Exploring Antarctica

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October 16, 2014
Subglacial Lakes
Ice Velocity (from Rignot et al., 2011)
Questions

• How old is Earth?
• When did land plants evolve?
• What did the surface of continents look like before this?
<table>
<thead>
<tr>
<th>Era</th>
<th>Period</th>
<th>Epoch</th>
<th>Millions of years ago</th>
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<tr>
<td></td>
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<td>Precambrian</td>
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</table>

- Biggest Extinction
- Significant amounts of Oxygen in atmosphere
- First Bacteria
- Oldest known rocks
- First (jawless) Fish
- First Ferns
- First Land Plants
- First Mammals and flowers
- First Ants
- "Lucy" Grasses
- Triceratops
- Homo sapiens
Surfaces without vegetation
Antarctic Dry Valleys

Most of Antarctica looks like this

The Dry Valleys are mostly rock
The McMurdo Dry Valleys
Modern Antarctic Exploration

- http://www.usap.gov/videoclipsandmaps/mcmwebcam.cfm
Getting to Antarctica
Getting around McMurdo
Antarctic Clothing

Big Red Parka

Mittens

Pants

Hat

Boots

Sunglasses

Beard

http://www.youtube.com/watch?v=9h6-LM50kzo
Central Transantarctic Mountains camp (CTAM)
Central Transantarctic Mountains camp
Motivating questions

- How old are the glacial deposits in Antarctic Dry Valleys?
- What geomorphic processes are active in these valleys? How quickly do they alter the landscape?
Life in the field
Ong Valley 2011-12
Camp Life
Research
Early Expeditions
Terra Australis (latin: South Land)

- Aristotle and Ptolemy hypothesized land in north should be balanced with land in south
- 15th - 18th century maps have southern landmass
- British explorer Matthew Flinders names Australia after Terra Australis (1814 book, A Voyage to Terra Australis)

1570 map by Abraham Ortelius
Captain James Cook (1728 – 1779)

• Three combined Royal Navy and Royal Society expeditions to:
  • seek evidence of *Terra Australis*,
  • circumnavigate as far south as possible
  • find Northwest Passage

Red: First Voyage 1768 – 1771
Green: Second Voyage 1772 – 1775
Blue: Third Voyage 1776 – 1779
  dashed blue after death
Captain James Cook

- Crosses Antarctic Circle for first time, circumnavigates continent
- Makes hats and lengthens jacket sleeves out of baize to tolerate weather
- Observes whales and seals
- Supposes sea ice formed in rivers and bays, so there must be land
Terra Australis

• “Once and for all the idea of a populous fertile southern continent was proved to be a myth, and it was clearly shown that whatever land light exist to the South must be a region of desolation hidden beneath a mantle of ice and snow.” – Robert Scott, A Voyage of the Discovery
Discovery of land mass

• Fabian Gottlieb van Bellingshausen (January 28, 1820) – Russian
• Edward Bransfield (January 30, 1820) - British
• Nathaniel Palmer (November 17, 1820) - US
• Mostly looking for seals
Antarctic Convergence
Sir James Clark Ross (1800 – 1862)

• Nephew of Sir John Ross
• Experience in Arctic
  • Locates magnetic north pole, 1831
• Antarctic voyage 1839 – 1844
  • Well equipped voyage, scientific goals
HMS Erebus and HMS Terror

- Bomb vessels, reinforced hulls for large mortars
- Terror used in war of 1812
- Able to ram and withstand collisions with sea ice
- Later outfitted with steam engines
Mounts Erebus and Terror
Sir James Clark Ross