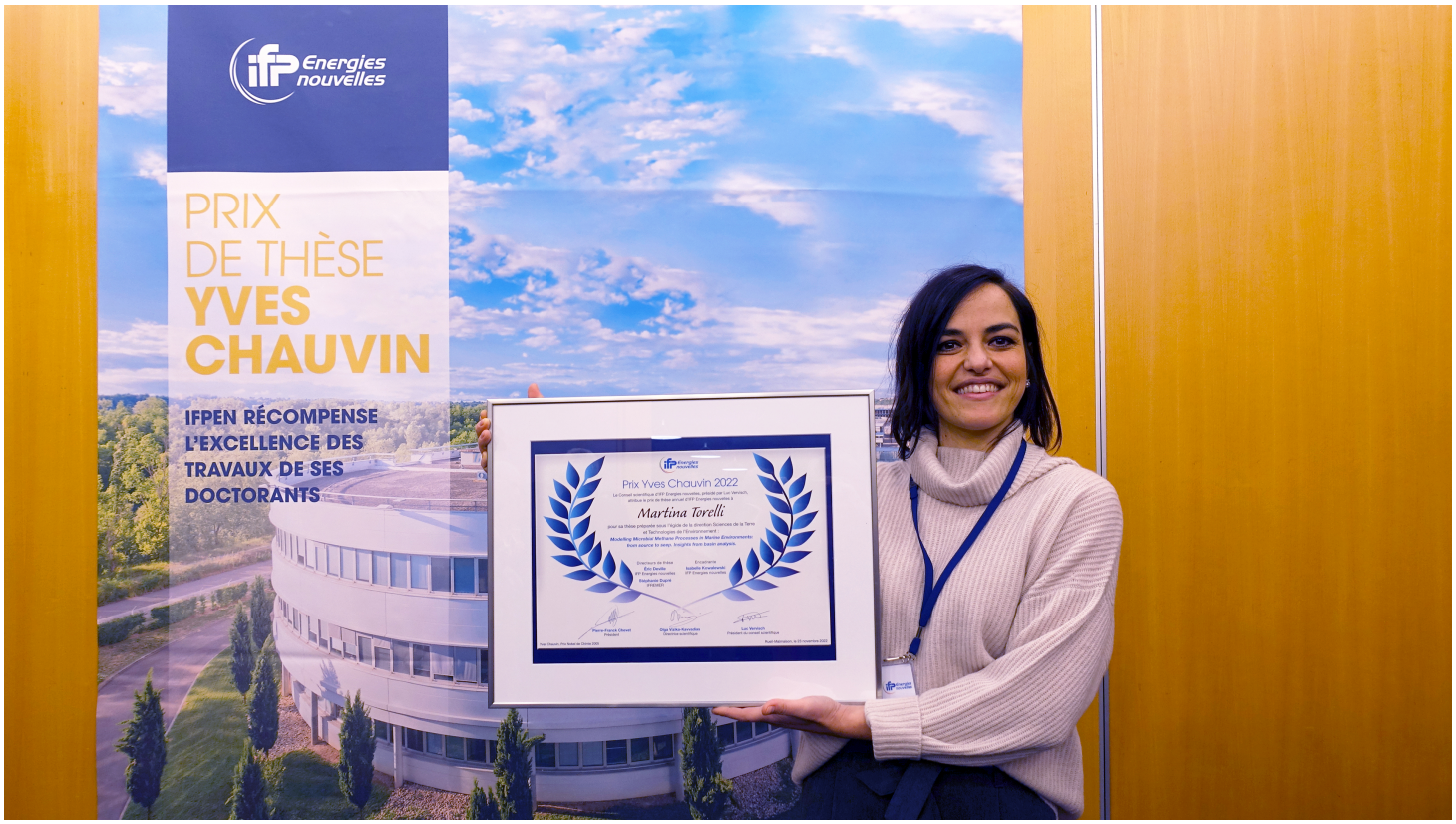

Written on 30 November 2022

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News

Fundamental Research

Environmental monitoring

Geochemistry

The 2022 Yves Chauvin Prize was awarded by the IFPEN Scientific Council to Martina Torelli for her thesis work entitled “Modelling Microbial Methane Processes in Marine Environments: from source to seep. Insights from Basin Analysis.”.

Martina Torelli has received her award at a ceremony held at IFPEN in Rueil-Malmaison on 23 November.

The research work of Martina Torelli has led to a better understanding of the nature and evolutionary dynamics of organic matter in order to predict at the scale of a sedimentary basin the quantities of biological methane emitted over time. This thesis was part of the collaborative research project PAMELA (PAssive Margins Exploration LAboratories) which focused on the passive margins of Aquitaine and those of Mozambique and Madagascar around the Mozambique Channel, and was directed by Eric Deville (IFP School) and Stéphanie Dupré (Ifremer), and co-supervised by Isabelle Kowalewski (IFPEN), Claude Gout and Johannes Wendebourg (TotalEnergies).

Let's meet the winner.

What is your background?

I am a geologist, with a master in Exploration Geology from the University of Roma Tre (Italy). I was always attracted by working in the geoscience domain as it integrates multiple subsurface natural processes. But I also wanted to apply my knowledge, so I did several internships in the industry. To deepen my knowledge and satisfy my scientific curiosity, I decided to continue my academic career in the context of an applied research project at IFPEN.
My thesis was focused on **biogenic methane that is generated naturally by bacteria within shallow sediments**. Shallow gas can be an energy source but also a climate agent if it is directly emitted into the atmosphere/ocean. The assessment of biogenic gas processes requires an understanding of **the biological activity at the microscopic scale** and **the evolution and degradation of organic matter over time**, combined with the comprehension of **the geological evolution of a sedimentary basin at a very large scale**. Integrating these processes in a unique workflow was the most challenging aspect of my project and motivated me to keep on pushing the limits.

What are you doing today?

Working within the energy industry was always my professional dream because **energy is essential to life**. Today we need to be open to new challenges and perspectives of energy as it can have multiple forms. That is why I recently integrated the TotalEnergies' OneTech Graduate Program, allowing me to apply and expand my knowledge and **be actively engaged in the energy transition**.

What are the possible concrete applications of the results of your thesis?

I have demonstrated that basin modelling can be used **to quantify emissions at the seabed** and **to estimate the amount of gas that is emitted over the past million years**. In my study area, **methane is emitted into the ocean**, but it is possible to apply a similar workflow for **biogenic gas produced from onshore sediments**. I undertook the task to assess natural emissions of methane via a well-known and validated basin modeling approach which, furthermore, can be used to make extrapolations of methane emissions in the geological past.

It is also important to note that IFPEN was already working on **the integration of biogenic gas generation processes at basin scale via numerical modelling** when I started my thesis project. However, the subject required an understanding of multiple disciplines, the integration of different scales and a validation on a focused study. My thesis helped to finally implement the existing biogenic gas prototype software that was never calibrated before.

Once the processes of methane genesis in a basin are well understood and modeled, we can also try to go further and **model the formation of gas hydrates**. Hydrates are solid gas deposits found in relatively shallow marine and onshore sediments. Hydrates are stable at specific temperature and pressure conditions but as soon as these conditions change (e.g. increase of temperature) they may become unstable and release large amounts of methane. Such studies would allow **to quantify another large source of natural methane emissions that impact the atmosphere and affect marine biodiversity**.

What did you gain doing your thesis at IFPEN?

I really liked to do my thesis at IFPEN. As doctoral student you are an integral part of IFPEN, they make sure that you feel comfortable with your thesis subject, and that you have all the requirements to continue your career. IFPEN organizes presentation days where all the doctoral students from different disciplines are coming together to meet people from industry. Students can attend scientific seminars on general and specific subjects, to deepen their knowledge on various subjects, and they can present their work at scientific conferences.

As a doctoral student, you have access to the large experience of IFPEN scientists. Everyone is ready to share their knowledge and discuss new proposition. **With my multidisciplinary subject, it was really important to have such a support from the different departments** that have helped me tackle some of the challenges I was facing.

I also appreciated the collaboration with other research centers, universities, and in particular the collaboration with the industry that helped me to shape my future career. IFPEN is an excellent research center with a long history in geosciences and is known world-wide for the characterization of organic matter and basin modelling. I had three very enriching years of PhD at IFPEN.

Slideshow of the Yves Chauvin 2022 Ceremony

Meeting with Martina Torelli, winner of the 2022 Yves Chauvin Prize
30 November 2022

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