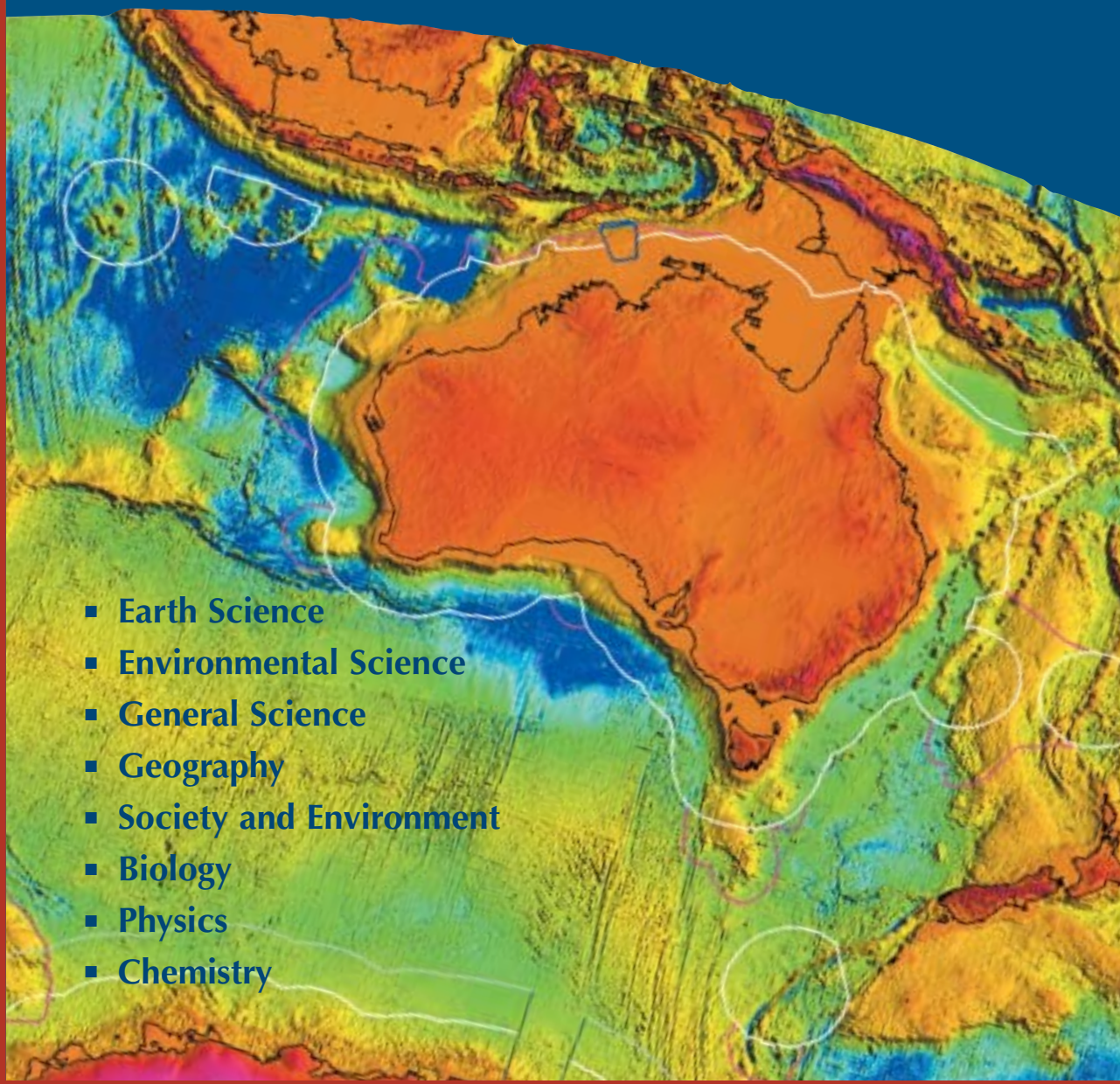
GEOSCIENCE Australia

Earth Science Education Resources

Complete catalogue of teaching resources from Geoscience Australia



- Earth Science
- Environmental Science
- General Science
- Geography
- Society and Environment
- Biology
- Physics
- Chemistry

GEOSCIENCE AUSTRALIA

SPATIAL INFORMATION FOR THE NATION

Natural Hazards

Australian Natural Hazards kit

Year level: – Primary 5-6
– Secondary 7-8

Description: Developed in consultation with Emergency Management Australia (EMA) this map kit defines the major hazards affecting Australia; severe storms, cyclones, earthquakes, tsunamis, landslides, volcanoes, bushfires, droughts and floods and shows their spatial distribution. A plate tectonics map provides a greater understanding of geohazards. This kit helps students and teachers to recognise the risks from different natural hazards and practical steps we can all take to reduce their effects.

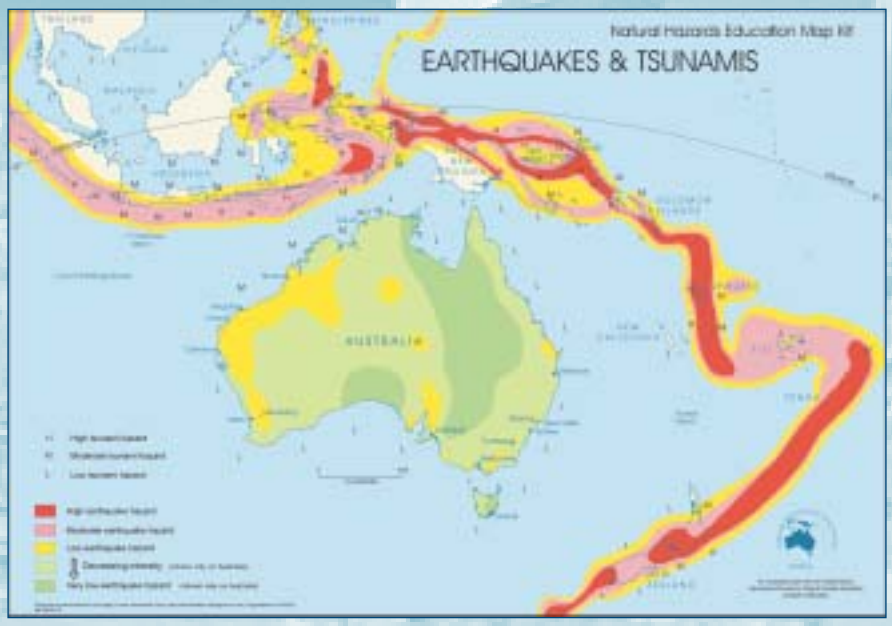
Format:
– 8 colour A3 poster maps with descriptive text
– 8 blackline A4 map masters
– background information on each hazard
– student activities
– EMA hazard action cards

Australian earthquakes image set

Year level: – Primary 5-6
– Secondary 7-12

Description: Newcastle's earthquake of December 1989 was Australia's worst in 200 years of recorded history, causing 13 deaths and $1,300 million damage. Australian Earthquakes examines the threat of earthquakes, how that threat is evaluated and mitigated and includes images of earthquake damage and maps of plate boundaries, Australia's seismic hazard and the location of earthquake epicentres. Also includes seismic traces from actual events.

Format: – CD-Rom or set of 15 slides (each with explanatory notes)



Earthquakes

Year level: – Primary 6
– Secondary 7-8

Description: What are earthquakes and how are they caused? How do we locate and measure earthquakes? Where were the world's most destructive earthquakes and how do they compare to Australia's worst earthquakes? This informative booklet includes maps of Australian earthquakes and Australia's seismic risk. Explore important concepts about earthquakes using practical student activities.

Format: – 52 page booklet
– 4 activities with photocopiable masters
– suggested answers

Tsunami!

Year level: – Secondary 7-10

Description: Australia is on the Pacific Rim, a danger zone for tsunamis – on average Australia experiences one every two years and we should educate our students about the risk from this natural hazard. Find out where tsunamis occur, what causes them and how we measure their size. Identify signs of an approaching tsunami and what warning systems exist. Carry out practical activities that reinforce key concepts about tsunamis.

Format: – 36 page booklet
– 3 activities with photocopiable masters
– suggested answers

Volcanoes

Shield Volcano 3D model

Year level: – Primary K-6
– Secondary 7-10

Description: Make your own model of a gently sloping, broad Hawaiian-style shield volcano built up from fluid, runny lavas. Great to compare with the classic stratovolcano model and include in discussions about Australia's own shield volcanoes!

Format: – class set of 30 A4 paper models

Australian Volcanoes image set

Year level: – Primary 5-6
– Secondary 7-10

Description: Learn about the eruption history of Australia's hot spot volcanoes over the last 60 million years. What caused Australia's recent volcanism? Does Australia have any active volcanoes? Predict Australia's next volcanic eruption - you might be surprised! These images compare the causes and characteristics of volcanoes worldwide with those in Australia. It also highlights nine Australian volcanoes, explaining their eruption history and characteristics.

Format: – CD-Rom or set of 15 slides (each with explanatory notes)

Volcanoes

Year level: – Primary 5-6
– Secondary 7-10

Description: *Volcanoes* is an invaluable resource for teaching Science, Geography and SOSE. This booklet covers a wide range of issues. Where are active volcanoes found and why? What types of volcanoes exist? What dangers do volcanoes pose? What causes volcanic eruptions and what different materials are produced? Learn how hot spots influenced Australia's volcanic past. Can volcanoes benefit people? Activities cover the science of eruptions and their impact on people including a realistic scenario where students are a scientific monitoring team for a hazardous volcano.

Format: – 60 page booklet
– 3 activities with photocopiable masters
– suggested answers

Volcanic Hazards image set

Year level: – Primary 5-6
– Secondary 7-10

Description: Produced in conjunction with the American Geophysical Union and the United States Geological Survey, this set of 20 images shows the worldwide distribution of volcanoes and their link to plate tectonics. Observe volcanologists at work and their methods for studying volcanoes. Examine characteristics, products and examples of eruption types. Includes attempts to mitigate hazards associated with volcanoes. Includes 1981's Mount St. Helens eruption.

Format: – CD-Rom or set of 20 slides (each with explanatory notes)

Stratovolcano 3D model

Year level: – Primary K-6
– Secondary 7-10

Description: Stratovolcanoes are classic, steep sided volcanoes that can erupt explosively, such as Mount Fuji. Help to bring volcanoes to life in your classroom with this simple, stratovolcano model. Students can examine a volcano's inner structure, plot the path of surface lava flows and see the risks faced by local towns.

Format: – class set of 30 A4 paper models

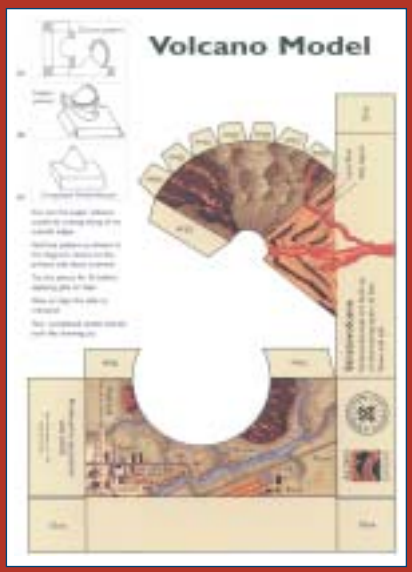


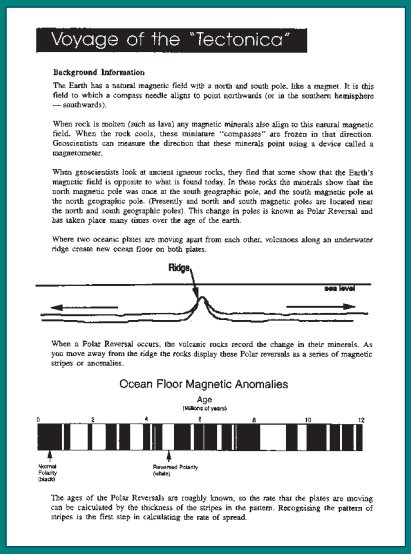
Plate Tectonics

Plate Tectonics

Year level: – Secondary 7-12

Description: Unsure about plate tectonic theory? This classic booklet reviews the internal structure of the Earth, the theory of plate tectonics and the different types of plate margins. Examine the evidence for plate tectonics such as fossils, geological structures, earthquake patterns and patterns of sea floor magnetic anomalies. Includes activities where students map plate boundaries, model a mid-ocean ridge and demonstrate the development of new sea floor crust. Investigate the geological development of 'Tectonicland'.

Format: – 56 page booklet
– 5 activities with photocopiable masters
– suggested answers


Voyage of the "Tectonica"

Background Information

The Earth has a natural magnetic field with a north and south pole, like a magnet. It is this field to which a compass needle aligns to point northwards (or in the southern hemisphere — southwards).

When rock is molten (such as lava) any magnetic minerals also align to this natural magnetic field. When the rock cools, these miniature "compasses" are frozen in that direction. Geoscientists can measure the direction that these minerals point using a device called a magnetometer.

When geoscientists look at ancient igneous rocks, they find that some show that the Earth's magnetic field is opposite to what is found today. In these rocks the minerals show that the north magnetic pole was once at the south geographic pole, and the south magnetic pole at the north geographic pole. (Presently and north and south magnetic poles are located near the north and south geographic poles). This change in poles is known as Polar Reversal and has taken place many times over the age of the earth.

Where two oceanic plates are moving apart from each other, volcanoes along an underwater ridge create new ocean floor on both plates.

Ridge

sea level

When a Polar Reversal occurs, the volcanic rocks record the change in their minerals. As you move away from the ridge the rocks display these Polar reversals as a series of magnetic stripes or anomalies.

Ocean Floor Magnetic Anomalies

Age
(Millions of years)

0 3 4 7 8 10 12

Normal Polarity (black)

Reversed Polarity (white)

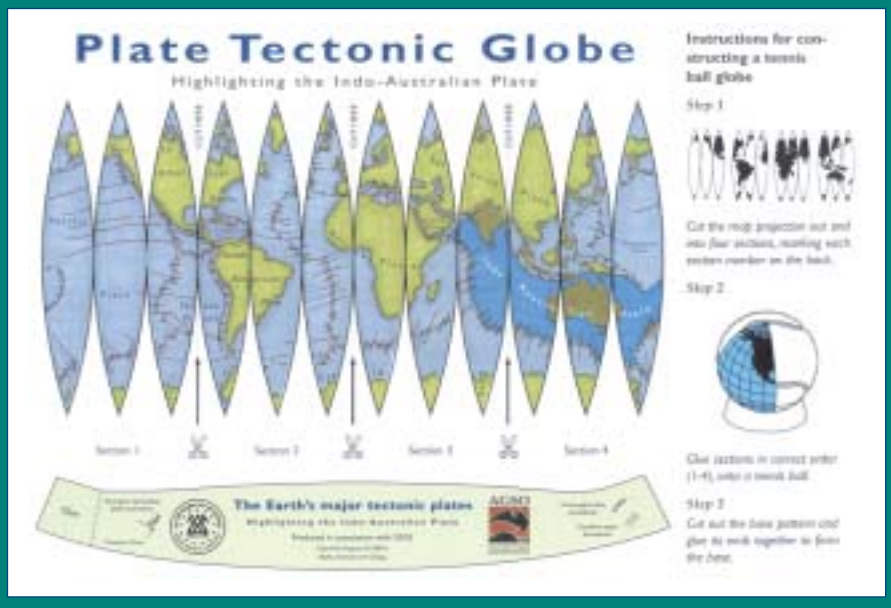
The ages of the Polar Reversals are roughly known, so the rate that the plates are moving can be calculated by the thickness of the stripes in the pattern. Recognising the pattern of stripes is the first step in calculating the rate of spread.

This Dynamic Earth: the story of Plate Tectonics

Year level: – Secondary 7-12

Description: Published by the Unites States Geological Survey, this comprehensive book is a thorough review of plate tectonics theory. Excellent colour graphics and clear, detailed text describe the fundamental concepts of this dynamic Earth on which we live. Individual essays review the major contributions to the plate tectonic theory. This book covers a wide range of topics such as deep ocean vents, magnetic anomalies, sea floor spreading, magnetic pole reversals, Australia's polar dinosaurs, earthquake distributions, developing rift valleys and the range of plate margins. It also describes the effects on people of natural hazards due to plate tectonics. A must for every secondary school!

Format: – 78 page full colour book



This Dynamic Planet poster map

Year level: – Secondary 7-12

Description: Are you searching for a way to help your students understand where and why tectonic events occur on Earth? This comprehensive poster maps the Earth's continents and plate boundaries. Also locates extinct, dormant and active volcanoes, the size, depth and location of modern earthquakes of magnitude 4.0 or greater, and the direction and speed of plate movements. For display in your classroom all year round!

Format: – large 104 x 141 cm colour poster map, folded

Plate Tectonic Globe 3D model

Year level: – Primary 5-6
– Secondary 7-12

Description: A flat plate tectonic map can be difficult for students to comprehend. Plate tectonics makes much more sense to your students using this innovative 3D model. Construct actual globes that show the location of major plate boundaries and highlight our own Indo-Australian plate. A simple, yet practical resource for teaching about our active Earth.

Format: – class set of 30 A4 paper models

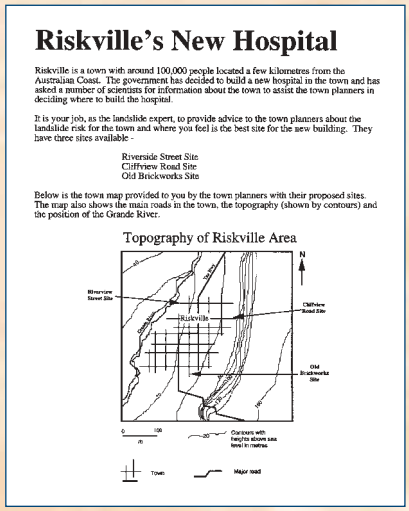
Landslides

Landslides

Year level: – Secondary 7-12

Description: Did you know landslides in Australia have killed more people than earthquakes? Sudden landslides devastate the landscape, people and property. Encourage your students to understand landslide hazards and how to reduce their risks using this booklet of informative activities. Learn about the signs of past and potential landslides, check the causes of slides, investigate property insurance in risk areas, and carry out a practical hazard assessment on Riskville using the local geology, hydrology, landuse and topography.

Format: – 44 page booklet
– 11 activities with photocopiable masters
– suggested answers



Riskville's New Hospital

Riskville is a town with around 100,000 people located a few kilometres from the Australian Coast. The government has decided to build a new hospital in the town and has asked a number of scientists for information about the town to assist the town planners in deciding where to build the hospital.

It is your job, as the landslide expert, to provide advice to the town planners about the landslide risk for the town and where you feel is the best site for the new building. They have three sites available -

Riverside Street Site
Cliffview Road Site
Old Brickworks Site

Below is the town map provided to you by the town planners with their proposed sites. The map also shows the main roads in the town, the topography (shown by contours) and the position of the Grande River.

Topography of Riskville Area

Landslide 3D paper models

Year level: – Primary 5-6
– Secondary 7-12

Description: Watch as the earth slides before your eyes! Study the movement of landslides and their effects using this interactive 3D model. See a hypothetical landslide's impact on natural and human landscapes. The straight-line movement of a landslide can be contrasted with that of the slump model.

Format: – class set of 30 A4 paper models

Australian Landslides image set

Year level: – Secondary 7-12

Description: The tragic impacts of landslides at Thredbo, Sorrento and Gracetown highlight the real dangers from landslides in Australia. This set provides vivid images of landslides, both large and small. The commentary describes the causes of landslides and other earth movements. Learn how people contributed to creating landslides and to minimising their impacts.

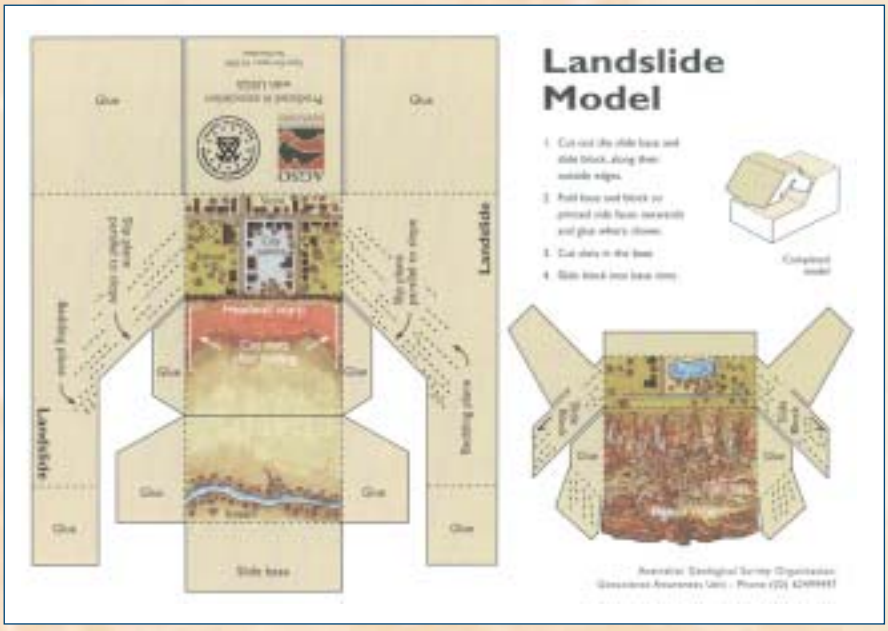
Format: – CD-Rom or set of 15 slides (each with explanatory notes)

Slump 3D paper models

Year level: – Primary 5-6
– Secondary 7-12

Description: Thredbo's two ski lodges were devastated by a slump! Show a slump's rotational motion using this interactive 3D model. See how the slump affects a nearby town and its infrastructure. A useful model to contrast with the straight-line movement of the landslide model.

Format: – class set of 30 A4 paper models



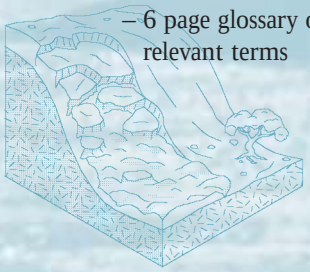
Australian Geology

Australia: evolution of a continent

Year level: – Primary 5-6
– Secondary 7-12

Description: This amazing publication fills a large gap in the literature. Sequential palaeogeographic maps summarise 590 million years of Australia's evolution into 70 time slices, from Cambrian through to Quaternary. Includes sections on geological time, plate tectonics, the break up of Gondwana, climate, sea level change, evidence for ancient environments and Australia's geological framework. See the extent of inland seas. Where and when was Australia volcanically active? In what environments did fossils form at different times? An invaluable reference for staff and students.

Format: – 96 page full colour book
– 70 palaeogeographic maps
– foldout legend
– 6 page glossary of relevant terms



Weathering and Erosion

Year level: – Primary 5-6
– Secondary 7-12

Description: Weathering, erosion and deposition are all around us. Without these processes we would not have mountains, river valleys, sandy beaches or even soil to grow food! This booklet outlines the different types of weathering, erosion and transport and utilises well known examples of the landscapes they form to enhance the understanding of these processes. Introduces the concept of regolith, an important new way of looking at, and mapping, the landscape.

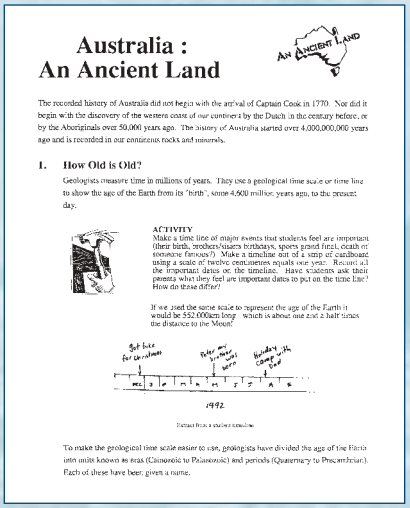
Format: – 50 page booklet
– 8 activities
– suggested answers

Australian: an ancient land

Year level: – Primary K-6

Description: Geoscience is fun! This resource includes simple introductions to concepts of geological time, timescales, dating, the movement of plates, Australia's past hot spot volcanoes, our only active volcano, ice ages, rocks, the formation of fossils and common fossils. Seven hands-on activities make geoscience fun: make your own 'fossils, erupt a volcano and find out when your school will be at the equator!

Format: – 18 page booklet
– 7 student activities



Australia :
An Ancient Land

The recorded history of Australia did not begin with the arrival of Captain Cook in 1770. Nor did it begin with the discovery of the western coast of our continent by the Dutch in the century before, or by the Aboriginals over 50,000 years ago. The history of Australia started over 4,000,000,000 years ago and is recorded in our ancestrous rocks and minerals.

1. How Old is Old?

Geologists measure time in millions of years. They use a geological time scale or time line to show the age of the Earth from its "birth", some 4,600 million years ago, to the present day.

ACTIVITY
Make a time line of major events that students feel are important (their birth, brothers/sisters birthdays, sports grand final, death or someone famous?). Make a timeline out of a strip of cardboard using a scale of twelve centimetres equals one year. Record all the important dates on the timeline. Have students ask their parents what they feel are important dates to put on the time line? How do these differ?

If we used the same scale to represent the age of the Earth it would be 552 000km long – which is about one and a half times the distance to the Moon!

1992

To make the geological time scale easier to use, geologists have divided the age of the Earth into units known as eras (Cainozoic to Palaeozoic) and periods (Quaternary to Precambrian). Each of these have been given a name.

Geology of Australia map

Year level: – Primary 5-6
– Secondary 7-12

Description: What lies beneath our feet? Explore the major geological regions with this large 1: 5,000,000 poster map. Explore why Western Australia is so hilly, why the 1850s gold rush occurred in southeastern Australia and where you would look for Jurassic and Cretaceous-aged dinosaurs? A perfect accompaniment to the book *Australia: evolution of a continent*.

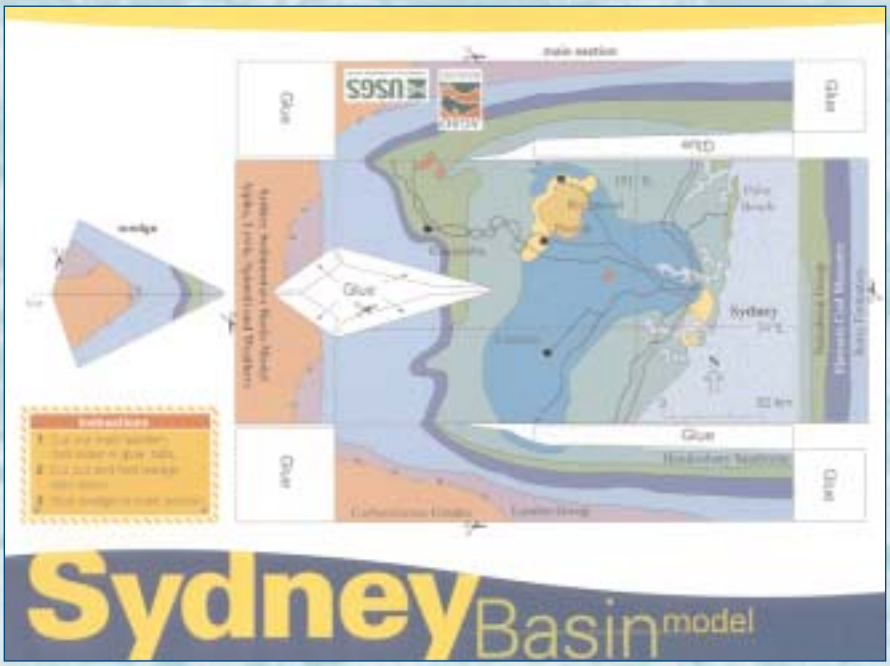
Format: – 1: 5,000,000 scale poster map

Sydney Basin 3D model

Year level: – Primary 4-6
– Secondary 7-12

Description: Create your own colour 3D model of NSW's Sydney Basin, a simple, revealing look at the major geology, stratigraphy and landmarks – extends westward from Sydney into the Blue Mountains beyond Katoomba. Shows major geological units; Carboniferous granite, Lambie Group, Berry Formation, Illawara Coal Measures, Narrabeen Group and Hawkesbury Sandstone. Help students visualise the underground geology in 3D with this easy to assemble model.

Format: – class set of 30 A4 paper models



What Is Geoscience Australia?

Geoscience Australia is Australia's premier geoscience agency. It is the Federal Government agency that undertakes research into a wide range of geoscience areas including:

- Geological mapping
- Topographic mapping
- Geophysical imagery
- Satellite imagery
- Geodesy
- Earthquake monitoring
- Hazard mitigation
- Regolith
- Petroleum and mineral assessment
- Petroleum and mineral systems
- Coastal research
- Definition of maritime boundaries

This work involves a range of science and technical specialists, including geologists, geochemists, geophysicists, surveyors, remote sensing experts, cartographers and database specialists.

Contact Us

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Celebrate Earth Science Week with us!

Geoscience Australia celebrates Earth Science Week throughout Australia. Get involved! Let us know what earth science activities you have planned leading up to, or during that week. Check out institutions near you to find out what they are doing to celebrate Earth Science Week. It's a great way to focus student interest in a fun and practical science!

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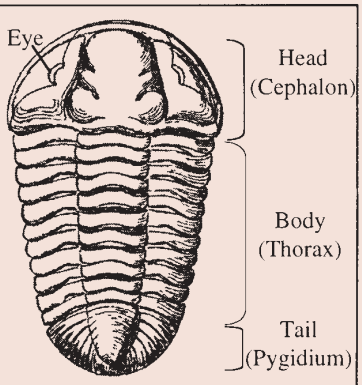
Activity: Trilobite Transformers

ARTHROPODS - Trilobites *(Ar-throw-pods tri-low-bites)*

Description

Like insects and other arthropods, trilobites had segmented bodies and legs. They were marine animals ranging in size from a few millimetres up to 72cm long.
Their bodies were divided into three sections, the head (cephalon), body (thorax) and tail (pygidium). Legs, which were not often preserved, extended below the shell.
Some trilobites, like insects, had highly developed compound eyes. These eyes were made up of a large number of calcite lenses that are often found perfectly preserved in fossils.



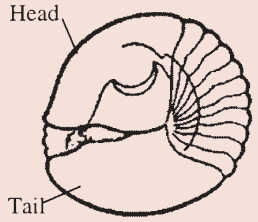
Trilobite structure (*Calymene*)

Time Period

The first trilobites evolved in the early Cambrian about 545 million years ago. All trilobites became extinct in the late Permian some 300 million years later.

Habitat & Lifestyle

Most trilobites lived on or near the sea floor from shallow to deep oceans. They either crawled along the sea floor and burrowed in the soft sediment, or swam freely in the water. Some trilobites rolled themselves up in a ball when attacked to protect their delicate under surface. Occasionally trilobite fossils are found in the rolled position.



A trilobite in the rolled position

Diet

Trilobites were predominantly filter feeders, living on small plants and animals in the water. Larger trilobites and especially those with good eyesight probably would have actively hunted bigger prey.

Fossilisation

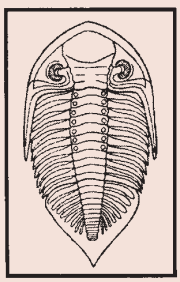
Trilobites can be found preserved as whole specimens or as parts of specimens, such as a head or tail.
Trilobites shed their exoskeleton as they grew like modern arthropods. In fact, most trilobite fossils are these cast off skeletons.

Variations on a Theme

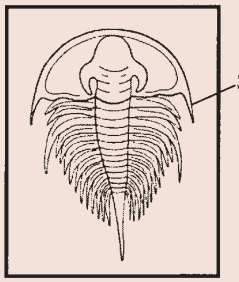
Geologists have described around 2000 different types of trilobites. The changing forms of trilobites during their time on Earth allows geologists to use them as "index fossils" for identifying specific periods in the Earth's history.

★ Did You Know? ★

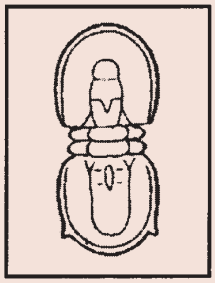
Some trilobites were left-handed! Trilobites shed their shells. In the process they often used the spine at the base of their head to anchor themselves while they split open and twisted out of their shell. It is possible to tell whether the trilobite used their left or right spike to do this.
Just like left handed humans, it turns out that about 10% of trilobites were left spined !


– *Dalmanites*

Olenellus –

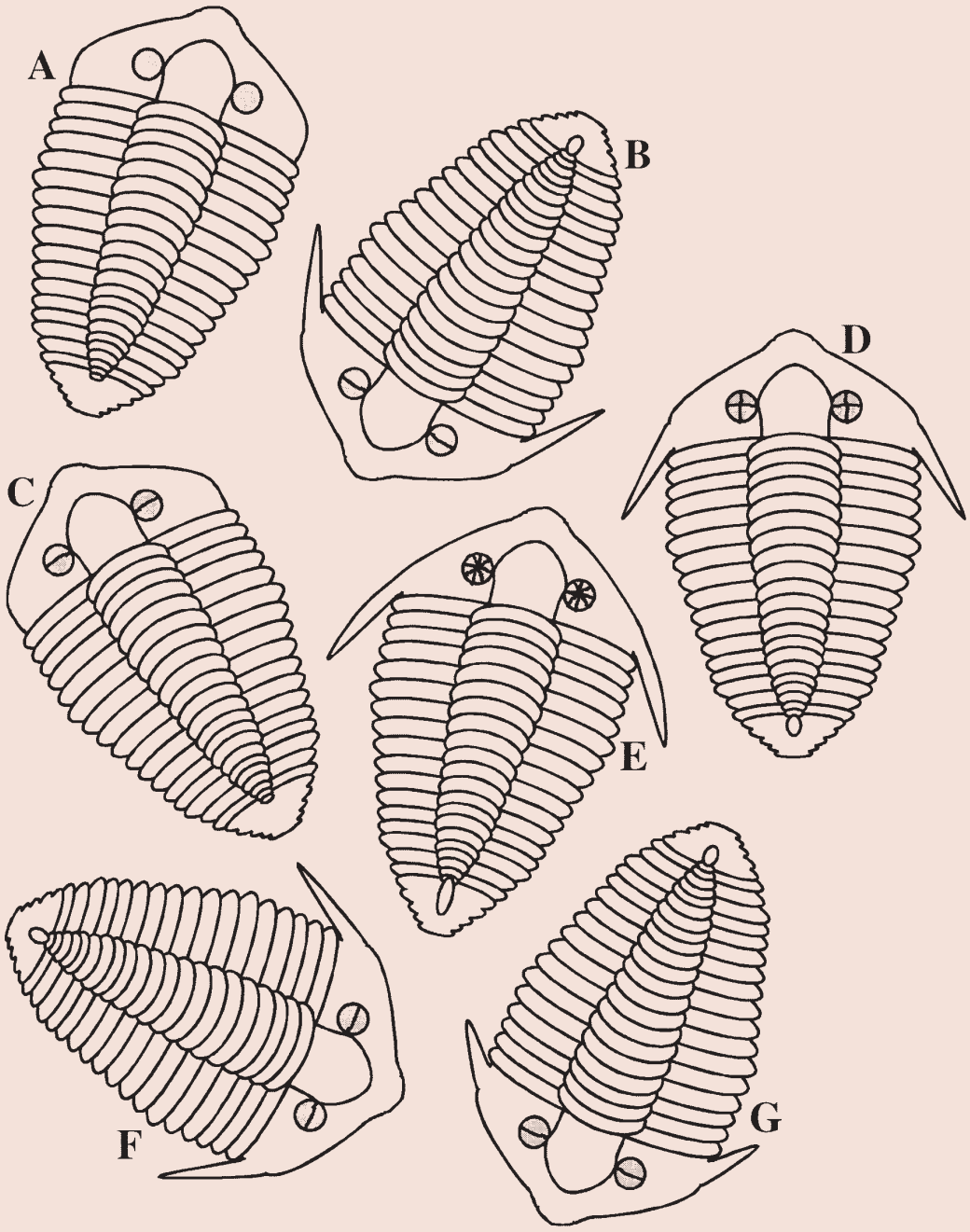


Agnostus –



Trilobite transformers

A Palaeontologist (pay-lee-on-toll-o-jist) has mixed up her fossil trilobite (tri-lo-bite) collection. Her seven trilobites are from different geological times. Each trilobite differs from the others, but only slightly. She knows that trilobite A is the oldest and that trilobite E is the youngest. Can you work out the order from youngest to oldest?



Earth Science Education Centre

Based in Canberra, the Earth Science Education Centre (ESEC) is the ideal, curriculum linked, excursion destination. Whether you teach at a local school or are touring the nation's capital from afar, bring your K-12 students to our education centre for a unique educational experience!

Activities available to school groups

Get involved in earth science at ESEC by carrying out hands-on, minds-on activities that cover a wide range of topics. Erupt a volcano, meet a 360 million year old fossil fish, study 'living fossil' plants, examine rocks from around the world, see Geoscience Australia's amazing 3D ocean floor maps, watch a simulated earthquake, create and record your own earthquake, recreate how rocks weather, see steps in the creation of limestone from living coral to rock, identify different minerals by their unique characteristics and sign our famous Visitors' Book!

Our sessions are low cost with high educational value. Our Education Officers are geology and teacher trained and will introduce your students to fun, curriculum-linked earth science activities!

How to Book

Bookings essential - book fast as sessions fill quickly! Contact Greg McNamara, manager of ESEC, on (02) 6249 9571 or e-mail us on education@ga.gov.au.

Teacher Workshops

Geoscience Australia runs a program of professional development workshops for primary and secondary teachers in capital and regional centres around Australia. Current topics include plate tectonics, natural hazards, mapping, gold, coasts, UN Law of the Sea, fossils and geological time.

Workshops are curriculum-linked and run by qualified teachers. We also offer group sessions for your school's science or geography/SOSE department. Session fees include a copy of the relevant Geoscience Australia education resource and all other materials. If you have any queries, contact us!

To inquire about our teacher workshop program, e-mail us on education@ga.gov.au, visit our website at www.ga.gov.au/education/ or contact us on (02) 6249 9673 or (02) 6249 9800.

Project LAVA

Join us for a truly unique experience on Project LAVA, Learning About Volcanic Activity! This amazing professional development experience in Hawaii is for all primary and secondary teachers, whether or not you have a geoscience background. You will come away enthralled!

Your volcanologist guide will introduce you to Kilauea, the active volcano on which you will live for a week. Walk over new rock! Collect samples from recent eruptions. See lava trees and steam vents. Visit towns devastated by tsunamis and lava flows. Perhaps the volcano's Goddess Pelee will make lava flow for you to witness. With all accommodation, all transport to and from Hilo International Airport, most meals, entry fees, geologist guide, all classes, field trips, all class materials, notes, classroom activities and Geoscience Australia educational products, this is excellent value.

For further information on Project LAVA please contact us on (02) 6249 9673, e-mail education@ga.gov.au or visit our website at www.ga.gov.au/education/

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Mapping

With the merger of Geoscience Australia and AUSLIG, we are now able to offer teachers a broad range of mapping products!

- Now available! The new 1:250,000 scale topographic maps for regions of Australia, complemented by 1:2.5 million & 1:5 million scale maps showing Australia as a whole.
- Guide to Reading Topographic Maps: A useful tool that clearly explains, through the use of examples and demonstrations, the information that topographic maps contain and how to read them. Also includes a transparent map card, displaying scales for common map sizes. Cheaper in sets of 10!
- Our Satellite Image of Australia poster is an impressive mosaic of 369 satellite images from LANDSAT 7, acquired between July 1999 and September 2000. Shows the land cover across Australia in pseudo natural colour.

Ordering

To order any of the maps above, contact your local authorised map retailer (for details of authorised retailers check www.ga.gov.au/education/nmretailers.html). Or contact;

freecall: 1800 800 173
phone: (02) 6201 4300
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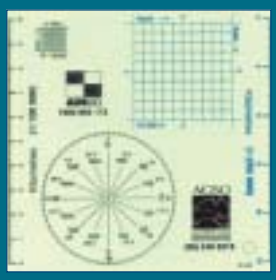
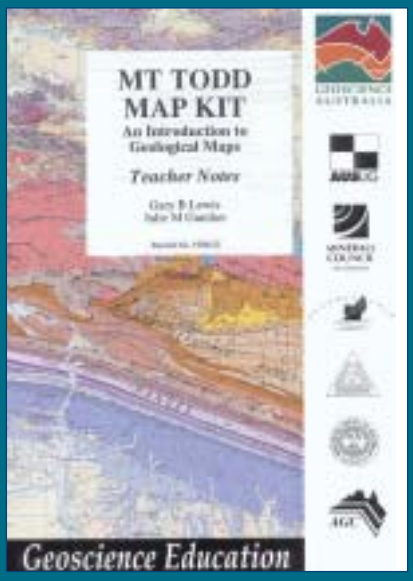




Mt Todd Map Kit

Year level: – Secondary 7-12

Description: This award winning map kit is your stepping stone into the world of geological maps and the link between geology and topography. The Mt Todd area of the NT, northwest of Katherine, includes interesting folding, faulting, granite intrusions, unconformities, weathering and land use. A feature is economic geology with local gold, tungsten and uranium deposits. Revise basic map skills such as latitude and longitude, direction, bearings, grid referencing, spot elevations, contours and scale. Activities also cover rock types, geological structures, geological time, superposition, stratigraphy, constructing cross sections and geological histories.

Format:
– 15 double-sided Mt Todd geology/topography 1:75,000 maps
– 15 map reading cards 1:75,000
– 86 page booklet with glossary
– 11 student activities + examination
– suggested answers

Map Reading Cards

Year level: – Secondary 7-12

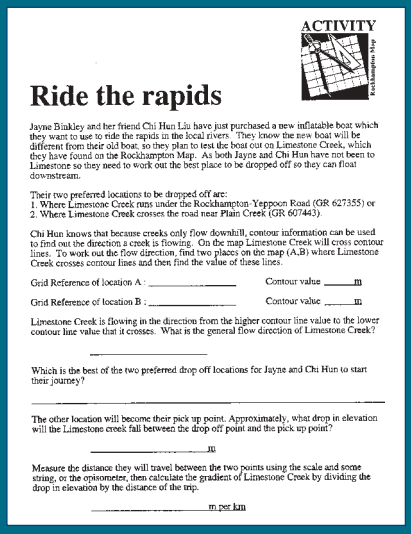
Description: Class sets of 20 transparent plastic map cards at combined 1:100,000 and 1: 250,000 scale to assist students to read latitude, longitude, bearings, distance and grid references on maps.

Topographic Map Kit

Year level: – Secondary 7-12

Description: Using this class set of 20 topographic maps and nifty map reading cards, students encounter sixteen fun and challenging tasks; pilot a submarine, land a plane in distress, engineer a dam and help train a football team! Help your students learn or review mapping skills such as latitude and longitude, legends, scale and distance, contours and cross-sections.

Format:
– 10 copies each Jacobs River and Rockhampton 1:100,000 maps
– 10 map reading cards 1:100,000
– 66 page booklet
– 16 student activities + exam
– suggested answers


ACTIVITY

Ride the rapids

Jayne Binkley and her friend Chi Hun Liu have just purchased a new inflatable boat which they want to use to ride the rapids in the local rivers. They know the new boat will be different from their old boat, so they plan to test the boat out on Limestone Creek, which they have found on the Rockhampton Map. As both Jayne and Chi Hun have not been to Limestone so they need to work out the best place to be dropped off so they can float downstream.

Their two preferred locations to be dropped off are:
1. Where Limestone Creek runs under the Rockhampton Yeppoon Road (GR 627355) or
2. Where Limestone Creek crosses the road near Plain Creek (GR 607443).

Chi Hun knows that because creeks only flow downhill, contour information can be used to find out the direction a creek is flowing. On the map Limestone Creek will cross contour lines. To work out the flow direction, find two places on the map (A,B) where Limestone Creek crosses contour lines and then find the value of these lines.

Grid Reference of location A : _____ Contour value _____m

Grid Reference of location B : _____ Contour value _____m

Limestone Creek is flowing in the direction from the higher contour line value to the lower contour line value that it crosses. What is the general flow direction of Limestone Creek?

_____

Which is the best of the two preferred drop off locations for Jayne and Chi Hun to start their journey?

_____

The other location will become their pick up point. Approximately, what drop in elevation will the Limestone creek fall between the drop off point and the pick up point?

_____m

Measure the distance they will travel between the two points using the scale and some string, or the opisometer, then calculate the gradient of Limestone Creek by dividing the drop in elevation by the distance of the trip.

_____m per km

Discovering Remote Sensing Kit

Year level: – Secondary 8-12

Description: Introduce the world of remotely sensed data with this comprehensive kit - includes reference notes, student activities and ten sets of information cards. Activities cover concepts of resolution, scale, radiation and spectral bands, reflectance, and false colour.

Format:
– 122 page booklet
– 12 student activities
– suggested answers
– 10 sets of 5 student A4 cards

Fossils and Geologic Time

Fossils

Year level: – Primary 3-6
– Secondary 7-10

Description: Teaching fossils in your classroom? What is a fossil? How are fossils formed? What living things become fossils? Extensively illustrated with fossil examples from around the world, this new resource includes 24 informative reproducible fact sheets covering a variety of vertebrates, invertebrates, plants and trace fossils - a useful adjunct to teaching your students about classification. Fascinating fossil facts will delight students and teachers alike! Includes fun and educational student activities.

Format: – 60 page booklet
– 24 fact sheets A4
– 6 activities with photocopiable masters
– suggested answers

Time and Life

Year level: – Secondary 7-10

Description: Finding it difficult to teach the concept of geological time? Learn how scientists use different dating techniques and under what circumstances. Palaeontology summary notes help to identify major groups of fossil organisms in your school collection and in the field. Student activities include geological time, radioactive decay, the importance of fossils in dating our Earth and fossil time ranges.

Format: – 60 page booklet
– 8 student activities
– suggested answers

Dinosaurs of Southern Australia

Year level: – Primary 5-6
– Secondary 7-12

Description: This image set outlines results of research by scientists working along Australia's southeast coast. Many of Australia's Cretaceous dinosaurs and associated fauna and flora lived at polar latitudes and developed fascinating methods of coping with the climate of that region. The 15 images illustrate examples of the Victorian dinosaurs and animals with which they shared a Cretaceous rift valley 120 to 110 million years ago.

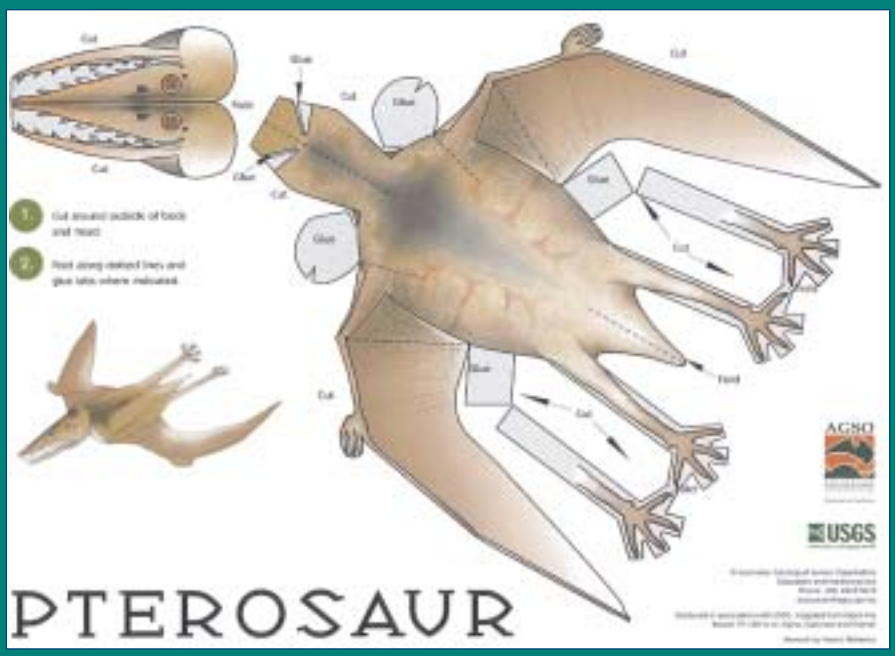
Format: – CD-Rom or set of 15 slides (each with explanatory notes)

Nautiloid 3D model

Year level: – Primary 5-6
– Secondary 7-10

Description: Build your own model of these elegant sea creatures. Nautiloids have been extinct for 100 million years but students can recreate them in 3D in your own classroom!

Format: – class set of 30 A4 paper models



Trilobite 3D model

Year level: – Primary K-6
– Secondary 7-10

Description: Extinct for 250 million years, what better way for students to study these creatures than by making their own 3D paper model! A great adjunct to our *Time and Life* and *Fossils* booklets.

Format: – class set of 30 A4 paper models

Triceratops 3D model

Year level: – Primary 5-6
– Secondary 7-10

Description: These famous North American dinosaurs were herbivores that used their bristling horns for defence. Each paper model creates a fun 3D animal.

Format: – class set of 30 A3 paper models

Pterosaur 3D model

Year level: – Primary K-6
– Secondary 7-10

Description: These Ornithocheirus were flying reptiles that cruised Australia's Mesozoic skies. Use our 3D models to create fun mobiles in your classroom!

Format: – class set of 30 A4 paper models

Oceans & Coasts

Gas, Energy & Change

Year level: – Secondary 9-12

Description: Using numerous illustrations this detailed resource defines energy, energy sources, energy transformations, chemistry of hydrocarbons, geological settings for gas and oil formation, geological traps, oil and gas in the geological time scale and how commercial oil and gas deposits are found and recovered. Includes uses of natural gas (including domestic), Australia's natural gas potential and environmental issues such as Greenhouse gases. Student activities explore many key concepts including the use of fossils to date drill cores and interpreting seismic sections.

Format: – 104 page booklet
– 15 student activities as photocopiable masters
– suggested answers

Coasts

Year level: – Secondary 7-10

Description: This resource describes natural and human-induced processes affecting coasts, provides background information on erosional and depositional coastlines and includes a special section on estuaries. Reproducible activities develop student understanding of key concepts such as longshore drift, sea level change, estuary analysis and a dune survey. Also includes a detailed Gold Coast case study and web-based research task. Associated CD-ROM is Mac and Windows compatible and includes a range of images of coastal landforms and coastal environments.

Format: – 47 page booklet
– CD-ROM images of different coastal features & case study
– 9 student activities
– suggested answers

Law of the Sea

Year level: – Secondary 8-12

Description: Did you know that Australia will have more offshore territory than onshore by 2004? This comprehensive teachers' guide reviews the history and development of the UN Convention on the Law of the Sea and its application to Australian jurisdiction with case studies on Antarctica, the North West Shelf and Orange Roughy. The Law of the Sea has been written by Geoscience Australia, an organisation conducting vital research for Australia's 2004 UN submission. Find out the impact of UNCLOS on marine areas to which Australia has access. Includes a detailed review of methods used by coastal countries eg. geophysics, to define areas of extended continental margin and marine zones such as the Exclusive Economic Zone. Practical activities are invaluable to geography, geology, environmental education and general science students in middle and senior secondary classes.

Format: – 108 page booklet with extensive glossary
– 9 student activities
– suggested answers

Gold

The Science of Gold

Year level: – Primary K-6
– Secondary 7-8

Description: Need the answers to those common questions; where do we find gold? Where should I look for gold? Incorporate easily understood aspects of science and technology into your Gold Rush lessons. Fun activities will keep students involved. What is their weight in gold worth? Just take care they don't catch 'Gold Fever'!

Format: – 18 page booklet
– 6 student activities

Real Gold!

Year level: – Primary K-6
– Secondary 7-10

Description: Start your own Gold Rush! Why give out paper gold stars when you can reward your students with real gold? Each set contains thirty pieces of Australian gold leaf in individual labelled bags, ready to present to your students.

Format: – 30 individually bagged pieces of 23-carat gold leaf

Gold Technology image set

Year level:

Description: What was it really like to search for gold during the Australian Gold Rushes of the 1850s? What equipment was used? In conjunction with Sovereign Hill's Education Service in Ballarat, we've produced 15 images showing the development of Gold Rush technology. See the equipment prospectors and miners used in their search for gold, from panning to deep lead mining. Learn about modern prospecting with airborne surveys and the role of geophysics in locating gold deposits today.

Format: – CD-Rom or set of 15 slides (each with explanatory notes)

Caves & Climate

Discovering Caves in Australia poster

Year level: – Primary 4-6
– Secondary 7-9

Description: This large poster map shows the location of all Australian show caves, and many other cave regions. Includes 24 informative full colour images covering aspects of Australian caves.

Format: – 108 x 78 cm full colour map poster

Discovering Caves kit

Year level: – Primary 4-6
– Secondary 7-9

Description: Australia boasts some 10,000 caves! Caves are a great way to introduce common scientific and geographic concepts to your students. This kit includes fact sheets on cave formation, the chemistry of limestone dissolution, the science behind cave decorations, dating cave deposits and decorations, caves as clues to past climates, karst landscapes, cave animals, cave fossils, cave use and management and Australian cave facts. A separate booklet includes curriculum linked, fun, reproducible student activities. Grow your own stalactites. Make a 3D model of a cave. Learn how to map a cave. Also includes full colour 'Discovering Caves In Australia' map poster. Sensational value!

Format: – 7 reproducible student activities
– 18 fact sheets
– 108 x 78 cm full colour map poster

Climate Change throughout Earth History

Year level: – Secondary 7-12

Description: This important resource examines the dynamic nature of Earth's climate in the past and its many influencing factors. Learn about natural fluctuations such as ice ages and periods of global warming that occurred over the life of our planet. Examine evidence used to study past climatic change including oxygen isotope evidence, fossils, palaeomagnetism, cave speleothems, glaciers, ice cores and tree rings. Reproducible activities lead students through concepts relating to changes in Earth's climate. If you teach about climate change, this booklet is a must!

Format: – 92 page booklet
– 5 student activities
– suggested answers

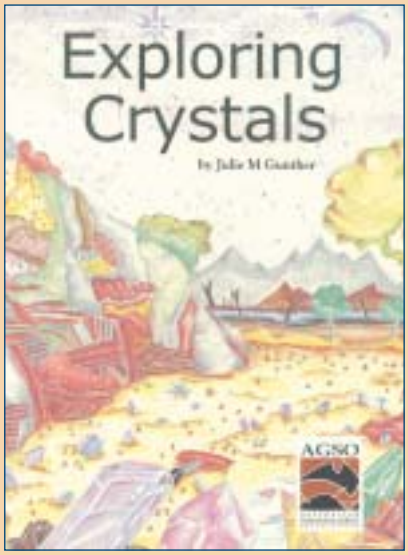
Crystals & Chemistry

Silicate Chemistry

Year level: – Secondary 10-12

Description: A detailed look at the elements in the Earth's crust, the nature of silicon and the silicon tetrahedron building block, the role of aluminium in silicate structures, silicate mineral characteristics and their formation. Includes activities to explore key features of silicates. Introduce your students to ternary and phase diagrams through practical activities. Systematically covers the inorganic chemistry of Earth's rock-forming minerals.

Format: – 40 page booklet
– 5 student activities



Exploring Crystals kit

Year level: – Primary K-6

Description: Explore the wonder of crystals! Teacher notes help to dispel some crystal myths. Nine reproducible student activities include growing crystals and constructing 3D crystal models. Glossary of common terms included. Includes a kit of common crystal specimens. An excellent resource for introducing the building blocks of rocks to primary students.

Format: – 54 page booklet
– 15 student activities
– kit contains 6 crystal samples: granite cube, magnetite octahedra, calcite rhomb, quartz points, cubic sugar, crystalline salt and a folding hand lens

National Parks

Jervis Bay Territory map

Year level: – Secondary 7-12

Description: This fascinating geoscience and environmental map explores links between many of the unique features of Jervis Bay. A geology map at 1:30,000 includes clear cross-sections. Smaller-scale inset maps include a wealth of information about vegetation patterns, coastal geomorphology, sites of geological and environmental interest, hydrogeology and regional geophysics. The text includes the geological history of the area and the evolution of the coastline, accompanied by LANDSAT imagery and colour photos.

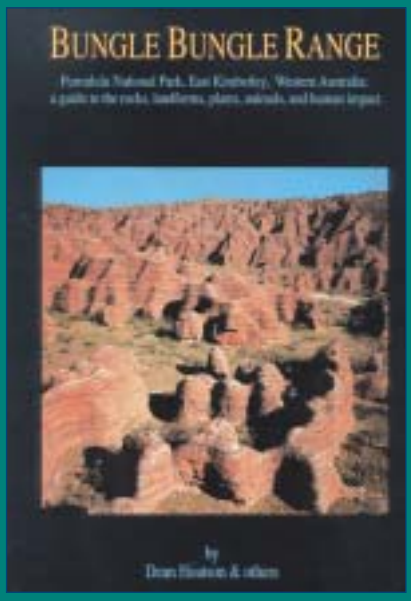
Format: – folded colour map

The Warrumbungle Volcano

Year level: – Secondary 7-12

Description: Planning a visit to Warrumbungle National Park? This informative geological guidebook outlines the spectacular geological features of this park and their origins. Discover the volcanic evolution of the Warrumbungles over the last 17 million years and how different structures formed. Learn what affects lava viscosity. Discover the minerals and rocks that occur. Concise maps of eastern Australia show the location of extinct volcanoes of which the Warrumbungles are a part. What is the likelihood of future eruptions? Amply illustrated with cross-sections, photographs and maps and includes a glossary of relevant terms. Suggested walking trails are included along with their geological features and points of interest on the road through the Park.

Format: – 51 page A5 book



Bungle Bungle Range Guide Book

Year level: – Secondary 7-12

Description: Clifton Pugh, Australian artist, said of the Bungle Bungles; "In all my Australian travels I've never seen anything like this; I'm overjoyed." Geoscience Australia, in association with the Geological Survey of Western Australia and the Department of Conservation and Land Management, produced this excellent guide book on the geological and biological wonders of the Bungle Bungles. Discover this unique landscape, its formation, 1,880 million year geological history, its animals and plants and the relationship between vegetation communities and landforms. Investigate Aboriginal culture, European exploration, the subsequent search for gold and other human impacts. Includes stunning photographs, satellite imagery and informative maps and diagrams, glossary and guides to popular walking trails.

Format: – 82 page A4 full colour book

Kosciusko geology map

Year level: – Secondary 7-12

Description: Discover the geology underlying Kosciusko National Park with this excellent 1:250,000 colour geological map. Extending from Tumut in NSW south to the Victorian border, this map shows major features; rock types, faults, rivers, human features such as roads and towns and features associated with the Snowy Mountains hydro scheme. An additional 1:100,000 inset geology map highlights glacial features in the area around Mount Kosciusko, Smiggin Holes and Thredbo Village.

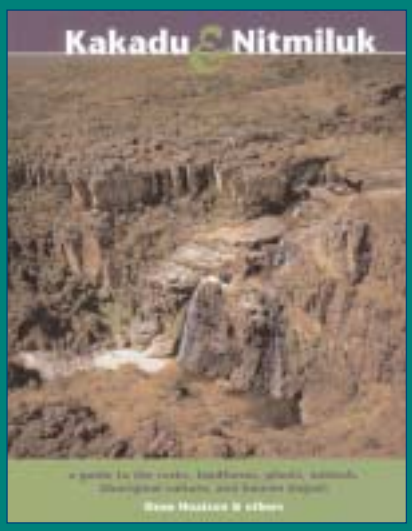
Format: – folded colour map

Kakadu and Nitmiluk guide book

Year level: – Secondary 7-12

Description: A comprehensive guide to the geology, landforms, plants, animals, Aboriginal culture, European exploration and human impact on the Kakadu and Nitmiluk National Parks in the Northern Territory. Fully illustrated with photographs and detailed maps, this book includes an extensive guide to the six main ecosystems represented in the parks. Includes a fascinating description of the region's 2500 million year geological history. The geological and other natural features of 47 popular walks are outlined with accompanying maps. Includes distance, time and grades of each walk, as well as habitats encountered.

Format: – 110 page A3 full colour book



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- **Australia: an Ancient land** – booklet
- **The Science of Gold** – booklet
- **Gold Rush technology** – slide set
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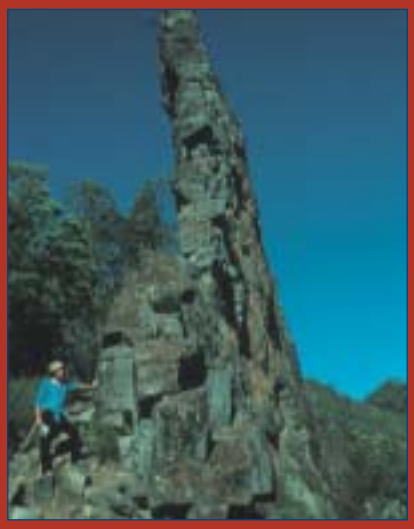
- **Trilobite** – 3D model set



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Geoscience Australia's most popular secondary educational products in a single set to save you money!

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- **Volcanoes** – booklet
- **Earthquakes** – booklet
- **Australian Earthquakes** – slide set
- **Plate tectonics** – booklet
- **Plate Tectonics** – 3D model set

3D Models Bulk Set

Buy in bulk and save: purchase eight class sets of 3D models for the price of seven!

Includes:

- **Nautiloid**
- **Trilobite**
- **Pterosaur**
- **Triceratops**
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- **Plate Tectonics globe**
- **Landslide**
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