

2015-2019 renewal application of the ILP Task Force 6 on Sedimentary Basins

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1. Objectives

The main objectives of the ILP Task Force on Sedimentary Basins are:

- to assist the international community of Earth Scientists involved in the study of asthenospheric and deep lithospheric/crustal processes to exchange views with colleagues involved in the study of sedimentary basins, and to promote collaborative projects integrating surface and deep processes for regional case studies;
- to promote regular meetings involving colleagues from universities, research institutes as well as the industry;
- to provide support for young scientists (PhD and post-docs) to participate in the activities of this international network.

These objectives have been addressed successfully during the last 10 years under the leadership of Francois Roure and Magdalena Scheck-Wenderoth by means of yearly international workshops dedicated to specific topics, rotating from one continent to the other, and to the organization of special sessions at EGU in Vienna and other international conferences in Europe. This has been done in order to keep the network attractive for any participant, even if they could not attend other more specific Task Force meetings across the Atlantic and in other continents.

The new leadership of Liviu Matenco and Fadi Henri Nader intends to benefit and continue this successful activity under the same main objectives. This is realized by a gradual transition in which the former and future leaderships are involved in the organisation of common activities during 2015, such as the dedicated EGU session on sedimentary basins or the upcoming ILP Sedimentary task force 6 meeting in Tokyo, Japan.

2. Scientific focus

The focus of the Task Force 6 activities is to foster collaborations between academia, research institutes and/or industry in all domains relevant for the understanding of sedimentary basins, from regional to nano-scale, from the deep earth to near surface processes.

In this activity, it is important to develop and validate novel concepts of sedimentary basin evolution and topography building by incorporating geological/geophysical datasets and methodologies applied to worldwide natural laboratories. We aim to understand and predict the processes that control the formation and evolution of the coupled orogens and sedimentary basins system through integration of field studies, analytical techniques and numerical/analogue modelling.

This scientific focus is welcoming integrative collaborative research achieved by a wide range of approaches. We aim to promote research in the domain of sedimentary basins evolution and quantitative tectonics for the study of mountain building and the subsequent

extensional collapse, and their quantitative implications for vertical motions on different temporal and spatial scales. The implications of tectonics on basin fluids (rock-fluid interactions and flow) are important to understand and predict geo-resources. Important are initiate innovative research lines in linking the evolution of sedimentary systems by integrating cross-disciplinary expertise with a focus on integrated sedimentary basins and orogenic evolution. The key is to strengthen the synergy between academic research and applied industry in large (inter)national interdisciplinary research networks able to tackle complex problems at integrated system level. We aim to be involved in creating a stimulating and motivating scientific environment for PhDs and post-doctoral fellows in collaboration with industry and research institutes.

Tectonic, surface and external forcing processes are responsible for the growth and decay of continental topography and sedimentary basins, i.e. the interplay between sediment supply and mass (re)distribution with the full range of deep Earth to surface processes. These are important to assess the impact of tectonics and sediment distribution in highly populated areas, affected by flooding events, regional landslides and active seismicity. The mechanisms that link exhumation, formation of topography, sedimentation and the evolution of geo-fluids are poorly understood because of a lack of insight into the variability of the rates and scales of the underlying processes. Important is to explore the dynamics of these processes by quantifying the link between tectonics and sedimentation with a multi-scale approach that combines field and laboratory studies, and basin-wide observations with process-oriented modelling and its feedback to original observations. This will provide new opportunities to analyse and quantify the interplay between deep Earth and surface processes in sedimentary basins, critical for understanding geo-resources and natural hazards.

By fostering the collaboration with the industry and research institutes, the Task Force is already involved in promoting a significant number of dedicated geo-resources projects, such as in the field of geo-fluids, geothermal energy or conventional/unconventional geo-resources. Such initiatives will place the Task Force in a unique position for quantifying geo-resources related processes and provide their novel understanding. A key step in achieving this objective will be to integrate observations in natural laboratories, fluid-rock-interaction and coupled fluid/mass transport, with scale modelling work on orogenic and basin-scale deformation, and with process-oriented modelling.

3. Implication of students and young scientists

We try to keep registration prices for our yearly international workshops as low as possible for students and participants from the universities. Further support to the students is provided in the form of travel grants, up to the maximum limit allowed to keep our budget balanced.

4. Links between Industry and Academia

The format of our meetings is excellent to stimulate the interactions between Industry and Academia, and initiate new collaborative work between new comers. Although ILP seed funding would not be sufficient to support alone the cost of the venues and expenses related to the invitation of key note speakers, we have up to now benefited from enough,

although not regular, sponsorship from the industry, thus helping to maintain the registration prices at a reasonable level. This is already available for the 2015 Tokyo meeting.

5. Road map proposed for 2015-2019

The previous 5 years of the Task Force were outstandingly successful and we intend to benefit by building on this success and extend the activities of Task Force 6 on Sedimentary Basins for another period of 5 years, i.e., for 2015 to 2019. We aim to continue securing interactions between the participating teams and industry by the yearly dedicated seminars of the Task Force in the same 3 days format of indoor presentations linked with a 2-days field-trip. The expected impact of such meeting is already proved by the high interest of the applied research and industry in the October 2015 Tokyo meeting, where the local organizers have already secured a significant amount of sponsorships.

Because of IUGS/IUGG commitments, the ILP task Force on Sedimentary Basin has global significance, we propose to keep the same policies of previous 2010-2014 yearly international workshops, i.e., to move alternatively from the western to the eastern hemisphere, and from the northern to the southern hemisphere. It is expected that participating members from different continents will still help to organize future meetings in various parts of the World. It is intended that the meetings will address general topics especially relevant for the area where the meeting takes place, and accompanying field trips can provide specific insights. We continue our involvement in the EGU annual convention in Vienna as proven by the dedicated session of the Task Force organized during 2015.

List of topics and (tentative) meetings to be scheduled in the next 5 years

2015

Following past successful meetings in Paris (2005), Quebec (2006), Morocco (2007), Ensenada, Baja California (2009), Abu Dhabi (2010), Tirana (2011), Brisbane (2012), and Marseille (2013), the 10th workshop of the International Lithosphere Programme (ILP) Task Force on Sedimentary Basins will be held in Tokyo, Japan, from 5-9 October 2015. The conference will take place in Tokyo (Shinagawa district) at Daiichi Tokyo Hotel Seafort from 5-7 October, followed by a 2-day post-conference field trip to the Izu arc-arc collision zone from 8-9 October. The meeting is organized by Hiroshi Sato and Tatsuya Ishiyama, from the Earthquake Research Institute at the University of Tokyo.

The theme of the conference will be focused, although not exclusively, on subduction that modifies the overriding plate by fractionation, accretion, and tectonic deformation including orogeny, back-arc spreading, basin formation, or intraplate shear-zone initiation. Contributions linking deep and shallow processes in sedimentary basins from subduction environments and related analogues. The ILP Task Force workshop will promote dialogue among researchers studying basin fill and fluid flow, those investigating deeper basin structure, and those developing numerical and analogue models of basin processes. A large number of contributions were received, that analyse the structure and physical properties of basins as well as the underlying crust and mantle, and also contributions that examine interactions between deep earth and surface processes and the implications of these interactions for basin dynamics.

The key topics of the meeting are a) subduction dynamics: forearc to backarc; b) active tectonics from shallow to deep; c) sedimentary basins from observation to modelling; d) sedimentary and petroleum systems; e) East, SE Asia geology. A number of top scientists will present their key invited contributions, Evgenii Burov (Université Pierre et Marie Curie, Paris, France), Christian Gorini (Université Pierre et Marie Curie, Paris, France); Frédéric Gueydan (Université Montpellier 2, Montpellier, France); Bilal Haq (NSF, Washington DC, US and Université Pierre et Marie Curie, Paris, France); Tanio Ito (Teikyo Heisei Univ., Japan); Manuel Pubellier (CNRS Ecole Normale Supérieure, Paris, France) and Hiroshi Sato (ERI, University of Tokyo, Japan). The workshop has attracted a high interest from the industry, manifested in direct sponsorships which will be used in particular for young scientist travelling to Japan.

2016-2019

The four other meetings will be planned as a combination between coming back and strengthening the European collaborations and partnerships outside (order not yet decided), with the following objectives:

- Organize a meeting in the **Eastern Mediterranean**, most likely in **Cyprus**, in order to benefit from the huge scientific effort dedicated recently by the international Earth Sciences community on the understanding the Eastern Mediterranean sedimentary basins and related processes such as geo-fluids evolution. Possibly organized in 2017;
- Taking the opportunity of recent academia and industry interest in the structure and evolution of the **Dinarides-Hellenides** and related sedimentary basins we aim to organize a workshop in Central Europe, most likely in **Serbia or Croatia**, countries that have received recently significant attention from new opportunities and partnerships. Possibly organized in 2016;
- Have a workshop dedicated to the **SE Asia evolution**, most likely organized in **Malaysia** in collaboration with existing local academic partnerships and industry. The pre-requisite contacts are already in place, details will be established at a later time. Possibly organized in 2018;
- Organize for the first time a meeting in **South America**, hopefully in **Argentina**, in order to benefit from the huge scientific effort dedicated recently by the international Earth Sciences community on the South Atlantic margins, Andes and sub-Andean basins. Possibly organized in 2019.

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Birth year: 1967

1997 - PhD degree in Tectonics, VU University Amsterdam, The Netherlands (Thesis: "Tectonic evolution of the Outer Romanian Carpathians: Constraints from kinematic analysis and flexural modelling", promotor: prof. Sierd Cloetingh)

Research Interests and publications

Sedimentary basins formation and evolution; Orogenic structure and coupling with sedimentary basins; Lithosphere dynamics; Evolution of tectonic-driven sedimentary sequences; Source to Sink systems; Evolution of the Alps-Carpathians-Dinarides-Hellenides orogenic system.

Authorship of 75 publications in international refereed journals, 2 special thematic volumes of the international journals "Global and Planetary Change" and "Tectonophysics". (Co-)supervisor of 11 completed PhD theses. Hirsch (H-)index: 22 (ISI Web of Knowledge); 24 (Scopus)

Employment history

- 1991 - 2003 Assistant professor, Lecturer, Associate Professor, University of Bucharest, Faculty of Geology and Geophysics, Romania;
- 2003 - 2006 Researcher, VU University Amsterdam, Faculty of Earth and Life Sciences, The Netherlands.
- 2006 - 2011 Research Leader of the Royal Academy of Sciences and Arts of The Netherlands (Onderzoeker 1), VU University Amsterdam, Faculty of Earth and Life Sciences, The Netherlands.
- 2011 Associate Professor (UHD), VU University Amsterdam, The Netherlands.

Few important (inter)national activities and awards

- 2010 - present, Panel member and co-chair PE10 Earth System Science, European Research Council, ERC Starters and Consolidators Grants, ERC Starters.
- 2011 - present, Director Teaching committee Netherlands Research School of Sedimentary Geology
- 2006 - 2011 - Research Leader of the Royal Academy of Sciences and Arts of the Netherlands
- 2002 - Burgen Award of Academia Europaea;
- 1999 - "G.M. Murgoci" Geosciences award; Romanian Academy of Sciences

CURRICULUM VITAE

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Arabic (mother tongue)

French (fluent in both oral and written communications)

English (fluent in both oral and written communications)

Education

- 2015: Habilitation à diriger la Recherche (HDR): **Univeristé Pierre et Marie Curie, Paris VI, France.**
Thesis title: Multi-scale diagenesis and impacts on heterogeneity of reservoir rocks
- 2003: Ph.D. degree in Geology: **KU Leuven University, Belgium.**
– with a grant from **Lebanese National Council for Scientific Research (LNCSR).**
Thesis title: Petrographic and geochemical study of the Kesrouane Formation (Jurassic), Mount Lebanon: implications on dolomitization and petroleum geology.
- 1994/2000 B.Sc./M.Sc. degree in Geology: **American University of Beirut, Lebanon.**
Thesis title: Petrographic and chemical characterization of the Jurassic-Cretaceous carbonate sequence of the Nahr Ibrahim region, Lebanon.

Key qualifications

IFP Energies nouvelles: Since January 2, 2007 – (formerly: Institut Français du Pétrole, IFP), I work principally on diagenesis (fluid-rock interactions) and its impacts on reservoir properties at the plug-, reservoir- and basin-scales. In addition, I launched several new research projects on seismic interpretations and modelling of frontier basins: PhD projects of N. Hawie (2014), R. Ghalayini (2015), S. Bou Daher (2015), V. Symeou (2017), N. Papadimitriou (2017), L. Inati (2018). I am also involved in teaching sedimentology, stratigraphy and diagenesis of carbonate rocks.

Professional and academic affiliations

1. Fellow of the **Geological Society of London** since January 2004.
2. Active Member of the **AAPG** since January 2005. Launching an Student Chapter at AUB (2007). Co-editing the AAPG European Region Newsletter (2010/2011). Alternate Delegate since 2010.
3. Member of the **Société Géologique de France** since January 2008.
4. Co-Leader of Task VII (Sedimentary Basins) of the **International Lithosphere Program (ILP).**

Selected Publications (since 2012; total peer-reviewed publications: 32)

1. Bou Daher, S., Nader, F.H., Muller, C., and Littke, R. (2015). Geochemical and petrographic characterization of Campanian-Lower Maastrichtian calcareous petroleum source rocks of Hasbayya, South Lebanon. *Marine and Petroleum Geology*, 64, 304-323.
2. Peyravi, M., Rahimpour-Bonab, H., Nader, F.H., Kamali, M.R. (2015). Dolomitization and buriql history of lower Triassic carbonate reservoir-rocks in the Persian Gulf (Salman offshore field). *Carbonates and Evaporites*, 30 (1), 25-43.
3. Nader, F.H. (2014). *The Geology of Lebanon*. Scientific Press, 108p.
4. Nader, F.H. (2014). Insights into the Petroleum Prospectivity of Lebanon. In: Marlow, L., Kendall, C., and Yose, L. (eds): *Petroleum systems of the Tethyan region*. AAPG Memoir 106, 241-278.
5. Nader, F.H., De Boever, E., Gasparrini, M., Liberati, M., Dumont, C., Ceriani, A., Morad, S., Lerat, O., and Doligez, B. (2013). Quantification of diagenesis impact on reservoir properties of the Jurassic Arab D and C members (offshore, U.A.E.). *Geofluids*, 13, 204-220.
6. Nader, F.H., Lopez-Horgue, M.A., Shah, M.M., Dewit, J., Garcia, D., Swennen, R., Iriarte, E., Muchez, P., and Caline, B. (2012). The Ranero hydrothermal dolomites (Albian, Karrantza valley, northwest Spain): Implications on conceptual dolomite models. *Oil & Gas Science and Technology*, 67 (1), 9-29.