

The Deputy Vice-Chairman

Marseille, 19 June 2020

Object: Presentation of the industrial chair « Carb3e: Carbonate geosciences: energy, environment, education » coordinated by professor Jean BORGOMANO (CEREGE) and TOTAL SA.

Dear Madam, Sir,

In support of the site policy aimed at increasing the transfer of research results from laboratories to industry and society, A*Midex foundation implements the "industrial Chair" scheme which encourages the creation of bilateral partnerships between research establishments and companies. This action aims to encourage the co-construction and implementation of research, training and innovation programmes, by targeting one or more priority issues for the partners of the Chair, with a view to the industrial partner's valorization of the results.

In this context, the industrial chair "**Carb3e: Carbonate geosciences: energy, environment, education**" coordinated by **Jean BORGOMANO**, professor of geology - sedimentology at the **European Centre for Research and Teaching of Environmental Geosciences**, in partnership with the company **TOTAL**, has received the support of the **A*Midex Steering Committee**.

This 3-year project received €276,000 in support from A*Midex Foundation, for a total budget of €1,199,200, and co-financing from TOTAL of €456,200.

The aim of this chair is to **understand and predict carbonate reservoirs in the context of the energy transition and global changes** :

Carbonate sedimentary systems, like modern coral reefs, belong to Earth external envelopes and form a unique interface between biosphere, hydrosphere, atmosphere and lithosphere that is in permanent physico-chemical disequilibrium. They consist in solid substratum, mobile or rigid, acting as a major carbon sink, with complex structures and heterogeneities at all scales.

Understanding carbonate sedimentary systems consists in fact to study exceptional archives of the Earth System, from Precambrian to present day, including evolution of life, climate and sea level changes. The particular spatial relationships between organic and mineral carbon cycles in the context of global-regional geodynamic and climatic changes have resulted in the preservation of more than 70 % of the global volume of conventional hydrocarbon in carbonate rocks.

Managing and securing these important energy resources is becoming critical to support the forthcoming energy transition, but remaining reserves in these complex reservoirs are difficult to detect and predict. Future exploration and production of hydrocarbon from carbonate reservoirs, that would not rely any longer on massive industrial investments, will subsequently become increasingly risky from economical and technological view points. Paradoxically, a successful energy

transition will require drastic improvements of our knowledge on carbonates to guaranty an economic hydrocarbon supply.

Such developments in carbonate reservoir geosciences will also contribute to address alternative energy challenges, like geothermal energy, thermal storage and co-generation, and critical issues such as water resources, especially in karst systems and CO₂ sequestration.

Improving geomodels from the past carbonate records will directly impact on our capacity to monitor and predict the evolution of modern coastal carbonate environments (coral reefs, atolls and islands) submitted to global climate changes (ie. sea level rise, ocean acidity, oxygen...).

Improving carbonate reservoir models for energetic resource exploration and production (fossil and renewable) and contaminant geological storages (CO₂) will contribute to the overall strategy of TOTAL towards the International Energy Agency "2° scenario".

The Carb3E industrial chair is set up for a period of 3 years, from 2018 to 2021.


Denis BERTIN