

The background features a collection of 3D-rendered characters and numbers. Some are black, some are red, and a central horizontal band is purple. The characters include '0', '1', '2', '3', '4', '5', '6', '7', '8', '9', 'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z'.

# **Professors and students**

A collection of 3D question marks in various colors (black, red, white) scattered across a light purple and white background. The question marks are rendered with soft shadows, giving them a three-dimensional appearance. A semi-transparent purple horizontal band is overlaid across the middle of the image, containing the text.

answer questions about  
the geosciences job market

## The professors' views:

*How would you describe the current job market and opportunities for graduating Earth Science students?*

**Aigner:** I think the job market is not bad, and in my experience, graduates in the petroleum geosciences sector who have done a thesis in a relevant and applied topic can get a job in no time. There are good opportunities for well-trained and dedicated people.

**Cabrera:** The ongoing economic crisis, the constant revision of energy strategies and the re-evaluation and optimization of available resources should result in new opportunities for geologists, geophysicists and geo-engineers. First of all, I expect that the traditional demand from mining and hydrocarbon industries will be maintained, despite recent staff reductions in some major companies. Secondly, I predict sustained, or even increased, demand for professionals by public administrations and private companies to address new tasks related



*Lluís Cabrera is professor of stratigraphy and basin analysis, and dean of the Faculty of Geology at the University of Barcelona, Spain, where he gained his Sc. degree and Ph.D. in Geology. His research interests include the application of sedimentology, sequence stratigraphy, and 3D reconstruction and modeling of sedimentary bodies to the exploration, development, and production of coal and oil.*

to CO<sub>2</sub> storage, environmental management and remediation, and alternative energy sources such as shallow geothermal.

**Clark:** For Master's level graduates, employability remains high, but they still need to be proactive to get the jobs.

**Landrø:** My impression is that the job market is good. The best students get job offers a long time before they deliver their thesis. There is a good mixture between contractors and major oil companies.

*What starting annual salary you think graduating students can make in their first jobs in 2010?*

**Aigner:** This is very variable depending on the company and the sector of work.

**Cabrera:** "Recruiting tasks are becoming more and more efficient and sophisticated..."

**Cabrera:** It depends a lot on the specialties (e.g. oil industry, environmental management and remediation, CO<sub>2</sub> storage) and varies greatly between different regions and countries. An average ranging between €55,000 and €65,000 (\$75,000 - \$90,000) could be considered reasonable for the major oil companies. Lower starting salaries would be attained in other oil or mining companies.

**Clark:** £30,000 - £35,000 (\$45,000 - \$55,000).

**Landrø:** This will vary, but I estimate an average of around €50,000 (\$70,000).

*Today's students communicate a lot through electronic networking sites. How do think this affects their chances on the job market?*

**Aigner:** I see this as a new and exciting fairway, but in my view, personal contacts, such as through internships, are still very useful.

**Cabrera:** The generation of job networks and exchanges is obviously improved by electronic networking, but it must be remembered that job offers are finally

substantiated after personal interviews. Students must be aware that traditional communication skills such as oral expression, well structured speaking, and writing, are still very important.

**Clark:** I haven't heard much about the FaceBook/Twitter world but I do see companies requiring online applications only. Student feedback is that they do not like this. It can be hard to know if the submission has been received and how it is being assessed. IT "glitches" can, and do, lead to erroneous rejections. "HR" should be about personal contact.

**Landrø:** I think it eases the recruiting process. However, the main hurdle is still the job interview, and the grades achieved during the university study.

*Does the university you work for offer internship opportunities for students and, if yes, what percentage of students are hired through an intern placement?*

**Aigner:** We attempt to keep close contacts with companies and help with internships. I estimate that roughly half of the new hires get their job this way.

**Cabrera:** No, to date.

**Clark:** Informal summer internships are possible, but it is very ad hoc and tied to individual staff members' research funds.

**Landrø:** Yes, but only for a limited number of students. It is more common that the students do summer internships with industrial companies.

*Do you feel there is a shift in the long term employment security versus new hires in the current industry?*

**Aigner:** This is something I can not fully oversee and comment on.

**Cabrera:** The situation was never homogeneous; there has never really been



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employment security. It is highly dependent on circumstances, such as commodity prices and demand.

**Clark:** I think the major companies are sending mixed messages – hiring and firing at the same time.

**Landrø:** No, the oil industry has always been characterized by oscillations, and my guess is that this trend will continue in the future.

*Currently there is lot of interest in alternative energy sources and topics such as CO<sub>2</sub> storage. Are these trends also reflected in what is currently offered in geoscience education? What other trends you can describe?*

**Aigner:** Many students like to go into geothermal energy, which in my view is an interesting trend. I also observe a lot of interest in environmental topics. I note with some concern a tendency to offer more and more highly specialized and narrow Master's courses. This can be at the expense of getting broad overviews and a critical assessment of the “big picture”.

**Cabrera:** It is difficult for geoscience education to constantly change its focus depending on particular demands of the job market. Changes sometimes happen so fast that it is hard fit and adjust education programs. On the other hand, providing good basic background will always a guarantee that graduating Earth Science students will be able to assimilate the diverse and specific requirements of different employers.

**Clark:** In our faculty at Leeds, CO<sub>2</sub> sequestration as a principle is certainly visible at all levels from undergraduate to Ph.D. A small number of oil companies have been far-sighted enough to present it as a potential career route within their

organizations. That said, regardless of projects such as Sleipner and Weyburn, it is still an experimental technology, with enough unknowns that it has to be presented with caveats.

**Landrø:** Universities are slow to respond to such trends. However, CO<sub>2</sub> storage projects are becoming increasingly used as examples in both geophysics and reservoir engineering.

*The industry is communicating more with universities. How do you feel about this and do you think it affects students' perception of the industry?*

**Aigner:** I think this is an excellent development, especially in Europe, where there is not really a strong tradition for this. It helps students to obtain a more balanced view of the industry, and overcome prejudices. We should go on like this.

**Cabrera:** Recruiting tasks are becoming more and more efficient and sophisticated, and the industry tries to appeal to young geoscientists by showing its most attractive aspects, such as exciting professional lives, personal realization and team work. I think that students' perceptions have become more positive over recent years.

**Clark:** Yes, companies are communicating more. Master's level students appear greatly impressed by the way industry is recognizing both them as individuals and the course that they are on. However, there needs to be a careful balance between “who is selling and who is buying”. Companies are competing for good students but students need to compete for places too. “Communicating” has to take many forms. “Interaction” would be a better process to aspire to. Offer-

ing demonstrations, workshops, datasets, staff-professor exchanges, internships, and, of course, scholarships, all need to be in the mix as well as recruitment talks. It would also be useful for industry to recognize that, in many developed countries, such as Europe, North America and Australasia, international students in higher education can be a major part of the economy. Companies will encounter large numbers of international students when they visit universities, and links that they make with higher education institutes need to reflect that in some proactive way. A wider issue is that the supply of numerate physical science school-leavers for Bachelor's degrees, and undergraduates for postgraduate degrees, is not improving. The industry needs to market itself at all levels from undergraduate downwards, and more widely than just geosciences departments. Physics and mathematics graduates can and do make excellent geophysicists. Almost no school-leavers come to us looking for a career in resource exploration: they are interested in natural hazards and climate change.

**Landrø:** This is warmly welcomed, and appreciated by both students and professors. The challenge is to maintain this communication during periods where the need for recruitment is low.

*Do university programs focus enough on the basic geological and geophysical skills required for the industry or have studies become too computer oriented? Does your university offer field programs?*

**Aigner:** I see the danger of neglecting the core competence in geology and geophysics. At Tübingen University, we still put a lot of emphasis on field work and field training. I feel that although a strong background in natural sciences is important, but



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we should not neglect the focus on “geo”. In my mind, the old saying “the more rock you have seen the better a geologist you are” still holds true!

**Cabrera:** To my knowledge, university programs offer adequate basic skills although it is obviously necessary to adapt them to changing circumstances. The most important issue is to not forget that, while computers and associated software are powerful tools to help realise a geoscientist’s research, they are subordinate to having an integrated comprehension of geological problems. With this in mind,

here in Barcelona we have been trying to keep our field work programs at as high a level as possible level, and aim to increase and improved them in future years.

**Clark:** Basic skills remain critical. Universities should be producing scientists, not technicians. While workstation-based training must be in the curriculum, it should always be used as a tool for understanding and applying principles, and learning critical assessment, not just to become familiar with individual software packages. All branches of the subject are becoming more and more complex, and no university degree can train a student to the full level of industry practice: therefore, it is vital to stress fundamentals, which will help a professional geoscientist to acquire more sophisticated skills later

**Landrø:** In our curriculum at Trondheim we offer several field courses, and one of them is particularly focused on bridging geology and geophysics. Another field course is focused on integrating all relevant disciplines, from drilling to geology.

*What are the most important integrated developments from the current industry to the geoscience education system?*

**Aigner:** 3D modelling offers a fascination to many students and forces everyone to think more quantitatively, more integrated, and strictly three-dimensional. The industry’s progressive willingness to provide access to high-technology software packages for teaching and research is win-win for everybody: the students, the universities, the software vendors and the oil companies.

**Cabrera:** Opening new technological, and sometimes conceptual, procedural

methods that enable further advances in knowledge.

**Clark:** Integration of reservoir engineering and evaluation with geophysical monitoring is a development of primary importance.

**Landrø:** Probably the focus on integrated operations, which will also influence our curriculum to a certain degree. The use of advanced visualization tools is another example.

*Do you have any personal advice for students developing their career potential for the geoscience industry?*

**Aigner:** My personal advice is short and simple: just go on with what makes you enthusiastic and thrilled.

**Cabrera:** Be aware that a good conceptual education and building fundamental skills may open a wider array of opportunities. It is always advisable to build specialization from a robust basic background.

**Clark:** Be numerate and quantitative: even “interpreters” needs to be. Spend time on your CV, as it will get only seconds of attention from HR recruiters. Be aware of what is happening in the industry: look at publications such as First Break and The Leading Edge to see who is active and why. Your professors can’t know about every company and contact name out there!

**Landrø:** Follow your interests and be critical, Look for new opportunities. Be sure that your geoscience toolkit is relevant and up to date. Fundamental courses in maths and physics are crucial.



**Martin Landrø** is professor of applied geophysics at the Norwegian University of Science and Technology (NTNU), Trondheim, where he gained an M.Sc. and a Ph.D. in Physics. Before returning to academia in 1998 he worked with SINTEF Petroleum Research and Statoil. His main fields of interests are reservoir geophysics (including time lapse seismic), seismic inversion methods, rock physics, four-component seismic, marine seismic acquisition, analysis of CSEM data, and gravimetric methods for monitoring purposes. Martin is also part of the EAGE Student Affairs Committee.

## Students' answers

*Do you feel the skills and knowledge you have obtained through your studies are sufficient to prepare you for a career in the geoscience industry? What do you think is lacking in your curriculum?*

**Bakay:** I think my skills and knowledge are sufficient for my future career. I gained knowledge from all fields of geology in general, as well as knowledge of the geology and geochemistry of oil and gas, including lithological study of reservoir rocks, the foundations of petrophysical studies and interpretation of log data, knowledge and practical experience of organic matter and methods of its investigation. I consider myself prepared for work in any department of the oil and gas business, except, perhaps, the interpretation of seismic data. Also my knowledge is not enough in seismic stratigraphy and risk assessment.

**Mocnik:** Yes, I think that the skills and knowledge I obtained through my study are sufficient for a career in geosciences industry. Foreign experience is lacking in my study curriculum, which I think would have been a benefit.

**Oraki Kohshour:** The curriculum in universities where geosciences are being taught is influenced by both industry and university. This means there needs to be a good understanding of the problems that the industry is experiencing. Universities must also provide a supply of graduates to meet a country's future strategic plans. The university where I am studying is increasingly benefitting from state-of-the-art equipment, provided with the help of industry.

**Saitet:** On a scale of 1-10, I would rate it at 6. Today's problems are increasingly being solved through a multi-disciplinary approach, but my curriculum lacked exposure to some geo-scientific disciplines.

**Stanciu:** The knowledge I obtained through my studies helped me to form the necessary background for the geoscience industry. The teachers gave us the "big picture" regarding the problem, and if interested, we could go and analyze it in a more detailed manner. Things I want to be studied more include case studies; some-

*Oraki Kohshour: "It is certainly important and also interesting to search for well-organized, highly disciplined and exciting jobs across the globe."*

times, theories alone are not sufficient without real cases to solve.

*Do you feel your education is providing a strong base of basic geological and geophysical skills as well as highly computerized skills?*

**Bakay:** I've built a very strong geological base, and perhaps to a lesser extent, geophysical. Computer skills taught in our department include simulation using various software packages, such as Temis, Trinity, Roxar and Petrel.

**Mocnik:** I think that my education provides a good base of geological, geophysical and computerized skills.

**Oraki Kohshour:** It is quite good. We have highly experienced and recognized faculty members, and good research facilities, which are being improved further. In the matter of computer facilities, we have still some way to go.

**Saitet:** It does provide basic geophysical skills, but not any geological or other relevant computerized skills. I had to learn these skills on my own or through other training programs outside the classroom.

**Stanciu:** The theoretical base of basic geophysical skills are very well provided, and also computerized skills, learning about different software currently used in the industry.

*Do you expect it to be difficult to find a job in the current employment market situation? What extracurricular activities have you undertaken to include in your resume and enhance your chances to find a good job?*

**Bakay:** The current situation reduces the possibility of a wide choice of opportunities, but I think the education I have received will make it not too difficult to obtain work that interests me. Useful extracurricular activities included an additional course on basin modelling and English language classes.

**Mocnik:** I think that finding a job will be not easy but I hope that my studies improved my chances.

**Oraki Kohshour:** It depends on the particular individual who is looking for a job, because I believe that a job exists for every job applicant; it just depends on job expectations. To enhance my own chances, I have worked on my personality to develop the ability for working in a team. I also believe that living a healthy life will improve your communication abilities and performance at work.

**Saitet:** I think it will be difficult. I have been looking for job since getting my Bachelor's degree but with no success. There are few opportunities here in Kenya. To



*Elena Bakay gained a Bachelor's degree in 2007 from the geological faculty of Lomonosov Moscow State University (MSU), Russia. In 2008 she graduated from the faculty with a qualification as a Petroleum Geologist. In 2009 she began studying for a Ph.D. at the Petroleum department of the MSU geological faculty, working in cooperation with Shell. Her current scientific focus is on the geochemistry of organic matter.*

**Daniel Saitet** holds a B.Sc. degree in Physics with Geophysics from Jomo Kenyatta University, Kenya and is currently finalizing his thesis towards an M.Sc. in Physics and Geophysics at the same university. His studies have included conducting resistivity studies in geothermal environments. To help fund his studies, he has worked in various areas including engineering, CAD and technical sales. He hopes to find a challenging and exciting opportunity to put his technical skills into practice.



improve my chances I have joined various professional bodies for networking and attended some capability-building workshops. I have also acquired geo-scientific computerized skills.

**Stanciu:** I believe it is quite difficult to find a job right now, mainly because of the financial crisis. Extracurricular activities that may help me find a good



**Arianna Mocnik** graduated in 2008 with a Masters degree in Applied Geophysics at the University of Trieste, Italy. In 2009 she started a Ph.D. course with the geoscience department at Trieste, in which she is analyzing different techniques of acquisition and processing of geophysical data aimed at characterizing non-aqueous fluids within sediments. These fluids include contaminant compounds that can be detected by ground penetrating radar in shallow sediments and hydrocarbons detected by seismic data in deeper layers.

job included technical courses such as Petrel software and a student education program provided by experts from ExxonMobil.

*What requirements would your future job and employer need to meet? Please describe your ideal job.*

**Bakay:** I want my work to be interesting and creative. It should be diverse, not routine. The main requirements would be an opportunity for career growth and high salaries.

**Mocnik:** My ideal job should provide a lot of practical experiences of data acquisition plus processing and analysis of the data.

**Oraki Kohshour:** My perfect job would be in an organization where there is a good environment among my colleagues, all motivated to work towards the benefit of the company. I would expect a rewarding atmosphere where an employee feels that managers are fairly judging their performance in their realm of responsibility. I also want a good boss who trusts the potential of new employees and lets them run rational risks.

**Saitet:** My idea job should be interesting, adventurous and challenging. I enjoy field work as well as computerized geoscientific data processing. I will also love a good degree of international exposure.

**Stanciu:** A good employer is one that invests in the employees, and in crisis situations tries to find ways of keeping them in the company. I want a secure job that will give me satisfaction from every point of view, and which will keep me motivated even after years of doing it.

*What do you estimate your first annual salary to be in the current job market?*

**Bakay:** I think the first annual salary should not be less than €24,000 (\$35,000) if you have PhD degree.

**Mocnik:** I don't know.

**Oraki Kohshour:** It depends to the country where I am working. At the moment, in Iran, which holds the world's third-largest proven oil reserves, a petroleum reservoir engineering graduate will receive about \$8,400 (€6,100), but this will increase with growing experience.

**Saitet:** Here in Kenya, probably only about \$4,000 (€3,000), which is why I am already thinking about a career change.

**Stanciu:** This is hard to say. Considering that I will start as a junior, probably I will receive the minimum salary.

*The industry is communicating more and more with universities. How do you feel about this, and do you think it affects your perception of the industry?*

**Bakay:** Cooperation between universities and companies gives students an opportunity to participate in scientific and industrial work during their studying. It enables students to work in a team with experienced professionals and collect new knowledge. The skills obtained during such projects provide benefits in the search for future work.

**Mocnik:** I think that collaboration between industry and University lets a student see working in a company can be and it can be a good opportunity to learn new aspects of geosciences.

**Oraki Kohshour:** It is an effective relationship. Strong communications will never be destroyed!

**Saitet:** Definitely it is a big leap forward! It will help students understand what is expected of them in industry and will also help universities to tailor their curricula to remain relevant to industry's needs.

**Stanciu:** I think this is a good thing, because this is the only way to harmonize what the universities are offering to the graduates and the needs of the industry. It is very important that students, having only attended school, are made more suited for a job and can easily find one.

*How do you feel the EAGE can assist you with your future career potential?*

**Bakay:** The EAGE gives students the opportunity to participate in scientific conferences by providing sponsorship, which allows them to discuss their research with leading professionals of all areas and get advice on future investigation. Participation in international conferences is taken into account by future employers.

**Mocnik:** The EAGE already stimulates students by organizing congresses that enable comparison with students from other countries and also with famous geoscientists.

**Oraki Kohshour:** I believe the EAGE plays a major role in constructing an atmosphere between professionals, students and industry.

**Saitet:** The EAGE provides an indispensable networking opportunity that enables

me to interact with peers and mentors. I wish I could attend all of its student activities and general events. This will definitely affect my career path for the better.

**Stanciu:** The EAGE can help students with their future careers by continuing to provide access, in different forms, to international symposiums where they can be in direct contact with the world of industry. Another way is by facilitating access to international journals and publications, and to the courses given by EAGE lecturers.

*During your studies, did you receive adequate information about employment opportunities and possibilities available to you?*

**Bakay:** Annual job fairs are held in the geological faculty, where the main Russian and international oil companies are presented. Here, students can find a company in which to get summer jobs, combine work with their education, as well as full-time jobs after graduation.

**Mocnik:** Yes, I received adequate information about future employment opportunities.

**Oraki Kohshour:** In the area I am studying (reservoir engineering) there is a promising supply of future job prospects. Iran's current producing reservoirs are almost in the second half of their lives, which will provide many technical challenges.

**Saitet:** No. I have not received any.

**Stanciu:** In recent years, more and more companies have been coming to my university and presenting themselves and



**Christian Stanciu** graduated in 2009 with a BSc in Geophysics from the Faculty of Geology and Geophysics of the University of Bucharest, Romania. He is now working towards an M.Sc. in Environmental Geological Engineering and plans to study for a Ph.D. in Geophysics. He also has a BSc in Economics and a Masters in Quantitative Insurance and Finance. His main scientific interests are seismology and marine seismic.

what they have to offer, from internships and scholarships to available jobs, providing direct contact with the industry.

*How important do you feel building a professional network during your studies is towards widening your future job possibilities?*

**Bakay:** Building a professional network is very important, and the sooner you start to think about future careers, the more likely it is that you will build it successfully.

**Iman Oraki Kohshour** is studying petroleum reservoir engineering at the Petroleum University of Technology (PUT) faculty of petroleum engineering in Ahwaz, Iran. His main areas of interest are enhanced oil recovery and fractured reservoir simulation. He has experience of ECLIPSE Blackoil and Compositional simulation software. He is currently the president of the EAGE chapter in Ahwaz.





*Saitet: "Don't wait until you are out of campus to start thinking about employment, instead, think strategically all the way through your courses of study."*

**Mocnik:** I think it could be very important, but it is difficult to make it happen during studies.

**Oraki Kohshour:** It is certainly important and also interesting to search for well-organized, highly disciplined and exciting jobs across the globe. This is not possible without building a professional network and knowledge of the industry, providing an effective bridge between a student and their future company.

**Saitet:** Networks, apart from getting you focused on the right professional path, also inspire, educate and enlighten you

about available opportunities. I think they are "a must-do" for every student!

**Stanciu:** I think this is very important. It is the most important way to have a real chance of getting a good job after graduation.

*Based on your experience, what specific advice do you have for your peers looking to be successful within this challenging industry?*

**Bakay:** I advise them to study well, take the interest in the courses, participate in research projects between the uni-

versities and oil companies and attend scientific conferences.

**Mocnik:** I think that, in this challenging industry, it is very important to have solid knowledge of geology, geophysics and computerized skills, keeping up with modern technologies and trying always to find new methods for processing, analyzing and interpreting geosciences data.

**Oraki Kohshour:** I advise them to equip themselves with a strong theoretical knowledge combined with hands-on experience that involves them in their particular area of interest.

**Saitet:** It is important to interact with peers from different parts of the world through professional networks and events. Don't wait until you are out of campus to start thinking about employment, instead, think strategically all the way through your courses of study.

**Stanciu:** Do everything with dedication and the results will come.

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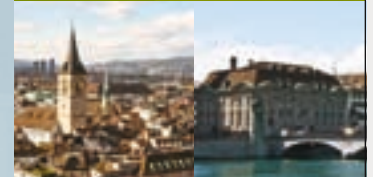
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