MONASH University

MONASH
EARTH, ATMOSPHERE AND ENVIRONMENT

monash.edu/earth-atmosphere-environment

GROUP OF EIGHT AUSTRALIA

EARTH, ATMOSPHERE AND ENVIRONMENT

Studies in Earth, Atmosphere and Environment encompass the whole Earth system, from the core of the Earth to our planet's atmosphere.

If you love science you are invited to apply your passion and study in the School of Earth, Atmosphere and Environment (EAE) at Monash.

WHERE WILL YOUR STUDIES TAKE YOU?

EAE will qualify you for many exciting careers as future leaders in applied or fundamental science, in industry or academia.

Earth Scientists earn some of the highest graduate salaries, even higher than Medicine, Law and Economics (source: www.graduatecareers.com.au).

YOUR CAREER NETWORK

We have our eye on your future and we work collaboratively with industry so our students develop an early link with real-world problems.

EAE has links with employers including the Bureau of Meteorology, Melbourne Water, Snowy Hydro, Hydro Tasmania, ESSO, Rio Tinto, Mount Isa Mines, MMG, AusIMM, Navarre Minerals, Agnew Gold, ANSTO, MTEC, Shell International, Geoscience Australia, Victorian Department of Land, Water and Planning, Victorian Department of Economic Development, Jobs, Transport and Resources, and a number of Co-operative Research Centres.

Some career options include

- Weather and climate prediction
- Environmental management and consulting
- Resource, energy and finance sectors
- Agriculture sector, including agribusiness
- Emergency services
- Data analytics
- Research and development
- Government agencies
- Risk management
- Science communication and education
- University sector
- Mineral exploration and mining

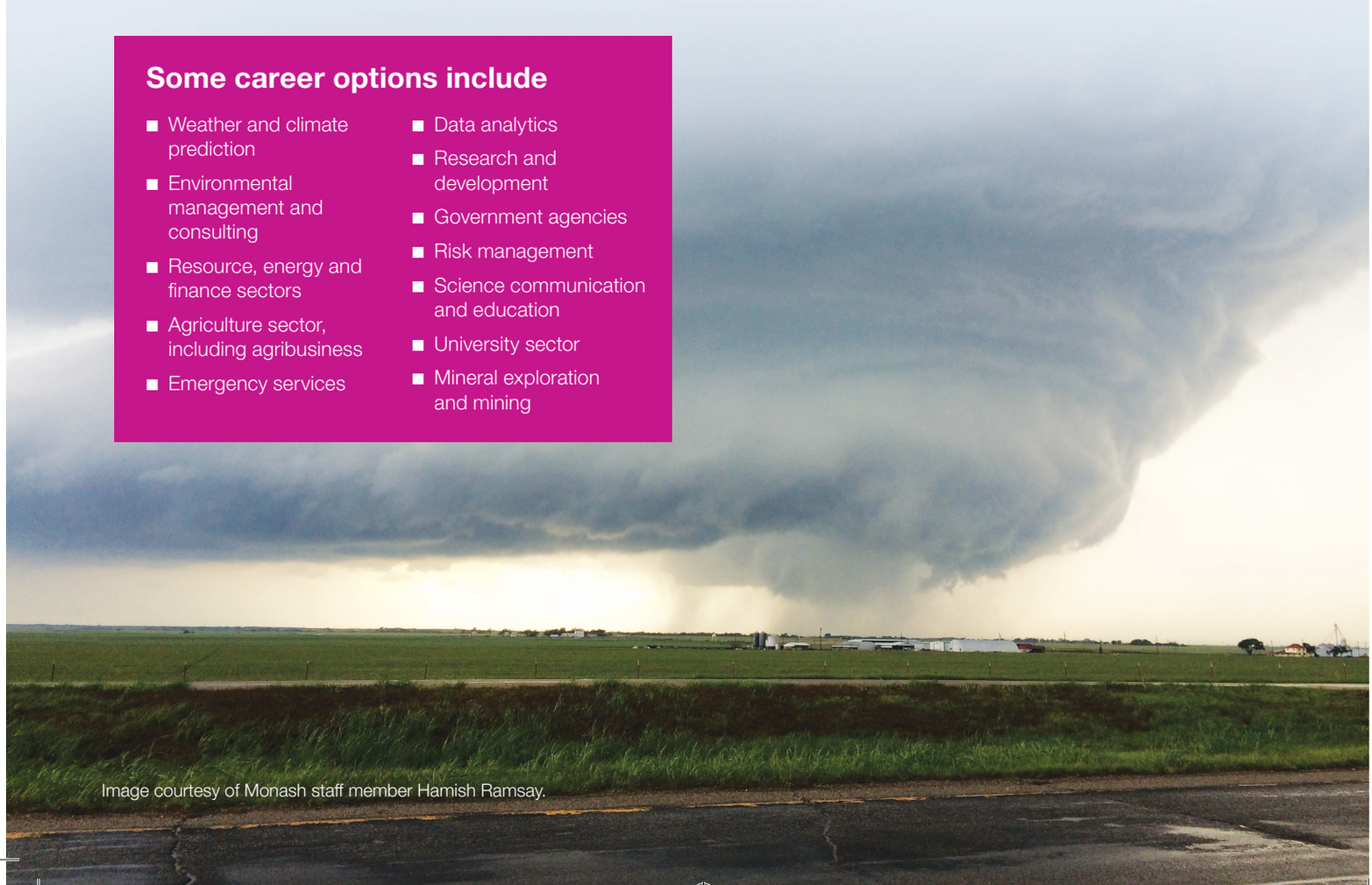


Image courtesy of Monash staff member Hamish Ramsay.

WHAT YOU'LL STUDY

In 2018 the majors offered are Earth Science (consisting of 3 streams), Atmospheric Science, and extended majors in Earth Science and Geographical Science. There are also many electives to choose from. Environmental and climate units offered by EAE also form part of the Environmental Science extended major managed by the School of Biological Sciences. For further details about the units you will study, as well as the electives available, visit the handbook: **monash.edu/pubs/handbooks**.

TO SHAPE OUR WORLD FOR A SUSTAINABLE FUTURE, YOU NEED TO KNOW HOW IT WORKS.

Majors	First year units	Brief description
Earth Science The Earth's Physical Environment The Earth's Climate Geosciences	**EAE1011:** Earth Atmosphere and Environment 1 **EAE1022:** Earth Atmosphere and Environment 2 Elective **SCI1300**	Earth Sciences is a broad discipline that addresses the major processes that have shaped our planet over time and continue to pose natural hazards to society, but also provide resources that we need to sustain a modern society. You will learn about geological processes (plate tectonics, basin formation, volcanology, earthquakes, and the formation of ore deposits); the Earth's physical environment (such as rivers, groundwater, soils, and landscapes) and the interaction of physical systems with the biosphere; and the Earth's climate and how we understand and predict natural and anthropogenic climate change.
Atmospheric Science	**EAE1011:** Earth Atmosphere and Environment 1 **EAE1022:** Earth Atmosphere and Environment 2 Elective **SCI1300**	Atmospheric Science is an interdisciplinary science that draws on the strengths of Environmental Science, Applied Mathematics and Physical Geography. It also applies concepts derived from Physics and Chemistry. Atmospheric Science explains how the weather and climate system works, from a gust of wind to global-scale climate change. Weather and climate are both critical to understanding the natural environment and how it is changing with human influence.
Geographical Science	**ATS1310:** Extreme Earth! Elective **ATS1309:** The Global Challenge **EAE1022:** Earth Atmosphere and Environment 2 Elective **SCI1300**	Geographical Science is the interdisciplinary study of understanding how natural and human processes affect our planet including soils, vegetation, water, landforms and climate throughout time. You will learn to analyse and synthesise complex environmental, economic, social and political information to enable a geographical understanding of humans, environments and the planet.

What you'll study in first year

EAE1011: Earth Atmosphere and Environment 1

Provides an introduction to the science involved in studying the Earth, including explanations of how and why our planet has changed since its formation 4.56 billion years ago. We will study the formation, history and anatomy of the Earth and the processes that drive change within our planet and its environmental systems, from the formation of the core to its crust, to the systems driving and sustaining the planet's living surface to the forces and processes involved in the formation of mountains and oceans, and our changing atmosphere and climate.

EAE1022: Earth Atmosphere and Environment 2

This unit will expand your knowledge of the environmental, geological and atmospheric processes that create the unique physical environment in which we live, and will demonstrate how these processes influence our lives from the provision of resources to natural disasters. You will examine how and why the Earth's surface, atmosphere and vegetation have changed in the past, and are predicted to change in the future, as a result of human influences such as deforestation, agricultural practices and human-induced climate change.

ATS1310: Extreme Earth!

This unit will focus on the catastrophes of our world today, such as droughts, earthquakes, epidemics, fires, floods, hurricanes, landslides, tsunamis and weather extremes. It seeks to understand the mechanics and dynamics of these environmental phenomena and how they interact with the social contexts in which these disasters occur. We will also investigate the role of international aid and risk management using local and international case studies.

ATS1309: The Global Challenge (Elective Unit)

What can you do in a world that is challenged by questions of poverty, environmental degradation, social inequality and economic exclusion? Insight is gained into the new and emerging forces of social, economic and environmental change. The unit examines how changing population and migration dynamics, urban development, patterns of consumption and growth, and labour markets intersect at local, national and global scales.

SCI1300: Climate Change: From Science to Society (Elective Unit)

This unit provides the scientific background to climate change, and assesses the environmental and societal impacts, and community and political responses to climate change. Starting from the basic principles and processes that define and govern the Earth's climate, the unit explores how the different spheres on Earth interact to produce the rich past and current variability of climate in space and time and how human influences are shaping the future of the Earth's climate. The unit investigates what options humankind has to respond to the economic, ethical and political challenges of climate change, including global and national governance models required to mitigate and adapt to its effects. The unit will provide students with the foundation and knowledge to respond to climate change challenges throughout their career, independent of their specific discipline.

UNIQUE LEARNING SPACES

In 2018, you will be taught in the award-winning 'Monash Earth Sciences Garden' and be among the first students to use our amazing Monash Rocks Augmented Reality App.

The app will transport you back in time to oceans brimming with now-extinct fauna that existed 410 million years ago. Download now from iTunes to preview.

Our state-of-the-art teaching laboratories and practical classes are also complemented by innovative field experiences. Some of the places you can visit include the volcanic plains of western Victoria, the You Yangs, Cape Liptrap, the Otway and Gippsland coasts, Wilsons Promontory and Lake Eildon in Victoria; and Broken Hill and Bermagui in New South Wales. We also have a field unit based in Italy in the Cinque Terre, Liguria.

As a student, you have the opportunity to accompany senior researchers on fieldwork expeditions, to places including Antarctica and Africa. In addition, you can also take part in a student exchange programs with other Universities across North America, UK and Europe.

APPLY YOUR PASSION FOR ALL SCIENCES

CHEMISTRY OF THE EARTH

The first chemists were geochemists. Studying geochemistry will give you an understanding of the building blocks of our planet, from minerals to mountains and from our ever changing environment to the beginning of our solar system.

Geochemistry has many applications in industry and scientific research. At EAE we study the chemistry of rocks, sediments, soils and waters so we can expand our understanding of our environment, how and when rocks or ores form, and processes to make use of geo-materials.

BIOLOGY OF THE EARTH

Combine your love of Biology with Earth Science to understand how life and planets develop together. The biology of the Earth embraces the investigation of all life (animals, plants, microorganisms) and its dynamic ecosystems, from our first record of fossils ~3.7 billion years ago to the present.

By studying the Biology of the Earth, you'll examine how and why ecosystems move and change. You will search for signs of early life in the far reaches of the planet through fossil records, painting a vivid picture of ancient and unfamiliar worlds. You'll also learn how plants and microorganisms can restore damaged and contaminated environments and how life in extreme environments on Earth informs our ongoing search for biology elsewhere in our Solar System.

PHYSICS OF THE EARTH

Did you know that the Earth behaves as one big magnet?

Have you ever considered that the Earth's resources are a consequence of the interaction between the deep mantle interior of the Earth and the movement of thin plates that form the skin of the Earth? These same plate movements are responsible for many of the natural disasters that affect modern society.

By studying the Physics of the Earth in the School of Earth, Atmosphere and Environment, you will be able to understand the world you live on and what lies below our feet. You can use your curiosity to become part of one of the great scientific challenges – how we manage our magnificent planet and its natural resources for future generations.

GEOGRAPHY AND ENVIRONMENT

Physical, chemical and biological processes have worked together to make the surface of our planet what it is today. But how do these landscapes form and how and why do they change? You can find out by studying Geographical Science.

You'll learn about the processes that form characteristic climates, move water and influence water quality, impact soil fertility which affects how we grow food, restore forests after a fire and use advanced spatial mapping tools to identify these changes.

You'll also discover how we can use this knowledge to understand human interactions with the land, water and atmosphere and how we can best manage Earth's precious resources.

PHYSICS OF THE ATMOSPHERE

Ever wondered why we can make accurate weather forecasts? Do you want to know how a tornado works? What does the science really say about human-induced climate change?

The answers lie in physics, and every day you are witnessing it in action in our atmosphere! By studying with EAE, you will be able to understand how the atmosphere works to make our weather and climate. You will learn the skills to do anything from weather forecasting, to untangling the intricacies of climate science for decision making in an era of human-induced climate change.

NATURAL HAZARDS

SUSTAINABLE RESOURCES

PRESERVING ECOLOGY

WEATHER PREDICTION

WATER AND FOOD SUPPLIES

CLIMATE CHANGE

RESEARCH SNAPSHOT

The School of Earth, Atmosphere and Environment has an extensive and highly successful research program with research strengths in Atmosphere and Climate, Geography and Environment and Solid Earth. You can become part of our vibrant research community and undertake an Honours, Masters or PhD, being mentored by some of Australia's best scientists.

SOLID EARTH

Solid Earth Research focuses on Structure and Dynamics of the Earth's Crust, Simulation of Earth's Processes, Minerals Metals and Energy and Deep Earth and Planetary Science.

GEOGRAPHY AND ENVIRONMENT

Geography and Environment research includes water resources, human impact on the planet, climate, soils, protecting living landscapes, environmental change, GIS and remote sensing.

ATMOSPHERE AND CLIMATE

Atmosphere and Climate focuses on weather climate and oceans. You can research clouds, climate change, bushfires, oceans, tornadoes, cyclones and the physics and maths driving weather and climate.

"My PhD project can help to determine how climate change will affect Melbourne and its residents and how dangerous future heatwaves will be."

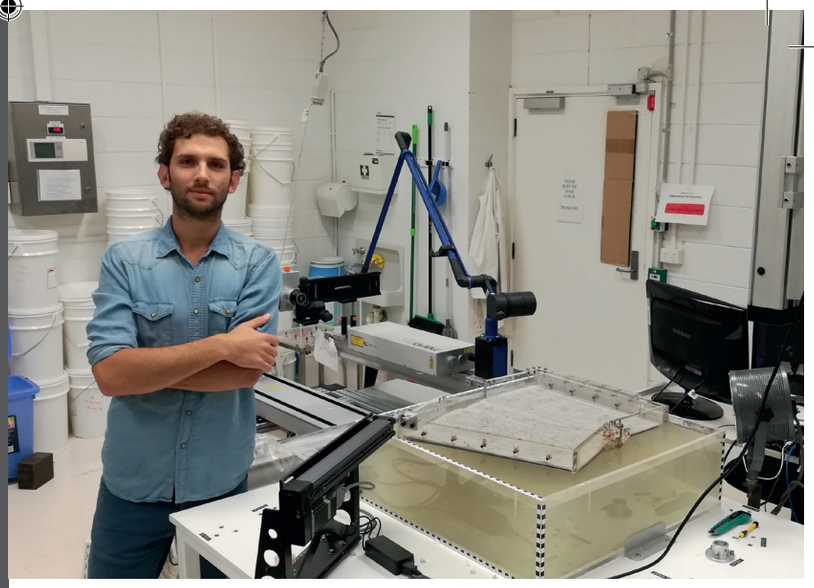
STEPHANIE JACOBS

PROJECT: REDUCING URBAN HEAT DURING HEATWAVES TO CREATE A MORE COMFORTABLE CITY

PHD CANDIDATE: STEPHANIE JACOBS

I study urban climate, climate change and their impacts on human health. More specifically, I research how to cool cities during heatwaves by painting roofs white to reflect away sunlight and planting gardens to create a more comfortable urban environment.

I do this by using a supercomputer to model the current and future climate of Melbourne. This gives me an idea of how climate change will affect Melbourne and its residents and how dangerous future heatwaves will be. My dream job would be to work at the Bureau of Meteorology as a climate scientist or as a climate change consultant.



"My PhD has provided me the opportunity to work in one of the best equipped labs in Australia. I have presented at conferences and met different people from across the globe. I discovered that teaching and communicating science is my passion. But above all, I'm happy because I wake up every morning knowing that I am doing what I like the most. It's the best decision I have ever made."

NICOLAS MOLNAR

My PhD project focuses on what happens when continents break apart. The outermost layer of our planet is broken up into rigid fragments known as tectonic plates which are constantly moving in different directions, but at very slow speeds, so it takes millions of years to see the result of their movement. That's why I use a cool method to speed up the process, from millions of years to just a few hours.

I have built my own miniature tectonic plates in a laboratory, by mixing different materials, which physically simulates natural processes. I stretch my model tectonic plates with a purpose-built apparatus until they fail and break. This simulates continents breaking apart and new oceans forming in between.

This method is very adaptable so it's fantastic to test different hypotheses. By comparing my results and interpretations with natural cases I can help understand very complex processes. Knowing more about the evolution of continents breaking up can be very important, not only to estimate where certain resources are located, but also for predicting the (distant) future of our planet.

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Further information

monash.edu/earth-atmosphere-environment

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