Nová výběrová přednáška MG420P13

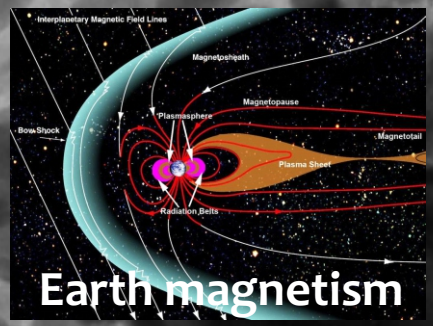
Earth Magnetism: Geological, Paleoclimatic, and Biological Applications

Prof. Michael Petronis, New Mexico Highlands Unniversity, Visiting Fulbright Scholar

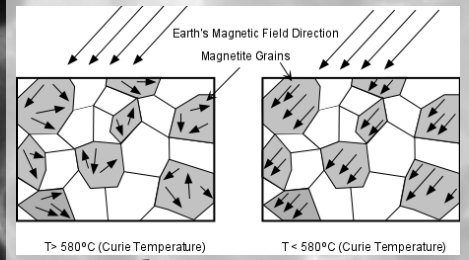
March – May 2022

Annotation

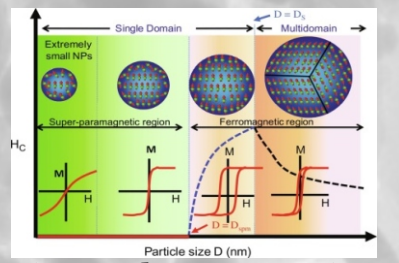
This course is focused on application of Earth magnetism on solving various geology problems including magnetism of minerals and rocks, paleomagnetism, regional tectonic, geochronology studies and other special topics including paleoclimatic and biological applications. Lectures will complement readings of the recommended text, with additional perspectives. The lecture is further accompanied by recommended practical course Rock magnetism in practice (MG420P11). It is expected that the audience will have at least some geology and tectonic background. Basic knowledge of rock magnetism is welcomed. This lecture is not suitable for first year undergraduate students. The course will start in mid-late March 2022.



Earth magnetism



Rock magnetism



Mineral magnetism

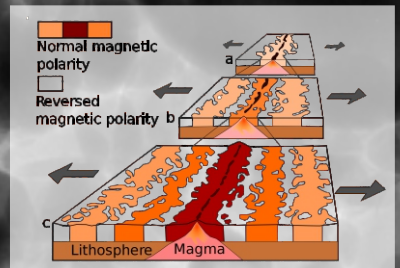
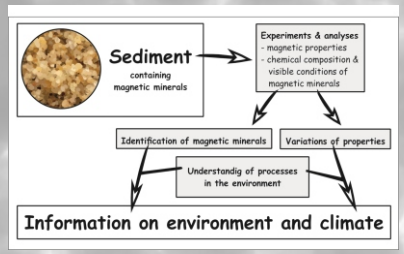
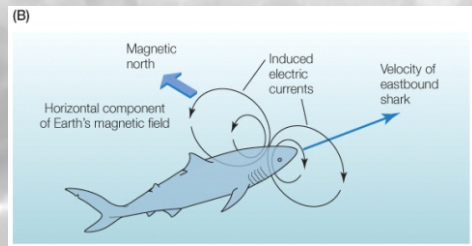


Plate tectonics



Paleoclimate



Biomagnetism

Syllabus

(1) Introduction to Earth Geomagnetism and Planetary Magnetism
(2) Ferromagnetic, Paramagnetic, Diamagnetic minerals
(3) Origins of natural remanent magnetism
(4) Biomagnetism - The Birds and the Bees of Organic Magnetoreception
(5) Paleomagnetic stability, paleomagnetic poles, tectonic applications
(6) Select applications of rock magnetism and paleomagnetism
(7) Paleoclimate proxies - physical, chemical and biological materials
(8) Primary magnetic fabrics in sedimentary, igneous, metamorphic rocks
(9) Ancient Earth magnetism, climate, and biological evolution

New Mexico Highlands University Paleomagnetism Laboratory

NEW MEXICO HIGHLANDS UNIVERSITY

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INSTITUTE OF GEOLOGY & PALEONTOLOGY

FACULTY OF SCIENCE
Charles University

EUROPEAN UNION
European Structural and Investment Funds
Operational Programme Research, Development and Education

MINISTRY OF EDUCATION, YOUTH AND SPORTS

Nový praktický kurz MG420P11

Rock magnetism in practice

Dr. Filip Tomek, Institute of Geology and Paleontology, Faculty of Science, Charles University

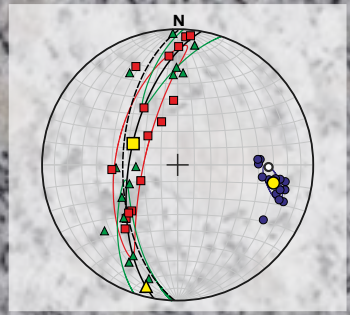
Prof. Michael Petronis, New Mexico Highlands Unniversity, Visiting Fulbright Scholar

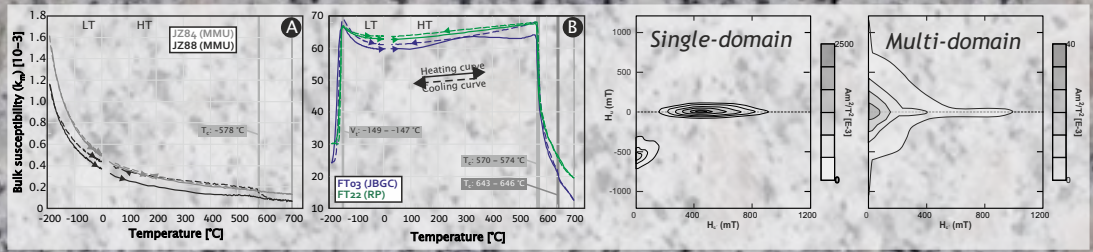
Annotation

This practical course is focused on application of rock magnetic methods on various geodynamic processes. Students will attend a short block of lectures oriented on anisotropy of magnetic susceptibility (AMS) and remanent magnetization (ARM), paleomagnetism and magnetic mineralogy. This will be followed by field works, where sampling procedure will be introduced. Next, students will be processing and measuring samples in the Laboratory of Rock Magnetism. Finally, students will work on their seminar theses, which include data processing and interpretations. The course is closely linked to the lecture Earth magnetism: geological, paleoclimatic, and biological applications (MG420P13), where the detailed rock magnetic and paleomagnetic methods will be discussed in great detail. It is expected that the audience will have at least some geology and tectonic background. Basic knowledge of rock magnetism is benefit.

Syllabus

(1) Introduction to rock magnetism and magnetic mineralogy
(2) Magnetic anistropy (AMS and ARM)
(3) Paleomagnetism
(4) Field works, sampling
(5) Laboratory works: introduction and measurements
(6) Data analysis and interpretation





LRM Laboratory of Rock Magnetism
at the Institute of Geology and Paleontology
Faculty of Science, Charles University

New Mexico Highlands University Paleomagnetism Laboratory
from Gilbert (1600) De Magnete

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Nová výběrová přednáška MG420P10

Plutons, volcanoes, and orogeny through time

Prof. Jiří Žák and Dr. Filip Tomek

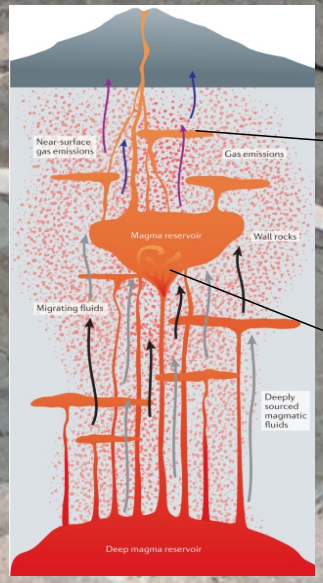
Institute of Geology and Paleontology, Faculty of Science, Charles University

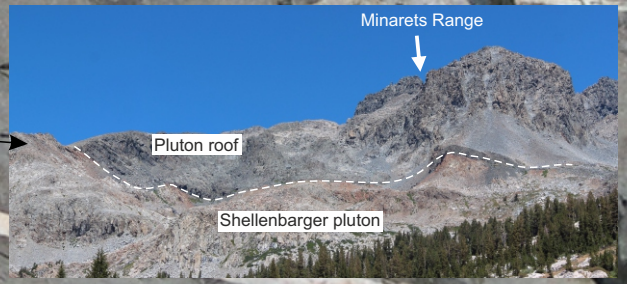
Annotation

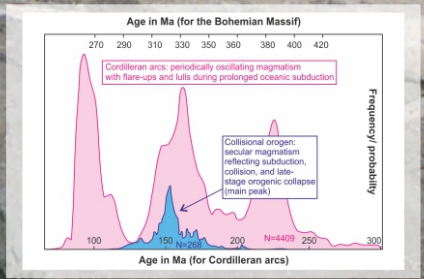
The class will provide an up-to-date overview of the evolution of magmatic systems in space and time, with an emphasis on a genetic link between magmatism and plate tectonics. A variety of intriguing issues related to mechanisms of emplacement and structural inventory, compositional and textural zonality, and magnetism of igneous bodies as a "recorder" of tectonic processes will be discussed. In the second part, students will learn about the causes, formation, and evolution of magmatism at convergent plate boundaries and in collisional orogens. We will also focus on the cyclicity of magmatism in magmatic arcs, the mechanisms of magma ascent under volcanoes and the structural record of pyroclastic eruptions of stratovolcanoes and calderas. This course loosely follows the lecture 'Earth magnetism' (MG420P13) and practical course 'Rock magnetism in practice' (MG420P11), which focus on rock magnetic and paleomagnetic research methods in solving issues related to magmatic and tectonic processes. It is expected that the audience will have at least some geology and tectonic background.

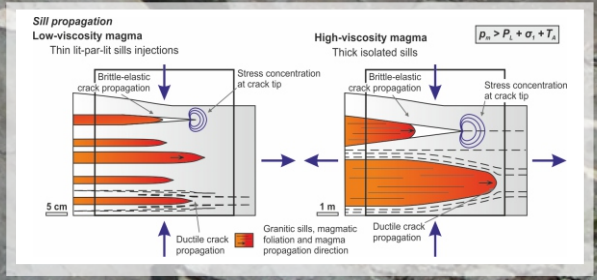
Syllabus

(1) Magma, magmatic systems, and magmatic processes
(2) Magma in motion
(3) Architecture of magma plumbing systems
(4) Pluton emplacement processes and construction of magma chambers
(5) Volcano-plutonic interface and structural record of volcanic eruptions
(6) Archean magmatism: making the continental crust
(7) Continental margin arcs: inside the subduction factory
(8) Continental collisions, hot orogens, and granite plutonism









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