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Mabrouk Boughdiri · Beatriz Bádenas · Paul Selden
Etienne Jaillard · Peter Bengtson · Bruno R. C. Granier *Editors*

Paleobiodiversity and Tectono-Sedimentary Records in the Mediterranean Tethys and Related Eastern Areas

Proceedings of the 1st Springer Conference of the
Arabian Journal of Geosciences (CAJG-1), Tunisia 2018

Advances in Science, Technology & Innovation

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Preface

The Austrian geologist Eduard Suess (1831–1914) considered the Tethys Ocean as connecting eastern and southern Asia with the Middle East and Europe through the Himalayas. It persisted from mid-Permian and vanished in the Paleocene and was an epicontinental sea, transgressed and regressed frequently, covering northern India to southern Siberia, from the present Pacific coastal area to Italy. At least since the earliest Mesozoic, the Tethys and its shallow marine margins occupied dominant surfaces of the Earth. Their evolution implies major events in the history of our planet as the Tethys represented, mainly, one of the most important components of the global climatic system. Through times, organisms adapted to resistant or precarious ecosystems and their diversity are preserved within various sedimentary rocks now incorporated into mountain ranges issued from the Tethys. Paleontological and sedimentological studies supporting paleogeographic and paleoclimatic reconstructions are continuously evidencing various key events of the Tethys and Earth history. Paleobiogeographic distributions, determined by multiple geographically disparate samples spanning their time range, allow precise bio-stratigraphy and long-distance interregional correlations. Considerations of various sedimentary facies analyses and depositional environment reconstructions are required for paleogeographic interpretations and cross-checking interactions between the paleoenvironment components and possible mitigating discrepancies. Much of the evidence for the Tethys history of environmental change has been derived from detailed geological observations across North Africa and the Middle East, across Europe, and central and eastern Asia. Still, more findings can be gleaned from drilling into the sedimentary archives beneath the present day oceans.

This proceedings volume is based on the best papers accepted for presentation during the 1st Springer Conference of the Arabian Journal of Geosciences (CAJG-1), Tunisia 2018. The book offers new paleontological, biostratigraphic, and sedimentological studies by experienced researchers mainly from research institutes in the Mediterranean and Middle East region. Main topics include: palaeontology, biostratigraphy, sedimentology, paleoclimatology, and geomorphology. This volume gives new insights into paleobiodiversity and major biological tools for biostratigraphy, patterns, mechanisms, and processes of Meso-Cenozoic sedimentation in the Mediterranean and Middle East. Included are case studies which particularly highlight the major controlling factors of Tethyan biosphere-geosphere interactions as inferred from the Mediterranean and Middle East regions.

Amilcar, Tunisia
Zaragoza, Spain
Lawrence, USA
Grenoble, France
Heidelberg, Germany
Brest, France
July 2018

Mabrouk Boughdiri
Beatriz Bádenas
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About the 1st Springer Conference of the Arabian Journal of Geosciences (CAJG-1), Tunisia 2018



The *Arabian Journal of Geosciences (AJG)* is a Springer journal publishing original articles on the entire range of Earth sciences in partnership with the Saudi Society for Geosciences. The journal focuses on, but not limited to, research themes which have regional significance to the Middle East, the Euro-Mediterranean, Africa, and Asia. The journal receives on average 2000 submissions a year and accepts around 500 papers for publication in its 24 annual issues (acceptance rate 25%). It enjoys the participation of an editorial team of 100 international associate editors who generously help in evaluating and selecting the best papers.

In 2008, Prof. Abdullah Al-Amri, in close partnership with Springer, founded the Arabian Journal of Geosciences (AJGS). In this year, the journal celebrates its tenth anniversary. On this occasion and to mark this event, the Founder and Editor-in-Chief of the AJGS Prof. Al-Amri organized in close collaboration with Springer the 1st Conference of the Arabian Journal of Geosciences (1st CAJG) in Hammamet, Tunisia, from November 12 to 15, 2018 (www.cajg.org).

The conference was an occasion to endorse the journal's long-held reputation for bringing together leading authors from the Middle East, the Euro-Mediterranean, Africa, and Asia who work in the wide-ranging fields of Earth sciences. The conference covered all cross-cutting themes of Geosciences and focused principally on the following ten tracks:

- Track 1. Climate, paleoclimate and paleoenvironmental changes
- Track 2. Geoinformatics, remote sensing, geodesy
- Track 3. Geoenvironmental engineering, geomechanics and geotechnics, geohazards
- Track 4. Geography, geoecology, geoarcheology, geotourism
- Track 5. Geophysics, seismology
- Track 6. Hydrology, hydrogeology, hydrochemistry
- Track 7. Mineralogy, geochemistry, petrology and volcanology
- Track 8. Petroleum engineering and petroleum geochemistry
- Track 9. Sedimentology, stratigraphy, palaeontology, geomorphology, pedology
- Track 10. Structural/petroleum/mining geology, geodynamics, marine geology

The dynamic four-day conference provided more than 450 attendees with opportunities to share their latest unpublished findings and learn the newest geoscience studies. The event also allowed attendees to meet and discuss with the journal's editors and reviewers.

More than 950 short contributing papers to the conference were submitted by authors from more than 70 countries. After a pre-conference peer review process by more than 500 reviewers, 700 papers were accepted. These papers were published as chapters in the conference proceedings by Springer.

The conference proceedings consist of ten edited volumes, each edited by the following group of *Arabian Journal of Geosciences* (AJGS) editors and other guest editors:

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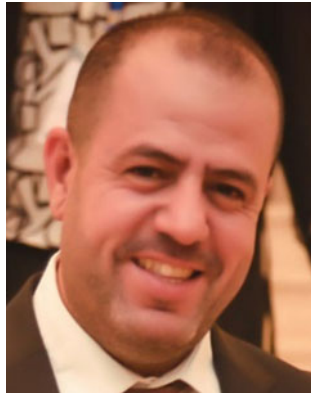
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Part I
Keynote

Phanerozoic Global Sea-Level Changes: Evidences from Tunisia Illustrating how Eduard Suess' Concepts (Gondwana, Tethys, Eustasy) are Still Relevant

Mohamed Soussi

Abstract

This key note is given in honor of the Austrian geologist Eduard Suess, born in London, August 20, 1831 and died in Vienna in April 26, 1914. It aims to illustrate, using some key selected stratigraphic intervals from the Tunisian geological archive, **how Edward Suess's concepts are still relevant** and is also planned to briefly introduce the most important features of the Geology of Tunisia for the guests of the CAJG Conference, November 2018)

This key note is given in honor of the Austrian geologist Eduard Suess, born in London, August 20, 1831 and died in Vienna in April 26, 1914. It aims to illustrate, using some key selected stratigraphic intervals from the Tunisian geological archive, **how Edward Suess's concepts are still relevant** and is also planned to briefly introduce the most important features of the Geology of Tunisia for the guests of the CAJG Conference, November 2018). Some of these features are in relation with the Gondwanan super continent development and fragmentation while other are connected to the Tethyan Ocean developed between the Gondwana to the south and Eurasia to the north during the Mesozoic before the onset of its closure during the Cenozoic.

Indeed, it will be shown progressively during the presentation that the major events that accompanied the history of the Geology of Tunisia fit perfectly the line of thoughts that Eduard Suess had at the end of the nineteenth century

especially about the role played by sea level fluctuations in the build of the stratigraphic archive. This conference also brings additional arguments to his theory which continues to impact our kind of reasoning, even if this conveys new modern terms created to explain more the process controlling the global Earth's dynamics especially the global plate tectonics and the eustatic movement theories. Among the concepts and ideas, proposed for the first time by this imminent "geoscientist", based on his exploration and geological investigations of distant regions of the world, some are retained for the purpose of our conference:

- (1) The hypothesis of the existence, 500 million years ago, of an ancient supercontinent named Gondwana or Gondwanaland (Eduard Suess 1885). This "megacontinent" eventually split into several continents which are Africa, South America, Australia, Antarctica, the Indian subcontinent and the Arabian Peninsula.
- (2) The hypothesis of the existence of an inland sea designated the "Tethys" (with reference to the Greek Goddess of the Sea) situated between Gondwana to the South and Laurasia to the North (Eduard Suess 1893).
- (3) the creation of the term Eustasy, (Edward Suess, in 1988, translated and published in English in 1906) to describe the rises and falls of sea level (eustatic movements) as a major factors controlling the development of transgressive and regressive events correlatable worldwide.

The above three concepts among other important ideas, mainly related to tectonics (genesis of the Alps and the introduction of the concept of the east African rift fracture in 1881, etc....) have been detailed in his famous and monumental, three volume treaty entitled "*The Face of the Earth*" (1885–1909) just before Wegener's Continental drift theory presented in 1912 and also the establishment of the theory of plate tectonic in the 1960s which greatly changed the line of thinking of geologists about the dynamic evolution of the Planet.

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