International School on Foraminifera

12th Course

Urbino

9th–28th June, 2019

First Circular

Course Description
The 12th 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 (10-14 June), Larger Benthic Foraminiferal Course (15-18 June), Smaller Benthic Foraminiferal Course (20-24 June) and Planktonic Foraminiferal Course (25-28 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

9 June Sunday Icebreaker Party

Foraminiferal Introduction

Day 1 (10 June Monday) Kaminski & Frontalini
Welcoming speech and course presentation
Famous Names and Milestones in the Study of Foraminifera
Introduction to Foraminifera & Review of Foraminiferal 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 (11 June Tuesday) 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 (12 June Wednesday) 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 (13 June Thursday) Hohenegger & Gooday
Biology of foraminifera
Ecology and taphonomy of foraminifera
Lab 1: Statistical analyses for ecological and paleoecological studies
Lab 1: Using statistical program packages

Day 5 (14 June Friday) 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 (15 June Saturday) Hohenegger, Papazzoni & Briguglio
Biology, bauplan and functional morphology, carbonate production (recent)
Most important groups of LBF in the Phanerozoic
Carbonate production and taphonomy (biostratigraphy and diagenesis), accumulation (inclusive nummulite banks)
LBF morphology using loose specimens, thin sections, microCT (Lab 1)
Upper Palaeozoic shallow water Fauna: the Fusulinina Suborder
Lab 1: Fusulinina in thin sections

Day 7 (16 June Sunday) Papazzoni & Briguglio
Shallow water K/T boundary and Palaeocene LBF associations
The Eocene biodiversity (I): the genus Nummulites
The Eocene biodiversity (II): the genus Alveolina
Lab 1: Palaeocene, Alveolina & Nummulites

Day 8 (17 June Monday) Hohenegger, Papazzoni & Briguglio
The Eocene biodiversity (III): the Orthophragminids
Oligo-Miocene LBF associations
Lab 1: Orthophragminids, Lepidocyclinids and Miogypsinids
LBF biostratigraphy, Oppel zones and applications
Modern LBF: ecology, distribution (now and future), applications
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

**Day 9 (18 June Tuesday) 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 study
- 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: age and paleoenvironment exercise
  - Neogene foraminiferal applications in the Red Sea hypersaline-associated succession

**Day 10 (19 June Wednesday) Day off**

**Smaller Benthic Foraminifera**

**Day 11 (20 June Thursday) 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 (21 June Friday) 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 (22 June Saturday) Cetean & Alegret**
- Biostatigraphic and Paleoeology 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 (23 June Sunday) Kaminski & Foy**
- Cenozoic Paleoeceanographic 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
Rigs and Stuff
Wellsite Micropaleontology

Day 15 (24 June Monday) **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

**Planktonic Foraminifera**

Day 16 (25 June Tuesday) **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, Climatic Zones and Water Masses
- Lab 1: Recent assemblages - wall texture - shell morphology
- Task 1: Identification of latitudinal zones based on PF

Day 17 (26 June Wednesday) **Wade**
- Neogene Planktonic Foraminifera
- Miocene and Pliocene Planktonic Foraminifera
- Pliocene 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 (27 June Thursday) **Wade & 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 (28 June Friday) **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 5th, 2019

Registration fees
Early registration (registration and payment before February 3rd, 2019)
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 February 3rd, 2019)

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](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: Raiffeisen Bank Polska S.A., ul. Piekna 20, 00-549 Warszawa  
SWIFT: RCBWPLPW  
IBAN: PL91 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 12th I.S.F.  (e.g. John Smith – 12th 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)  
Dr. Fabrizio Frontalini, Urbino University (Italy)  
Prof. Laia Alegret, University of Zaragoza (Spain)  
Dr. 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)
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.collegionazionaleurbino.it/en/1/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 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 March 2019 and will be 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/