International School on Foraminifera

14th Course

Urbino

3rd – 22th June, 2021

First Circular

Course Description

The 14th Course on Foraminifera is designed to provide an overview of the Taxonomy, Ecology, Biodiversity, and Geological History of Benthic and Planktonic Foraminifera. This intensive course is intended for students interested in Micropalaeontology, Palaeoceanography, Palaeoecology, Climate History, Biology, and Environmental applications. The aim is to provide a primer on the study of foraminifera and examples of how foraminifera can be used as (paleo)environmental and (paleo)oceanographical proxies. We review the current classification schemes of the foraminifera, discuss their ecology and life history, review their usefulness for biostratigraphical applications, and use case studies to investigate the geological history of the group with lab and practical sessions. The entire course consists of approximately 60 hours of lectures and 60 hours of practical work.

Course Structure

Four distinct courses are planned: Foraminiferal Introduction (4-8 June), Larger Benthic Foraminiferal Course (9-12 June), Smaller Benthic Foraminiferal Course (14-18 June) and Planktonic Foraminiferal Course (19-22 June).

Teaching Format

The course consists of lectures and practical classes covering the taxonomy, distribution, ecology, and paleoecology of foraminifera. Microscope lab sessions provide the opportunity for participants to learn the foraminiferal genera and species, and view Cretaceous to Neogene foraminiferal assemblages from Petroleum Exploration areas and ODP sites as well as Quaternary and modern assemblages. At the end of each lecture session, different tasks will be assigned to participants to reinforce the knowledge learned. Course materials include the pdf lectures and numerous pdf reprints of classic papers.

Courses Outline

3 June Thursday Icebreaker Party

Foraminiferal Introduction

Day 1 (4 June Friday) Kaminski & Frontalini

Welcoming speech and course presentation.
Famous Names and Milestones in the Study of Foraminifera
Introduction to Foraminifera & Review of Foraminferal Suborders
Sample Preparation Techniques
Lab Task 1: Identification of foraminiferal wall composition, coiling, chamber arrangement, and apertures of benthic foraminifera
Lab Task 2: Dividing forms by wall structure, coiling and chamber arrangement
Material: Nova Scotia Agglutinated Foraminifera & Mediterranean Sea

Day 2 (5 June Saturday) Kaminski, Cetean & Frontalini
Morphology and Classification of Benthic Foraminifera
Miliolids, Buliminids and small Rotaliids
Collecting modern foraminifera
Lab Task 1: Identification of benthic foraminiferal genera: wall composition, coiling, chamber arrangement and shape, and apertures
Material: Arabian Gulf and Adriatic Sea

Day 3 (6 June Sunday) Kaminski & Cetean
Introduction to Planktonic Foraminifera and their Classification
Morphology and Classification of Planktonic Foraminifera
Lab task 1: Identification of wall structures, coiling and chamber morphology
Material: Sargasso Sea and South Atlantic

Day 4 (7 June Monday) Hohenegger & Gooday
Biology of foraminifera
Ecology and taphonomy of foraminifera
Lab 1: Statistical analyses for ecological and paleoecological studies
Lab Task 1: Using statistical program packages

Day 5 (8 June Tuesday) Pawlowski & Gooday
Introduction to molecular genetics of Foraminifera
Taxonomy, distribution and ecology of monothalamous foraminifera including deep-sea, freshwater and terrestrial species
Lab 1: Observations of living foraminifera
Lab 2: Samples preparation for DNA extraction
Lab 3: Sampling methods for living foraminifera

Larger Benthic Foraminifera

Day 6 (9 June Wednesday) Hohenegger, Papazzoni & Briguglio
Biology, bauplan and functional morphology, carbonate production (recent)
Most important groups of LBF in the Phanerozoic
LBF morphology using loose specimens, thin sections, microCT
Upper Palaeozoic shallow water Fauna: the Fusulinina Suborder
Shallow water K/T boundary and Palaeocene LBF associations
Lab: MicroCT; Fusulinina in thin sections; Palaeocene LBF

Day 7 (10 June Thursday) Papazzoni & Briguglio
The Eocene biodiversity (I): Nummulitids
The Eocene biodiversity (II): Orthophragminids
The Eocene biodiversity (III): Alveolinids
Lab: Nummulitids, Orthophragminids, Alveolinids

Day 8 (11 June Friday) Hohenegger, Papazzoni & Briguglio
LBF biostratigraphy, Oppelzones and applications
Oligo-Miocene LBF associations
Modern LBF: ecology, distribution (now and future), applications
Lab 1: Lepidocyclinids and Miogypsinids
Lab 2: Paleodepths estimation by means of LBF
Evening Session: “Foraminiferal Party”. Slide presentations by ISF participants - five minutes each: five photos, five PowerPoint slides

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**Day 9 (12 June Saturday) Hughes**

- Early Carboniferous foraminifera and their use for paleoenvironmental interpretation
  Lab and Task 1: Asbian foraminiferal identification using thin sections (paleoenvironment study)
- Late Permian foraminifera of the Middle East and their biosteering application
  Lab and Task 2: Triassic foraminiferal identification using photomicrographs (age determination)
- Jurassic foraminifera of the Middle East: age, paleoenvironment and implications for cycle definition
  Lab & Task 3: Jurassic foraminiferal identification using thin sections (age determination)
- Jurassic foraminifera of the Middle East (Oxfordian): age and paleoenvironment
  Lab & Task 4: Jurassic (Oxfordian) foraminiferal identification using photomicrographs: paleoenvironment exercise
- Late Jurassic hypersalinity events: foraminiferal & associated microfaunal/floral responses
  Lab & Task 5: Jurassic hypersaline foraminiferal identification using photomicrographs: paleoenvironment study
- Cretaceous foraminifera of the Middle East: age, paleoenvironment and implications for cycle definition
  Lab & Task 6: Cretaceous (Aptian) foraminiferal identification using photomicrographs: paleoenvironment exercise
- Neogene foraminiferal applications in the Red Sea hypersaline-associated succession

**Day 10 (13 June Sunday)** Day off

**Day 11 (14 June Monday) Kaminski**

Morphogroups and functional morphology of smaller benthic foraminifera
Ecology and distribution of benthic Foraminifera
Lab: Databases, Taxonomy of benthic foraminiferal suborders
Task 1: Water depth estimation based on SBF
Task 2: Identification of SBF morphogroups

**Day 12 (15 June Tuesday) Kaminski & Frontalini**

Community Structure, Life History, and Reproduction
Oceanographic proxies, benthic foraminiferal microhabitats, and productivity/oxygenation
Benthic foraminifera and water mass properties
Atlantic and Mediterranean shallow water benthic Foraminifera
Lab: Modern smaller benthic foraminifera: Foraminiferal genera and assemblages
Task 1: Productivity/oxygen estimation based on SBF
Task 2: Environmental Interpretation
Keynote lecture by Laia Alegret: Deep-sea drilling and the JOIDES Resolution

**Day 13 (16 June Wednesday) Cetean & Alegret**

Biostratigraphy and Paleoecology of benthic foraminifera
The ODP record, Cretaceous/Paleogene boundary, Paleocene-Eocene Thermal Maximum, Eocene hyperthermals and late Eocene
Lab: A review of late Cretaceous to Paleogene faunas and index taxa
Task 1: Paleodepth estimation based on upper depth limits of SBF
Task 2: Paleoproductivity/paleoxygen estimation based on SBF

**Day 14 (17 June Thursday) Kaminski & Foy**

Cenozoic Paleoceanographic events and SBF
Neogene of West Africa, and Gulf of Mexico: The ACEX Arctic Drilling Expedition
Lab: The Paleogene record; North Sea, Trinidad, Angola, Carpathians, Gubbio
A review of Jurassic to late Cretaceous faunas, Bering Sea Pleistocene faunas
Task 1: Flysch type fauna identification – index taxa
Task 2: Oxygen minimum zone fauna

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Rigs and Stuff
Wellsite Micropaleontology

**Day 15 (18 June Friday) Kaminski & Frontalini**
- Morning field excursion to the Gubbio area
  - Cretaceous-Paleogene sequence at Contessa Highway and Contessa Road
  - Paleocene-Eocene Thermal Maximum and other hyperthermals at Contessa Road
  - Oceanic Anoxic Event 2 “Bonarelli” at Contessa Quarry
  - K/Pg boundary at Bottaccione
  - Oceanic Anoxic Event 1a “Selli” at Gorgo a Cerbara
- Afternoon tourist visit to Gubbio
- Social Dinner

**Day 16 (19 June Saturday) Kucera**
- Modern Planktonic Foraminifera
- Taxonomy of modern planktonic foraminifera
- Structure of cytoplasm, Feeding, Symbionts, Ontogeny
- Reproductive and seasonal cycles, Depth habitats
- Origin of Planktonic Foraminifera
- Biogeography of Planktonic Foraminifera
- Faunal Provinces, Climate Zones and Water Masses
- Lab 1: Recent assemblages - wall texture - shell morphology
  - Task 1: Identification of latitudinal zones based on PF

**Day 17 (20 June Sunday) Kucera and Kaminski**
- Neogene Planktonic Foraminifera
- Miocene and Pliocene Planktonic Foraminifera
- Pleistocene Planktonic Foraminifera
- Biochronology and Zonal schemes
- Lab 1: Miocene index species - Pliocene-Pleistocene index species
  - Task 1: Identification of biozones
  - Task 2: Identification of glacial and interglacial assemblages

**Day 18 (21 June Monday) Petrizzo**
- Paleogene Planktonic Foraminifera
- Biostratigraphy
- Notes on Paleoceanography
- Lab 1: Paleogene index species
  - Task 1: Morphology of Paleogene PF
  - Task 2: Identification of biozones
- Aperitif

**Day 19 (22 June Tuesday) Petrizzo**
- Mesozoic Planktonic Foraminifera
- Biostratigraphy
- Notes on Paleoceanography
- Lab 1: Upper Jurassic to Maastrichtian index species
  - Task 1: Morphology of Cretaceous PF
  - Task 2: Identification of biozones

Min number of participants: 20

Final deadline May 1st, 2021

Registration fees
- Early registration (registration and payment before March 27th, 2021)

PhD/MSc Students:
One module Euro 390
Two modules Euro 600
Three modules Euro 760
Full course Euro 870

Academic/Industrial staff:
One module Euro 570
Two modules Euro 860
Three modules Euro 1060
Full course Euro 1190

Late registration (registration and payment after March 27th, 2021)

PhD/MSc Students:
One module Euro 450
Two modules Euro 730
Three modules Euro 930
Full course Euro 1000

Academic/Industrial staff:
One module Euro 640
Two modules Euro 1020
Three modules Euro 1210
Full courses Euro 1300

The fee includes:
• lectures (4-day course)
• lecture notes, handouts, PowerPoint, pdf of reprints
• icebreaker party
• refreshments
• aperitifs
• excursion
• social dinner

How to register
Registration must be done by submitting the registration form that can be download from http://isf.tmsoc.org website, or by sending an email to isf@tmsoc.org

The course fee must be paid to the following bank account:
Account name: Fundacja Mikropaleontologiczna Micropress Europe
Bank address: BNP Paribas Bank Polska Spółka Akcyjna ul. l. Kasprzaka 10/16, 01-211 Warszawa, Polska
BIC: RCBWPLPW
IBAN: PL 91 1750 0012 0000 0000 2841 0832
Currency of account: Euro (€). (Please contact us for further instructions if you wish to pay in Pounds Sterling, in US Dollars, or by Credit Card).
Reason for payment: participant’s name and 14th I.S.F. (e.g. John Smith – 14th I.S.F.)
As soon as you have a copy of the bank transfer, please send it by e-mail to isf@tmsoc.org

Correspondence and Information:
isf@tmsoc.org

Lectures
Prof. Michael A. Kaminski, King Fahd University of Petroleum & Minerals (Saudi Arabia)
Prof. Fabrizio Frontalini, Urbino University (Italy)
Prof. Laia Alegret, University of Zaragoza (Spain)
Prof. Antonino Briguglio, University of Genova (Italy)
Dr. Claudia Cetean, Robertson Ltd (UK)
Prof. Rodolfo Coccioni, Urbino University (Italy)
Dr. Danielle Foy, Blue Phoenix Geological Ltd. (UK)
Prof. Andrew Gooday, National Oceanography Centre (UK)
Requirements

The course is primarily intended for young researchers at the PhD or MSc stages of their careers and industrial staff working with Foraminifera, meiofauna, micropaleontology, paleoceanography, paleoecology, climate history. Applicants will primarily be selected on the basis of the relevance of the course for their current work. Because the course is oversubscribed, places on the course are reserved in the order of payments received. Please register early in order to reserve your place.

Location

The course will be held in Urbino at the “Collegio Internazionale”. The “Collegio Internazionale” is in the historic center of Urbino, two blocks from the main square please visit, http://www.collegiointernazionaleurbino.it/en/galleria-immagini.html.

Accommodation and meals

It is possible for participants to book accommodation at the “Collegio Internazionale” University Hall. Most of the rooms are double-occupancy and have en-suite bathrooms, only a few single rooms are available and will be assigned in enrollment order. The rooms are furnished, air-conditioned, clean and comfortable. The cost of the accommodation is €18 in double and €25 in single per night including breakfast. The accommodation cost is paid upon your arrival in cash or by debit/credit card at the reception desk of Collegio Internazionale. Cafeteria meals may be obtained by a rechargeable debit card (each participant will receive a meal card at reception) at the nearby university residential block in the “Mensa del Duca” (1-minute walk from the Collegio Internazionale). The cost is €10 for a complete meal (first course, second course, side dish, bread, fruit and water). Urbino City Tax €7.50 for the entire stay.

Insurance

The registration fees do not include insurance of any kind. Participants are strongly advised to take out appropriate insurance, including cover for travel, accommodation, medical assistance and personal possessions.

The second circular with detailed information about the course is scheduled to be distributed in early April 2021 and will be only sent to people who replied to the first circular.

We look forward to seeing you in Urbino!

For more information, please visit our new website at www.isf.tmsoc.org/
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