

# THE FLUX LINE

## News of the Geomagnetism, Paleomagnetism and Electromagnetism Section of AGU

November 2019

### Remarks from the President

Greetings to all! 2019 has been a hectic year on the AGU front with several major activities for AGU Council members in addition to “normal operations”. 2019 marks the 100<sup>th</sup> anniversary of AGU and as many of you know, GPE was one of the original divisions of AGU (“the Section of Terrestrial Magnetism and Electricity”). We continue to have much to celebrate including extending warm congratulations to the 2019 GPE Fellows (Alan Jones and Zheng-Xiang Li), the Gilbert Awardee (Suzanne McEnroe) and Bullard Lecturer (Gauthier Hulot).

The 2019 Fall AGU Meeting returns to San Francisco and promises to be an exciting week, with a strong GPE presence and the usual GPE Early Career Event, Bullard Lecture and GPE Business Meeting and Reception. A big thanks goes to Ioan Lascu for his hard work in scheduling the GPE program at the meeting (see Ioan’s report for more details). Many special events are planned for the Fall Meeting, highlighting the Centennial. France Lagroix and I contributed to the Earth Interior Centennial programming: of particular interest to GPE will be the Core Dynamo session on Monday morning and tutorials later in the week. Lennart de Groot’s group has been developing some posters to highlight GPE science and key contributions, and these posters will be available as PDFs by the time of the Fall Meeting.

Another major effort this year has been the development of AGU’s next Strategic Plan. The previous Strategic Plan was completed and released in 2010, and has guided ongoing operations and targeted plans for meetings, publications and international engagement. The development of the new strategic plan has been underway since late 2018, with considerable involvement of AGU Council including interviews, questionnaires, and scenario planning to identify how AGU can best position itself to thrive and remain successful in the context of external trends.

The Austin Challenge is another exciting AGU development. Jamie Austin, AGU Development Board member, has donated up to \$1 million to be matched by AGU members for an endowment for student travel to AGU meetings. Sections have been challenged to help meet this one-time goal and ensure continued student representation at AGU meetings. GPE members have always been generous in support of the section; please consider supporting this endeavor.

As the end of the year approaches its time to start thinking about nominating your colleagues for various AGU awards including Fellowship of the AGU. New, as of this year, is a longer nominations period. The nomination platform opened October 15<sup>th</sup> and is accessible at <https://www.agu.org/Honor-and-Recognize/Honors/>

As part of an AGU-wide effort GPE now has a Section Canvassing Committee (see below) to encourage nominations for awards for under-represented groups. If you have suggestions for nominees, please let Laurie, Martyn or Jon know and they can follow up with potential nominators. 2020 is also “election year” (and no I’m not talking about the US Election!), and potential GPE Secretary and President-Elect candidates will be solicited early in the New Year so if you are interested in serving or want to nominate a colleague please contact France, myself or someone on the canvassing committee.

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Finally, I'd like to extend a personal thanks to all those who have served on GPE committees during this busy year, and especially to Laurie Brown for taking on additional responsibilities (Canvassing Committee and Austin Challenge) as Past President.

With best wishes for the rest of the Fall and I look forward to seeing many of you in San Francisco in December!

*Catherine Johnson* (GPE President)

### **Executive Committee**

Catherine L. Johnson (President)  
France Lagroix (President-Elect)  
Ioan Lascu (Secretary)  
Laurie Brown (Past President)  
Ken Kodama (Fluxline Editor)  
Katerina Petronotis (Webpage editor)  
Annemarieke Béguin ((Student Representative)  
Lennart de Groot (Early Career Representative)

### **Fellows Committee and William Gilbert Award Committee**

France Lagroix  
Kathy Whaler  
Dominique Jault

### **Fall Meeting Program Committee**

Ioan Lascu

### **Canvassing Committee**

Laurie Brown (Chair)  
Martyn Unsworth  
Jon Aurnou

The GPE Executive Committee is an eight-person committee providing discussion, feedback, and suggestions concerning GPE activities, procedures, and governance. Membership includes the elected GPE officers (President, President-Elect, Past President, and Secretary) as well as several appointed positions, with terms of office running for two years. The section website manager and the Fluxline editor are two such positions. Two other positions are the student representative and the early career representative, as outlined below:

**Student Rep:** This position should be a graduate student pursuing research in a subject covered by GPE, and expecting to be a student for the next two years. Traditionally the student rep, with help from the rest of the executive committee, organizes the GPE student mixer at the Fall meeting.

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Early Career Rep: This position is for a GPE member who is in the first ten years of employment in a GPE field including academia, industry, or government agencies.

### **Fall 2019 AGU Centennial Meeting, San Francisco, December 9-13**

The Geomagnetism, Paleomagnetism, and Electromagnetism section received 319 abstracts this year, representing an increase of ~40% in number of abstracts compared to last year. GPE will have primary responsibility for 12 oral sessions, 11 poster sessions, and 1 eLightning session, in addition to a number of sessions co-organized and cross-listed with other sections. In parallel to the regular meeting program, this year there will be a special Centennial program, which will include contributions pertinent to GPE in the Earth Interior neighborhood on Monday morning's Habitability session. There will also be two tutorials later in the week, one on core dynamics, and one on magnetic microscopy. For program details please see synopsis at the end of this document. Many thanks go out to all our session conveners, as well as to Ioan Lascu, GPE Secretary and section representative on the Fall Meeting Planning Committee, who helped put the program together. Ioan points out that we need OSPA judges for our student presentations. Please sign up to judge student presentations by going to <https://ospa.agu.org/2019/ospa/>

Mark your calendars for these special events:

- GPE Student Reception: Sunday, Dec 8, 6:00–8:00 pm, at Thirsty Bear. This is a GPE-sponsored event to help students and postdocs get to know each other and meet the GPE leadership. If you plan on attending please email Annemarieke Béguin ([a.begu@uu.nl](mailto:a.begu@uu.nl)).
- AGU Icebreaker: Monday, Dec 9, 6:00–8:00 pm, Moscone North Exhibit Hall F.
- James B. Macelwane Early Career & Student Breakfast: Tuesday, Dec 10, 7:00–8:00 am, Grand Hyatt, Independence A.
- Bullard Lecture: Tuesday, Dec 10, 5:00–6:00 pm, *Observing, Understanding and Predicting the Earth's Magnetic Field: Successes and Challenges*, presented by Gauthier Hulot, Moscone South 201-202.
- GPE Business Meeting and Reception: Tuesday, Dec 10, 6:30–8:00 pm, Marriott Marquis, Nob Hill A-D Lower B2
- AGU Honors Ceremony: Wednesday, Dec 11, 6:00–8:00 pm, Moscone North Hall E.
- AGU Honors Banquet: Wednesday, Dec 11, 8:30 pm (ticketed event).

### **All students and early-careers are invited to the AGU Fall Meeting GPE Student/Early-career Mixer**

It is that time of year again to start thinking about AGU Fall Meeting! As you start filling your schedule with exciting scientific programs, we would love you to include the 9th annual Geomagnetism-Paleomagnetism-Electromagnetism student mixer. This year we will be gathering on **Sunday, December 8, 6:00 – 8:00 P.M.** at **ThirstyBear** (661 Howard St, San Francisco) one block from the Moscone Center. Drop by after picking up your registration materials early and

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get to know your GPE peers before the meeting starts!

The GPE student mixer is a great place for you to meet other students, the GPE section leadership, and the GPE student representative (Annemarieke Béguin). Highlights of the upcoming week's events will be enjoyed over light appetizers, limited drinks, and friendly conversation with peers. Per tradition, there will be fabulous door prizes that will harness your inner child with a magnetic theme!

All students, especially first-time AGU attendees are encouraged to attend, as the student mixer is a good way meet new friends that help each other navigate the meeting with confidence. We hope you will be able to attend and share your AGU experiences with fellow students.

There is no charge for the event but we ask that you RSVP so we know how many people to expect, preferably by the end of November. PLEASE RSVP to Annemarieke Béguin: [a.beguिन@uu.nl](mailto:a.beguिन@uu.nl) If you have dietary needs (allergies, etc.) please include this in your RSVP.

We look forward to meeting you or seeing you again at the GPE student mixer!

NOTE: This is a separate event from the AGU-wide student mixer. This is a much smaller, GPE-focused event for students and early careers only (please no advisors).

### **GPE Community Access**

There are several ways to communicate with the section, including these two:

The new AGU GPE section web site is: <https://connect.agu.org/gpe/home>  
Content from the previous web platform has been migrated (Thank you Katerina !). A new feature is the "Discussion" tab, which enables GPE members to interact with the GPE community and its section leaders.

We also welcome photos or other fun and interesting information on our Facebook page: <https://www.facebook.com/AGUGeoPaleoElectroMagnetism>

### **New EOS Section Science Advisor & Call for EOS article proposals**

As you may be aware, EOS has recently changed the process by which scientist-authored articles are submitted to the magazine. They have transitioned from a manuscript-submission to a proposal-submission process. Proposals are evaluated by a panel of Eos Science Advisors, and if accepted, the Advisors and EOS staff writers provide guidance on developing the article for a broad audience. These changes are designed to make hurdles to submission lower so that you can more easily share your great science with EOS readers and the AGU community. The types of

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articles have also been modified to include Science Updates, Opinions, Feature Articles, and GeoFizz ("lighthearted" looks into science).

Please consider submitting your ideas to EOS. More information on the submission process can be found here: <https://eos.org/agu-news/changes-to-the-eos-scientist-authored-submission-process>

If you have questions, you may contact EOS directly at [eos@agu.org](mailto:eos@agu.org). You may also contact the GPE Science Advisor, Julie Bowles ([bowlesj@uwm.edu](mailto:bowlesj@uwm.edu)) or one of the additional GPE advisory panelists: Kerry Key ([kkey@ldeo.columbia.edu](mailto:kkey@ldeo.columbia.edu)), Monika Korte ([monika@gfz-potsdam.de](mailto:monika@gfz-potsdam.de)), Yongxin Pan ([yxpan@mail.iggcas.ac.cn](mailto:yxpan@mail.iggcas.ac.cn)), and Nick Swanson-Hysell ([swanson-hysell@berkeley.edu](mailto:swanson-hysell@berkeley.edu)).

### 2019 Bullard Lecturer



This year's Bullard Lecture will be given by Dr. **Gauthier Hulot** of the Institut de Physique du Globe de Paris. Gauthier is an accomplished and influential geomagnetist across all aspects of the discipline from modelling paleomagnetic observations to interpreting historical and modern satellite data. He introduced key statistical concepts to characterize geomagnetic field variations that are still used today and instigated and initiated an important, and on-going, debate on the predictability of the geodynamo. The Bullard Lecture, entitled "Observing, Understanding and

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Predicting the Earth's Magnetic Field: Successes and Challenges", will be on Tuesday, December 10, at 5:00 pm in Moscone South Room 201-202.

## 2019 Gilbert Award



Professor **Suzanne A. McEnroe**, of the Norwegian University of Science and Technology, is the 2019 recipient of the William Gilbert Award. The award recognized Suzanne's leadership in research that has transformed our understanding of mineral magnetism, paleomagnetic field records and geomagnetic field anomalies. Suzanne McEnroe is the leading scientist and engine behind the discovery and explanation of lamellar magnetism, characterized by a combined very high magnetic stability and high magnetic intensity in certain naturally occurring iron titanium oxides. The discovery of lamellar magnetism is also a breakthrough shifting how the earth science community interprets crustal magnetic anomalies on earth and other terrestrial planets. The implications of this nanoscale magnetic observation are thus far reaching, affecting our view of the depth to Curie-temperature isotherm, the geothermal and magnetic framework of the earth's crust, as well as causes of high-amplitude magnetic anomalies observed from aircrafts or satellites. Suzanne also facilitated the convergence of the earth science, the mineral exploration and the nanomaterial communities creating a new discipline of magnetic petrology, which uses cutting edge nanoscale observation and modelling tools and is transforming the way rock magnetic research is done today.

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## 2019 AGU Fellows for GPE

The 2019 Class of AGU Fellows were announced earlier this summer, and we are delighted to report that Drs. Alan G. Jones of the Dublin Institute of Advanced Studies (Ireland) and Zheng-Xiang Li of Curtin University (Australia) are the newest GPE members to be honored with Fellowship. They will be officially recognized at the AGU Honors Ceremony held at the Fall meeting on Wednesday, December 11 at 6:00 pm in Moscone North Hall E. The ceremony and following reception are open to all.



Dr. **A. G. Jones** is recognized for fundamental studies of the solid earth using EM methods and their relationship to broader earth sciences. As a leader in developing the modern magnetotelluric method, Alan's major contributions have been in developing practical approaches to treating galvanic distortion (indispensable for 2D inversion of MT data and interpretation), in fostering "open science" before its time through the creation, management and support of MTnet (a resource for the exchange of data and information, and repository for inversion and processing codes), in setting an example of cross-disciplinary science, combining MT, seismic, geochemical and geological data and enabling greater depth and insight of interpretations. The sustained impact, of Prof. Alan Jones's work, throughout his career has shaped and challenged the electromagnetic induction research community.

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Prof. **Zheng-Xiang Li** is recognized for his insights and leadership in restoring pre-Pangean supercontinents and their connections to mantle superwells, true polar wander and snowball Earth. Through his leadership, distinct fields of research (e.g. supercontinents, global plumes, paleomagnetic studies, large igneous provinces, TPW, 4D whole Earth geodynamic modelling and CO<sub>2</sub> budget on geological time scales, low latitude glaciations) in geology and geophysics have come together, enabling important advances in our understanding of global geodynamics in particular the formation and location of superwells (i.e. LLSVPs), flat-slab subduction and most recently the modulation of supercontinent cycles by longer superocean episodes. Prof. Li's paleogeographic reconstructions and geodynamic implications of his work have had a sustained impact on a very broad fraction of the Earth Science community from surface processes to the core to living species.

*Please join us in recognizing the 2019 GPE Fellows and the 2019 Gilbert award recipient at the GPE Section Reception and Business Meeting, Tuesday December 10 at 6:30-8:30 pm in Marriott Marquis, Nob Hill A-D Lower B2.*

## 2020 Nominations

It's never too early to start thinking about nominations for AGU Fellows and the Gilbert award for 2020. Nominations are due March 15<sup>th</sup> for Fellows and Union Awards & Medals and April 15<sup>th</sup> for the GPE section William Gilbert award. New, as of this year, is a longer nominations period. The nomination platform opened on October 15<sup>th</sup> and is accessible at <https://www.agu.org/Honor-and-Recognize/Honors/>.

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Remember that in even-numbered years, the Gilbert Award is restricted to junior researchers. If you have a nomination in mind and/or need help coordinating the nomination package you can reach out to GPE's canvassing committee.

Finally, many thanks to those who led and supported nomination packages in 2019 and to the GPE awards committee for their time and effort.

### **News from the GPE Community**

#### The 11<sup>th</sup> Santa Fe Conference on Rock Magnetism

The 11<sup>th</sup> Santa Fe Conference on Rock Magnetism, was held between June 6<sup>th</sup> and 9<sup>th</sup> in Santa Fe, New Mexico, with funding by the National Science Foundation and generous donations from Lake Shore Cryotronics, Quantum Design, 2G Enterprises and Frontiers, allowing it to be free of charge to conference participants. There were 51 participants from 13 countries, including 8 students and 13 post-docs. The "Santa Fe" format is different from most meetings, with four topical half-day sessions convened by invited scientists who in turn invite 3-4 speakers to give 15-30 minute talks followed by ample time for discussion by all. Unique to the Santa Fe conference are the keynote talks, presented by renowned scientists whose expertise lies outside of magnetism, but directly pertains to research within our community. This year's keynote talks were delivered by Ron Walsworth (Harvard University) on "Quantum Diamond Sensors", and Raimund Muscheler (Lund University, Sweden) on "Separating solar and geomagnetic field signal contributions to cosmogenic radionuclides" (both presentations are available at [www.irm.umn.edu/SantaFe11](http://www.irm.umn.edu/SantaFe11)). The conference was immediately followed by a one-day workshop on micromagnetic modelling with MERRILL led by Wyn Williams (University of Edinburgh). For a detailed description of this year's conference please see the IRM Quarterly report at <http://www.irm.umn.edu/quarterly/irmq29-1.pdf>



Pre-conference optional field trip to Bandelier National Monument. Photo: Myriam Kars.

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## GPE Sessions-2019 Fall AGU Meeting

Day	Room	8:00-10:00AM	10:20AM-12:20PM	1:40PM-3:40PM	4:00PM-6:00PM
Monday 12/09	Moscone South 203-204	GP (Oral GP005-I) Frontiers in Electromagnetic (EM) Geophysics I	GP (Oral GP005-II) Frontiers in Electromagnetic (EM) Geophysics II		
	Moscone South 205-206			GP (Oral GP006-I) Celebrating Past, Present, and Future Frontiers of Rock and Mineral Magnetism: From Anisotropy to FORCs I	GP (Oral GP006-II) Celebrating Past, Present, and Future Frontiers of Rock and Mineral Magnetism: From Anisotropy to FORCs II
	Moscone South Poster Hall			GP (Poster GP005-III) Frontiers in Electromagnetic (EM) Geophysics III Posters GP (Poster GP005-IV) Frontiers in Electromagnetic (EM) Geophysics IV Posters	
Tuesday 12/10	Moscone South 203-204	GP (Oral GP012-I) Magnetism of Sediments, Soils, and Organisms, and How They Are Influenced by Changing Geomagnetic Fields and the Environment I	GP (Oral GP012-II) Magnetism of Sediments, Soils, and Organisms, and How They Are Influenced by Changing Geomagnetic Fields and the Environment II	GP (Oral GP004-I) Crustal Magnetic Anomalies: Induced and Remanent, Marine and Continental, Terrestrial and Planetary I	
	Moscone South Poster Hall	GP (Poster GP010) Investigating Earth Processes Using Low-Earth-Orbiting Space Magnetometry: Successes and Opportunities I Posters		GP (Poster GP006-III) Celebrating Past, Present, and Future Frontiers of Rock and Mineral Magnetism: From Anisotropy to FORCs III Posters	
	Moscone South 201-202				<b>GP (Oral GP019) 5:00-6:00</b> <b>Edward Bullard Lecture of the GPE Section I</b>
Wednesday 12/11	Moscone South 205-206	GP (Oral GP014-I) Planetary Magnetism and Core Processes: Earth and Beyond I			
	Moscone South 203-204			GP (Oral GP008-I) Refining Our Understanding of Earth's Magnetic Field Variations: Methods, Data, and Models Across All Timescales I	GP (Oral GP008-II) Refining Our Understanding of Earth's Magnetic Field Variations: Methods, Data, and Models Across All Timescales II
	Moscone South Poster Hall	GP (Poster GP012-III) Magnetism of Sediments, Soils, and Organisms, and How They Are Influenced by Changing Geomagnetic Fields and the Environment III Posters		GP (Poster GP004-II) Crustal Magnetic Anomalies: Induced and Remanent, Marine and Continental, Terrestrial and Planetary II Posters	

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Thursday 12/12	e Lightning Theater II		GP (eLightning GP007-I) General Contributions in GPE eLightning	
	Moscone South 203-204			GP (Oral GP003-I) Chronostratigraphy using Magnetic Methods I
	Moscone South Poster Hall	GP (Poster GP008-III)Refining Our Understanding of Earth's Magnetic Field Variations: Methods, Data, and Models Across All Timescales III Posters		GP (Poster GP014-II)Planetary Magnetism and Core Processes: Earth and Beyond II PosterGP (Poster GP007- II)General Contributions in Geomagnetism, Paleomagnetism, and Electromagnetism II Poster
Friday 12/13	Moscone South 205-206	GP (Oral GP017-I) The Impact of Tectonics and Paleogeography on Climate Evolution I		
	Moscone South Poster Hall		GP (Poster GP003-II) Chronostratigraphy using Magnetic Methods II Poster	GP (Poster GP017-II) The Impact of Tectonics and Paleogeography on Climate Evolution II Poster

Centennial programming (Habitability), Centennial Theater, Monday Dec 9

- 8:00–9:00 Accretion
- 9:00–10:00 Core and Dynamo
- 10:20–11:20 Evolution of the Differentiated Earth
- 11:20–12:20 Ingredients for Life

Tutorials (Moscone South-104-105, LLS)

- TT32B-Magnetic Microscopy, Roger Fu, Harvard University, Wednesday, Dec 11, 10:50–11:20
- TT42D-A Primer on Core Dynamics, Jonathan Aurnou, UCLA, Thursday, Dec 12, 11:50–12:20