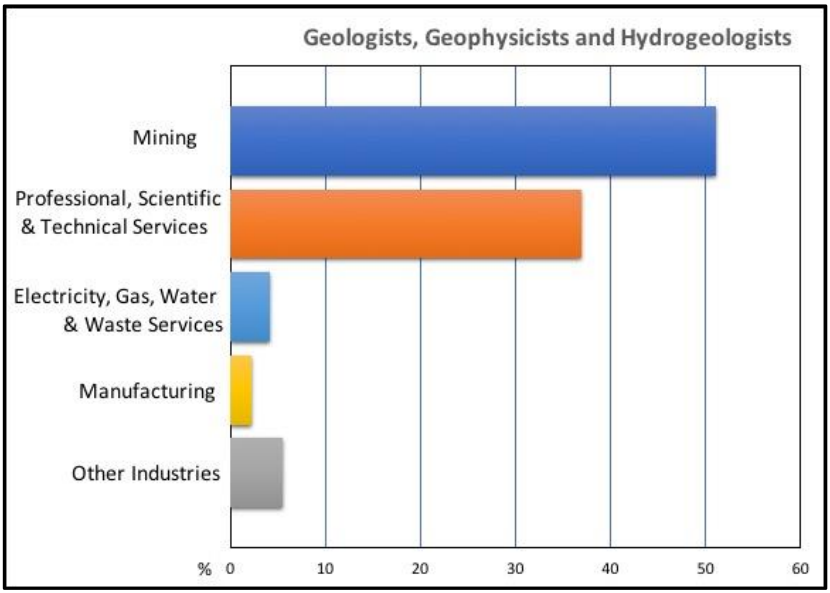
Careers in Geology and Geophysics

School of Geosciences, Faculty of Science

THE UNIVERSITY OF SYDNEY

Careers in Geology and Geophysics

Q: Are all Geologists employed in Mining?
A: No, there are many career paths available.



- Job Outlook Australia

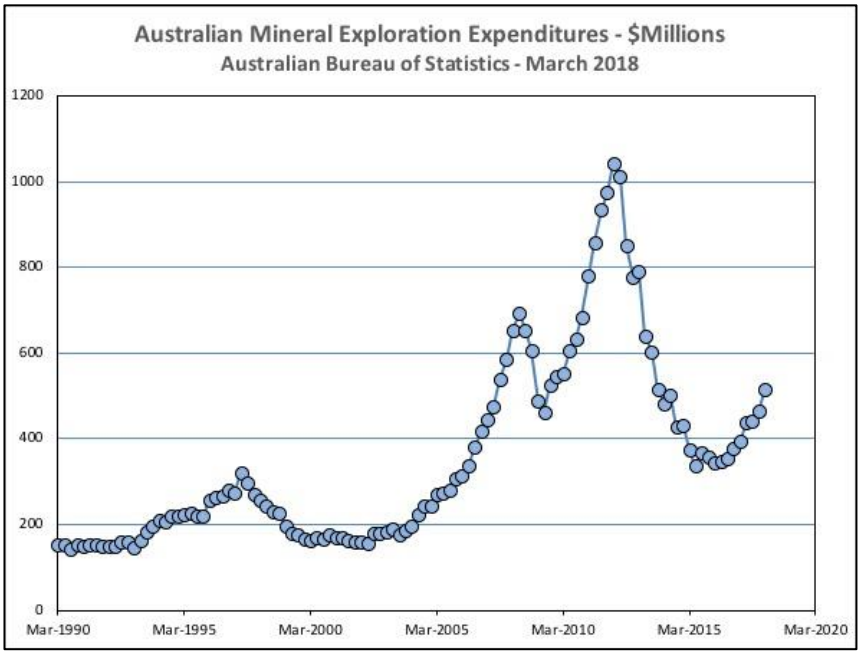
Why Geologists chose their jobs:

Australian government Job Outlook surveys say that Geology professionals:

- value independence and are results oriented.
- want to fully use their strongest abilities and welcome the potential to get ahead based on their achievements.
- enjoy jobs that involve ideas, searching for facts and figuring out problems.
- appreciate the steady flow of interesting work and the ability to try out their own ideas.
- Have the ability to derive general rules from lots of detailed information and come up with different ways of grouping things.
- acquire and work with data that involves dedicated computer software.

Are there geology jobs now that the "Mining boom" is supposedly over?

Yes, there are. The "boom" was really only about exporting iron ore. Exploration expenditures (and related jobs) are on the rise again. As the resource industry hires more geologists, "geo-career" opportunities in other sectors are likely to also increase.



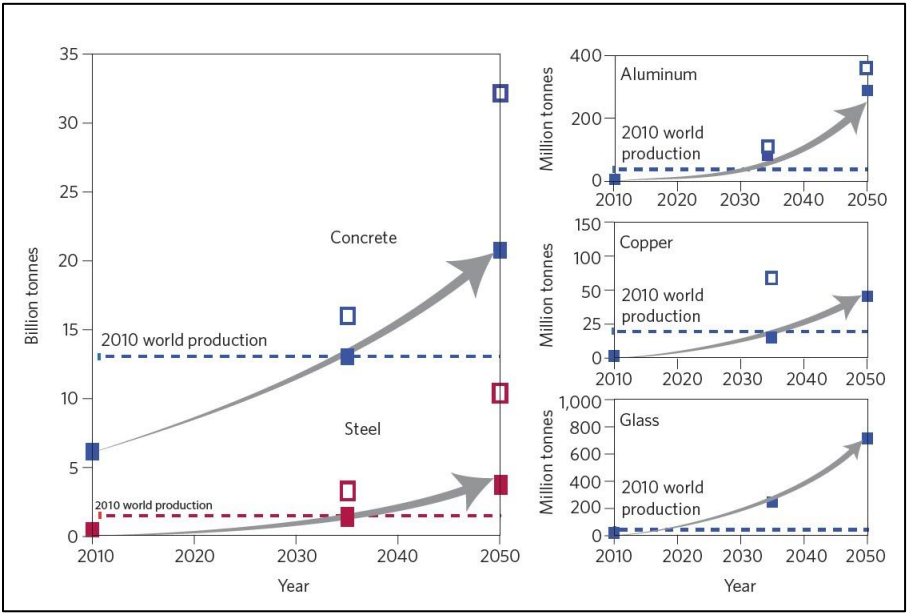
"*It is a very good time to get into the resources sector….and it appears that we are at a point now where we are able to pick and choose which jobs we want, much like during the mining boom*" – James Egan (1.5 years after graduating in Honours)

But what about Climate Change? Will we still need geologists?

Society will need *more* geologists to look for the environmentally and socially best sources of metals and to help address the effects of climate change. Geologic expertise is needed to protect our land, coasts and oceans. Geologists will need to quickly find the appropriate resources to enable rapidly developing new technologies but they must also find ways to provide greater quantities of traditional resources. As explained in an article from the journal Nature Geoscience (2013 v 6, 894-896) *Metals for a low-carbon society*, the replacement of carbon-based fuels alone will require massive allocations of traditional resources:

"for an equivalent installed capacity, solar and wind facilities require up to 15 times more concrete, 90 times more aluminium, and 50 times more iron, copper and glass than fossil fuels or nuclear energy."

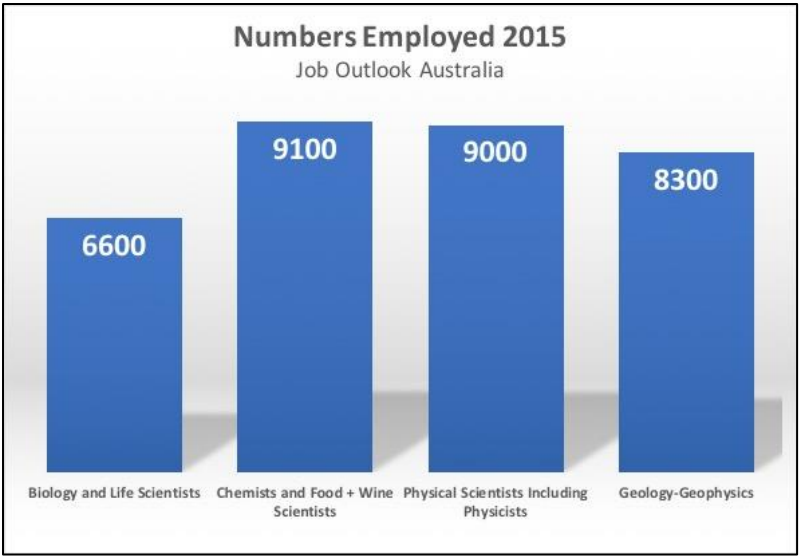
Raw Materials needed for Global Carbon-Free Energy by 2050 far exceeds present *total* annual production of these materials

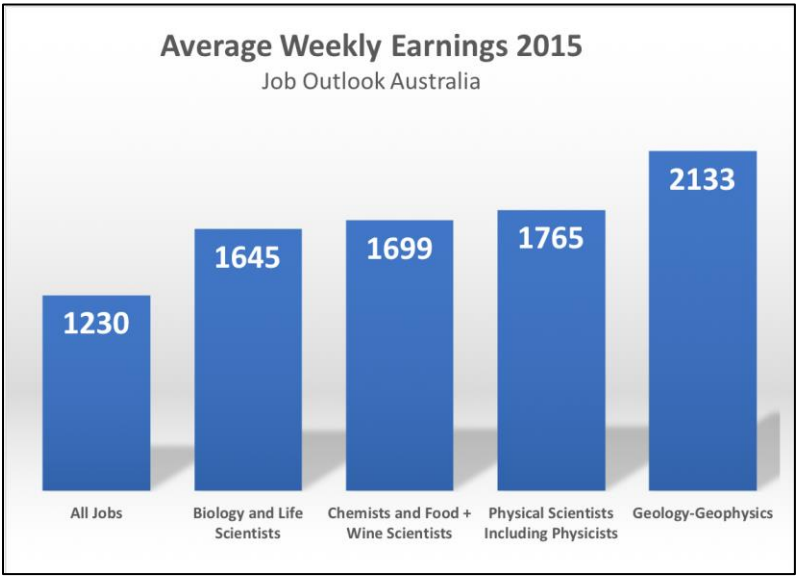


- Nature Geoscience 2013

How do Geoscience career prospects compare to other Science disciplines?

Only a relatively small number of University students choose a Geology or Geophysics pathway every year, but the most recent employment data demonstrate their importance to the Australian economy and their strong earning potential. Geoscience students can usually get jobs in the subject areas of their degrees. Note that the most recent data shown here comes from the 2015 "trough year" after the iron export boom moderated





What about the Future *inside* the Resource Industry?

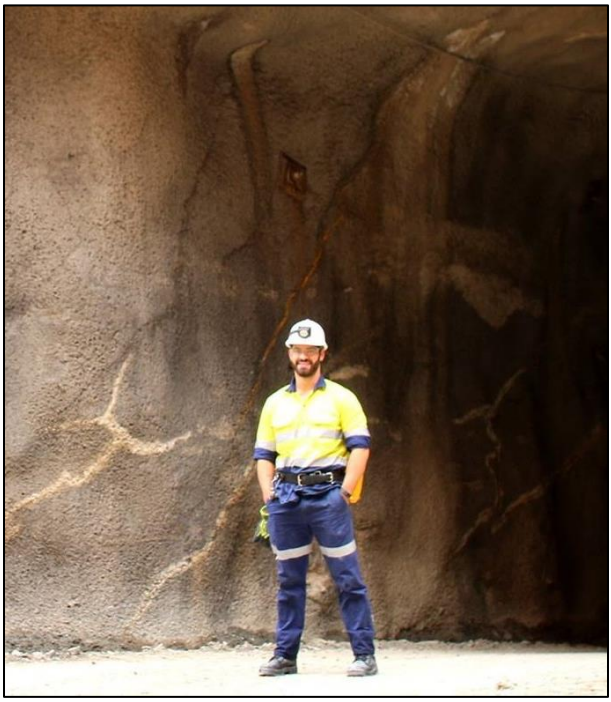
The Australian Mining News Paper (1/2/2018) endorsed predictions that the top 3 key new trends involve:

Bringing digital to life: data, and the ability to organise, manage, and process it, is rapidly becoming a competitive differentiator.

Overcoming innovation barriers: innovation is necessary for the industry to transform, and it isn't confined to technology; it includes the adoption of more innovative approaches to engaging with stakeholders, re-envisioning the future of work, and identifying the commodities that will be in greatest demand going forward.

The future of work: the adoption of digital solutions, such as robotic process automation, autonomous equipment, and artificial intelligence will augment performance in the mining industry……. Rather than eliminating jobs though, it will likely translate into concerted efforts to retrain people to use technology and redesign jobs at both the mine site and in the back office.

Introducing Some of Our Graduates



James Egan, Honours 2016: I am currently working as an underground Operations Geologist for Gold Fields at their St Ives Operation in Western Australia. The St Ives Operation is located approximately 80 kilometres south of Kalgoorlie and 630 kilometres east of Perth. The mine produces over 450,000 ounces of gold per annum, making it one of the leading gold producers in Australia.

My current role, both underground and in the office, focuses on Grade Control, where I work within a team to maximize recovery of the highest-grade ore. We use diamond drilling, core logging and underground mapping/sampling for the creation of our 3D mine models.

Overall, the various challenges and problems that we face in underground mining on a daily basis make it a very interesting and enjoyable career choice. There is lots of diversity in the role, with significant time spent both in the office and down in the underground workings. In addition, the 8 days on and 6 days off work roster enable a very enjoyable and healthy work/life balance.

My university degree focused on a Resource and Economic-Geology related Honours project that paved an excellent pathway to where I currently am in my career. It allowed me to build a strong conceptual framework of ore-deposit geology and also exposed me to real-world problems that industry geologists experience every day in their field of expertise.

Rakib Hassan, PhD, 2016: Soon after graduating with a Bachelor of Science (Applied Physics) in 2003, I had the great opportunity to work with geophysicists. While working with scientists at the University of Melbourne, Monash and Caltech (USA), I developed scientific software to better understand processes, both shallow and deep within the Earth's interior, that shape the Earth's surface. I had completed a Bachelor and a Master of Science degree at RMIT and Macquarie University, respectively, prior to commencing my studies at the University of Sydney.

I was privileged to be a part of the dynamic and renowned EarthByte research group, which is engaged in cutting-edge research in the fields of Plate Tectonics and Deep Earth Dynamics. Being a part of this group, I was able to collaborate with researchers at leading institutions, e.g. Caltech (USA), and develop novel ideas that helped shape my thesis work. I also had the amazing opportunity to run large computer models, simulating deep Earth processes, on the largest supercomputer of the southern hemisphere, Raijin. I am currently employed at Geoscience Australia as a Scientific Computing Specialist, where I develop computationally intensive workflows for processing various geophysical datasets on a national scale. Although we cannot directly measure physical quantities and observe processes deep within the Earth, geophysicists are continually developing newer and innovative methods of inferring deep Earth structure and processes that drive large scale motion such as plate tectonics. It is immensely rewarding to be a part of this journey in which the secrets of the deep Earth are incrementally revealed.

Rosemary Elkington, Honours 2007: I'm a Mine Geologist at Olympic Dam, South Australia. I've been there for three years, primarily carrying out underground mapping, planning drill holes for optimal near mine exploration, managing drillers, training new grad geos, modelling Copper distribution, and of course logging.

I'm on 7 days on, 7 days off roster, which is pretty good. I have good music, podcasts and movies to watch to pass my free time on site. My partner, two dogs and cat live in Orange. He works as a Geologist at a little company just south of the Cadia mine.

Economic Geology was a great career choice. It gave me a good reason to travel to places that people wouldn't ordinarily go to. I have been to many remote and pristine places around Australia and met some really interesting, good local people, which I've enjoyed.

Balraj Hansra, Honours 2010: I am currently a Study Lead with BHP working on the South Flank project, based in Perth. My main responsibilities are to ensure that we provide our shareholders with the highest value option set. I work on areas such as enhancing capital productivity, investment analysis and project managing a set of stakeholders to deliver a successful study for the business which will create sustainable value for our shareholders. Working with a group of highly dedicated & passionate professionals on a challenging project has been the highlight in my current role. The most rewarding part is to collaborate with a broad group of stakeholders to solve a complex challenge to ensure we add sustainable business value for our shareholders whilst ensuring we have safety at the forefront of our minds. The role is constantly changing and presents a new challenge everyday – I really enjoy the fast pace of my role. Being in a role where I can sustainably add business value through solving complex challenges whilst ensuring that we are still making a difference to society, is a key priority for me. I am lucky to be in that opportunity right now.

Lena O'Toole, Honours 2017: I am a Graduate Mine Geologist at Mount Isa Mines (Glencore). I work on a 7:7 roster at George Fisher underground zinc-lead-silver mine where my main responsibilities include: geological and geotechnical core logging, utilising and interpreting geochemical assay data, grade control, underground mapping and sampling, geological modelling and analysis using Surpac and use of Siro Vision data to aid in geological interpretations. I previously worked (and will again) as an exploration geologist utilising geochemistry, exploration geophysics and geology to target mineral exploration.

Working in Mount Isa, it's exciting to be the first person viewing rocks, structures and formations from approx. 1.6 billion (YES BILLION) years ago and I get paid to do it! I have so many geology related aspirations and am determined to aspire to them all! No surprise to anyone who knows me; my ultimate career and life goal is to work/conduct research in Antarctica. Geology is so diverse that for now, I aim to gain as many valuable geological skills and experiences as I can – field work, research, exploration, geochemistry, marine geology research voyages and of course palaeontology. I will undertake a PhD in the future, but first I want to concentrate on my industry career.

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