



6th IAGA School

**linked to IUGG in Berlin 2023
at the Geomagnetic Observatory Niemegk
of German Research Center for Geosciences, GFZ,
Germany
July 06th – 12th, 2023**

The coordination and organisation of the IAGA School is done by the IAGA Interdivisional Commission on Education and Outreach (ICEO) chair person Barbara Leichter (GeoSphere Austria), supported by the local organisers Jürgen Matzka and colleagues from the GFZ Niemegk observatory.

Schedule Overview

The dates for the IAGA School are July 6th (arrival day) to July 12th (departure day), the lectures will be from July 7-11. 2023

Date	Timetable	Topic	Lectures
Thursday 6 th July	arrival day		
Friday 7 th July	9:00-11:00 lecture Break: 11:00-11:30 11:30-12:30 lecture Lunch: 12:30-13:30 13:30-15:00 lecture	Core field/observations: <ul style="list-style-type: none">• Earth's Magnetic Field• Observing the Earth's magnetic field: ground observatory network• Measurements from satellites• Variations of the Earth's magnetic field: Lunar, secular, daily, annual, 11 years, irregular, reversals	Kusumita Arora (India)

	<p>Break: 15:00-15:30</p> <p>15:30-18:00 lecture/ practicals</p>	<ul style="list-style-type: none"> Models of the Earth's magnetic field 	<p>Ashley Smith (UK) (Tutor) all days</p>
<p>Saturday 8th July</p>	<p>9:00-11:00 lecture</p> <p>Break: 11:00-11:30</p> <p>11:30-12:30 lecture</p> <p>Lunch: 12:30-13:30</p> <p>Excursion: Tour of the Geomagnetic Observatory Niemegk</p>	<p>Numerical core field simulation</p> <ul style="list-style-type: none"> Fundamentals of the dynamo problem Recent advances in Dynamo Simulations Practical dynamo simulations 	<p>Johannes Wicht (Germany)</p> <p>Jürgen Matzka and Marcos Vinicius Siqueira da Silva (Germany)</p>
<p>Sunday 9th July</p>	<p>9:00-11:00 lecture</p> <p>Break: 11:00-11:30</p> <p>11:30-12:30 lecture</p> <p>Lunch: 12:30-13:30</p> <p>13:30-15:00 lecture</p> <p>Break: 15:00-15:30</p> <p>15:30-18:00 lecture/ practicals</p>	<p>Paleo-/rock magnetism</p> <p>Palaeomagnetism: reading and deciphering records of the prehistoric field</p> <ul style="list-style-type: none"> First Principles: Rocks, sediments and archaeological materials as magnetic recorders Practical Details: Sampling, measuring, checking for reliability Palaeomagic: Data interpretation and statistics. Examples and exercises. The Prehistoric field: The evidence for field variability, geomagnetic excursions and polarity reversals. The Time Averaged Field: The geocentric axial dipole hypothesis, palaeomagnetic poles, continental reconstruction 	<p>Gillian Turner (New Zealand) (whole day)</p>

<p>Monday 10th July</p> <p>9:00-11:00 lecture</p> <p>Break: 11:00-11:30</p> <p>11:30-12:30 lecture</p> <p>Lunch: 12:30-13:30</p> <p>13:30-15:00 lecture</p> <p>Break: 15:00-15:30</p> <p>15:30-18:00 lecture/ practicals</p>	<p>9:00-11:00 lecture</p> <p>Break: 11:00-11:30</p> <p>11:30-12:30 lecture</p> <p>Lunch: 12:30-13:30</p> <p>13:30-15:00 lecture</p> <p>Break: 15:00-15:30</p> <p>15:30-18:00 lecture/ practicals</p>	<p>Magnetosphere:</p> <p>Magnetospheric Morphology</p> <ul style="list-style-type: none"> • Magnetospheric Boundaries • Magnetospheric Current Systems • Plasma Populations <p>Magnetospheric Dynamics</p> <ul style="list-style-type: none"> • Plasma Entry and Transport Processes • Storms and Substorms • Magnetosphere/Ionosphere Coupling • Auroral Acceleration <p>Lithospheric field:</p> <ul style="list-style-type: none"> • Introduction and history • Measurements and data processing • Mapping and relationship to subsurface structures • Applications in compared planetology. 	<p>Jay Johnson (USA)</p> <p>Erwan Thébault (France)</p>
<p>Tuesday July 11th</p> <p>9:00-11:00 lecture</p> <p>Break: 11:00-11:30</p> <p>11:30-12:30 lecture</p> <p>Lunch: 12:30-13:30</p> <p>13:30-15:00 lecture</p> <p>Break: 15:00-15:30</p> <p>15:30-18:00 lecture/ practicals</p>	<p>9:00-11:00 lecture</p> <p>Break: 11:00-11:30</p> <p>11:30-12:30 lecture</p> <p>Lunch: 12:30-13:30</p> <p>13:30-15:00 lecture</p> <p>Break: 15:00-15:30</p> <p>15:30-18:00 lecture/ practicals</p>	<p>EM/MT</p> <p>Introduction</p> <p>Earth's electromagnetic environment</p> <p>Some theory</p> <p>Instruments</p> <p>Magnetotelluric (MT) methods</p> <p>Geomagnetic depth sounding (GDS)</p> <p>Controlled-source methods</p> <p>Forward modeling</p> <p>Inverse modeling</p> <p>Global conductivity structure</p>	<p>Steven Constable (USA) (whole day)</p>
<p>Wednesday 12th</p> <p>departure day</p>	<p>departure day</p>	<p>departure day</p>	<p>departure day</p>

Lectures and lecturers

Name of Lecturer: **Kusumita Arora (India)**

kusumita.arora@gmail.com

CSIR – National Geophysical Research Institute (NGRI)



Topic: Core field/observations:

- Earth's Magnetic Field
- Observing the Earth's magnetic field: ground observatory network
- Measurements from satellites
- Variations of the Earth's magnetic field: Lunar, secular, daily, annual, 11 years, irregular, reversals
- Models of the Earth's magnetic field

Name of Lecturer/Tutor: **Ashley Smith (UK)**

Ashley.Smith@ed.ac.uk

University of Edinburgh



Topic: Tutor through the whole IAGA School time, focusing on Python tools and data dissemination via Jupyter notebooks.

Name of Lecturer: **Johannes Wicht (Germany)**

wicht@mps.mpg.de

Max Planck Institute for Solar System Research



Topic: Numerical core field simulation

- Fundamentals of the dynamo problem
- Recent advances in Dynamo Simulations
- Practical dynamo simulations

Name of Lecturer: **Gillian Turner (New Zealand)**

gillian.turner@vuw.ac.nz

Academic (Postgraduate)

Wellington Faculty of Science



Topic: Palaeomagnetism: deciphering records of the prehistoric field

- First Principles: Rocks, sediments and archaeological materials as magnetic recorders
- Practical Details: Sampling, measuring, checking for reliability
- Palaeomagnetic: Data interpretation and statistics
- The Prehistoric field: the evidence for field variability, excursions, polarity reversals,

- the Time Averaged Field: the geocentric axial dipole hypothesis, palaeomagnetic poles, continental reconstruction

Name of Lecturer: **Jay R. Johnson (USA)**

jri@andrews.edu

Andrews University / Department of Engineering



Topic: Magnetosphere

Magnetospheric Morphology

- Magnetospheric Boundaries
- Magnetospheric Current Systems
- Plasma Populations

Magnetospheric Dynamics

- Plasma Entry and Transport Processes
- Storms and Substorms
- Magnetosphere/Ionosphere Coupling
- Auroral Acceleration

Name of Lecturer: **Erwan Thebault (France)**

thebault.erwan@gmail.com

University of Nantes Laboratoire de Planétologie et de Géodynamique



Topic: Lithospheric field:

- Introduction and history

- Measurements and data processing
- Mapping and relationship to subsurface structures
- Applications in compared planetology.

Name of Lecturer: **Steven Constable (USA)**

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Institute of Geophysics and Planetary Physics

Scripps Institution of Oceanography



Topic: Electromagnetic Induction Methods

- Introduction
- Earth's electromagnetic environment
- Some theory
- Instruments
- Magnetotelluric (MT) methods
- Geomagnetic depth sounding (GDS)
- Controlled-source methods
- Forward modeling
- Inverse modeling
- Global conductivity structure