



# ALERT Geomaterials

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<http://alertgeomaterials.eu>

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## EDITORIAL

Dear ALERT members,

during the last ALERT Workshop in Aussois 2017 (almost one year ago!), the General Assembly elected 15 colleagues who will compose the new Board of Directors for the period October 2017-October 2020. They are (in alphabetical order):

Frédéric Collin (Liège, Belgium), Claudio di Prisco (Milano, Italy), Ivo Herle (Dresden, Germany), Cristina Jommi (Milano, Italy), Panos Kotronis (Nantes, France), David Mašín (Prague, the Czech Republic), François Nicot (Grenoble, France), Euripides Papamichos (Thessaloniki, Greece), Manuel Pastor (Madrid, Spain), Lorenzo Sanavia (Padova, Italy), Jean Sulem (Paris, France), Claudio Tamagnini (Perugia, Italy), Jean Vaunat (Barcelona, Spain), Cino Viggiani (Grenoble, France), and Antonis Zervos (Southampton, UK).

The very first task of the Board was to appoint a new "bureau", including a Director, two vice directors and a president. Which they did: Frédéric Collin from Liège, Belgium, is the new director of ALERT; Claudia Vitone from Bari, Italy, is the new vice-director for administration, and Stéphane Grange from Lyon, France, is confirmed in his role of vice-director for finances. Cino Viggiani from Grenoble, France, is the new president. This bureau is almost entirely new – the only "expert" member being Stéphane. This is why it was decided to also enroll in the bureau Andrea Galli from Milano, Italy, in the newly created role of "assistant director", to help the new team to handle the life of ALERT-Geomaterials thanks to his longstanding experience. Moreover, Frédéric resigned from his position of elected member of the board, and it was decided to replace him with the first non-elected

candidate: Jelke Dijkstra (Chalmers, Sweden).

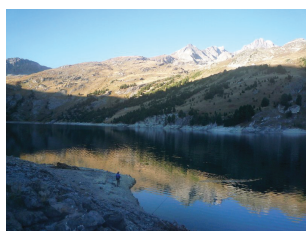
We are fully aware that this Newsletter comes quite late – much later than over the last years. However, you bet we've been working hard for ALERT-Geomaterials since October 2017. Besides the organization of the workshop and doctoral school that will take place in Aussois in October this year, we have set the program for the Olek Zienkiewicz Course, that will be held in Bari in November this year, and we have managed the Ioannis Vardoulakis PhD Prize – for which we have received 10 applications.

Finally, we have decided to support the new initiative "Open Geomechanics", an open access geomechanics journal that was launched in early 2018 (the people behind this effort are listed here: <http://www.opengeomechanics.org>). To make it clear: "Open Geomechanics" will not be an ALERT journal, nor will there be any editorial exchanges between "Open Geomechanics" and ALERT. Financially speaking, "Open Geomechanics" will be completely independent of ALERT. We have only committed to be their legally responsible association for the next two years.

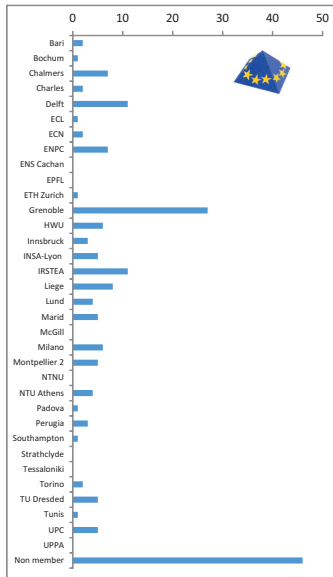
It is a great pleasure for us to open a new "ALERT" year, hopefully rich of research and educational events, in the very spirit of our association, which is creating and sharing knowledge in geomechanics. We're happy and proud to serve the community during our three-year appointment. We hope to be up to the level set by the previous bureau, and we count on your active help and contribution!

See you all in Aussois!

Frédéric Collin and Cino Viggiani



Impressions of Aussois  
Photographs of the photo  
competition 2012



Participants of the ALERT Workshop 2017

## ALERT Workshop 2017

In 2017 the annual ALERT Workshop was held from Monday, 2nd until Wednesday, 4th October again in Aussois, France. The regional distribution of the participants from the institutional members of ALERT Geomaterials is shown on the left hand side. In total, 182 participants registered for the ALERT workshop 2017.

As it was introduced in 2013, the session on Tuesday lasted only half a day allowing the Board of Directors meeting, the PhD-prize ceremony and the Special lecture to be held in the afternoon.

The three topics of the ALERT Workshop 2017 are listed below:

- 1 Porous Media Mechanics from geomaterials to non-geological media**  
coord. W.G. Gray, B. Schrefler, & C. Tamagnini
- 2 Must Critical State Theory for Granular Mechanics be Revisited?**  
coord. Y.F. Dafalias, G. Viggiani
- 3 Advanced numerical modelling of geomaterials with emphasis on large deformation and flow problems**  
coord. M.A. Hicks, P. Mira, & L. Sanavia

We thank all active participants and coordinators for their effort.

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## ALERT PhD Prize 2017



Anne-Catherine Dieudonné  
(Université de Liège)  
Xiusong Shi  
(Technische Universität Dresden)

The jury of the ALERT PhD Prize 2017 was composed of the professors Manuel Pastor (Universidad Politécnica de Madrid), William G. Gray (University of North Carolina, Chapel Hill and University of Vermont, Burlington), Antonis Zervos (University of Southampton) and David Masin (Charles University Prague). Only PhD students from one of the institutions belonging to ALERT are eligible candidates for the prize which is dated to 1000 Euro.

The three finalists Dieudonné Anne-Catherine (Université de Liège), Shi Xiusong (Technische Universität Dresden) and Vrakas Apostolos (ETH Zurich) were chosen by the jury out of 8 applications.

The jury awarded the PhD student Anne-

Catherine Dieudonné for her work entitled

**Hydromechanical behaviour of compacted bentonite: from micro-scale analysis to macro-scale modelling**

and the PhD student Xiusong Shi for his work entitled

**Deformation behaviour of multi-porosity soils in landfills**

The abstract of both PhD thesis are available on the ALERT website.

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## ALERT Doctoral School 2017

The ALERT Doctoral School 2017 lasted from Thursday, 5th October to Saturday, 7th October and was attended by 94 participants. The school was dedicated to

### Discrete Element Modeling

The organization was carried out by Gaël Combe (Laboratoire 3SR Grenoble) and Stefan Luding (University Twente). The accompanying book, containing articles referring to the lectures, can be downloaded from the ALERT website.

The lectures were presented by

- Stefan Luding (University of Twente)
- Christophe Martin (Université Grenoble Alpes)
- Farhang Radjai (University of Montpellier)
- Gaël Combe (Université Grenoble Alpes)
- Vanessa Magnanimo (University of Twente)
- Kianoosh Taghizadeh (University of Twente)
- Frédéric Victor Donzé (Université Grenoble Alpes)
- Jean-Yves Delenne (University of Montpellier)
- Vincent Richefeu (Université Grenoble

Alpes)

- Anthony Thornton (University of Twente)

The purpose of the school was to present the basic concepts of particle simulation methods and their application to classical and modern problems of geomechanics

In order to tackle this topic, the first two days of the school were divided into :

- Simulation (molecular Dynamics, Event Driven, DEM basics)
- Advanced contact laws for DEM applications
- Contact Dynamics
- Good practice and sample preparation
- DEM applied to Soils Mechanics
- DEM applied to Rock Mechanics
- Granular rheology, granular matter, dense flows and micro-macro transition
- LBM method for Fluid/Grain coupling

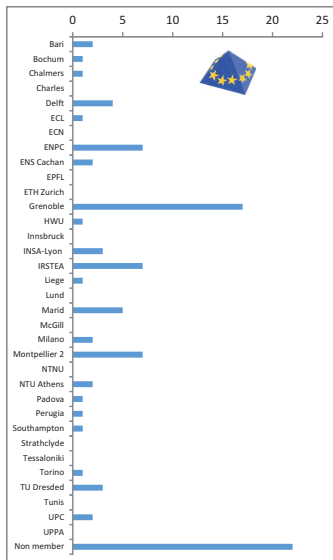
On Saturday, these lectures were followed up by 2 parallel sessions of practical computer exercises: for beginners and for experts.

On behalf all the ALERT members we want to thank the lecturers and the organizers for their commitment.

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The accompanying book, containing articles referring to the lectures, as well as some books of previously held doctoral schools can be downloaded from the ALERT website.

<http://alertgeomaterials.eu/publications/>



Participants of the ALERT Doctoral School 2017



## Special Lecture 2017: Prof. William G. Gray

The ALERT Special lecture 2017 was delivered by Prof. William Gray from the University of North Carolina in USA

The lecture was digitized during the presentation and is available for downloading on the ALERT website.

The title of the lecture was:

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**Systematic Description of Multiphase Flow in Porous Media**

The ALERT Special Lecturer 2017  
Prof. W.G. GRAY



Università  
degli Studi  
di Perugia



## ALERT Olek Zienkiewicz Course 2017

The 10th ALERT Olek Zienkiewicz Course was held for five days in June 2017 in Assisi, Italy.

The school is organised by Cristina Jommi (Delft University of Technology, the Netherlands) and Claudio Tamagnini (University of Perugia, Italy).

The topic of the Course was

**Geotechnics of soft and organic soils**

Lectures and tutorials covered several issues:

- Fundamental behaviour
- Constitutive modelling
- Modelling and numerical Implementation
- Engineering of soft soils

The 10th ALERT Olek Zienkiewicz Course was attended by 54 PhD students and 2 Young Doctors from 21 Countries (including the students of the LARAM School).

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Organising Institutions of the  
ALERT OZ Course 2017



UNIVERSITAT POLITÈCNICA  
DE CATALUNYA  
BARCELONATECH



Massachusetts  
Institute of  
Technology



Università degli Studi  
di Roma Tor Vergata



NTNU  
Norwegian University of  
Science and Technology



Organising Institutions of the  
ALERT Workshop & School 2018

## ALERT Workshop 2018

The ALERT Workshop in 2018 will be organized from Monday, 1st October to Wednesday, 3rd October. The workshop will again take place in the Centre Paul Langevin in Aussois, France.

The focus of the three workshop sessions and the responsible coordinators are listed below:

### 1 Fluid flow and strain localization: fingering and fracture processes in partially saturated materials

coord. F. Casini, G. Sciarra & J. Vaunat  
[francesca.casini@uniroma2.it](mailto:francesca.casini@uniroma2.it)  
[giulio.sciarra@gmail.com](mailto:giulio.sciarra@gmail.com)  
[jean.vaunat@upc.edu](mailto:jean.vaunat@upc.edu)

### 2 Geomaterials under the nanoscope

coord. R. Pellenq, F. Radjai & F.J. Ulm  
[pellenq@mit.edu](mailto:pellenq@mit.edu)  
[franck.radjai@umontpellier.fr](mailto:franck.radjai@umontpellier.fr)  
[ulm@mit.edu](mailto:ulm@mit.edu)

### 3 Offshore Geotechnics

coord. F. Pisano, K.G. Gavin & G. Eiksund  
[F.Pisano@tudelft.nl](mailto:F.Pisano@tudelft.nl)  
[K.G.Gavin@tudelft.nl](mailto:K.G.Gavin@tudelft.nl)  
[gudmund.eiksund@ntnu.no](mailto:gudmund.eiksund@ntnu.no)

The first and third sessions (Monday and Wednesday, respectively) are open to abstract submission, when the second half-day session on Tuesday will be held by invited speakers only.

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The online registration for the ALERT Workshop & School is open.  
<http://alertgeomaterials.eu/2018/07/registration-for-the-alert-workshop-school-2018-is-open/>

## ALERT Doctoral School 2018

The workshop is followed by the ALERT Doctoral School which will be hosted from Thursday, 4th October to Saturday, 6th October also in Aussois. The topic of the ALERT School will be dedicated to

### Energetical methods in geomechanics

and will be organized by I. Einav (University of Sydney) and E. Gerolymatou (Chalmers University of Technology).

Lectures will be held on the first two days of the workshop and will include the following topics:

- Basic thermodynamic definitions
- Definition and uses of virtual power
- Energetics in granular media from the viewpoint of DEM

- Landau's approach for advanced thermodynamics
- Hierarchical derivation of constitutive relationships using thermodynamics
- Energetical background of common approaches
- Multiphysics and multicomponent applications
- From Fracture to Breakage Mechanics

On Saturday, exercise examples will evidence the effect of constitutive choices on the energetics. The Lectures will be held by Mario LIU, Ioannis STEFANOY, François GUILLARD, Itai EINAV, Eleni GEROLYMATOU, Manolis VEVEAKIS, and Yida ZHANG.

The online registration for the ALERT Workshop & School is open on the ALERT website.

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CHALMERS



THE UNIVERSITY OF  
SYDNEY

Organising Institutions of the  
ALERT School 2018





## ALERT Olek Zienkiewicz Course 2018

The 11th edition of the ALERT Olek Zienkiewicz Course will be held from Monday, 5th November to Friday, 9th November 2018 in Bari, Italy. The topic of the school is



Bari, Italy

### Natural versus compacted clayey soils: from micro to macro behaviour and modelling

The school is organised by Federica Cotecchia (Polytechnic University of Bari), Jean Vaunat (Universitat Politècnica de Catalunya - BarcelonaTech), Claudia Vitone (Polytechnic University of Bari).

**Abstract:** The theme chosen for the Olek Zienkiewicz Winterschool 2018 has been subject of intense research aimed at yielding the impact that micro to meso-scale phenomena of different typology (i.e. mechanical, physico-chemical, thermal, electromagnetic) have on the behaviour of soils and rocks at the macro-scale. The school will focus on clayey soils, either natural, or compacted, and provide knowledge about their genesis and consequent features at the micro to meso-scale, and about how their macro-response varies with the micro to meso-features. Particular emphasis will be given to the either experimental, or modelling research contributions that have provided new evidence and understanding of the phenomena at the micro to meso-scale, that generate observable trends in macro-response. The lectures will concern, as first, the fundamentals about the genesis of clays of different structure, either consolidated or compacted, and about the different scales of structures in clays. Thereafter, they will deal with the analysis and modelling of the hydro-mechanical behaviour of the clayey materials characterized at the micro- to meso-scale. Hence, the course will provide an overview of

the up-to-date studies that have represented major paradigms in improving both the understanding of the relationships between the macro-response of classes of clayey soils and their micro to meso-features, and the modelling of their behaviour. Starting from the basics of mineralogy and particle interactions, up to basic hydro-mechanical response of reconstituted and natural clays, sensitive and not, the lectures will also focus on the behavior of hard soils, soft rocks and transitional soils, as well as on the effects of weathering, high organic content and fissuring. The ALERT OZ Winterchool will be organised in 4 hours morning and afternoon sessions, that will be delivered by experienced lecturers coming from different universities: Universitat Politècnica de Catalunya, University College London, Université Grenoble Alpes, Ecole des Ponts Paris Tech., Politecnico di Bari, Politecnico di Milano, Sapienza University of Rome, Purdue University.

Lectures covering the following topics as well as practical sessions on some of them will be delivered:

- Fundamentals about the genesis of clays and different scales of structures
- Consolidated unfissured clays: fundamentals to advanced analysis of the mechanical behaviour
- Compacted clays: fundamentals to advanced analysis of the mechanical behaviour
- Hard clays/weak claystones: analysis and modelling of the hydro-mechanical behaviour
- Transitional soils, fissured and weathered clays: analysis of the mechanical behaviour

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For more details as well as the online registration form please visit the ALERT web-site:

<http://alertgeomaterials.eu/category/oz-course>



Organising Institutions of the  
ALERT Olek Zienkiewicz Course  
2018



## New Institutional Member of ALERT

During its meeting in Aussois, held in October 2017, there was no new application for the membership in ALERT Geomaterials.

Francesca Casini (University of Tor Vergata) becomes an associated member of University of Perugia. Giuseppe Modoni (University of

Cassino) also becomes an associated member of University of Grenoble (this was decided in 2016, but it becomes effective in October 2017).

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## Special Lecture 2018: Prof. Rolland Pellenq



The ALERT Special Lecturer 2018  
Prof. Rolland Pellenq

The Special lecture during the coming ALERT Workshop 2018 will be presented by Prof. Rolland Pellenq, Director of Research at CNRS, the French Government Agency for Scientific Research and a MIT Senior Research Scientist. He will talk about

**The potential of mean force: the tool to model dense colloidal systems**

We investigate the interactions responsible for the cohesion of strongly interacting colloidal materials such as clays, cement... It is known that the swelling/cohesive properties of these materials depend both on the nature of the some counter-ions compensating their surface charge along with the water intake. The overall goal of this work is to determine the right level of modeling complexity required to capture the behavior of these charged colloids immersed in an electrolyte and set up the stage for modeling at the meso-scale. From the

(analytical) mean-field DLVO theory to a full atomistic description, we introduce the concept of "Potential of Mean Force" as the tool to get an efficient but still realistic description between strongly interacting colloidal grains such as clay and cement hydrate nanoparticles. In particular, we introduced the Explicit Solvent Primitive Model (ESPM), in which ions are modeled as charged hard spheres and solvent molecules as soft spheres with embedded point dipoles. We showed that taking explicitly into account the solvent in such a Primitive Model description, allows a quantitative description of system's cohesion in quantitative agreement with atomistic scale results. From ionic correlation interactions to pure electrostatics, the ESPM approach is shown to be an efficient strategy to get a truly consistent multi-scale modeling approach of complex systems.

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