

Organization

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Challenges in marine geology

Marine geology, the study of the Earth's oceanic crust and sediments, presents several challenges due to the harsh and inaccessible nature of the marine environment. Some of the key challenges in marine geology include:

Inaccessibility and depth: The majority of the Earth's surface is covered by oceans, and much of it is deep and difficult to access.

Extreme pressure: The pressure in deep-sea environments increases with depth, creating challenges for equipment design and durability.

Remote sensing: Large portions of the seafloor remain unexplored or are difficult to access.

Sample collection: Collecting samples from the seafloor is challenging due to the depth, pressure, and complex geologic features.

Corrosive environment: The marine environment can be corrosive, affecting the durability of equipment and instruments.

Limited direct observation: Unlike terrestrial geology, where researchers can directly observe and study rock formations, marine geologists often rely on indirect methods.

Data integration: Data collection in marine geology involves a variety of techniques, such as seismic surveys, sediment coring, and bathymetric mapping.

Environmental impact: Conducting research in the marine environment can have environmental impacts.

Tectonic plate boundaries: Many key geological processes, such as plate tectonics and subduction, occur beneath the ocean.

Climate change impacts: Understanding the impact of climate change on marine geology requires data collection for a long-term monitoring (paleoceanography).

This programme is sponsored by:



Italian Geological Society (SGI)

Italian Society of Mineralogy and Petrology (SIMP)

Italian Paleontological Society (SPI)

International Ocean Discovery Programme Italia (IODP)

With support from the International Seabed Authority Partnership Fund



ISA
Partnership
Fund

About ISAPF:

This course is carried out in partnership with the International Seabed Authority (ISA) within the framework of the Women in Blue Initiative endorsed by the ISA Partnership Fund as part of the Women in Deep-Sea Research Project (WIDSR) to celebrate the 30th anniversary of ISA.

As part of this initiative, selected trainees from developing States are being sponsored to participate in the course in Bologna.

www.ismar.cnr.it



Photo: BGR



Marine Geology Advanced School

Deep Sea Frontiers

A comprehensive understanding of the geological frontiers that lie beneath the ocean depths

January 27th - 31st, 2025
Bologna, Italy

Area della Ricerca di Bologna (Room 216)

A limited number of travel grants for the full seminar series are available to Masters or PhD students.

Apply by October 13th, 2024 here

Programme:

Day 1: Introduction to marine geology

08:00–09:00 Welcome and registration
09:00–09:30 Introduction to the school and agenda
Morning: Exploring the seafloor
10:00–11:30 Age determinations: rock and sediment dating techniques
11:30–13:00 Biostratigraphy
Afternoon: Exploring the subseafloor
14:00–16:00 Seismic reflection and refraction: data acquisition & processing
16:30–18:00 Heat flow, gravity and magnetics: data acquisition & processing
18:00–20:00 Icebreaker activities

Day 2: Methodologies for the exploration of the deep-sea

Morning: Exploring the seafloor
08:30–10:30 Seafloor mapping: data acquisition & processing
11:00–13:00 ROVs, AUVs, and manned submersibles
Afternoon: Deep-sea exploration in practice
14:00–14:30 A gateway to ocean exploration: ECORD/IODP-Italia
14:30–15:15 Featured lesson: Tyrrhenian Sea IODP Leg 402 - preliminary results
15:15–16:00 Featured lesson: Eastern Fram Strait IODP Leg 403- Preliminary Results
16:30–18:30 Seafloor dynamics: insights from multibeam & seismic data analysis

Day 3: Geology of the deep sea

Morning: Plate tectonics: how the Earth works
08:30–10:30 Plate tectonics and seafloor spreading
11:00–13:00 Mid-ocean ridges, faulting, detachment faults & hydrothermal activity
Afternoon: Transfer and Storage of Matter, Chemicals and Energy
14:00–16:00 Deep-marine sedimentary processes & systems
16:30–18:30 Ground truth: analysis & interpretation of deep-sea cores

Day 4: Geology of the deep sea (continued)

Morning: Geochemical processes in seafloor environments
08:30–10:30 Major, trace and isotopes geochemistry of oceanic lithosphere
11:00–13:00 Geochemistry of sediments
Afternoon: Geochemical processes in seafloor environments
14:00–16:00 Fluid circulation: seawater interactions with rocks and sediments
16:00–18:00 Geochemistry & geodynamics in practice: implications in reconstructions

Day 5: Importance & interdisciplinary connections of marine geology

Morning: Marine geology and life
08:30–09:30 Sapropels: climate, oceanography and paleoenvironment
09:30–10:30 Marine geology and climate
11:00–12:00 Marine geology and biosphere
12:00–13:00 From rocks to rotation poles: insights from paleomagnetism
Afternoon: Hazards and resources
14:00–15:30 Geological hazards in the deep sea
16:00–17:00 Deep-sea resources
17:00–17:30 Closing remarks

Lecturers & Topics

Fabio CARATORI TONTINI: Marine heat flow, gravity & magnetics
Christian BERNDT: Seismic data acquisition & processing
Antonio LANGONE: Rock dating
Elisabetta ERBA: Biostratigraphy
Salvatore PASSARO: Seafloor mapping data acquisition
Alessandro BOSMAN: Seafloor mapping data processing
Fabian BONETTI: ROVs, AUVs, and manned submersibles
Marcia MAIA: Plate tectonics and seafloor spreading
Javier ESCARTIN: MOR, faulting, detachment faults & hydrothermal activity
Javier Hernández MOLINA: Deep sedimentary processes
Daniele BRUNELLI/Alessio SANFILIPPO: Geochemistry of oceanic lithosphere
Gert DE LANGE: Sediment geochemistry
Chiara BOSCHI: Fluid circulation
Gert DE LANGE: Sapropels: climate, oceanography and paleoenvironment
Paolo MONTAGNA: Marine geology and climate
Marco TAVIANI: Marine geology and biosphere
Luca LANCI: From rocks to rotation poles: insights from paleomagnetism
Lisa MCNEIL: Deep sea hazards
Marzia ROVERE: Deep sea resources

PRACTICAL EXERCISES – SEAFLOOR DYNAMICS: INSIGHTS FROM GEOPHYSICAL DATA

Fabiano GAMBERI/Federica FOGLINI/Giovanni DE ALTERIIS/Gemma AIELLO

PRACTICAL EXERCISES – GROUND TRUTHING: ANALYSIS OF DEEP-SEA CORES

Hernández MOLINA/Fabiano GAMBERI/Alina POLONIA/Alessandra ASIOLI

PRACTICAL EXERCISES – ROCK GEOCHEMISTRY & GEODYNAMICS

Alessio SANFILIPPO/Daniele BRUNELLI/Luca LANCI/Marco LIGI

FEATURED LESSON – TYRRHENIAN SEA IODP LEG 402 – PRELIMINARY RESULTS

Nevio ZITELLINI/Filomena LORETO

FEATURED LESSON – NORTH ATLANTIC IODP LEG 403 – PRELIMINARY RESULTS

Renata Lucchi

Deep Sea Frontiers

Application process:

Candidates must fill in the application form and send it with all supporting documents in digital form, from September 1st, 2024 and no later than October 13th, 2024. Only complete applications will be assessed. Incomplete applications may be rejected without further notification.

A complete application consists of:

1. Personal information about the applicant as reported in the application form.
2. Diploma and transcripts (diploma supplement or list of the subjects taken during the study and correspondent marks).
3. Motivation letter (in English) – the letter should present the applicant's motivation to enroll the School, including the competencies and skills he/she would like to achieve, future perspectives and aspirations.
4. An extended abstract of their research activity as reported in the application form.
5. Curriculum Vitae (CV) with information about relevant experience and professional training.
6. Up to a maximum of 30 students will be admitted to the course. Registrations beyond this maximum will be placed on a waiting list.
7. The course fee is €350 including course materials, daily lunches and coffee breaks and social dinner. Travels, accommodation and other meals must be covered by the participants. Confirmation of registration will be sent once the registration fee has been paid via the appropriate link (communicated via email) starting from October 14th no later than October 27th, 2024.
8. Up to a maximum of 5 scholarships covering school fee, travel and accommodation will be awarded to the most deserving Masters and PhD students. The members of the Steering Committee will evaluate the CV and motivation letter of the applicants, with priority for Master's students. The registration fee will be refunded to the scholarship winners.

