Keynote Speakers

Dr. Monika Korte

Secretary General of International Association of Geomagnetism and Aeronomy/IAGA

Interim Head of the Geomagnetism Section of German Research Center for Geosciences (GFZ Potsdam), Germany

- Her main research interest is the evolution of the geomagnetic core field on all time scales. She has worked with observational and paleomagnetic data to model the field and its secular variation, and she is also interested in the separation of magnetic field sources and lithospheric magnetic field signatures.
- From 2003 to 2014 she was scientific head of the Adolf-Schmidt-Observatory for Geomagnetism of GFZ in Niemegk and later led the group dealing also with the international collaborative and supported observatories of GFZ, including the Lombok Geomagnetic Observatory in Indonesia. She has been involved in collaborative geomagnetic repeat station surveys in Germany, Europe and Southern Africa. Her research interests mainly cover the geomagnetic core field and its evolution on all time scales, but also the separation of internal field secular variation and long term magnetospheric variations. She is also interested in the lithospheric field on the side.
- Since her time as a post-doctoral research fellow of Alexander von Humboldt-foundation at Scripps Institution of Oceanography, University of California at San Diego in 2001-2002, she has been interested in the reconstruction of the global long-term magnetic field evolution, from Holocene time-scales to geomagnetic excursions, using archeo- and paleomagnetic data.
- She authored in topic(s): Earth's magnetic field & Secular variation, and has an h-index of 30, co-authored 103 publication(s) receiving 4731 citation(s).

Evolution of Earth's magnetic field

Earth's magnetic field varies on a broad range of time scales. While fast variations generally have their sources in electrical current systems around Earth, the main field generated in Earth's core evolves over time-scales from months to millions of years. This presentation focusses on the geomagnetic field evolution on scales beyond the observational era, i.e. centuries and longer. First, an overview is provided over characteristics of archeo- and paleomagnetic data, i.e. the materials that provide information about the field variations on these time-scales. Then, it is discussed how the full global view of the long-term changes can be obtained. This is important for two reasons: a) The underlying magneto-hydrodynamic processes in Earth's outer core that need to be understood to predict the future magnetic field evolution can only be studied in a global perspective. b) The geomagnetic field creates the magnetosphere, which plays an important role to shield our habitat against space weather influences, and which also only can be studied when knowing the global field configuration. New results concerning the global view on geomagnetic field excursions, particularly the Laschamps excursion 41 000 years ago, are discussed. Finally, the presentation briefly touches on full polarity reversals, and on archeomagnetic dating as an interdisciplinary application of good knowledge of geomagnetic field evolution.

Prof. Mioara Mandea

President of International Association of Geomagnetism and Aeronomy/IAGA

Centre National d'Etudes Spatiales (CNES)/
French Space Agency, France

- President of International Association of Geomagnetism and Aeronomy/IAGA and Chair of the Outreach Committee of European Geosciences Union.
- She was also President of the Geophysical Maps Commission of the Commission for the Geological Map of the World, and Chair of the Education Award Committee of AGU.
- Mioara Mandea has a broad international education and has worked with geosciences institutions and universities in Romania, France, and Germany.
- She graduated in Engineering in Geology and Geophysics from the University of Bucharest, obtaining doctorates from the University of Bucharest in geophysics and geophysical prospecting and from the IPGP France in internal geophysics. She received the Habilitation from the University Paris VII in 2001.
- She has been granted the Van Straelen prize (French Geological Society), the Hepites Prize (Romanian Academy), Medal Slovak Academy of Sciences, AGU International Award, Chevalier de l'Ordre National du Mérite, and Petrus Peregrinus Medal from EGU. She is Member of Academia Europea, Member of Academie Royale de Belgique, Member of Russian Academy of Science, and is also a Titular Member of the Academy of Romanian Scientists. Mioara Mandea's research interests mainly concern measuring, mapping, and understanding the multitude of magnetic fields encountered in near-Earth and near Earth-like planets. She has concentrated her work in some major directions, participating in the general effort of measuring Earth's magnetic field from the ground to space, developing new tools to model the geomagnetic field and its secular variations (with a special emphasis on geomagnetic jerks), or using the geomagnetic information to determine physical properties in the deep Earth's interior (with special studies on the lower mantle conductivity or motions at the core-mantle boundary). Her fields of research also include geopotential field mapping, on global or regional scales, with important implications for the understanding of rapid changes within the Earth's system.
- Mioara Mandea has published more than 255 papers, books, and chapters in books, and has been involved in organizing more than 50 workshops and conferences.
- She has supervised 11 worldwide PhD students (France, Germany, US, Romania, Croatia, Algeria, Indonesia, and Portugal).

Prof. Danilo Erricolo

Professor and Director of Graduate Studies
Department of Electrical and Computer Engineering
University of Illinois at Chicago
Chicago, IL, USA

Publication Topics: electromagnetic wave scattering, inverse problems, iterative methods, permittivity, UHF filters, antenna radiation patterns, beam steering, image reconstruction, leaky wave antennas, liquid crystals, microstrip filters, notch filters, optimisation, radiofrequency imaging, resonator filters, split ring resonators, varactors, MIMO communication, Markov processes, Monte Carlo methods, UHF resonators, antenna phased arrays, approximation theory, autonomous aerial vehicles, buildings (structures)

Biography

Danilo Erricolo (Fellow, IEEE) received the Laurea degree of Doctor (summa cum laude) in electronics engineering from the Politecnico di Milano, Milan, Italy, in 1993, and the Ph.D. degree in electrical engineering and computer science from the University of Illinois Chicago (UIC), Chicago, IL, USA, in 1998. He is currently a Professor with the Department of Electrical and Computer Engineering, the Director of the Andrew Electromagnetics Laboratory, and an Adjunct Professor in bioengineering with UIC. In 2017, he was nominated as a University of Illinois Scholar. In summer 2009, he was an Air Force Faculty Fellow with the Air Force Research Laboratory, Wright-Patterson Air Force Base, Dayton, OH, USA. He has authored or coauthored more than 300 publications in refereed journals and international conferences. His research interests include the areas of antenna design, electromagnetic propagation and scattering, high-frequency techniques, wireless communications, electromagnetic compatibility, the computation of special functions, and magnetic resonance imaging. He was elected as a Full Member of Commissions B, C and E of the U.S. National Committee (USNC) of the International Union of Radio Science (URSI), and a Committee of the U.S. National Academies. He served as the Chair (2009–2011), the Vice Chair (2006–2008), and the Secretary of the USNC-URSI Commission E on Electromagnetic Environment and Interference (2004–2005). He was the Chair of the USNC-URSI Ernest K. Smith Student Paper Competition (2009–2014), the Vice-Chair of the Local Organizing Committee of the XXIX URSI General Assembly, Chicago, in August 2008, and a member at Large of USNC-URSI (2012–2017). He was the General Chairperson of the 2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting, Chicago, in July 2012. He was an Elected Member of the IEEE AP-S Administrative Committee (2012–2014), the Chair of the IEEE AP-S Distinguished Lecturer Program (2015–2016), and the Chair of the Chicago Joint Chapter of the IEEE AP-S and Microwave Theory and Techniques Society (2011–2016). He has served on more than 50 conference technical program committees, chaired over 70 conference sessions, and organized more than 30 special sessions at international scientific conferences. He has been the Editor-in-Chief of the IEEE Transactions on Antennas and Propagation, since August 2016.

Towards a smart electromagnetic environment

This is an exciting time for the field of antennas and propagation because the anticipated future generations of wireless systems are bringing closer together antenna perspectives with propagation aspects. Antennas are one of the key enabling elements in many devices that impact the daily lives of billions of people for applications that include communications, computing and sensing. The word antenna strictly refers to the radiator that launches a guided electromagnetic wave into the air. Traditionally, antenna engineers have been concerned with design challenges such as maximizing the radiation along a specific direction, while minimizing the side lobes.

The introduction of smart antennas caused the transition from antennas to antenna systems as the operation of the antenna is more intimately connected to the RF front end and the signal processing unit that processes and controls the signals received by and sent to the antenna. Multiple antenna systems, known as Multiple input multiple output (MIMO) systems, were introduced to increase the overall communication channel capacity. The increase in communication channel capacity was not associated with antennas, but rather with features of propagation phenomena. Specifically, under appropriate conditions, one can leverage the diversity of the electromagnetic field at different locations so that it is possible to extract more information and thus leading to higher communication channel capacity. From the antenna perspective, the design of multiple antenna systems is complicated by the fact that when antennas are in close proximity, mutual coupling among radiating elements must be taken into account.

Deeper understanding of propagation phenomena and antenna design is fundamental for Massive MIMO systems, where massive refers to the number of antennas being larger than the number of users. If sufficient diversity among the various physical propagation channels exists, it is possible achieve higher gain than with ordinary MIMO systems. From the antenna perspective, dealing with a massive antenna system further complicates the challenges of MIMO system due to the large number of RF chains needed.

More recently, thanks primarily to the increased available computational power and higher demands for the quality of communication links, new research efforts are being devoted towards the creation of a smart electromagnetic environment. The novelty consists in achieving a holistic approach where the environment where propagation occurs, together with the wireless infrastructure and the users are all taken into account to improve the performance of the system by going beyond the standard concepts of wireless infrastructure and wireless channel. In fact, while traditional communication systems focus the radiated power along the terminal direction to maximize link quality and information transfer by, for instance, increasing the antenna gain and reducing the sidelobe level, next generation multi-user multi-antenna architectures could maximize the signal-to-noise-ratio by spatially distributing the power to constructively exploit the wave scattering phenomena in the multipath propagation environment, regardless of the gain, the sidelobe levels, or the grating lobes. As an example, for propagation in urban environments, the scattering scenario needs to be considered as an asset rather than an impediment. Accordingly, building walls may be seen as an opportunity to install intelligent reflective surfaces to improve coverage at locations that cannot be reached through direct line-of-sight-paths.

Dr. Yunus Daud

Head of Geothermal Research Center
Universitas Indonesia, Indonesia

Founder of NewQuest Geotechnology

- He obtained his doctor degree in the field of Exploration Geophysics from the Department of Earth Resources Engineering, Kyushu University, Japan, with the dissertation title Geophysical Studies Over the Sibayak Geothermal Field (Indonesia).
- He is working in research, education and business-related to geothermal resources technology.
- He has been teaching and research supervising for undergraduate and graduate students at the University of Indonesia in the field of geothermal exploration technology, mainly electromagnetic, gravity, and MT methods, as well as geothermal systems and technology.
- He has been developing 7 (seven) geoscientific software with patents including GeoSlicer-X, a 3-D visualization software for geoscientists and engineers. He has also been giving training courses in geothermal exploration, especially 3-D magnetotelluric (MT) technology and resource assessment for geothermal company's staffs.
- In addition, He has been founding PT NewQuest Geotechnology and providing a consultant in geothermal exploration and development for geothermal industries.

Dr. M.V. Reddy

Nouveau Monde Graphite, Canada

- Dr. M.V. Reddy obtained his Ph. D (2003) in the area of Materials Science and Engineering (with highest distinction) from the University of Bordeaux, France. From July 2003 to May 2019, he worked at the Department of Materials Science and Engineering, Chemistry and Physics, National University of Singapore (NUS). Singapore. June 2019 to Aug 2021, he had worked at the Centre of Excellence in Transportation Electrification and Energy Storage, Hydro-Québec, Canada. Currently working as a Senior Professional Researcher at Nouveau Monde Graphite (New graphite world) (NMG), Quebec, Montreal, Canada.
- Over the past 21 years, he has conducted leading research on Materials for Energy Storage (cathodes, anodes, supercapacitors and electrolytes), Materials processing & characterization, and the development of in situ techniques for Energy storage renewable technologies.
- Dr. Reddy has published 220 papers in various international journals. He has obtained an h-index of 68 with over 17000 citations. These have recently placed him within the top 2% highly cited researchers in Energy (world Ranking the 1002nd out of 186500 researchers) and Highly cited Researcher in Materials Science in Canada (National ranking:39)
- Dr. Reddy is serving as an editorial advisory board member in Materials Research Bulletin and Journal of Energy Storage (Elsevier, Scopus journal) as well as several open access journals
- Awards: Outstanding Science Mentorship Award (2010- 2018), and Inspiring Research Mentor Award (2011 to 2019), 2021 Battery Materials electrochemistry award from the Electrochemical Society of India, Indian Institute of Science (IISc), Bangalore, India.
- Invited life member in ICDD USA and given 150 talks at various conferences and workshops & FDP.
- Invited committee member in various international Research proposals, theses and conference organizations and visiting Professor at various Universities