1st IAGA Summer School

Merida, Mexico

August 20-25, 2013

Ionosphere and Thermosphere

Andrew W. Yau

Department of Physics and Astronomy, University of Calgary, Calgary, Alberta, Canada

Course (ca. 4 hrs)

1. The upper atmosphere and the thermosphere
2. Composition, dynamics and energetics of the thermosphere
3. Formation, structure and composition of the ionosphere
4. Dynamic and electro-dynamic processes in the ionosphere

Practical Exercise (ca. 2 hrs)

Model and data comparison

Inverse Models of the Geomagnetic Field

Monika Korte, GFZ German Research Centre for Geosciences, Potsdam, Germany

Mioara Mandea, Centre National d'Etudes Spatiale, Paris, France

Alexandre Fournier, Institut de Physique du Globe, Paris, France

Course (ca. 4 hrs.)

1. Introduction: Purpose of global inverse models
2. Spherical harmonic field representation
3. IGRF
4. Satellite era models
5. Centennial models
6. Millennial-scale models
7. Paleomagnetic models

Practical Exercise (ca. 2 hrs.)

Comparison of models and real magnetic observatory data and global magnetic field change

Data Inversion in a Bayesian Setting

Matthias Holschneider

University of Potsdam, Potsdam, Germany

Course (ca. 4 hrs.)

1. Two dimensional analog model of geomagnetic data inversion
2. Spline modeling as variational problem
3. Bayesian data inversion
4. Spline inversion in a Bayesian setting

Magnetic Anisotropy of Rocks

Martin Chadima

AGICO, Inc., Brno & Institute of Geology, v.v.i., AV CR, Prague, Czech Republic

Course (ca. 4 hrs.)

1. Definition and application in geology
2. Magnetic anisotropy of minerals
3. Magnetic fabric vs. texture of rocks
4. Magnetic fabric of sedimentary, deformed, and metamorphosed rocks
5. Magnetic fabric of igneous rocks
6. Sampling, measurement and data processing

Practical Exercise (ca. 2 hrs.)

Demonstration of measurement and data processing

Paleomagnetism

Lisa Tauxe

Scripps Institution of Oceanography, La Jolla, USA

Course (ca. 4 hrs.)

1. Overview of paleomagnetism and applications in Earth and Environmental Sciences
2. Physics of Magnetism
3. Preserving an ancient geomagnetic field
4. Getting a paleomagnetic vector

Practical Exercise (ca. 2 hrs.)

Analyzing paleomagnetic data
PmagPy and the MagIC database

Electromagnetic Induction

Alan G. Jones

Dublin Institute for Advanced Studies, Dublin, Ireland

Course (ca. 4 hrs.)

1. Introduction to electrical and electromagnetic techniques in geophysics
2. Theoretical background of EM induction - simple case only (magnetotellurics)
3. Outline of methods
   - 3.1. DC resistivity
   - 3.2. Induced and spontaneous polarization
   - 3.3. EM methods
   - 3.4. Ground Penetrating Radar
4. Magnetotellurics in detail
5. Examples of application of MT
6. Experimental design