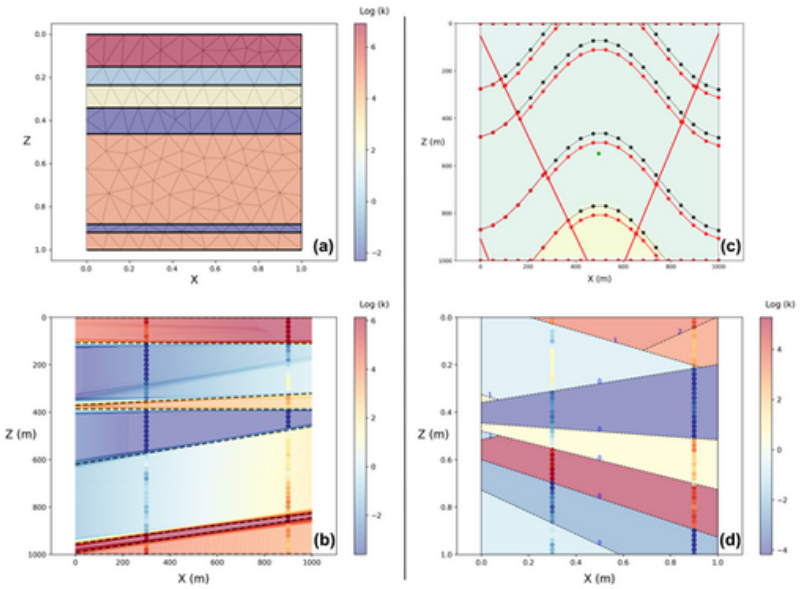



*Figure 1: Different parameterizations of a 1D-2D layered geological model proposed by TIFlow*

# ALUMNI TESTIMONIAL

**Margaux RAGUENEL, Reservoir Engineer at TotalEnergies - RING PhD student 2017-2019**

*During my PhD, I enjoyed discovering new things and being at the interface of several fields, which allowed me to meet a lot of people.*
*I have many memories of both individuals and moments spent at RING. It is hard to pick one but I believe we can truly highlight the support of the team, both literally and figuratively, in all circumstances.*
*Not only from a scientific perspective, as everyone is always available for discussions, exchanging opinions, or providing help, but also in a more down-to-earth manner. For instance, during our field trip to the Dolomites, my knee was still rehabbing, and team members took turns carrying my backpack.*
*What I appreciated at RING was the cross-disciplinary nature of research projects, with the team's expertise recognized on various subjects related to subsurface modeling.*

RING RESEARCHERS AND STUDENTS HAVE A SOLID BACKGROUND IN APPLIED MATHEMATICS, STATISTICS AND PHYSICS,AS WELL AS AN EXPERIENCE IN COMPUTER PROGRAMMING.

**Work with us**

# POST DOC OPPORTUNITIES

We welcome Post Doc researchers who are interested in working on RING's research topics and we support funding applications to Marie Skłodowska-Curie Actions, Fond National Suisse, and others.

A two-year postdoc position is currently open to applications until **July 15, 2024:**
***Tetrahedral mesh updating for subsurface modeling: line and finite surface insertion.***

# MASTER OPPORTUNITIES

We offer Master internships for students who undertake the ENSG Numerical Geology option.
To apply, students must enter the ENSG's "Diplôme d'ingénieur" either in first year after an entry exam or a Bachelor, or in 2nd year after a M1.
Students with a M1 (or a M2 in Sciences of the Earth) can also apply directly for a Master 2 STPE / GEIR.
***Applications for the new MSc specialty in numerical geology are already closed on CampusFrance and monmaster.gouv.fr but are still open on :*** **e-candidat.univ-lorraine** until **June 15, 2024.**

# PORTRAIT

**Giusi RUGGIERO, 2nd year PhD student**

*I started my PhD at RING in September 2022. Before that, I completed a Bachelor degree in Geological Sciences at Sapienza University, in Rome, and a Master degree in Exploration and Applied Geophysics at the University of Pisa.*
*My research aims at quantifying structural uncertainty. To this end, we adopt an alternative approach based on a two stage inversion: the first one implies the use of the homogenization operator in the context of Full Waveform Inversion (FWI) of seismic data with the aim of recovering a smooth effective medium ; the second inversion is performed in order to recover small scale information in terms of geological structures through a downscaling inverse problem, also called inverse homogenization. The downscaling is solved using a Bayesian formulation with a MCMC algorithm, thus obtaining a probability distribution over possible fine-scale geological models.*
*What I enjoy about researching is to continuously learn something new and challenge myself in new ways. I find it stimulating and a valuable opportunity for personal and professional growth.*
*I had just started the PhD when I attended the IAMG conference in Nancy. Meeting young researchers from different countries and discovering their studies was a great welcoming to the research environment and gave me the right motivation to start this journey.*
*I really appreciate the friendly and supportive work environment at RING. Everyone is incredibly collaborative and ready to offer suggestions and help. I like the fact that very often we enjoy spending time together outside of work. This team's spirit makes working here a great experience.*
*Outside of work, I enjoy practicing yoga/pilates and spending good time outdoors with friends. During weekends, I particularly like discovering places around the region and making new experiences.*
*Before starting my PhD, I did not know a lot about this French region and the city. I discovered that Nancy is a city full of art. Apart from museums, there are numerous examples of Renaissance and Art nouveau architecture around the city which makes it very elegant. Moreover, it is a very active city, full of students, offering various musical and cultural events every month of the year.*

# AFTER WORK

**TEAM-BUILDING ACTIVITIES ARE ALSO PART OF THE LIFE AT RING. AS WE WELCOME PEOPLE FROM ALL AROUND THE WORLD, IT IS IMPORTANT TO US THAT WE INCLUDE EVERYONE AND MAKE PEOPLE FEEL LIKE THEY'RE "PART OF THE FAMILY" INSIDE AND OUTSIDE THE WORK ENVIRONMENT.**

*Discovery of local restaurants*

*Visit of Marseille*

*Trip to Italy*


*Summer gig*

# 2024 RING CONSORTIUM

## COMPANIES


## UNIVERSITIES & RESEARCH INSTITUTES

### Europe

1. (at) Montan Universitat Leoben
2. (be) Faculte Polytechnique de Mons
3. (ch) Basel University
4. (ch) ETH Zurich
5. (ch) Neuchatel University (CHYN)
6. (cr) Croatian Geological Survey
7. (de) Bayerisches LfU Munchen
8. (de) BGE Bundesgesellschaft für Endlagerung
9. (de) BGR Hannover
10. (de) BSU Geological Survey Hamburg
11. (de) Bergakademie Freiberg
12. (de) Bremen University Marum
13. (de) Darmstadt Technische Universität
14. (de) Geologischer Dienst NRW
15. (de) Goettingen University GZG
16. (de) Hessisches Landesamt für Umwelt und Geologie (HLNUG Wiesbaden)
17. (de) IFG Geophysik Kiel University
18. (de) IFG Hannover University
19. (de) Karlsruher Institute für Technologie (KIT)
20. (de) LAGB Sachsen-Anhalt
21. (de) LBEG (NIfB Geological Survey) Hannover
22. (de) LBGR Brandenburg
23. (de) LGB MAINZ - Landesamt fur Geologie und Bergbau Rheinland-Pfalz
24. (de) LGRB Freiburg University
25. (de) LIAG Institut Hannover
26. (de) LUNG MV - Landesamt fur Umwelt, Naturschutz und Geologie
27. (de) Landesamt für Umwelt des Landes Schleswig-Holstein (LFUSH)
28. (de) LfULG Dresden - Sachsisches Landesamt fur Umwelt Landwirtschaft und Geologie
29. (de) Muenchen University
30. (de) TLUBN
31. (de) TU Munchen
32. (de) Senate Department for the Environment, Transport and Climate Protection
33. (es) Barcelona University
34. (es) Consejo Superior de Investigaciones Cientificas (CSIC)
35. (es) Institut Cartografic i Geologic De Catalunya (ICGC)
36. (fi) Geological Survey of Finland
37. (fi) Helsinki University - Institute of Seismology
38. (fr) ARMINES - Paris School of Mines
39. (fr) Antilles University
40. (fr) CNRS France - UNISTRA - ENS
41. (fr) Cergy Pontoise University
42. (fr) Geosciences Rennes UMR 6118
43. (fr) Institut des Sciences de la Terre d'Orléans (ISTO)
44. (us) LBL - Berkeley Lab
45. (fr) LMTG Toulouse
46. (fr) Pau University
47. (fr) Provence University Aix-Marseille
48. (ir) ICRAG - Irish Center for Research in Applied Geosciences
49. (it) Milano Bicocca University
50. (it) O.G.S. Trieste
51. (pl) Institute Geophysics Pas Warsaw
52. (pl) Polish Geological Institute - National Research Institute - Warsaw
53. (pt) LNEG Porto Laboratorio Nacional de Energia e Geologia
54. (pt) University of Evora
55. (se) Geological Survey Of Sweden
56. (se) LULEA University of Technology
57. (se) Uppsala University - Sweden
58. (si) UL NTF Ljubljana University
59. (sl) Geological Survey of Slovenia
60. (uk) British Geological Survey
61. (uk) Heriot Watt University
62. (uk) Imperial College - London

### Asia

1. (cn) China University Of Petroleum (UPC)
2. (cn) Institute of Geology CAGS
3. (cn) Chungnam National University (CNU)
4. (kr) Kangwon National University Korea

### North America

1. (ca) Alberta University
2. (ca) Geological Survey of Canada
3. (ca) INRS ETE
4. (ca) Laurentian University
5. (ca) Manitoba Geological Survey
6. (ca) Northern Alberta Institute of Technology (NAIT)
7. (ca) Saskatchewan University
8. (ca) Saskatchewan Geological Survey (Industry & Research at Saskatchewan)
9. (us) Energistic (POSC)
10. (us) Geological Survey of Alaska DGGS
11. (us) Harvard Cambridge University
12. (us) Houston University - Earth & Atmospheric Sciences
13. (us) LBL
14. (us) Stanford University
15. (us) Univ. California Santa Barbara ICS
16. (us) Washington and Lee University

### South America

1. (br) UNISINOS Brazil

### Oceania

1. (au) CSIRO
2. (au) Department of Water Western Australia
3. (au) Geological Survey of South Australia
4. (au) Geological Survey of Western Australia
5. (au) Geosciences Australia
6. (au) Geological Survey of Victoria
7. (au) Melbourne University
8. (au) Mineral Resources Tasmania
9. (au) Monash University
10. (au) Department of Regional NSW - Resources
11. (au) Northern Territory Geological Survey
12. (au) Queensland Geological Survey
13. (nz) GNS Science - New Zealand