

## Scientific Themes

### Special Sessions (SpS) and General Sessions (GS)

#### Theme 1. Continental carbonates, karst and cave deposits

- 1.1. SpS 1: The response of continental carbonates to (paleo)environmental perturbations: New insights from emergent and old/refined indicators (Convenors: Daniel A. Petrash, Ivica Pavičić and Andrea Martín Pérez)
- 1.2. SpS 2: Cave sediments – archives of past environmental changes (Convenors: Nadja Zupan Hajna, Petra Bajo, Maša Surić, Tomislav Kurečić and Astrid Švara)
- 1.3. SpS 3: Continental carbonates, karst and caves

#### Theme 2. Shallow-marine carbonate depositional systems and carbonate platforms

- 2.1. SpS 1: Biogeodynamics of Mesozoic marine carbonate depositional systems (Convenors: Thomas Steuber and Mariano Parente)
- 2.2. GS: Shallow-marine carbonate depositional systems and carbonate platforms

#### Theme 3. Deep-marine carbonate depositional systems

- 3.1. GS: Deep-marine carbonate depositional systems

#### Theme 4. General topics in carbonate sedimentology

- 4.1. SpS Special Session in celebration of Maurice Tucker's contribution to carbonate sedimentology: Studies of carbonate rocks and sediments – from sequence stratigraphy and cycles to dolomites and microbialites (Convenors: Juan Carlos Laya, Paul V. Wright, Mirosław Slowakiewicz, Edoardo Perri and Trevor Burchette)
- 4.2. SpS 2: Early diagenesis in carbonate sediments (Convenors: Theresa Nohl, Chelsea Pederson, Mohammed Hashim, Juan Carlos Laya and Paul Wright)
- 4.3. SpS 3: Non-marine and marine carbonate factories and their expressions in sequence stratigraphy (Convenors: John Reijmer and Peter Burgess)
- 4.4. SpS 4: Resedimented carbonates – generation, transport, deposition (Convenors: Arnoud Sloopman, Katarina Gobo, Krešimir Petrinjak, Rosine Riera and John Reijmer)
- 4.5. SpS 5: Modern advancements in the characterization of dolomite (Convenors: Cole McCormick and Cathy Hollis)
- 4.6. SpS 6: Carbonate sedimentary systems and their petrophysical expression (Convenors: Anneleen Foubert, Eva de Boever and John Reijmer)
- 4.7. GS: General topics in carbonate sedimentology

#### Theme 5. Continental clastic depositional systems

- 5.1. SpS 1: Lake sediments as archives of natural and anthropogenic changes in climate and the environment (Convenors: Marta Marchegiano and Patricia Roeser)
- 5.2. SpS 2: New advances in lacustrine sedimentology (Convenors: Shuxin Pan, Carlos Zavala, Mathieu Schuster, Guodong Wang and Lisha Yang)
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#### Theme 6. Shallow-marine clastic depositional systems

- 6.1. SpS 1: Coastal depositional systems: understanding past and modern systems for a resilient future (Convenors: Valentina M. Rossi, Cornel Olariu, Ron J. Steel and Allard W. Martinus)

6.2. SpS 2: Mixed process expressions, and controls on sedimentation in tidal systems (Convenors: Shahin E. Dashtgard, Robert W. Dalrymple and Sergio G. Longhitano)

6.3. SpS 3: Coastal boulder deposits (CBD) as archives of extreme wave events (Convenors: Stefano Furlani, Giovanni Scicchitano and Tvrtko Korbar)

6.4. SpS 4: The sedimentology of coastal storms past & present: informing preparedness for climate change (Convenors: Michael Savarese and Bosiljka Glumac)

6.5. SpS 5: Spatial and temporal variability in coastal to shelf environments (Convenors: Sonia Campos-Soto, Marta Cosma, Marcello Gugliotta, Romain Vaucher, Anna van Yperen and Valentin Zuchuat)

6.6. GS: Shallow-marine clastic depositional systems

### **Theme 7. Deep-marine clastic depositional systems**

7.1. GS: Deep-marine clastic depositional systems

### **Theme 8. General topics in clastic sedimentology**

8.1. SpS 1: Subaqueous sediment gravity flow processes and products (Convenors: Joanna Pzonka, Xin Shan, Arif Hussain and Katarina Gobo)

8.2. SpS 1: Analogues and experiments for understanding early diagenesis of clastic sediments (Convenors: Stuart Jones, Richard Worden, Dimitrios Charlaftis and Sanem Acikalin)

8.3. GS: General topics in clastic sedimentology

### **Theme 9. Volcaniclastic deposits**

9.1. SpS 1: Volcanism and sedimentology (Convenor: Pujun Wang)

9.2. SpS 2: Impacts of volcanism on sedimentary systems (Convenors: Andrea Di Capua, Federica Barilaro, Rosanna De Rosa and Gabor Kereszturi)

9.3. GS: Volcaniclastic deposits

### **Theme 10. Evaporites**

10.1. SpS 1: Evaporitic sedimentary environments, processes and products, with emphasis on the Messinian Salinity Crisis (Convenors: Francesco de la Pierre and Luis Gibert)

10.2. GS: Evaporites

### **Theme 11. Biochemical and biological processes in sedimentary rocks**

11.1. SpS 1: Carbonate biomineralization processes, biominerals, environmental mineralogy /geochemistry (Convenors: Mirosław Slowakiewicz, Edoardo Perri, Mónica Sánchez Román and Daniel Ariztegui)

11.2. SpS 2: Trace fossils in sedimentological analysis: Expanding their applicability in space and deep time (Convenors: Anthony P. Shillito and Maximiliano Paz)

11.3. GS: Biochemical and biological processes in sedimentary rocks

### **Theme 12. Stratigraphic markers and archives**

12.1. SpS 1: Understanding major paleoenvironmental and paleontological crises during the Mesozoic by exploring shallow water carbonates geological archives (Convenors: Gianluca Frijia, Brahimsamba Bomou and Alexis Godet)

12.2. SpS 2: The sedimentary role of calcareous green algae, from Paleozoic to modern (Convenors: Mardi McNeil, Juan Carlos Braga and Jody Webster)

12.3. SpS 3: The stratigraphic record of paleoenvironmental variation in epeiric basins (Convenors: Miquel Poyatos-Moré, Orsolya Sztanó, Ernesto Schwarz, Chelsea Pederson and Mariano Ramirez)

12.4. SpS 4: Tephra and cryptotephra layer detection and identification through multi-proxy data integration (Convenors: Christian Laag, Yohan Guyodo, Stoil Chapkanski and France Lagroix)

12.5. SpS 5: Paleoclimate and paleoenvironmental changes in shallow-marine seas (Convenors: Romain Vaucher, Amy I. Hsieh, Barbora Krizova, Christian Zeeden and Shahin E. Dashtgard)

12.6. SpS 6: Paleosols as valuable records of terrestrial climate and environments (Convenors: Goran Durn, Andrea Mindszenty and Franz Ottner)

12.7. SpS 7: IGCP739: The Mesozoic–Paleogene hyperthermal events

12.8. GS: Stratigraphic markers and archives

### **Theme 13. Provenance of sediments – from source to sink**

13.1. SpS 1: Plastic particles as anthropogenic grains in the current and future stratigraphic record (Convenors: Sarah Gabbot and Patricia Corcoran)

13.2. SpS 2: Controlling factors of sediment generation in source to sink studies (Convenors: Guido Pastore and Muhammad Usman)

13.3. SpS 3: Quantitative study for source-to-sink system (Convenors: Guodong Wang, Yongqiang Qu, Duonian Xu and Lisha Yang)

13.4. SpS 4: From river catchments to the deep sea: case studies, applications, state of the art and new frontiers of source-to-sink research (Convenors: Alessandro Amorosi, Michael D. Blum, Piret Plink-Björklund, Luigi Bruno, Bruno Campo and Claudio Pellegrini)

13.5. GS: Provenance of sediments – from source to sink

### **Theme 14. Tectonics and sedimentation**

14.1. SpS 1: Intramountain basins – recorders of tectonics, climate, and biota interactions (Convenors: Nevena Andrić-Tomašević, Oleg Mandić and Marijan Kovačić)

14.2. GS: Tectonics and sedimentation

### **Theme 15. Sedimentology and hydrocarbons**

15.1. SpS 1: Seismo-sedimentological characterization of 3D seismic data (Convenors: Alan Vranjković and Camille Cosson)

15.2. GS: Sedimentology and hydrocarbons

### **Theme 16. Techniques and technologies in sedimentology**

16.1. SpS 1: Beyond dating: frontiers of luminescence as a sedimentological proxy (Convenors: Gloria I. López and Sebastien Huot)

16.2. GS: Techniques and technologies in sedimentology

### **Theme 17. Open topics in sedimentology**

17.1. SpS 1: Open Science: data, software, knowledge, and education (Convenors: Anne Bernhardt, Alisa Martek, Aurélia Privat, Romain Vaucher and Valentin Zuchuat)

17.2. SpS 2: Sedimentary geology education: reaching out to Generation Z and beyond (Convenors: TBA)

17.3. SpS 3: Sedimentology and geotourism (Convenors: TBA)

17.4. SpS 4: Sedimentology and archaeology (Convenors: TBA)

17.5. GS: Open topics in sedimentology

### Description of Special Sessions

#### 1.1. Special Session: The response of continental carbonates to (paleo)environmental perturbations: New insights from emergent and old/refined indicators

Convenors: Daniel A. Petrash (Czech Geological Survey, Prague, Czechia), Ivica Pavičić (Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb, Croatia) and Andrea Martín Pérez (Institute of Palaeontology ZRC SAZU, Ljubljana, Slovenia)

Continental carbonates form in a wide variety of depositional and early diagenetic settings, from rivers, lakes and springs, to soils, caves and glaciers. Therefore, they can display a diversity of geometries, mineralogies and fabrics. Due to their sensitivity to climate forcing, these deposits are potential records of information valuable to decode the triggers and effects of global (paleo)environmental perturbations in land ecosystems. The information includes diverse physical and chemical proxies that can also be sensitive to basin-scale forced oscillations. To understand how these proxies are incorporated, altered or preserved in continental carbonates, an increasing number of studies have directed attention to unravel precise carbonate nucleation and crystal growth mechanisms. Some of these studies confer relevance to syngenetic biological controls, while others ascribe a key role to abiotic variables within of the sedimentary and/or diagenetic system. This session aims to bring together current research on the formation of continental carbonates to understand how tectonics, hydrology, climate and ecosystems interact to produce a wide array of deposits with contrasting physical features and discrete chemical and/or isotopic signatures with significance to paleoenvironmental reconstructions. We welcome contributions investigating the sedimentology, geochemistry and geobiology of continental carbonates, both in the rock record and in modern settings. We also look forward to receiving research seeking for a better understanding of their early stages of formation, or dealing with novel observations made in natural environments, or in the lab—in the form of experimental (synthetic) growth and carbonate mineral alteration efforts.

#### 1.2. Special Session: Cave sediments – archives of past environmental changes

Convenors: Nadja Zupan Hajna (ZRC SAZU Karst Research Institute, Postojna, Slovenia), Petra Bajo (Croatian Geological Survey, Zagreb, Croatia), Maša Surić (Department of Geography, University of Zadar, Zadar, Croatia), Tomislav Kurečić (Croatian Geological Survey, Zagreb, Croatia), and Astrid Švara (ZRC SAZU Karst Research Institute, Postojna, Slovenia)

Karst caves play an increasing role in studies of past environmental changes on various temporal and spatial scales. This is primarily due to the wealth of information stored in clastic sediments as well as speleothems found inside most of the caves. Both of these natural archives capture information about the conditions that prevail inside the cave and/or at the karst surface at the time of their deposition. Clastic cave deposits are typically derived from various processes. They contain critical information about the early phases of speleogenesis, climate, and regional palaeohydrology that may not be available in other archives. However, the vast majority of speleothems provide information about the latest speleogenetic phase, as they typically grow under vadose conditions. Due to their amenability for radiometric dating speleothems are nowadays considered as one of the most powerful archives in studies of past climate and environmental changes.

This session welcomes presentations on all aspects of research of cave sediments, i.e. their stratigraphy, depositional processes, provenance, mineralogy, geochemistry, dating techniques, palaeoclimate, and palaeoenvironmental interpretations as well as studies of modern depositional conditions. We especially welcome presentations in which research of clastic cave sediments and speleothem records is combined in order to explore the full potential of both archives. Presentations of the results based on field and laboratory observations, as well as innovative experimental work are all welcomed.

#### 2.1. Special Session: Biogeodynamics of Mesozoic marine carbonate depositional systems

Convenors: Thomas Steuber (Department of Earth Sciences, Khalifa University, Abu Dhabi, UAE) and Mariano Parente (Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse, Università di Napoli Federico II, Napoli, Italy)

The Mesozoic evolution of marine carbonate depositional systems was linked with the biological evolution of benthic and planktonic carbonate producers. During the Mesozoic greenhouse world, multiple innovations and crises in biocalcification occurred. These are typically evaluated in the context of environmental change such as, e.g., oceanic anoxic events, perturbations of the ocean's carbonate system, or rapid climate change. We invite

contributions that address the biogeodynamics of Mesozoic carbonate depositional systems, preferably with a multidisciplinary approach.

#### **4.1. Special Session: Special Session in celebration of Maurice Tucker's contribution to carbonate sedimentology: Studies of carbonate rocks and sediments – from sequence stratigraphy and cycles to dolomites and microbialites**

Convenors: Juan Carlos Laya (Department of Geology and Geophysics, Texas A&M University), Paul V. Wright, Mirosław (Mirek) Slowakiewicz (University of Warsaw, Faculty of Geology), Edoardo Perri and Trevor Burchette

Studies in carbonate rocks and sediments have progressed at a remarkable pace in the last few decades and Maurice Tucker has been a key figure in many of those developments, ranging from the sequence to the nano-scale. As he has described his career "I study any Rock that fizzes". Maurice has not only been significant in developing new ideas but has also been a pivotal figure in disseminating the scientific progress through his many books, and is internationally recognized as an influential figure in advancing carbonate sedimentology. This session aims to celebrate his career with a combination of talks reviewing new advances in carbonate sedimentology including and not limited to carbonate sequence stratigraphy and cyclostratigraphy and diagenesis.

#### **4.2. Special Session: Early diagenesis in carbonate sediments**

Convenors: Theresa Nohl (Westfälische Wilhelms-Universität Münster, Institut für Geologie und Paläontologie), Chelsea Pederson, Mohammed Hashim, Juan Carlos Laya (Department of Geology and Geophysics, Texas A&M University) and Paul Wright

Carbonate sediments are our unique window into past ecosystem evolution, palaeoenvironmental changes and palaeoclimate. They form in a wide variety of depositional settings, involving numerous biological, chemical and physical processes. Post-depositional processes can subsequently alter the sediment's original characteristics. On one hand these processes complicate the reconstruction of original environmental and ecological information, especially at the early stages, and on the other hand they provide important insights into a range of biological, geochemical and physical interactions in the subsurface. Different diagenetic processes and products in marine environments have been studied extensively over the last decades. However, recent work has demonstrated that many of these processes are still poorly understood and controversial, especially those that occur during early marine diagenesis. Moreover, we now appreciate, but are yet to fully understand, how critically important mineral transformations are in marine fluids even during very shallow burial. This session invites contributions that focus on the sedimentological, geochemical, and geobiological processes associated with carbonate diagenesis in general, with a particular emphasis on processes that occur during early diagenesis.

#### **4.3. Special Session: Non-marine and marine carbonate factories and their expressions in sequence stratigraphy**

Convenors: John Reijmer (Amsterdam/Fribourg) and Peter Burgess (Liverpool)

The carbonate factory concept, including how such factories respond to relative sea-level oscillations, climate overturns and environmental changes, is still the fundamental basis for understanding most carbonate depositional systems. However, drone-assisted quantitative outcrop studies and experimental numerical forward modelling play an increasingly important role helping unravel the interplay of these controlling factors as they are expressed in the sequence stratigraphy of non-marine to marine, carbonate-dominated depositional systems. In this session we invite authors to submit contributions highlighting novel approaches in this research field. Studies applying various carbonate factory concepts in quantitative outcrop and forward modelling approaches, as well as seismic data applications are welcomed.

#### **4.4. Special Session: Resedimented carbonates – generation, transport, deposition**

Convenors: Arnoud Slotman (Department of Geology and Geological Engineering, Colorado School of Mines, Golden, Colorado, USA), Katarina Gobo (Department of Geology, Faculty of Science, University of Zagreb, Croatia), Krešimir Petrinjak (Croatian Geological Survey, Department of Geology, Zagreb, Croatia), Rosine Riera (Norwegian Geotechnical Institute, Perth, Australia), and John Reijmer (Faculty of Science, Department of Earth Sciences, Vrije Universiteit Amsterdam, The Netherlands).  
Department of Geosciences, University of Fribourg, Switzerland)

Carbonate environments yield a diverse range of depositional products. Carbonate sediments in marine, lacustrine and terrestrial systems are subject to a multitude of transport and depositional processes. The nature of sediment in carbonate-dominated environments relies on the carbonate factory involved, but also on the temporal and spatial setting, as well as the climate and environmental locale. These factors combine into variations in the amount, grain-size spectrum and mineralogy of the carbonate sediments. Other parameters that impact sediment redistribution in carbonate-dominated settings include platform and slope morphology, and oceanic setting and currents.

Carbonate particles itself comprise a wide range of sizes and shapes governed less by sediment maturity and more by the skeletal nature of the carbonate-producing organisms combined with non-skeletal sediment production. The divergence of shape and density between carbonate and siliciclastic particles leads to marked differences in hydraulic behaviour. However, there are many examples of resedimented carbonate and siliciclastic grains occurring together.

This session aims to explore depositional models for pure and mixed resedimented carbonates – from modern to ancient and from the scale of single grains to shelf-to-basin profiles. We welcome researchers from all disciplines, in particular early career scientists.

#### **4.5. Special Session: Modern advancements in the characterization of dolomite**

Convenors: Cole McCormick and Cathy Hollis (University of Manchester)

Our understanding of dolomitization, cementation, and recrystallization in carbonate sedimentary rocks has progressed considerably over the past decade, namely due to modern advancements in the techniques used for field, petrographical, and geochemical analyses (e.g., clumped isotope thermometry, rare earth element analyses, U-Pb geochronology, noble gas isotope analysis). There have also been significant advances in the use of geochemical proxies (e.g.  $d^{53}\text{Cr}$ ,  $d^{56}\text{Fe}$ ,  $d^{11}\text{B}$  and halogen concentrations) for interpretation of palaeoclimate, seawater chemistry and oxygenation, although the extent to which these are retained after dolomitization is still unclear. We invite abstracts that address the geological significance of novel analytical techniques, particularly those that illuminate fundamental processes in the formation of dolomite and/or the significance of these processes to paleoceanography or tectonics.

#### **4.6. Special Session: Carbonate sedimentary systems and their petrophysical expression**

Convenors: Anneleen Foubert (Fribourg), Eva de Boever (Utrecht/Groningen) and John Reijmer (Amsterdam/Fribourg)

In this session we solicit contributions discussing the petrophysical properties of mixed, non-marine and marine carbonate systems. The evaluation of porosity (pore shape, pore size, pore networks) and permeability distributions as well as acoustic velocity expressions of mixed, non-marine and marine carbonate depositional systems are important in the exploration and exploitation of alternative geo-energy solutions, such as geothermal and geological storage applications (e.g., carbon capture and storage).

Outcrop-related studies and core studies, but also modelling studies and experimental studies are welcomed. Studies based on 3D correlative microscopy (e.g., FIB-SEM, CT-scanning) and upscaling, from sedimentary facies to outcrop-scale, would also fit in this session.

The understanding of carbonate sedimentary systems and their petrophysical behaviour, taking a process-based and quantitative approach across different scales, is crucial in the acceleration of the global energy transition towards a carbon-neutral and sustainable society.

#### **5.1. Special Session: Lake sediments as archives of natural and anthropogenic changes in climate and the environment**

Convenors: Marta Marchegiano (Chemistry Department, Vrije Universiteit Brussel, AMG-VUB research unit, Belgium) and Patricia Roeser (Environmental Geology Group Institute for Geosciences, University of Bonn, Germany)

Lake sediments offer valuable high-resolution archives allowing unique reconstructions of climate- and human-induced environmental changes at various time scales. The accurate interpretation of lacustrine records requires an in-depth understanding of both modern and past sedimentation processes. Combining these data with those of multi-proxy investigations can allow to understand the impact of global climate change on specific area as well as to disentangling climate from anthropic triggers. This session welcomes studies from the broad fields of modern and paleo limnology. We encourage presentations dealing with a variety of approaches (e.g. geochemical, sedimentological and biological) that allow to reconstruct past climate and environment, including

state of the art methodology. Paleoclimate and paleoenvironmental reconstructions based on well-dated sedimentary archives applying methods such as inorganic and organic geochemistry, sedimentary DNA, biological remains as well as numerical models or statistical approaches are also welcomed.

### **5.2. Special Session: New advances in lacustrine sedimentology**

Convenors: Shuxin Pan (Research institute of petroleum exploration & development-Northwest (NWGI), PetroChina, Lanzhou, China), Carlos Zavalam (Universidad Nacional del Sur, Buenos Aires, Argentina), Mathieu Schuster (Centre National de la Recherche Scientifique, Strasbourg, France), Guodong Wang (Research institute of petroleum exploration & development-Northwest (NWGI), PetroChina, Lanzhou, China) and Lisha Yang (Research institute of petroleum exploration & development-Northwest (NWGI), PetroChina, Lanzhou, China)

Lacustrine basins are important oil & gas-productive areas of the world. In recent years, lacustrine sedimentology has made great achievement in term of source-sink system analysis, shallow-water delta, beach bar, deep-water sediments, fine-grained deposits, lacustrine carbonate, events deposits, deep reservoir forming mechanism and seismic sedimentology. Even so, challenges of the lacustrine sedimentology are widely existed and needed to carry out innovation. The main idea of this theme is innovation and new exploration fields of lacustrine deposits.

### **6.1. Special Session: Coastal depositional systems: understanding past and modern systems for a resilient future**

Convenors: Valentina M. Rossi (National Research Council of Italy, Institute of Geosciences and Earth Resources, Pavia, Italy), Cornel Olariu (Jackson School of Geosciences, University of Texas at Austin, Austin, Texas, U.S.A), Ron J. Steel (Jackson School of Geosciences, University of Texas at Austin, Austin, Texas, U.S.A), and Allard W. Martinius (Delft University of Technology, Delft, The Netherlands and Equinor ASA, Trondheim, Norway)

Coastal areas are very economically and ecologically valuable environments, and some are very densely populated. However, nowadays these areas are extremely vulnerable and under the threat of global changes. Deposits of coastal environments constitute reservoirs for fresh water resources, hydrocarbons, geothermal energy, and can provide storage for CO<sub>2</sub>. Furthermore, these deposits are excellent archives that allow us to understand the evolution of coastal depositional systems under varying sea level, coastal processes and sediment supply.

In this session, we invite contributions on modern, ancient, experimental and numerical modeling studies of coastal depositional systems to improve our understanding of these systems in the past, present, and their possible evolution in the future to guide their correct management.

### **6.2. Special Session: Mixed process expressions, and controls on sedimentation in tidal systems**

Convenors: Shahin E. Dashtgard (Department of Earth Sciences, Simon Fraser University, Burnaby, Canada), Robert W. Dalrymple and Sergio G. Longhitano

This session focuses on how wave and fluvial processes are expressed in tidal systems, and the allogenic and autogenic forcings that impact sedimentation therein. The intention of this session is to develop a more complete picture of how tidal systems work and how they are expressed in the sedimentary record.

### **6.3. Special Session: Coastal boulder deposits (CBD) as archives of extreme wave events**

Convenors: Stefano Furlani (University of Trieste, Italy), Giovanni Scicchitano (University of Bari, Italy), and Tvrtko Korbar (Croatian Geological Survey, HGI, Croatia)

Extreme wave events along rocky coasts can produce specific geomorphological signature in terms of erosion and deposition. Large coastal boulder deposits (CBD) and solitary boulders are common in the sites exposed to open seas, but can be find also in sheltered areas due to regional strong winds, specific geomorphology of the basin, or appropriate local sea-bottom topography. The boulders can be emplace well above high tide and may include megaclasts that weight up to hundreds of tonnes. The origin of this type of coastal deposits can be related both, to extreme storm waves and to (mega)tsunamis, depending on the site conditions, such as the regional active tectonic setting or extreme wave exposure.

In this session, studies about coastal morphology and sedimentology of boulder deposit sites, monitoring of boulder movements using on-site observations with new technologies, such as image analysis and IA, modelling of wave impacts on rocky coasts, dating of the boulder deposition, and other approaches, are welcome.

#### **6.4. Special Session: The sedimentology of coastal storms past and present: informing preparedness for climate change**

Convenors: Michael Savarese (Department of Marine & Earth Sciences, Florida Gulf Coast University Fort Myers, Florida, USA) and Bosiljka Glumac (Smith College Northampton, USA)

As climate change is anticipated to generate greater storminess as the planet transitions through the 21<sup>st</sup> century, a better understanding of storm history and the associated sedimentologic processes and products is warranted. With such understanding comes a greater capacity to predict, and therefore manage, the impact of future storms. This session will explore: the proxies used by sedimentologists and stratigraphers to interpret storm history; the geomorphologic response of coastal landscapes; the new technologies employed to advance our knowledge; and the modeling efforts available to predict future outcomes. Lastly, we invite case studies in which geoscientists have effectively worked with managers and decision makers to build capacity in coastal resilience.

#### **6.5. Special Session: Spatial and temporal variability in coastal to shelf environments**

Convenors: Sonia Campos-Soto (Complutense University of Madrid), Marta Cosma (National Research Council of Italy), Marcello Gugliotta (University of Bremen), Romain Vaucher (University of Lausanne), Anna van Yperen (University of Oslo), and Valentin Zuchuat (RWTH Aachen)

At any latitude and under any kind of climatic conditions, coastal to shelfal systems are characterized by the interplay of various processes (e.g. riverine, tidal, waves/storms, wind). These processes interact with sediment mixtures and can result in complex morphodynamics, variable sedimentary facies, and stratigraphic architectures. The depositional record of these mixed process interactions is challenging to decipher, especially given changes in depositional systems across various timescales: variations in relative sea level, climate, and/or sediment supply, amongst other factors. In addition, the sedimentary signature and architecture preserved in the record can misrepresent what processes were active at the time of deposition, blurred by the amalgamation of different timescales at which each of the processes occur. Because coastal and shallow-marine areas around the world are subjected to intense and ever-increasing anthropogenic stresses, a better understanding of these depositional systems will benefit their sustainable protection and development by local communities and policy makers. In this session, we invite contributions of studies on coastal to shelfal systems either in the rock record or in modern examples, in any type of climatic and tectonic setting, with data acquired (but not limited to) from fieldwork, remote-sensing, experimental lab work, and numerical modelling. Early Career Scientists are warmly welcome to showcase their work, and we encourage them to apply for oral presentations.

#### **8.1. Special Session: Subaqueous sediment gravity flow processes and products**

Convenors: Joanna Pzonka (Mineral and Energy Economy Research Institute, Polish Academy of Sciences, Poland), Xin Shan (First Institute of Oceanography, Ministry of Natural Resources, China), Arif Hussain (College of Petroleum Engineering and Geosciences, King Fahd University of Petroleum and Minerals, Saudi Arabia) and Katarina Gobo (Department of Geology, Faculty of Science, University of Zagreb, Croatia)

Subaqueous sediment gravity flows constitute one of the most significant processes of sediment transfer on Earth. They transport and accumulate large quantities of clastic and carbonate sediments, organic matter, and anthropogenic pollutants (e.g. plastics) in subaqueous environments, including lake, delta, continental shelf, continental slope, submarine fan and basin plain. Their deposits may host large volume of hydrocarbon reserves, but also preserve organic carbon that reduces carbon dioxide in the atmosphere significantly. Subaqueous sediment gravity flows are caused by catastrophic events of variable magnitude such as mass failures, major river floods, storm waves, volcanic eruptions and earthquakes, therefore, they are difficult to predict and monitor directly. The sedimentary records of these flows significantly enhance our understanding of sediment transport processes and emplacement mechanisms, paleoclimate, and tectonics. We invite contributions focusing on depositional processes (shallow to deep-water settings) and products (both ancient to modern sediments) of subaqueous sediment gravity flows. Studies using established methods, as well as ones presenting applications of novel approaches, such as modelling and laboratory work to reconstruct records of past events, their impacts on the environment, and forecast the probability of future events. Early Career Scientists are warmly encouraged to give oral presentations.

## 8.2. Special Session: Analogues and experiments for understanding early diagenesis of clastic sediments

Convenors: Stuart Jones (Durham University, UK), Richard Worden (University of Liverpool, UK), Dimitrios Charlaftis (Durham University & Badley Ashton & Associates, UK) and Sanem Acikalin (University of Newcastle, UK)

Early clastic diagenesis occurs at or near the surface of sediments (sands and muds) where chemistry of the interstitial waters is controlled mainly by the depositional environment. The initial sediment composition, texture, pore fluid chemistry, microbiology and depositional setting all influence the mechanical and chemical properties of the sediment, which in turn may lead to substantial differences in the nature and magnitude of diagenetic change through time and burial. Understanding the early and on-going processes that change the properties of clastic sediments are of economic and environmental importance, and especially for the energy transition. This session invites contributions focused on multidisciplinary approaches to explore a broad range of geochemical, microbial and mechanical changes using modern sedimentary analogues and use of experimental studies. Early Career Scientists are encouraged to participate, including immature ideas and concepts to promote discussion. Our aim is to provide an in-person live discussion about the-state-of-the-art of diagenetic processes studies and to identify promising paths for new research focused on understanding the importance of early diagenetic processes.

## 9.1. Special Session: Volcanism and sedimentology

Convenor: Pujun Wang (Jilin University, China)

Volcanism and sedimentology are the twin brothers that reflect deep Earth properties and epigenic processes of the Earth. Their interaction process and results are the key to revealing characteristics of the Earth system. Volcano-sedimentary rock associations occur throughout Earth history. The evolution of the Earth surface system is controlled by the earth's internal operation. Volcanism is one of the important links between the Earth's internal processes and the evolution of the surface system. Volcanogenic sedimentary successions are common types of basin fills at various kinds of tectonic settings throughout Earth history. They provide key spatial and temporal records of the interaction processes between global and/or regional tectonics, volcanism, basement features, and overlying sedimentary covers. We seek contributions on (1) volcanism-sedimentary processes including sedimentology and facies analysis that operate between source and sink; (2) the past caldera tectonic systems buried in sedimentary basins and their impact on the subsequent basin forming, filling, and sequence of sedimentary facies; (3) the volcano-related basement architecture and building process and their impact on the overlying basin formation, filling style, and facies distribution; (4) the Paleoclimatic and paleoenvironmental aspects related to the interaction between volcanism and sedimentology; (5) the geological records and/or methods that can characterize the specific features of the interaction processes between volcanism and sedimentology.

## 9.2. Special Session: Impacts of volcanism on sedimentary systems

Convenors: Andrea Di Capua, Federica Barilaro, Rosanna De Rosa and Gabor Kereszturi

Volcanism plays a fundamental role in the evolution of sedimentary basins and the control of sedimentary processes. From one side, in fact, it produces and disperses large volumes of pyroclastic particles, which are directly accumulated into depocenters or enter into sediment routing systems before their final rest. From the other side, it drives the upcoming of hydrothermal/thermal fluids that interact with the surrounding environments, favoring a multiple spectrum of processes such as rock weathering, authigenic mineral precipitation and maturation of organic matter.

In order to stimulate a multidisciplinary debate on the impact exerted by volcanoes on sedimentary systems, we invite presentations that include, but are not limited to: 1) field- and/or laboratory-based description and interpretation of volcanoclastic sediments and related processes both in modern and ancient realms; 2) basin-related studies on the impact of volcanism under geo-energy purposes; 3) analyses on sedimentary sequences derived from or modified by the uprising of volcanogenic fluids.

This session is co-sponsored by the Commission on Volcanogenic Sediment of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI).

### **10.1. Special Session: Evaporitic sedimentary environments, processes and products, with emphasis on the Messinian Salinity Crisis**

Convenors: Francesco de la Pierre (Università degli Studi di Torino, Dipartimento di Scienze della Terra, Italy) and Luis Gibert (Universitat de Barcelona, Dept. Mineralogy, Petrology and Applied Geology, Spain)

Evaporites are chemical sediments formed in saline environments where evaporation generates brines concentrated in different compounds. These evaporitic rocks and associated brines have economic interest since are the source of basic materials used in construction, as gypsum, or strategic elements for the development of our society, as Na, K, Li, B. Because of their particular petrophysical properties evaporites are important in tectonic processes. They form detachment surfaces, diapirs and minibasins, playing a key role in the genesis and sealed structure of hydrocarbon reservoirs. During these energy transition times, thick evaporitic units have been proved useful to produce artificial reservoirs to store gas (hydrogen, methane etc). Finally, evaporites are excellent archive of biological activity, since both extremophile communities (archaea, bacteria) and the organisms that live above the pycnoclines (diatoms, forams etc.) are rapidly trapped in the evaporites and often excellently preserved. All these forms of life supply important information about the sedimentary setting and some of them favor the formation of bio-induced minerals as for example dolomite.

This session is addressed to all researchers working on different aspects of evaporitic sediments from ancient environments to modern analogs, from deep-sea brine pools to shallow continental salars. We welcome to this session studies related to the Messinian Salinity Crisis, when the youngest Salt Giant on Earth was formed in the Mediterranean region.

### **11.1. Special Session: Carbonate biomineralization processes, biominerals, environmental mineralogy /geochemistry**

Convenors: Mirosław Slowakiewicz (University of Warsaw, Faculty of Geology), Edoardo Perri, Mónica Sánchez Román, and Daniel Ariztegui

Prokaryotes (bacteria and archaea) contribute a significant fraction of modern biodiversity in terms of species abundance, total biomass and capacity to thrive in habitats inhospitable to more conspicuous forms of life. As a consequence of their diverse metabolic capabilities, prokaryotes participate in transformations and fluxes of most elements present on Earth and hence are important drivers of geochemical cycles. Throughout their long evolutionary history, some prokaryotes have acquired the capability to precipitate biominerals, a process referred to as biomineralization. Biominerals in recent decades have received growing interest from a large interdisciplinary scientific community. Understanding carbonate (bio)mineralization processes gives a deeper knowledge of natural risk, of changes related to anthropogenic activities, and provides tools for risk assessment. Investigating (bio)minerals allows the development of new technologies for a wide range of problems such as water quality, pollution and cement failure. This session is open to the whole scientific community interested in biominerals, sustainability and related technology development. We especially target the following themes: (1) impact of geobiological, geochemical and physico-chemical processes driving carbonate precipitation, with applications to palaeoenvironments and past climate changes, (2) experimental methods and visualization technologies to understand mineral nucleation, precipitation, alteration, and diagenesis, and (3) their synthetic analogues relevant to the environment, biobased-environmental-technologies such as wetland systems, waste and water treatment, bio-metallurgy, bioremediation, or investigations on biominerals relevant to health.

### **11.2. Special Session: Trace fossils in sedimentological analysis: Expanding their applicability in space and deep time**

Convenors: Anthony P. Shillito and Maximiliano Paz

Trace fossil analysis is a valuable tool to support sedimentological, sequence stratigraphical, geochemical, and palaeoenvironmental interpretations in both modern and ancient sediments. For this reason, an accurate assessment of animal-substrate interactions is fundamental for any facies analysis. Despite the recent explosion of published papers, there are still many environments that have hardly been explored. Also, recent work has emphasized that trace fossil analysis can contribute to evolutionary palaeoecology, providing insights for the understanding of major radiations and extinctions through geologic time. This would be essential to calibrate currently used trace fossil models. In this session, we invite contributions concerning the innovative application of trace fossils analysis to several geological problems (sedimentological, geochemical, palaeoenvironmental, etc.) and the study of trace fossils through Earth's history, both in modern sediments and ancient deposits.

### 12.1. Special Session: Understanding major paleoenvironmental and paleontological crises during the Mesozoic by exploring shallow water carbonates geological archives

Convenors: Gianluca Frijia (University of Ferrara, Department of Physics and Earth Sciences), Alexis Godet (University of Texas at San Antonio, Department of Earth and Planetary Sciences), and Brahimsamba Bomou (Université de Lausanne, Institut des Sciences de la Terre (ISTE))

Shallow-marine carbonate-producing ecosystems represent unique windows on the geological past of our planet. They constitute excellent archives of the response of neritic biocalcifiers to severe perturbations of the geochemical cycles during the Mesozoic. Furthermore, they host a valuable record of carbonate-associated proxies of past ocean conditions due to their sensitivity to environmental parameters such as sea level, water temperature, chemistry and turbidity, nutrient and oxygen levels. During the last forty years, research efforts correlated Oceanic Anoxic Events that affected oceans worldwide and resulted in the deposition of organic-rich series in basins, to major biotic turnovers in carbonate platforms. However more discrete crises affected the carbonate platform during the Mesozoic which still need to be documented in detail.

We invite contributions that combine classic and cutting-edge methods in sedimentology, stratigraphy, geochemistry and associated subfields, to identify paleoenvironmental forcing mechanisms and quantify their impact on the evolution of Mesozoic carbonate platforms. Because shallow-marine carbonates are susceptible to be severely altered after their deposition, we also welcome contributions that will consider the impact of diagenetic alteration on the preservation of geochemical signals.

### 12.2. Special Session: The sedimentary role of calcareous green algae, from Paleozoic to modern

Convenors: Mardi McNeil (Queensland University of Technology, Brisbane, Australia), Juan Carlos Braga (Department of Stratigraphy and Palaeontology, University of Granada, Spain), and Jody Webster (School of Geosciences, The University of Sydney, Australia)

Calcareous green algae are important carbonate producers in modern low-latitude, shallow-water marine environments. They contribute significant amounts of carbonate either as fine-grained carbonate particles resulting from the decay of their aragonite skeletons or as sand- to pebble-sized skeletal pieces, which can be dispersed in the sediment or concentrate as biostromes and bioherms.

Similar carbonates related to calcareous green algae are known since the Late Paleozoic, when phylloid and other enigmatic algae together with dasycladaleans formed extensive deposits. Dasycladaleans continued to be noteworthy components of carbonate rocks until the Early Cenozoic. Halimedaceans are by far the major carbonate producers among green algae in the modern ocean. Members of the family such as *Udotea* and *Penicillus* are unidentifiable in the fossil record while *Halimeda* beds and bioherms occur sporadically mainly since the Miocene, with an extensive modern example of *Halimeda* bioherms occurring in Australia's Great Barrier Reef.

In the last decades, advances on the knowledge of calcareous green algae ecology, sedimentology and stratigraphy, morphology, biogeochemistry and geological record have improved the general understanding of the sedimentary role of the group. This session provides a forum for researchers on modern and fossil calcareous green algae to come together and share perspectives with the community. We welcome contributions from across the spectrum of spatial and temporal scales and from related sub-disciplines.

### 12.3. Special Session: The stratigraphic record of paleoenvironmental variation in epeiric basins

Convenors: Miquel Poyatos-Moré (Universitat Autònoma de Barcelona, Spain), Orsolya Sztanó (Eötvös Loránd University, Hungary), Ernesto Schwarz (Universidad Nacional de La Plata-CONICET, Argentina), Chelsea Pederson (University of Southern Mississippi, USA), and Mariano Ramirez (George Mason University, USA)

Epeiric seas are sea-water masses which extend over continental platforms. They have formed through Earth's history in multiple tectonic and climatic settings, with their deposits being relatively well preserved in the rock record. Modern examples include the Persian Gulf, the Marmara and Baltic seas, or the Hudson Bay, and ancient examples include the Western Interior Seaway, the Paratethys Sea, or the Iberian Basin. Epeiric sea basins are prone to periods of partial or total disconnection from larger oceans and thus to global eustasy and marine water composition. This makes them sensitive systems to local tectonics, salinity, oxygenation, and climatic fluctuations, and therefore excellent laboratories to study how changing conditions in receiving basins influence biogenic and sedimentation patterns. In order to gain a holistic understanding of the dynamics in these restricted seas (e.g., regional hydrography, ocean connections, sediment-distribution processes and pathways, sea-floor oxygenation, etc.), integration of multiple proxies is required, including (but not limited to) structural, sedimentary, ichnological, and geochemical studies.

This session invites contributions of studies on sedimentary successions from epeiric or restricted seas, either from the rock record or modern examples, from multiple climate or tectonic settings, and either focused on the sedimentological, ichnological, or geochemical record of such successions, or with a more multidisciplinary approach. Early Career Scientists are particularly encouraged to submit and present their work.

#### **12.4. Special Session: Tephra and cryptotephra layer detection and identification through multi-proxy data integration**

Convenors: Christian Laag (Université Paris Cité, Institut de Physique du Globe de Paris, CNRS, Paris, France), Yohan Guyodo (Université Paris Cité, Institut de Physique du Globe de Paris, CNRS, Paris, France), Stoil Chapkanski (University of Paris 1, Panthéon-Sorbonne, Laboratory of Physical Geography (LGP), Paris, France) and France Lagroix (Université Paris Cité, Institut de Physique du Globe de Paris, CNRS, Paris, France)

Studies presenting data of various physical properties (e.g., magnetism, colorimetry, granulometry, mid-infrared-spectrometry and geochemistry) demonstrate the ability to detect and/or identify (crypto)tephra layers preserved in marine and lacustrine sediment archives and also terrestrial one such as loess-paleosol sequences and cave deposits. One can characterize the mineral composition, grain size and degree of alteration, an important factor affecting tephra material in terrestrial environments, by one or several of the above mentioned proxy data types. Integrated multi-proxy data increases the potential of detecting cryptotephra layers and identifying source volcanic eruption.

Tephra layers are important stratigraphic markers and chronological tools. Determining a geochronology in terrestrial loess and paleosol sequences beyond the limit of radiocarbon and luminescence dating is challenging. Tephrochronology can help overcome this challenge despite enhanced glass shard weathering characteristic of terrestrial environments. Recent developments with molecular-based analytical techniques sensitive to both crystallized and amorphous compounds, such as the Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR-FTIRS), can help characterize weathering remains in tephra material and multivariate statistics of mid-infrared spectra may allow the discrimination between different (crypto)tephra layers.

In this session, we invite studies targeting tephra detection and tephra discrimination in Quaternary paleoenvironmental archives. The use of various analytical methods and the development of new and innovating means to identify tephra material in sedimentary records are welcome.

#### **12.5. Special Session: Paleoclimate and paleoenvironmental changes in shallow-marine seas**

Convenors: Romain Vaucher (Institute of Earth Sciences (ISTE), University of Lausanne, Geopolis, Switzerland), Amy I. Hsieh (Department of Earth Sciences, Simon Fraser University, Burnaby, Canada), Barbora Krizova (Department of Physics and Earth Sciences, University of Ferrara, Italy), Christian Zeeden (LIAG—Leibniz Institute for Applied Geophysics, Geozentrum Hannover, Germany) and Shahin E. Dashtgard (Department of Earth Sciences, Simon Fraser University, Burnaby, Canada)

The shallow-marine realm (i.e., beach to shelf) is directly affected by short- and long-term climatic fluctuations and sea level change on glacial-interglacial time scales. Climate fluctuations also drive changes in extreme weather events (e.g., tropical cyclones and floods). Traditionally, shallow-marine sedimentary strata are considered to preserve low-resolution archives of paleoclimate and paleoenvironment records because of their presumed temporal incompleteness. However, shallow-marine strata preserve high-resolution records of climate and environmental changes in sedimentary basins with high sediment accumulation rates. In this session, we invite contributions focused on reconstructing Earth's past climate and environmental conditions using shallow-marine strata as archives. Presentations may include but are not limited to field, borehole, laboratory, and modeling data dealing with clastic, carbonate, and/or mixed systems. We particularly invite early-career scientists to deliver oral presentations.

#### **12.6. Special Session: Paleosols as valuable records of terrestrial climate and environments**

Convenors: Goran Durn (University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Zagreb, Croatia), Andrea Mindszenty (Eötvös Loránd University, Budapest, Hungary) and Franz Ottner (BOKU – University of Natural Resources and Life Sciences, Vienna, Austria)

The importance of geochemical, mineralogical, and micromorphological (GMM) studies for paleoenvironmental interpretation of paleosols in a variety of sedimentary settings is well recognized and can provide a high-resolution proxy for paleoclimate and landscape dynamics. Past climate changes have had a significant impact on the biogeochemical cycles, mineralogy, and micromorphological characteristics of paleosols. Paleoclimate signals in paleosols may also be complicated by diagenetic overprinting. We therefore welcome presentations

that address GMM aspects in paleosols as indicators of changes in paleoclimate and paleolandscape as well as multidisciplinary studies of paleosols that examine weathering processes/erosion and paleosol formation at regional unconformities. Presentations addressing modern soil analogs of ancient climatic conditions are also welcome.

### **12.7. Special Session: IGCP739: The Mesozoic-Paleogene hyperthermal events**

Convenors: Xiumian Hu (Nanjing University, Nanjing, China), David Kemp (China University of Geosciences, Wuhan, China), Micha Ruhl (The University of Dublin, Dublin, Ireland), Santanu Banerjee (Indian Institute of Technology, Powai, India), Ismail Yilmaz (Middle East Technical University, Ankara, Turkey), Ying Cui (Montclair State University, Montclair, USA)

Climate states have been alternating on variable timescales between Hothouse, Warmhouse, Coolhouse and Icehouse through the Earth history. Among them, the extreme global warming episodes, known as hyperthermal events, are often short-lived and widely documented in the sedimentary records of the Mesozoic-Paleogene interval, e.g., End-Permian mass extinction, Carnian Pluvial Event, End-Triassic mass extinction, Toarcian and Cretaceous Oceanic Anoxic Events and Paleocene–Eocene Thermal Maximum. These climate extremes have been linked to the massive and rapid release of greenhouse gases into the ocean-atmosphere system, and share common features in major environmental, paleoecological and biotic turnovers. As such, they can potentially serve as analogues for anthropogenic climate change and associated environmental changes. Nonetheless, the driving mechanisms, responses and feedback of the Earth's climate system across these deep time hyperthermals are heavily debated. The goal of this special session is to highlight recent research advances on Mesozoic-Paleogene hyperthermal events. We welcome contributions comprising interdisciplinary approaches (sedimentological, paleontological, geochemical, and numerical modelling) and comparative studies of both marine and terrestrial environments across these hyperthermals.

### **13.1. Special Session: Plastic particles as anthropogenic grains in the current and future stratigraphic record**

Convenors: Sarah Gabbot (University of Leicester) and Patricia Corcoran (The University of Western Ontario)

The compositions and textures, transport and depositional mechanisms, and degradation of plastic grains found in sedimentary environments allow for a clearer understanding of climatic, surficial, and human influences through modern geologic time. Like natural sedimentary grains, plastic debris particles are affected by Earth's surficial processes, although their low density, composition and various shapes can lead to unique behaviours in aquatic and terrestrial settings, such as during atmospheric transport, settling, and resuspension. Plastic grains have been identified in sediment cores, grab samples, and even in consolidated sedimentary deposits, such as those referred to as plastiglomerate and technofossils. In addition, sampling, processing and analyzing sediment containing plastic grains, including microplastics (< 5mm), often follows similar procedures used for natural sedimentary deposits. With this special session, we invite contributions that provide novel and insightful data concerning the behaviour of plastic particles in sedimentary environments, as well as presentations that demonstrate how techniques developed for sedimentary investigations are applied to the study of microplastics pollution. This session will appeal to sedimentologists, environmental scientists, and material scientists, and will bring academics together to network and share best practices in the field of anthropogenic debris research.

### **13.2. Special Session: Controlling factors of sediment generation in source to sink studies**

Convenors: Guido Pastore and Muhammad Usman (Laboratory for Provenance Studies, Department of Earth and Environmental Sciences, University of Milano-Bicocca, Milano, Italy)

Throughout sediment routing systems, a series of chemical, physical and transport-dynamic processes modify the pristine sediment composition. Sediment generation (erosion, transport and accumulation) studies allow for a better understanding of the interplay between external forcing factors, such as climate and tectonics, and internal factors, such as proto-source lithology to better characterize the sedimentary history from source to sink. Recent developments in analytical techniques support the crucial role of modifications during sediment transport and storage on sediment composition. Future studies characterizing sediments should, therefore,

explicitly consider possible modifications of sediment composition for a more robust understanding of sedimentary systems. The scope of this session is not only to present sedimentary provenance studies, sustained with robust mineralogical/geochemical/isotopic datasets and valuable statistical and modelling interpretations, but also to emphasize the processes controlling compositional modifications. Conceptual approaches and analytical techniques that aim to link sediment compositions to their respective source rocks need a renewed discussion in the sedimentology community. Aspects that deserve explicit consideration are: isotopic and geochemical provenance proxies, weathering of mineral phases in different climates, physical grain sorting due to density and shape during transport, and selective diagenetic dissolution. These often mask the original sedimentary signal, complicating our understanding of the overall sedimentary system. We encourage contributions on I) single grain analysis for source identification, II) multi-technique provenance analysis, III) physical and chemical alteration studies along transport and during diagenesis, IV) sorting and concentration effects of minerals during transport, V) study of sedimentary basins for Quantitative Provenance Analysis, sediment budget and mass balance of modern and ancient routing systems, IV) advances in investigatory techniques (e.g. refined microscale analysis or renewed statistical and modelling approaches).

### 13.3. Special Session: Quantitative study for source-to-sink system

Convenors: Guodong Wang, Yongqiang Qu, Duonian Xu and Lisha Yang (Research institute of petroleum exploration & development-Northwest (NWGI), PetroChina, Lanzhou, China)

The study of "source-to-sink" system is now a hot spot in the interdisciplinary research of basin-orogen dynamics sedimentology, geography and geomorphology. Although great success has gained after 20 years' research on source-to-sink system of all aspects, the theories and ideas still need to be deepened and improved in basins with different evolutionary processes and types and different time scales. Quantitative study is the key to the in-depth study of the source-to-sink analysis. Through the observation of the modern lake basins from source to sink, the modern source-to-sink parameter database by using high-resolution remote sensing data can be established for the physical and numerical simulation to innovate new methods and technologies for multidisciplinary integration of source-to-sink analysis. Finally, the quantitative source-to-sink system mapping can be achieved, and the quantitative source-to-sink system model can be established. Quantitative study for source-to-sink appears to be at the forefront of a new revolution in research and application. It is hoped that this meeting will provide a prelude to this revolution

### 13.4. Special Session: From river catchments to the deep sea: case studies, applications, state of the art and new frontiers of source-to-sink research

Convenors: Alessandro Amorosi (Biological, Geological and Environmental Department, University of Bologna, Italy), Michael D. Blum (University of Kansas, USA), Piret Plink-Björklund (Colorado School of Mines, USA), Luigi Bruno (Dipartimento di Scienze Chimiche e Geologiche, University of Modena and Reggio Emilia, Italy), Bruno Campo (Biological, Geological and Environmental Department, University of Bologna, Italy), and Claudio Pellegrini (Institute of Marine Sciences, Cnr, Italy)

The linkage between onshore to offshore segments, from river catchments to the deep oceans via coastal plains and shelves, is fundamental to unravel the complexity of Sediment Routing Systems (SRSs). Through basin analysis, landscape evolution and multiscale stratigraphic reconstructions, source-to-sink studies aim to quantify sediment generation, transfer, storage, and redistribution on a variety of timescales. The impact of several factors, including human activities and climate changes, can also be assessed by the study of SRSs.

This session aims to discuss the state of the art in source-to-sink analysis in siliciclastic and mixed siliciclastic-carbonate realms on a variety of time scales (from the ancient geological record to the Anthropocene), with a focus on future developments and their potential applications within the context of past, present, and future climate change. We invite presentations from stratigraphers and sedimentary geologists, experimentalists, and numerical modelers that contribute to the advancement of our understanding of SRSs, both in modern and ancient depositional settings.

We particularly welcome comprehensive and interdisciplinary approaches that point to novel concepts of generic significance that enhance the holistic comprehension of: (i) assessment of sediment provenance through compositional characterization of sediments; (ii) dispersal pathways for organic and inorganic detritus; (iii) calculation of sediment volumes delivered to a basin; (iv) sediment-budget calculations reconstructed through geomorphological analyses; (v) processes and mechanisms of sediment production, routing and accumulation; (vi) evolution of sedimentary basins in response to changes in sediment supply and accommodation; (vii)

applications to natural resource exploration and exploitation, landscape management, and the social and/or economic impact of source-to-sink investigations.

#### **14.1. Special Session: Intramountain basins – recorders of tectonics, climate, and biota interactions**

Convenors: Nevena Andrić-Tomašević (Institute of Applied Geosciences, Karlsruhe Institute of Technology, Germany), Oleg Mandić (Geological-Paleontological Department, Natural History Museum Vienna, Austria), and Marijan Kovačić (Department of Geology, University of Zagreb, Faculty of Sciences, Croatia)

Intramountain basins are an integral part of the mountain ranges. Therefore, they are important recorders of deformation, erosion, syntectonic deposition, magmatic events, variations in biodiversity, and local and regional climatic evolution. Consequently, their sedimentary succession provides an insight into links, interactions, and feedback between tectonics, climate, and biota.

This session aims to assemble research efforts focusing on the dynamics and evolution of the intermountain basins at various temporal and spatial scales, and the “inversion” of their sedimentary record to reconstruct climatic, tectonic and/or biotic evolution/interaction. We invite contributions from the broad field of earth sciences based on field observations, numerical and experimental work.

#### **15.1. Special Session: Seismo-sedimentological characterization of 3D seismic data**

Convenors: Alan Vranjković (INA Exploration, Oil Industry, Croatia) and Camille Cosson (Aspen Technology Inc., USA)

3D prestack and poststack seismic data holds crucial information necessary for unlocking hydrocarbon exploration and development potential, especially in stratigraphic type of HC trapping. Basin depositional environment evolution through 3D seismic attribute analysis can be used to identify lateral and vertical sedimentary facies distribution. Sedimentary analysis from core data through wireline logs is upscaled to 3D seismic data enabling seismo-sedimentological characterization of the subsurface. Extracted 3D seismic data geobodies in seismo-geological interpretation, calibrated with well data gives better understanding of key petroleum system elements distribution – source rocks, reservoir rocks and seal rocks. Seismo-sedimentological characterization which links core and 3D seismic data will play important role in future exploration of brown field basins. Towards seismo-sedimentary geobody atlas of depositional facies recorded in 3D seismic data, presented session will try to start this project on the wider exploration level.

#### **16.1. Special Session: Beyond dating: frontiers of luminescence as a sedimentological proxy**

Convenors: Gloria I. López (Colombian Geological Society, Colombia, & Associate Scientist, Recanati Institute for Maritime Studies – RIMS, University of Haifa, Israel,) and Sebastien Huot (Luminescence Dating & Gamma Spectrometry Laboratories, Illinois State University, Champaign IL, USA,)

Since its invention in 1985, Optically Stimulated Luminescence (OSL) rapidly became a valuable alternative to date sedimentary environments beyond the classical Radiocarbon Dating or heated materials beyond its older counterpart, Thermo-Luminescence (TL) Dating. The abundance of both quartz and feldspar mineral grains not only opened up an array of dating possibilities in terms of sediment, rock, or material types, but also at the grain size level. Its inception as a dating method relies on physico-chemical characteristics intrinsic to quartz and/or feldspar grains and their ability to interact with naturally occurring processes such as ionizing radiation, sunlight, or heat. The efficiency of these two natural chronometers depends on several factors such as the quality and provenance of the mineral grain, the length of exposure to the sedimentary cycle (erosion – transport – deposition), the type of surface processes involved in the cycle, the degree of reworking and geo/bioturbation during burial, and the effectiveness of bleaching during exposure to natural sunlight or heating event... not forgetting, alas, the degree of anthropogenic influence, if any.

Instrument developments, including the Portable OSL Reader (P-OSL), and relatively recent methodological advances at both the measurement and analytical levels have not only helped improve and refine luminescence dating but also enhance the understanding of the luminescence signal transforming its application beyond a simple dating method. Nowadays OSL and TL signal values may be used as sedimentological proxies for a variety of processes namely transport, provenance, degree of sedimentary chaos or turbulence, textural maturity, mineralogy, etc. Moreover, P-OSL signals provide additional valuable insights on sedimentation rates, sedimentary facies, besides the overall picture of the continuity of any stratigraphic sequence or depositional pattern.

This session invites submissions focused on novel applications, methodologies using OSL, TL and/or P-OSL in a variety of environments, sediments or rocks as sedimentological proxies. Submissions on non-traditional viewing

and/or analysis of values, novel modelling and statistical approaches aimed at refining sedimentological chronologies, large sets of data or chrono-stratigraphies are also welcome.

#### **17.1. Special Session: Open Science: data, software, knowledge, and education**

Convenors: Anne Bernhardt (Freie Universität Berlin, Germany), Alisa Martek (National and University Library in Zagreb, Croatia), Aurélia Privat (University of Leeds, UK), Romain Vaucher (University of Lausanne, Switzerland) and Valentin Zuchuat (RWTH Aachen, Germany)

Open Science in academia implies that everything produced by researchers or teachers should be freely accessible to all. Despite a strong push towards Open Science practice in academia and beyond, many financial barriers and lack of Equity, Diversity and Inclusivity (EDI) in academia persist and contribute to major inequalities in access to global scientific knowledge, data, software, and education.

In the digital era where we evolve professionally, making these resources available around the world is easier than it was in the past, and more and more institutions commit to support Open Science. In addition, the world of publishing is undergoing radical changes. Promoting knowledge and science communication is crucial for our society and is a pivotal tool for decision-making by policymakers and stakeholders, as well as citizens who legitimately must have access to publicly-funded research.

In this session, we invite all types of contributions that promote and develop the Open Access to science for all, including the use of Open Science practices (i.e. Open Data and open-source softwares), sustainable and participative community-driven initiatives supporting EDI, transparency, and openness in research, and fostering the broad dissemination of scientific knowledge related to the Earth System. Early Career Scientists are warmly welcome to showcase their work, and we encourage them to apply for oral presentations.

#### **17.2. Special Session: Sedimentary geology education: reaching out to Generation Z and beyond**

#### **17.3. Special Session: Sedimentology and geotourism**

#### **17.4. Special Session: Sedimentology and archaeology**