

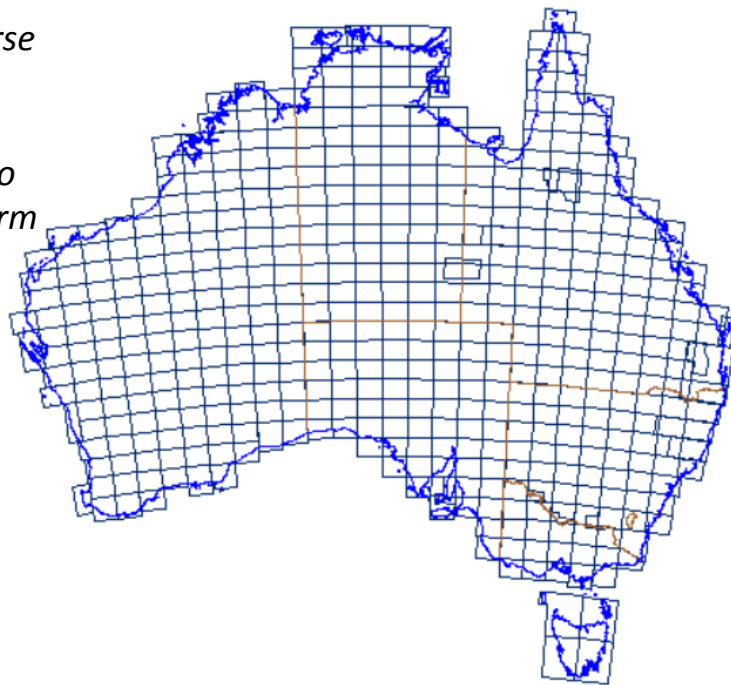
Geological  
mapping

1

*Every year geological survey parties would systematically traverse across selected 1:250,000 scale sheet areas, examining rock outcrops and transferring the information onto aerial photographs. This field information would then be transferred to topographic base maps and published. These early maps still form the base for many geological maps today.*

*Geological mapping*

During the 1960's, 1970's and 1980's there was a national effort by the Commonwealth Government Bureau of Mineral Resources, Geology and Geophysics (BMR) and the Mining Departments in State and Territory Governments to survey and map the whole Australian continent from coast to coast.



# Geology of the Batemans Bay region

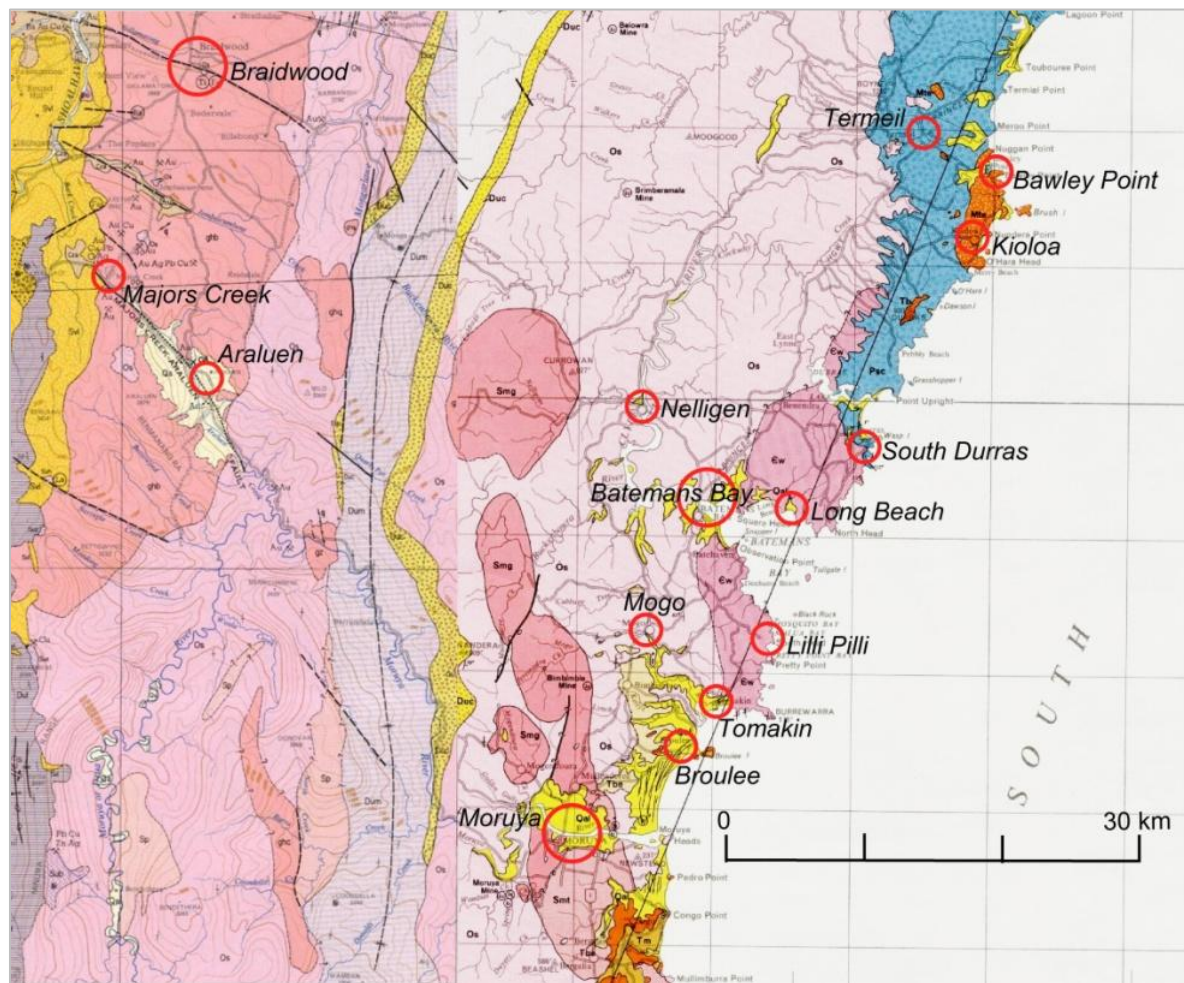
## Geological mapping

2

### Legend

- Quaternary sediments, sand dunes, mudflats, etc. Qal
- Permian–Triassic sedimentary rocks of the Sydney Basin; e.g. Wasp Head Formation, Pebbly Beach Formation, etc. Psc
- Middle–Late Devonian Merimbula Formation (Dum). Dum
- Middle–Late Devonian Eden–Comerong–Yarwal Volcanic Zone; e.g. Comerong Volcanics (Duc). Duc
- Devonian granite plutons of the Bega Batholith; e.g. Braidwood Granite (ghb), Moruya Tonalite (smg), etc. ghb
- Late Silurian–Early Devonian volcanic rocks; e.g. Long Flat Volcanics near Braidwood, etc. Svl
- Ordovician deep water turbidite sedimentary rocks of the Adaminaby Group; e.g. around Nelligen, etc. Os
- Cambrian–Ordovician sedimentary mélangé, chert, conglomerate, etc. of the Narooma – Batemans Bay accretionary complex; e.g. Wagonga Beds. Ew

Geological map resulting from 1960's field work.



Geological map based on the 1:250,000 scale Canberra and Ulladulla geological map sheets.

○ Communities in the Batemans Bay region.



Doug Finlayson  
Canberra, 2016



# Geology of the Batemans Bay region

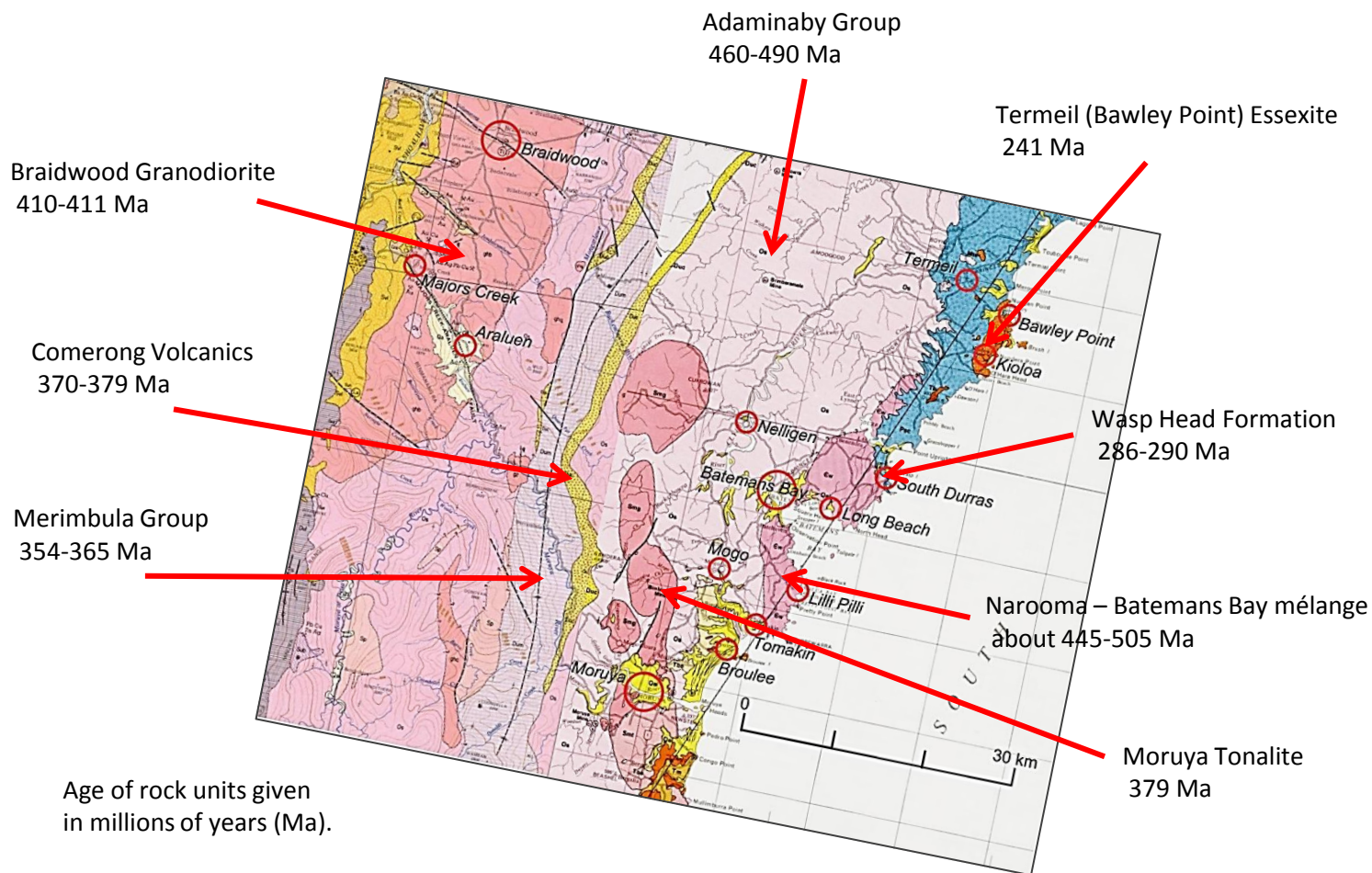
## Geological mapping

3

The Old Courthouse Museum  
Batemans Bay NSW

Best J.G., D'Addario G.W., Walpole B.P. and Rose G., 1964, Canberra 1:250 000  
Geological Sheet SI/55-16, 2nd edition, Geological Survey of New South Wales, Sydney.

Rose G., 1966, Ulladulla 1:250 000 Geological Sheet SI/56-13, 1st edition, Geological Survey  
of New South Wales, Sydney



# Geology of the Batemans Bay region

## Geological mapping

4

### Legend

Quaternary sediments, sand dunes, mudflats, etc.

Qal

Termel (Bawley Point) Essexite (Mte) – Early Triassic intrusion.

Mte

Wasp Head Formation, Pebbly Beach Formation - Permian-Triassic sedimentary rocks of the Sydney Basin.

Psc

Merimbula Formation (Dum) and Comerong Volcanics (Duc) – Middle-Late Devonian sedimentary and volcanic rift sequences.

Dum & Duc

Braidwood Granodiorite (ghb) – Early Devonian granite pluton of the Bega Batholith.

ghb

Moruya Tonalite (dmt) – Early Devonian pluton within the Moruya Supersuite.

dmt

Long Flat Volcanics (Svl) - Late Silurian-Early Devonian volcanic rock unit near Braidwood.

Svl

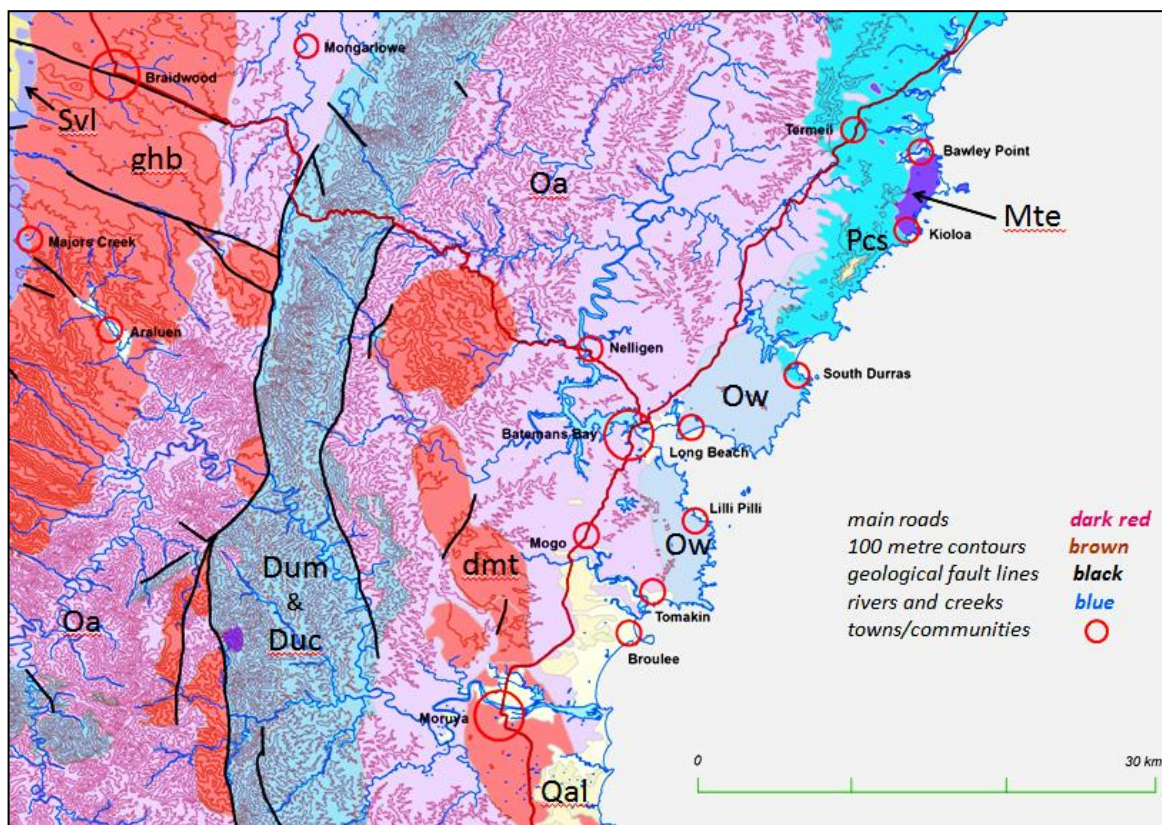
Adaminaby Group (Oa) - Ordovician deep water turbidite sedimentary rocks, (siltstones, mudstones, sandstones, etc).

Oa

Narooma – Batemans Bay Accretionary Complex – Cambrian-Ordovician sedimentary mélangé, chert, conglomerates, volcanics of the Wagonga Group.

Ow

Map compiled from the 2008 Digital Geological Map of Australia derived from earlier 1:250,000 scale geological mapping of the continent.



Extract from digital geological map - Surface Geology of Australia, 1:1million scale, 2008. Published by Geoscience Australia, Canberra.

Extract by David Haycraft and Doug Finlayson



Doug Finlayson  
Canberra, 2016



## Geology of the Batemans Bay region

### Geological mapping

5

William Smith



Doug Finlayson  
Canberra, 2016

## The Old Courthouse Museum Batemans Bay NSW

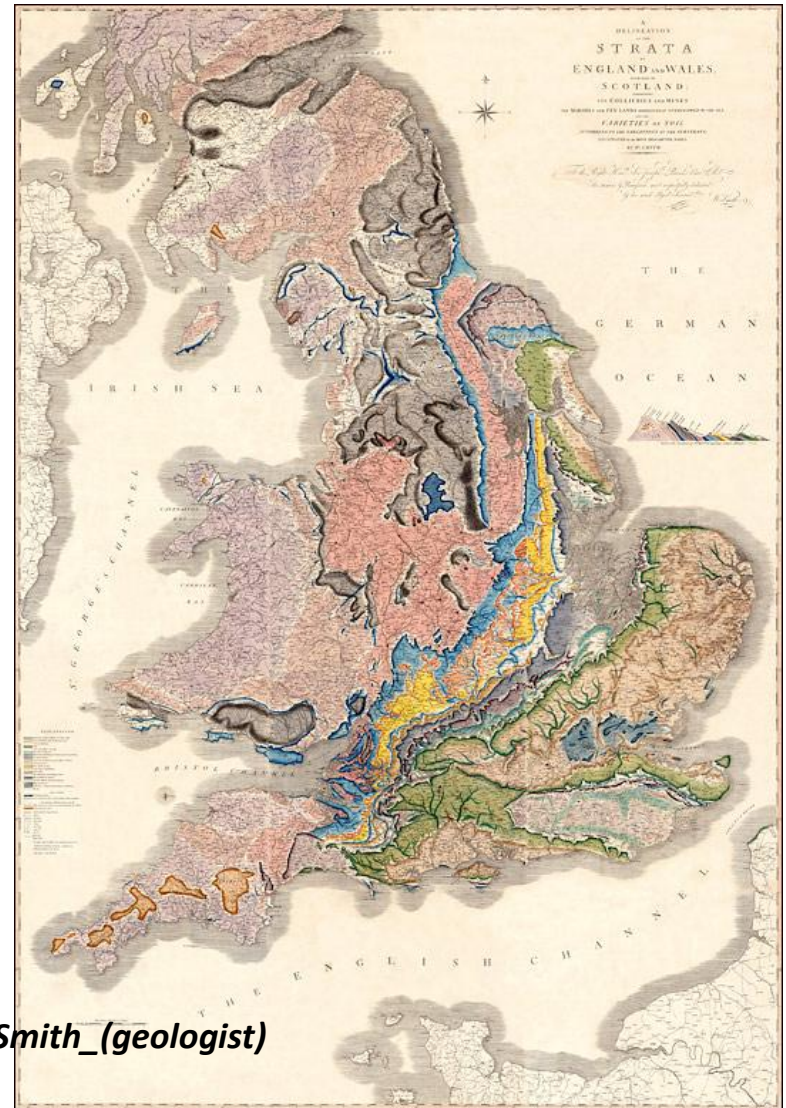
### *The first geological map*

William Smith (1769 – 1839) was the son of a blacksmith and born in Oxfordshire, England. Early in his life he worked in coal mines and noted the layers of rock and the fossils embedded in the various layers.

Later in life he became a surveyor and engineer building canals across the country. He made notes of all the rock layers and fossils and eventually compiled the information into the first geological map of any country, first published in 1815.

The map covered a large part of England and also parts of Scotland and Wales.

[https://en.wikipedia.org/wiki/William\\_Smith\\_\(geologist\)](https://en.wikipedia.org/wiki/William_Smith_(geologist))



## Geology of the Batemans Bay region

### Geological mapping

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Late Triassic ammonite fossils collected by William Smith.



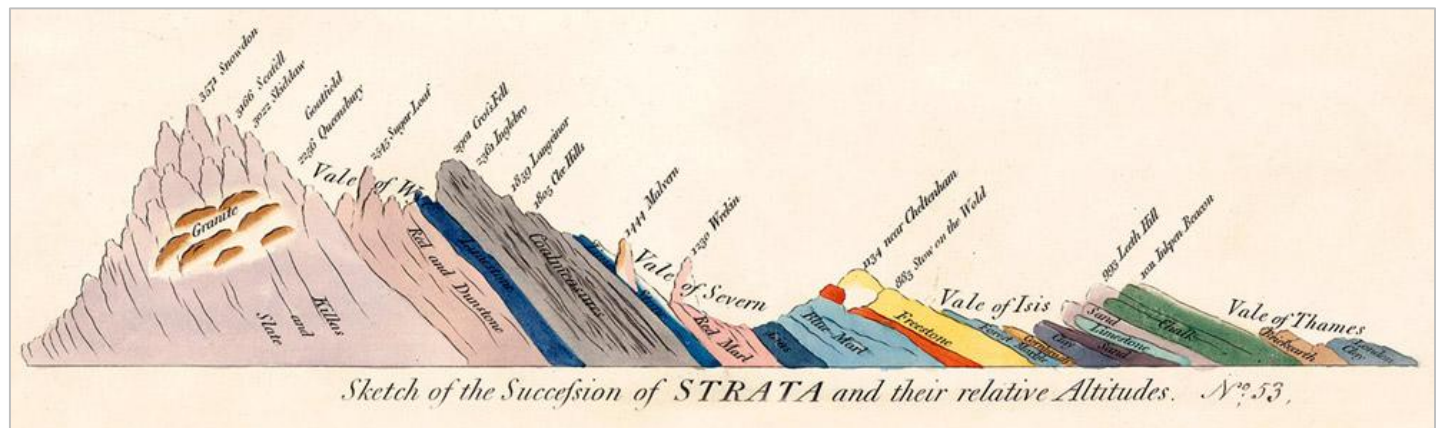
Doug Finlayson  
Canberra, 2016

## The Old Courthouse Museum Batemans Bay NSW

William Smith, as a surveyor for many canals across the country, travelled some 10,000 miles per year, mapping rock strata as he went. Digging a canal meant slicing through rock layers across miles of landscape, and the cross-sectional views of strata allowed Smith to confirm the order of rock layers across large distances.

He accumulated observations of strata and fossils in mines and canals. He found the key to telling the layers apart - their fossils were different. This was the finding that became known as Smith's **Principle of Faunal Succession**. Today it appears in geology textbooks the world over.

<http://earthobservatory.nasa.gov/Features/WilliamSmith/page2.php>





# Geology of the Batemans Bay region

## Geological mapping

7

Folding in rock sequences at Surf Beach near Batehaven.

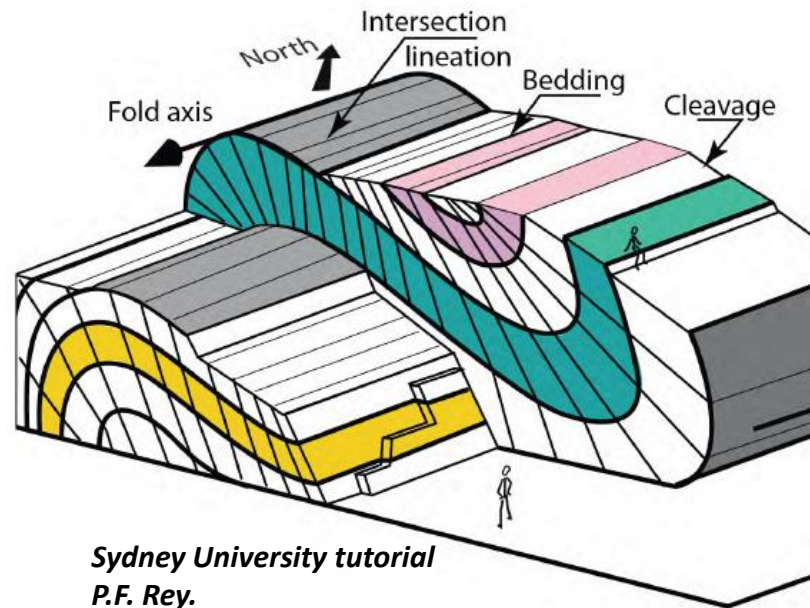


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The Old Courthouse Museum  
Batemans Bay NSW

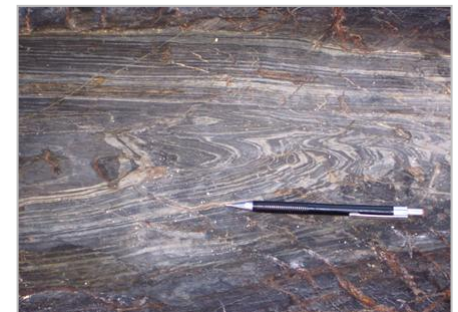
## Who said you can't bend rocks?

When mapping the geology of an area, structural geologists try to work out the sequence of the various faults and folds they find in rock outcrops. Tectonic events at the margins of the continent place a stress across the whole continent and result in earthquakes, faulting and folding both at a large scale and at a small scale over many millions of years. Mapping structures in 3D is quite a difficult job.



Sydney University tutorial  
P.F. Rey.

Small scale folding in mudstones  
near Batemans Bay.

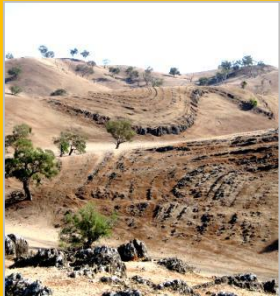


# Geology of the Batemans Bay region

## Geological mapping

8

Folding in limestone outcrop near Wee Jasper, NSW.



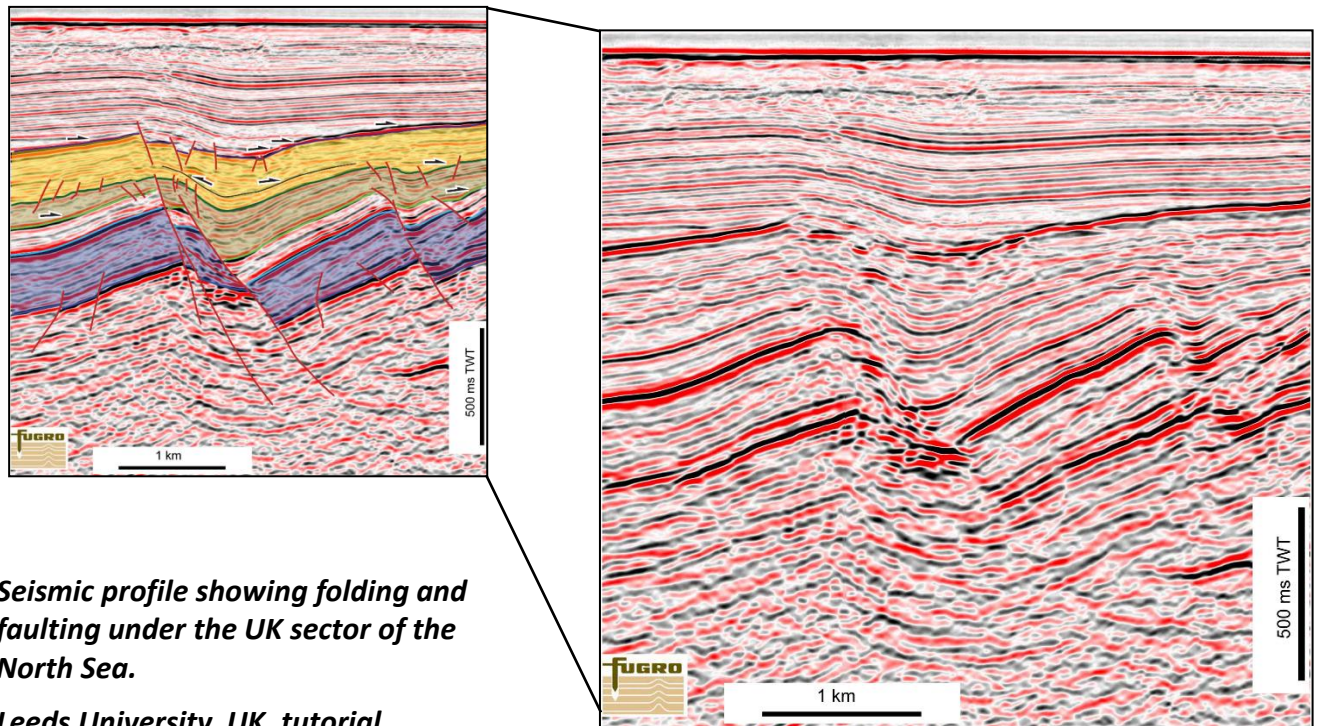
Doug Finlayson  
Canberra, 2016

The Old Courthouse Museum  
Batemans Bay NSW

## Looking at structures under the surface

Using seismic exploration tools we can look at the structures under the Earth's surface. Those geologists looking for oil and gas resources can interpret the faulting and folding seen on seismic profiling records and work out whether there are likely to be reservoirs worth drilling for energy resources.

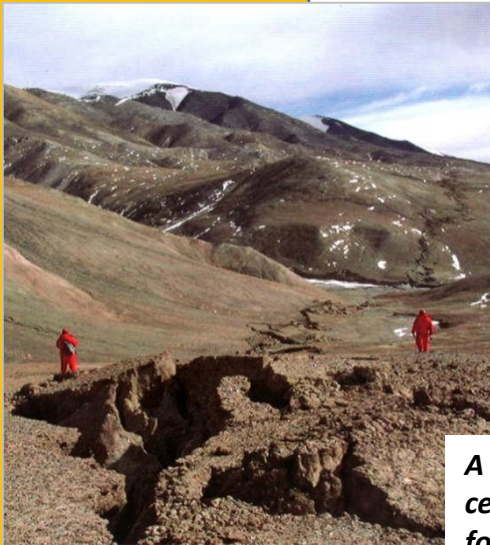
[https://en.wikipedia.org/wiki/Structural\\_geology](https://en.wikipedia.org/wiki/Structural_geology)



**Seismic profile showing folding and faulting under the UK sector of the North Sea.**

**Leeds University, UK, tutorial.**





*There's much more information on web sites and in books and journals.  
Some of these are listed below.*

### *Books, maps and publications*

- ***The Geology of Australia*** – D. Johnson, Cambridge University Press, 2004
- ***Best J.G., D'Addario G.W., Walpole B.P. and Rose G., 1964.*** Canberra 1:250 000 Geological Sheet SI/55-16, 2nd edition, Geological Survey of New South Wales, Sydney.
- ***Rose G., 1966,*** Ulladulla 1:250 000 Geological Sheet SI/56-13, 1st edition, Geological Survey of New South Wales, Sydney

### *Web sites*

- ***Maps of Australia*** – Geoscience Australia, Canberra.  
<http://www.ga.gov.au/data-pubs/maps>
- ***Geological maps of New South Wales*** – Dept. of Industry, Resources and Energy <http://www.resourcesandenergy.nsw.gov.au/>

***A massive 8.1 magnitude earthquake at Kunlun Pass in central Tibet on 14 November, 2001, changed the landscape forever in a few seconds. The length of the surface rupture was 426 km.***