

# Biogeography. Lecture 36

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# Outline

## Biogeography of the World

The basics of island biogeography

Biogeography of Australian region

## Biogeography of the World

Very basics of Ocean biogeography



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# Biogeography of the World

## The basics of island biogeography

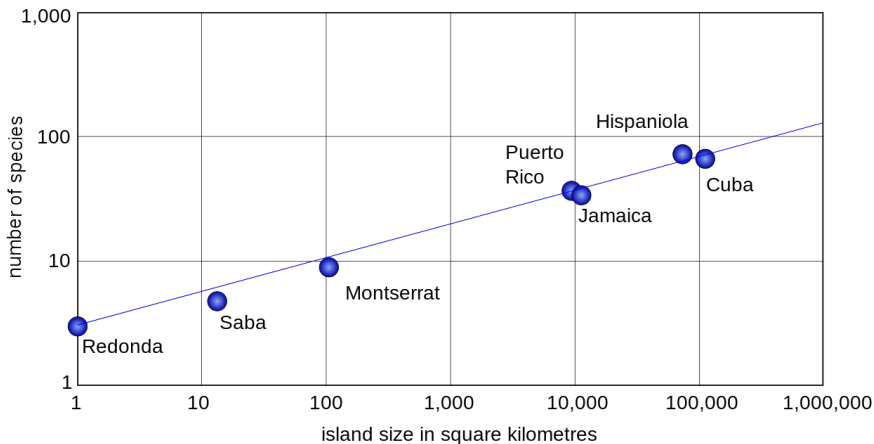


# The basics of island biogeography

- ▶ Immigration and extinction
- ▶ Distance effect
- ▶ Species-area curve and the effect of island size



# Species-logarea line for reptiles and amphibians in Caribbean



# Biogeography of the World

## Biogeography of Australian region



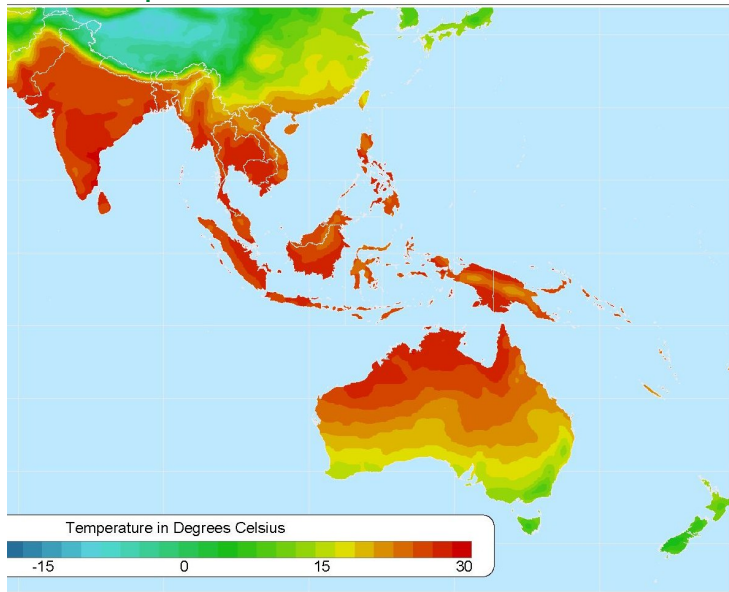
This is a detailed physical map of Australia and its surrounding regions. The map shows the following features:

- Geographical Features:**
  - Mountains and Ranges:** The Great Australian Bight, the Tasman Sea, the Coral Sea, the Great Australian Bight, the Tasman Sea, the Coral Sea, the Great Australian Bight, the Tasman Sea, the Coral Sea.
  - Rivers and Water Bodies:** The Great Australian Bight, the Tasman Sea, the Coral Sea, the Great Australian Bight, the Tasman Sea, the Coral Sea.
  - Coastlines:** The Great Australian Bight, the Tasman Sea, the Coral Sea, the Great Australian Bight, the Tasman Sea, the Coral Sea.
- Major Cities and Towns:** Sydney, Melbourne, Perth, Adelaide, Brisbane, Canberra, Darwin, Alice Springs, Uluru, Ayers Rock, Broome, Port Hedland, Kalbarri, Geraldton, Perth, Adelaide, Melbourne, Sydney, Canberra, Brisbane, Darwin, Alice Springs, Uluru, Ayers Rock, Broome, Port Hedland, Kalbarri, Geraldton.
- Other Regions:** New Zealand, South Island, North Island, Cook Strait, Wellington, Auckland, Christchurch, Dunedin, Invercargill, Bluff, Milford Sound, Fiordland, Southern Alps, Tasmanian Alps, Mount Kosciuszko, Mount Snowy, Mount St Helens, Mount Fuji, Mount Everest, Mount Qomolangma, Mount Everest, Mount Qomolangma, Mount Everest, Mount Qomolangma.

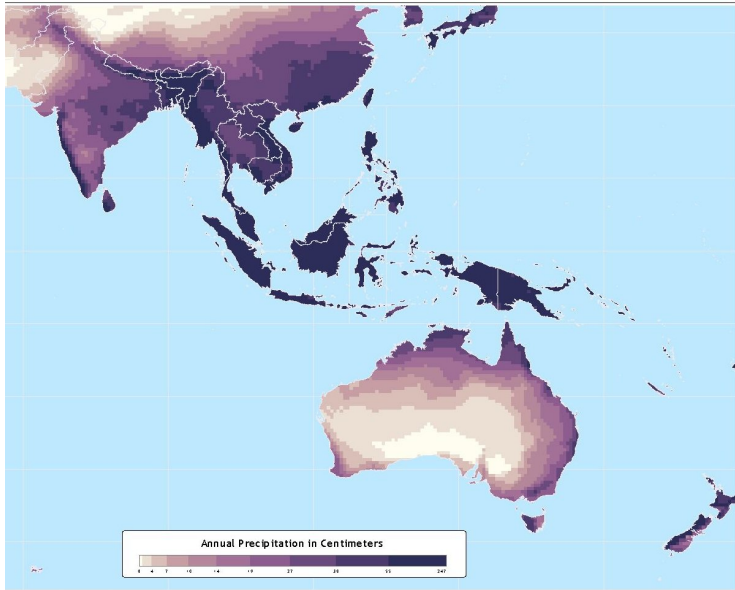




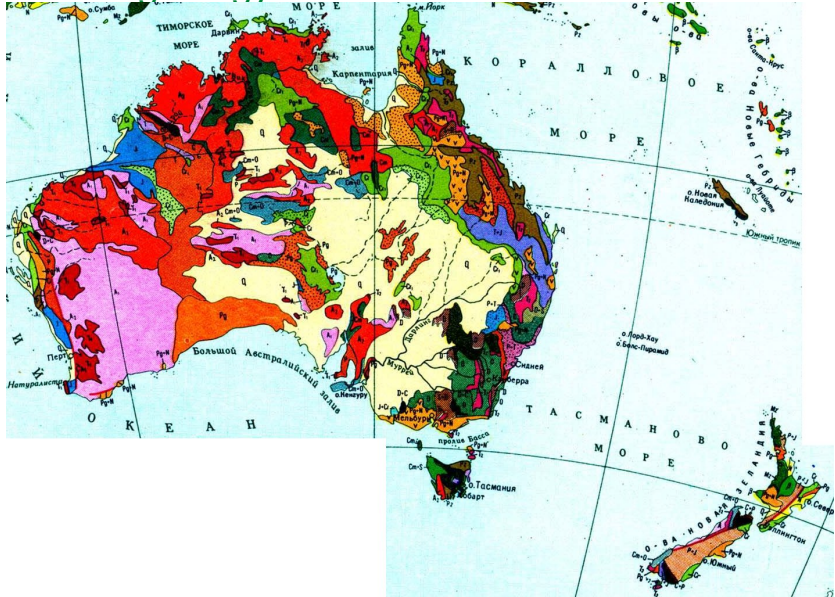
# Australia: temperatures



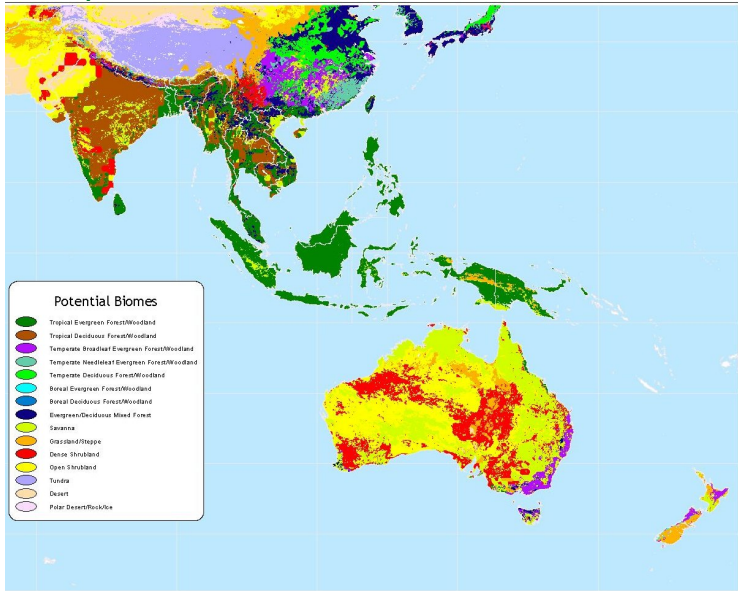
# Australia: precipitation



# Australian geology



# Australia: potential biomes

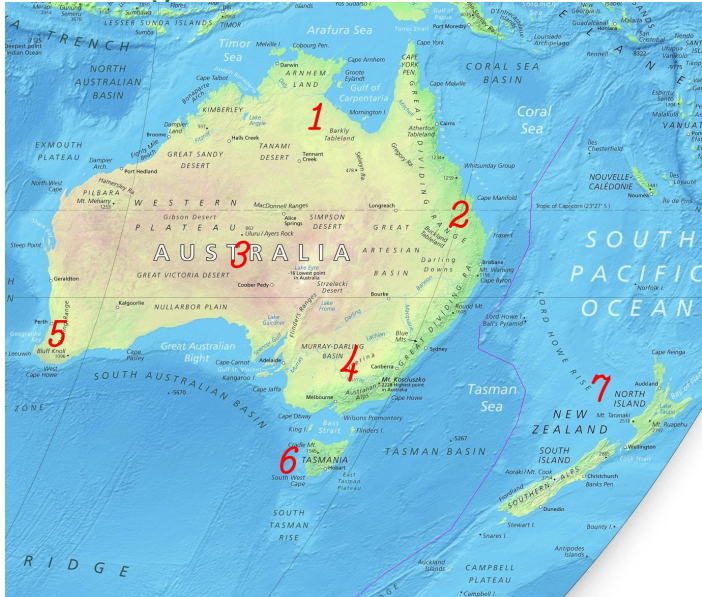


# Australian: 7 biogeographical regions

1. Tropical North
2. Tropical East: Queensland
3. Desert Center
4. Australian core: South and Southeast
5. Australian Southwest
6. Tasmania
7. Zealandia, partly submerged microcontinent: New Zealand, Lord Howe and New Caledonia



# Australian: 7 regions



# Australian regions: key features

1. **Tropical North:** climate similar to Gran Chaco in South America, developed rain and extremely dry seasons. Billabongs (shallow drying lakes) are common. The east of region is Australian grasslands, home of many bird species like emu (*Dromaius novaehollandiae*), malleefowl (*Leipoa ocellata*), numerous cockatoo parrots (Cacatuoidea) and Rainbow bee-eaters (*Merops ornatus*). Extinct "marsupial hippo", *Diprotodon*, also lived here.
2. **Queensland:** One of three richest regions. Wet forests. Cuscuses (*Phalanger*) there replace monkeys, *Agathis* conifer substitute for angiosperm tree dominants. Forest "ostrich" cassowary (*Casuarus*)
3. **Desert Center:** similar to Sahara. Species-poor. Bowerbirds (Ptilonorhynchidae) are probably most famous animals here.
4. **Australian core:** "all what you know about Australia", platypus (*Ornithorhynchus anatinus*), koala (*Phascolarctos cinereus*), kangaroo (*Macropus giganteus*) and other marsupials, Proteaceae and Myrtaceae plants like *Banksia* and *Eucalyptus*, each with many species. Home of living fossil Wollemi pine, *Wollemia nobilis*. Among birds, many "non-singing" passerines like lyrebird (*Menura novaehollandiae*).
5. **Australian Southwest:** Very small but rich region with high endemism. Many interesting marsupials like numbats (*Myrmecobius fasciatus*, replacement of anteater), the only Australian pitcher plant (*Cephalotus follicularis*), grass trees (*Xanthorrhoea*), moloch lizard (*Moloch horridus*) and many others.
6. **Tasmania:** the temperate variant of Australian biota, the only glaciated (50%) region. Most famous representatives are two marsupial carnivores, Tasmanian devil (*Sarcophilus harrisii*) and (now extinct) Tasmanian wolf (or tiger) (*Thylacinus cynocephalus*). Lots of unusual plants like Huon pine, *Lagarostrobos* or *Tasmannia*.
7. **Zealandia:** shatters of microcontinent, probably close to the extinct biota of Antarctic. **No mammals.** Extinct moa (*Dinornis*) and extant kiwi bird (*Apteryx*). Tuatara (*Sphenodon*). The most primitive flowering plant (*Amborella*).



# Summary for Australia

- ▶ The most biogeographically isolated region
- ▶ High and dry: similar to Africa
- ▶ New Zealand (Aotearoa) has multiple “Holantarctic” connections





# Biogeography of the World

## Very basics of Ocean biogeography

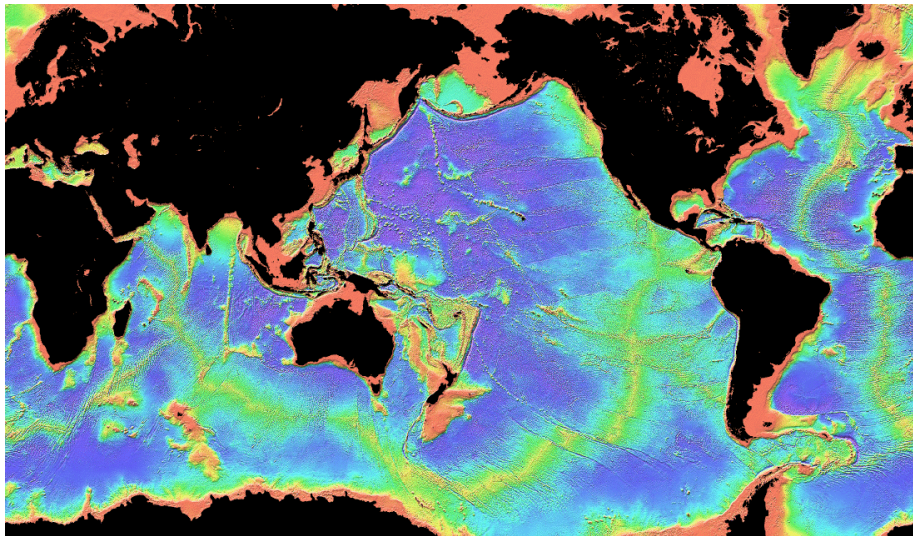


# Biogeography of Ocean

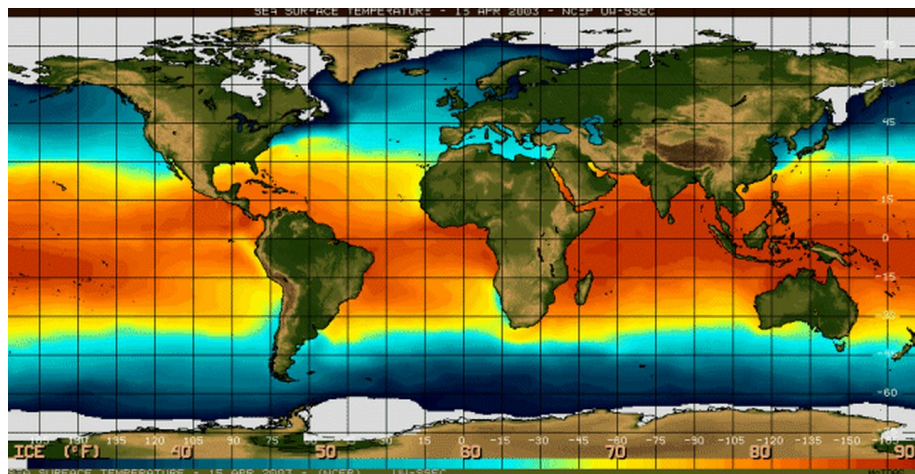
- ▶ Diversity in 3D space
- ▶ Rich cool and poor tropical waters
- ▶ Rich coastal and poor open ocean waters
- ▶ Whereas surface biogeography of ocean is determined by continents and currents, biogeography of abyssal is unique.



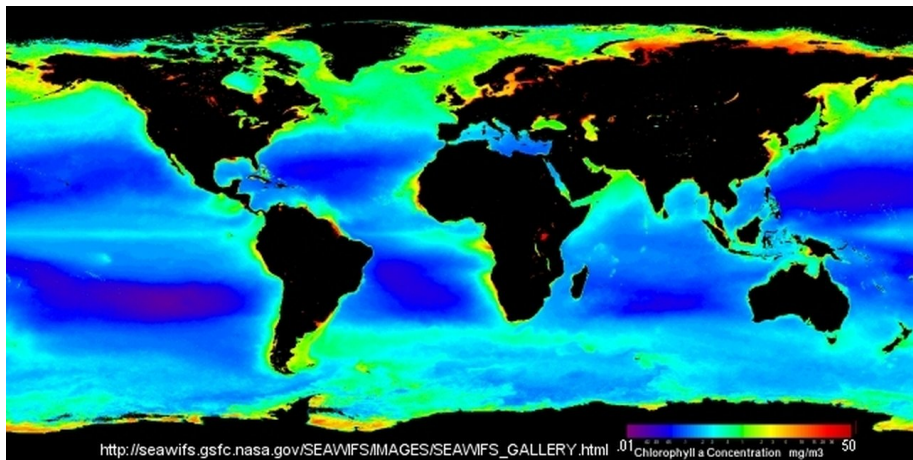
# Ocean depths



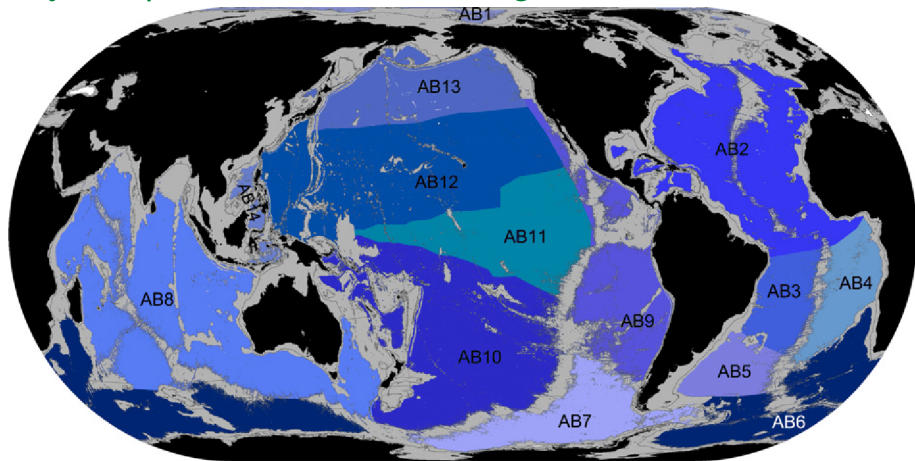
# Ocean temperatures



# Ocean productivity



# Abyssal provinces from Watling et al., 2013



AB1: Arctic Basin

AB2: North Atlantic

AB3: Brazil Basin

AB4: Angola, Guinea, Sierra Leone Basins

AB5: Argentine Basin

AB6: Antarctica East

AB7: Antarctica West

AB8: Indian

AB9: Chile, Peru, Guatemala Basins

AB10: South Pacific

AB11: Equatorial Pacific

AB12: North Central Pacific

AB13: North Pacific

AB14: West Pacific Basins



## Short anonymous absolutely voluntary survey

1. What do you **like** most in biogeography course (except Puerto Rico trip ;-)?
2. What do you **dislike** most in biogeography course?
3. **Which part of Puerto Rico trip** do you remember most of all?
4. Please grade (1—bad, 5—excellent):
  - A. Lectures
  - B. Puerto Rico trip
  - C. Presentations
  - D. Exams
5. Please recommend something for the next Biogeography class.

