Polární biologie rostlin

Polar Plant Biology

Přednáška č. 1 (Lecture No. 1)

Miloš Barták

Oddělení fyziologie rostlin
PřF MU Brno, Kampus Bohunice
A13, Kamenice 5, 62500 Brno

Struktura přednášek – jaro 2021

List of lectures – Spring 2021

1. Introductory lecture (Highlights of Antarctica / Svalbard)
2. Biomes (Arctic, Antarctica)
3. Microbiological mats, soil crusts
4. Algae and cyanobacteria
5. Special water environments and their autotrophs
6. Mosses, liverworts
7. Higher plant of polar regions
8. Ecology of plants
9. Plant physiological processes in harsh environments
10. Survival strategies of extremophiles
11. Polar expedition planning, work in the field
12. Students project (interactive work with maps)
13. Case studies from Antarctica / Svalbard
14. Final seminar

Není určeno pro zveřejnění, jen pro osobní účely.

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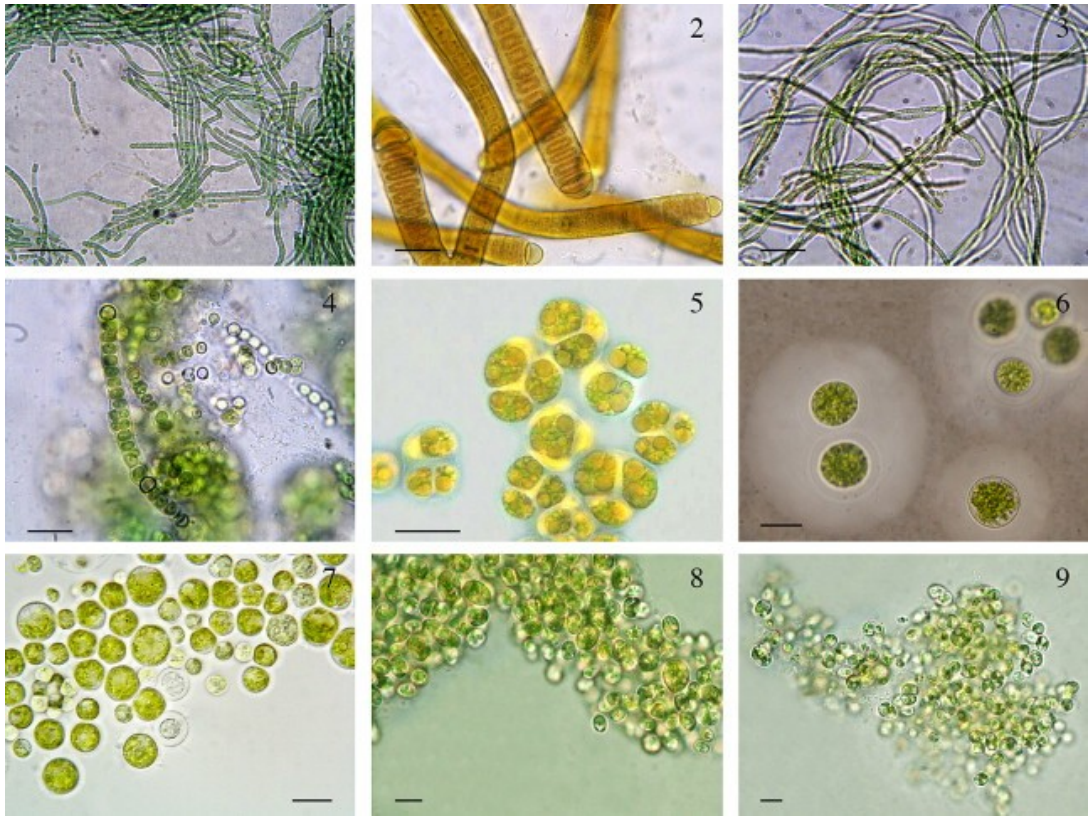
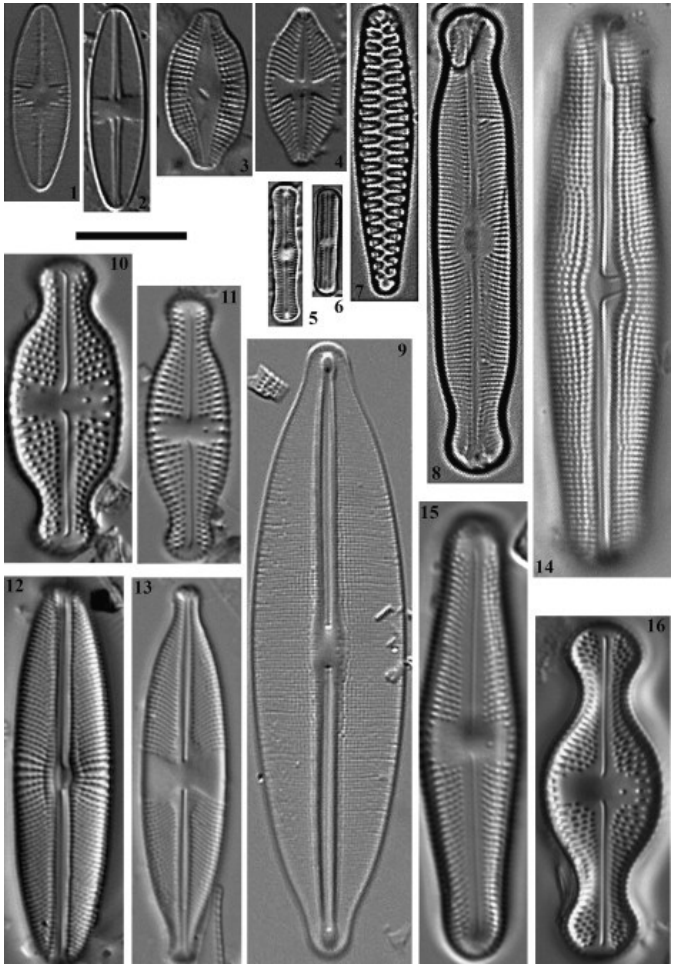
Seepages

sinice = cyanobacteria



Rozsivky = diatoms



- Wim Vyvermana Elie Verleyena, Annick Wilmotteb, Dominic A. Hodgsonc, Anne Willemsd, Karolien Peetersd, Bart Van de Vijvere, Aaike De Wevera, Frederik Leliaertf, Koen Sabbea

Ostrov Krále Jiřího, Antarktida

Deschampsia antarctica

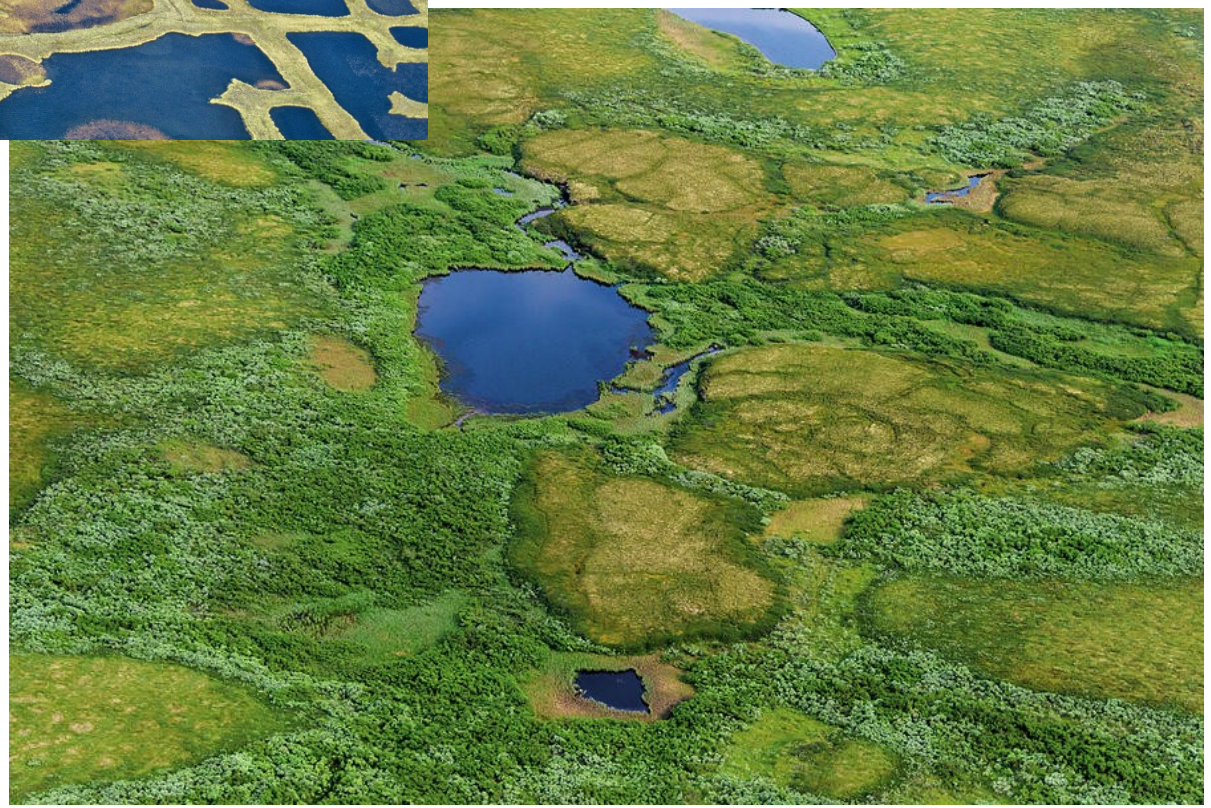
Svalabard
Špicberky

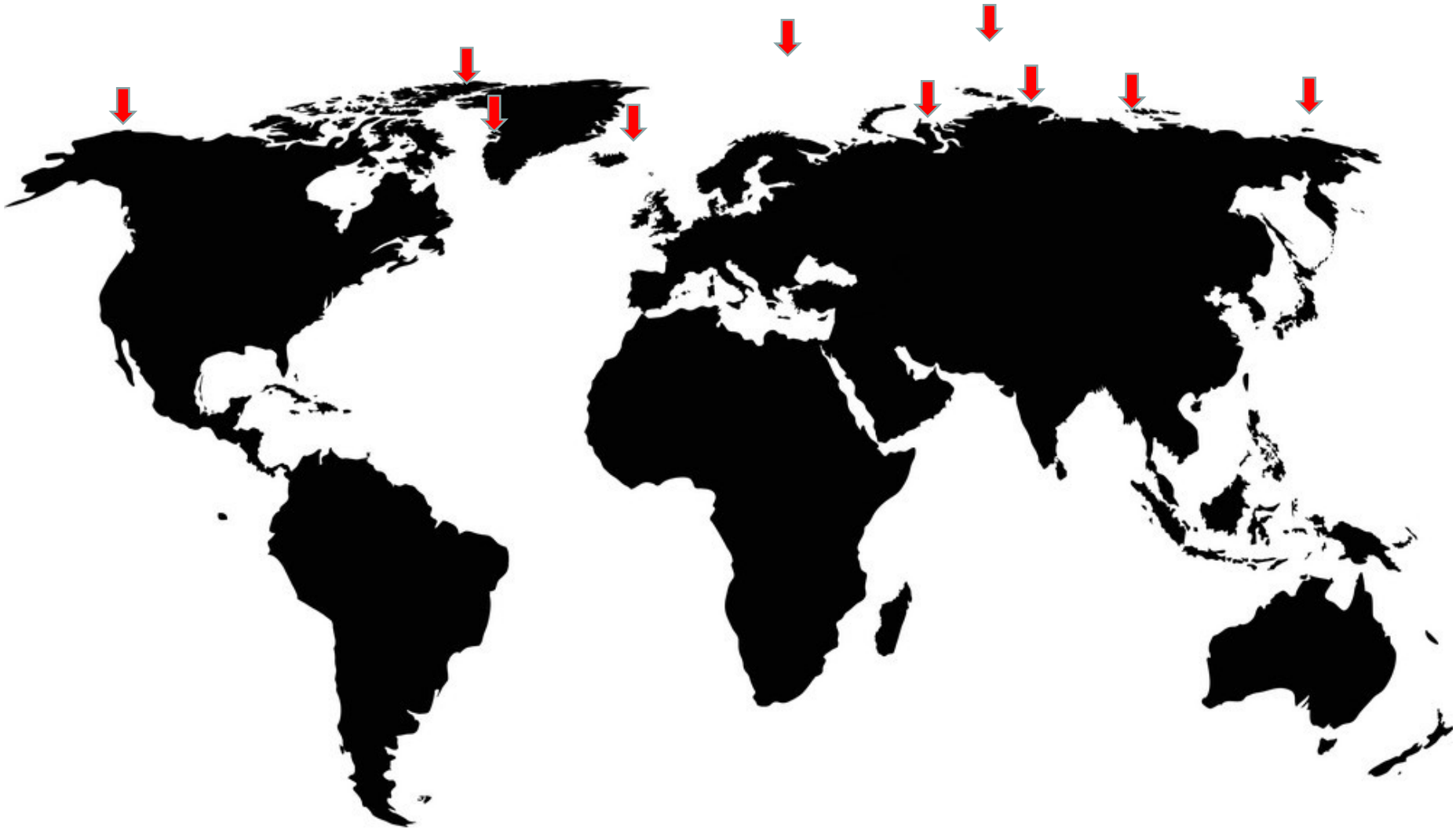
Údolí Adventdalen

Ruská Arktida

Delty řek:
Lena

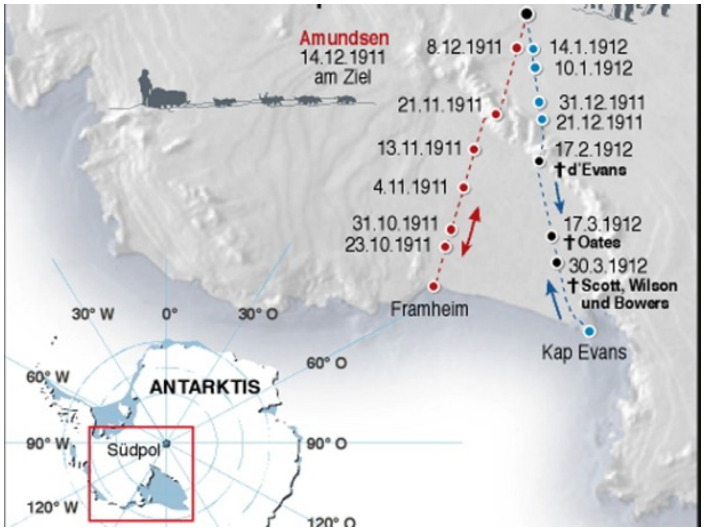
Pečora





Historie dobývání Antaktidy (jižního pólu)

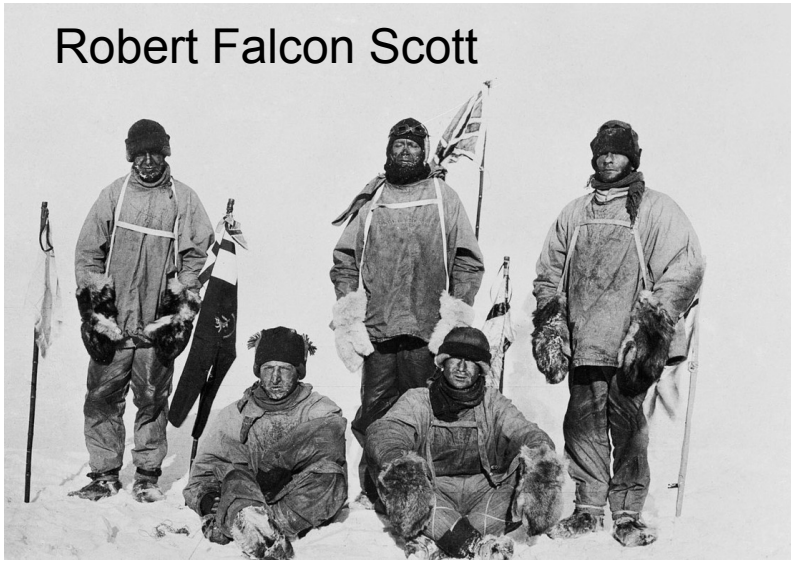
Race for the South pole



Roald Amundsen

14 December 1911

Robert Falcon Scott

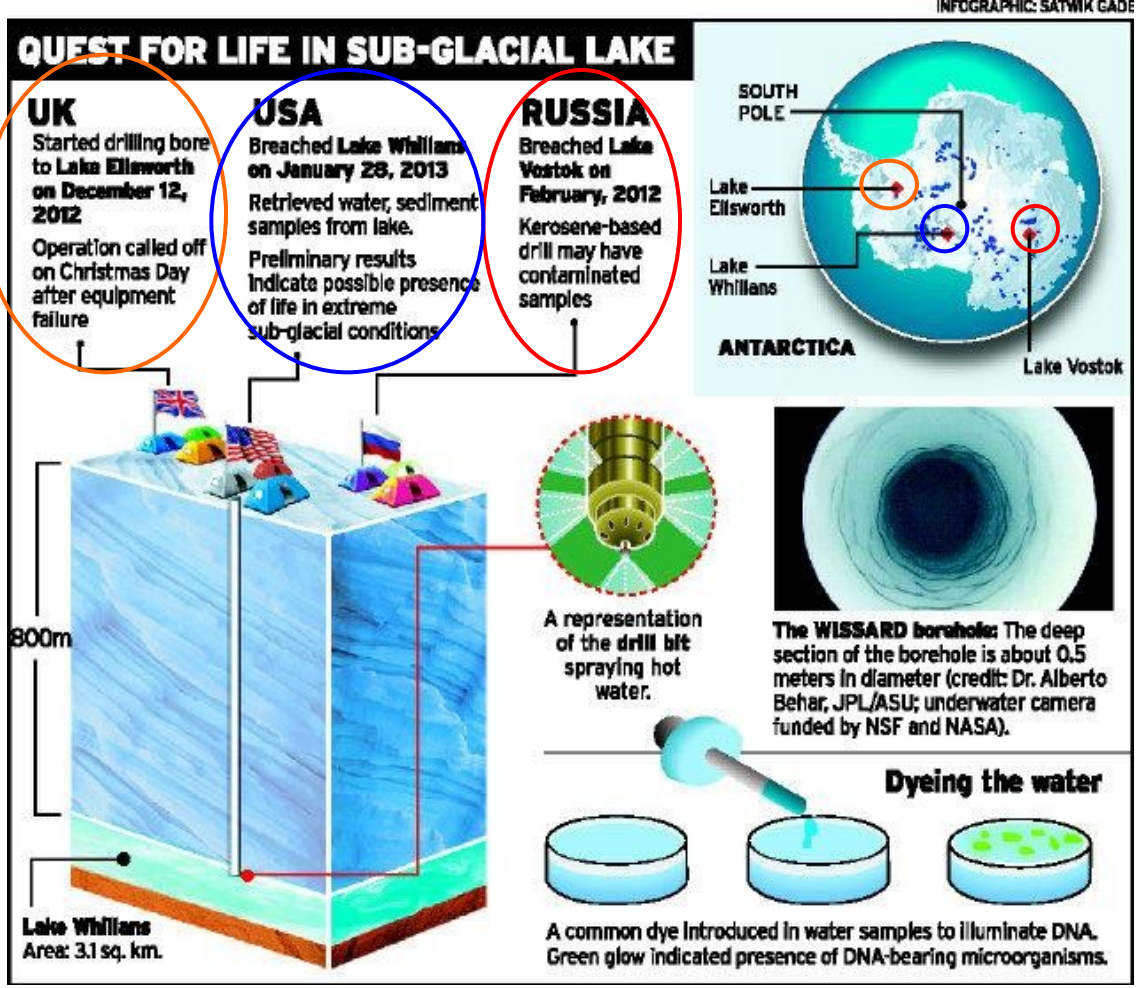


Motivace
Být první na Jižním pólu

Velké příběhy historie polárních oblastí

… a něco podobného se děje právě teď

… and something similar is happening right now



Quest for life In subglacial lakes

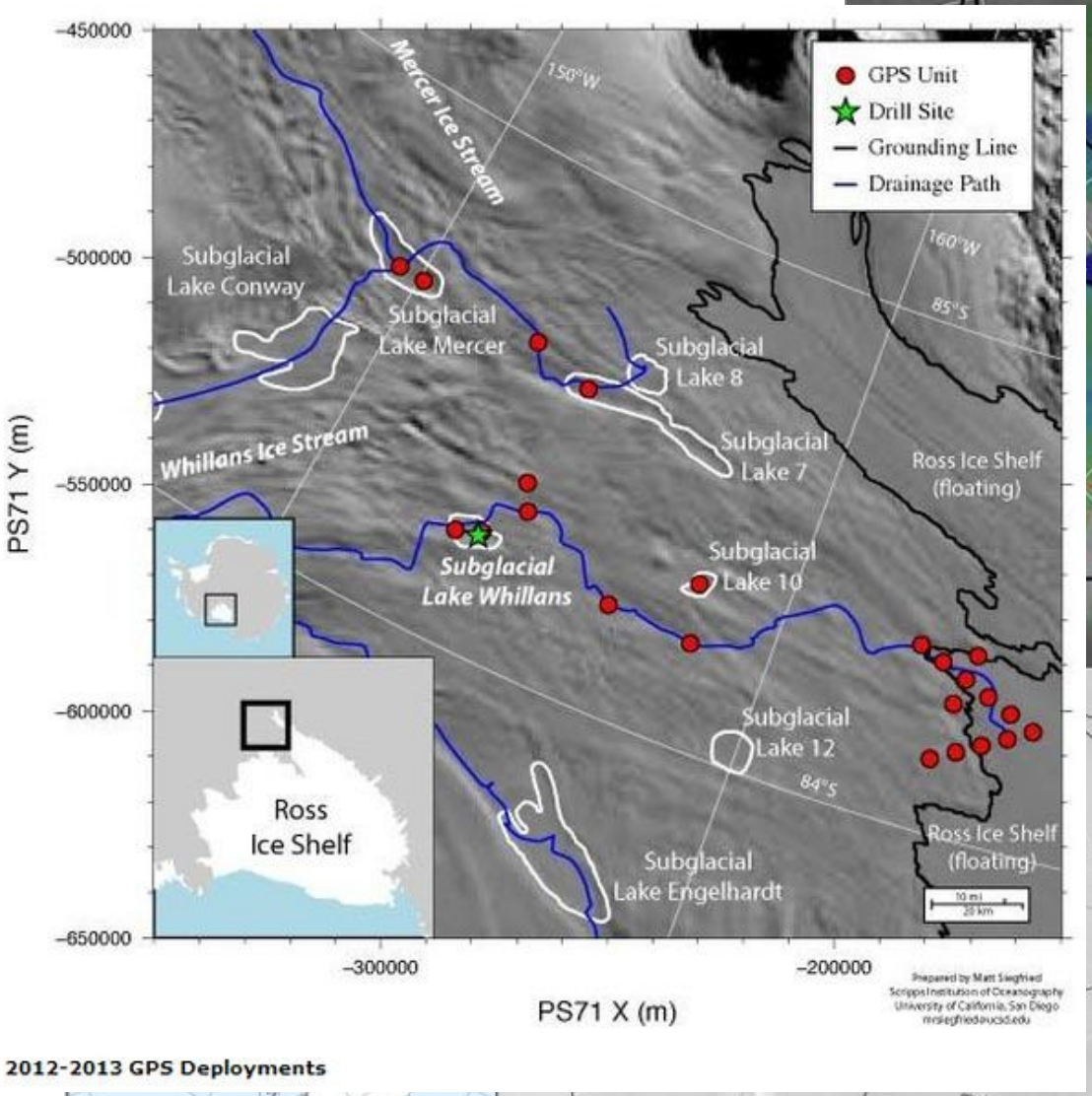
Source: http://www.thehindu.com/sci-tech/science/water-from-the-cold-underworld/article4412043.ece?homepage=true

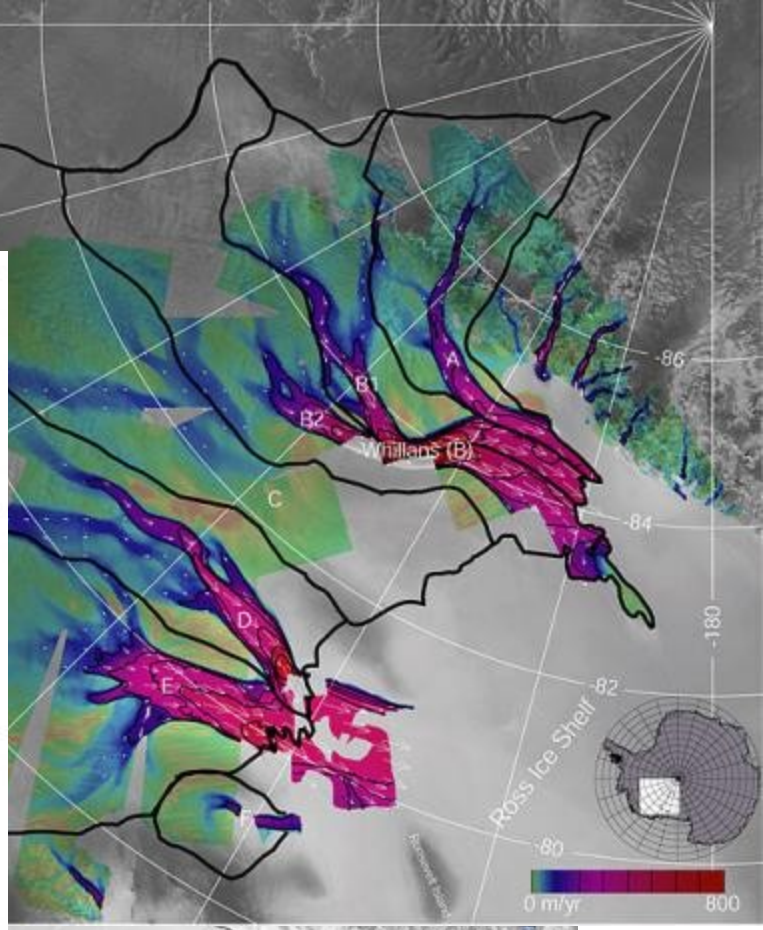
American expedition, dubbed WISSARD, finds possible signs of life in Lake Whillans

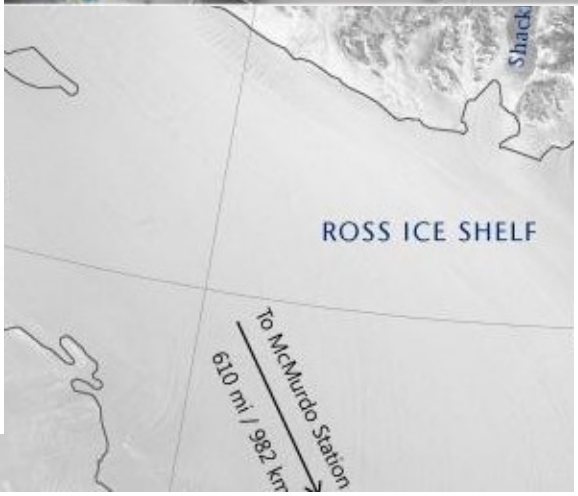
Water samples retrieved on January 28, 2013 from Lake Whillans, a sub-glacial lake about 800 metres beneath the western edge of the Antarctic ice-shelf, have shown possible signs of life. The announcement came from an American expedition that gained access to the 3.1-sq kilometre water body after boring through the shelf using a special hot-water drill.

The retrieved samples are significant because they come from a lake that has been isolated from the rest of the world for thousands of years. Moreover, due to the weight of the massive glacier above it, the lake exists under immense pressure (which shifts the freezing point of its water to a lower temperature).

WHISSARD





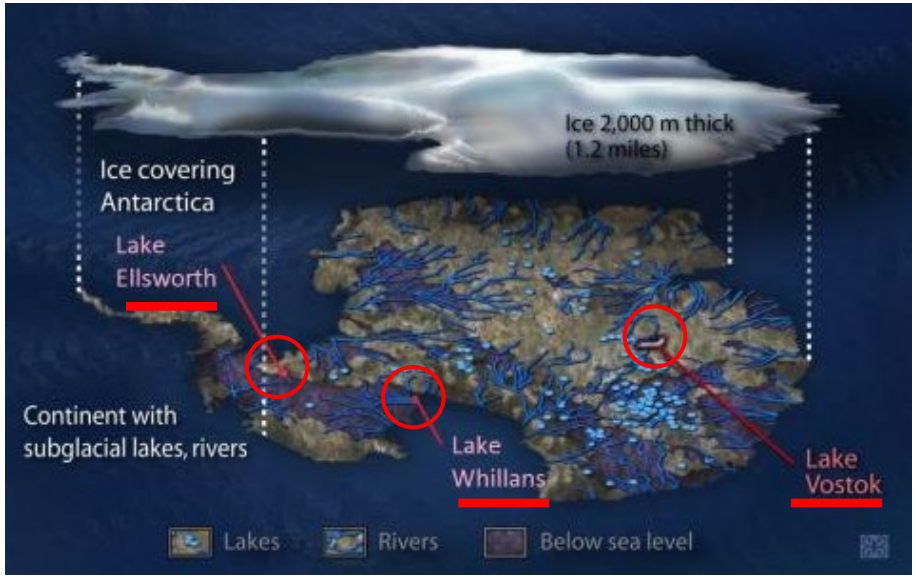


2012-2013 GPS Deployments

We Have Life! Scientists Confirm Microbes Beneath

Antarctic Glaciers

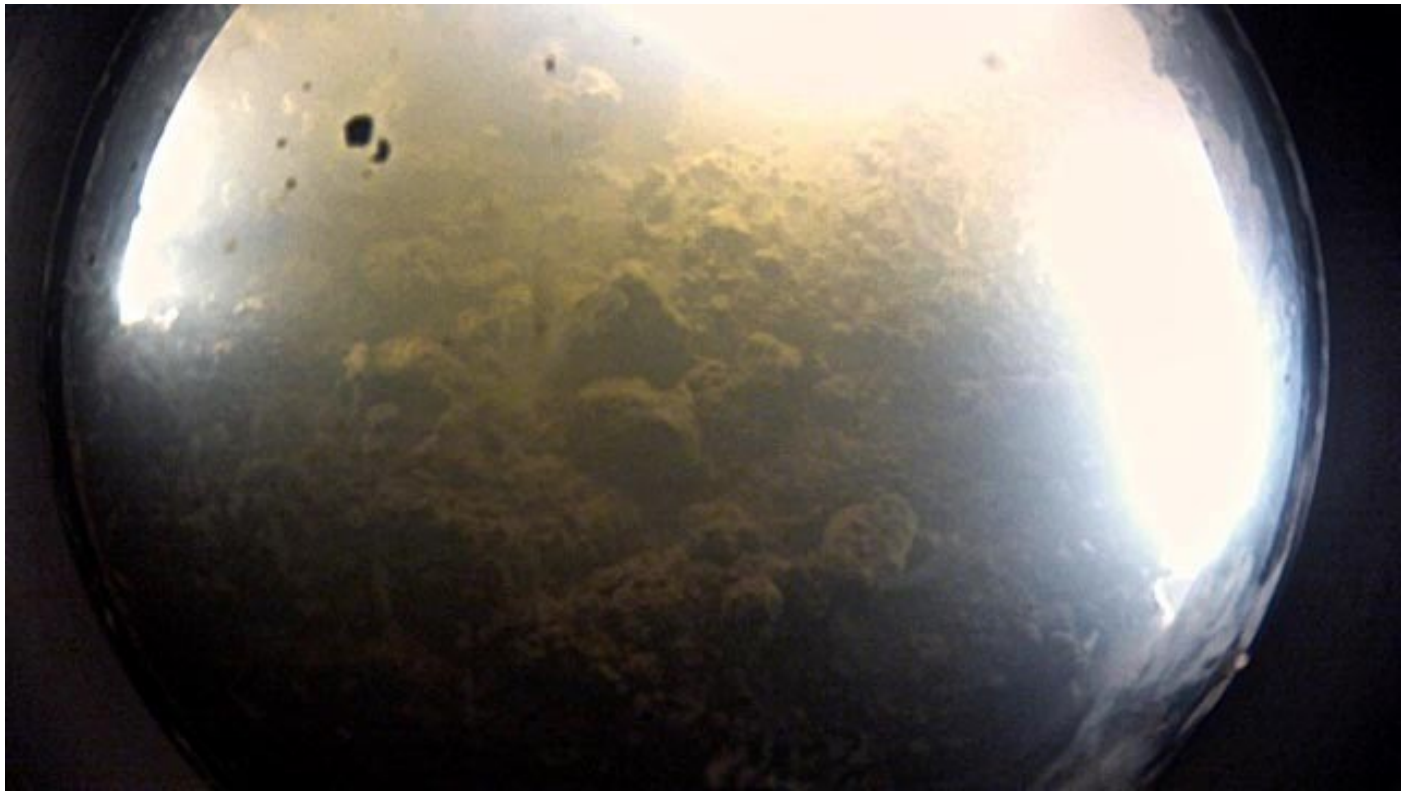
13. unora 2013



Life under the ice
WISSARD team discovers evidence that bacteria live in Lake Whillans
By Peter Rejcek, Antarctic Sun Editor
Posted February 8, 2013
It's life. But is it life as we know it?
Previous coverage
Water world: U.S. researchers breach Antarctic subglacial lake in search for extreme life
Poised for the plunge: WISSARD team ready to explore subglacial Lake Whillans
Magical realism: WISSARD project poised to explore subglacial Lake Whillans
That question will be answered in the months ahead, but it appears that the first evidence that something lives in a lake covered by nearly a kilometer of ice in West Antarctica emerged at the end of January. Scientists analyzed the [redacted] only hours after bottles containing the cloudy lake liquid had been winched to the surface on Jan. 29.

- Source: www.whissard.org

Source: www.wissard.org

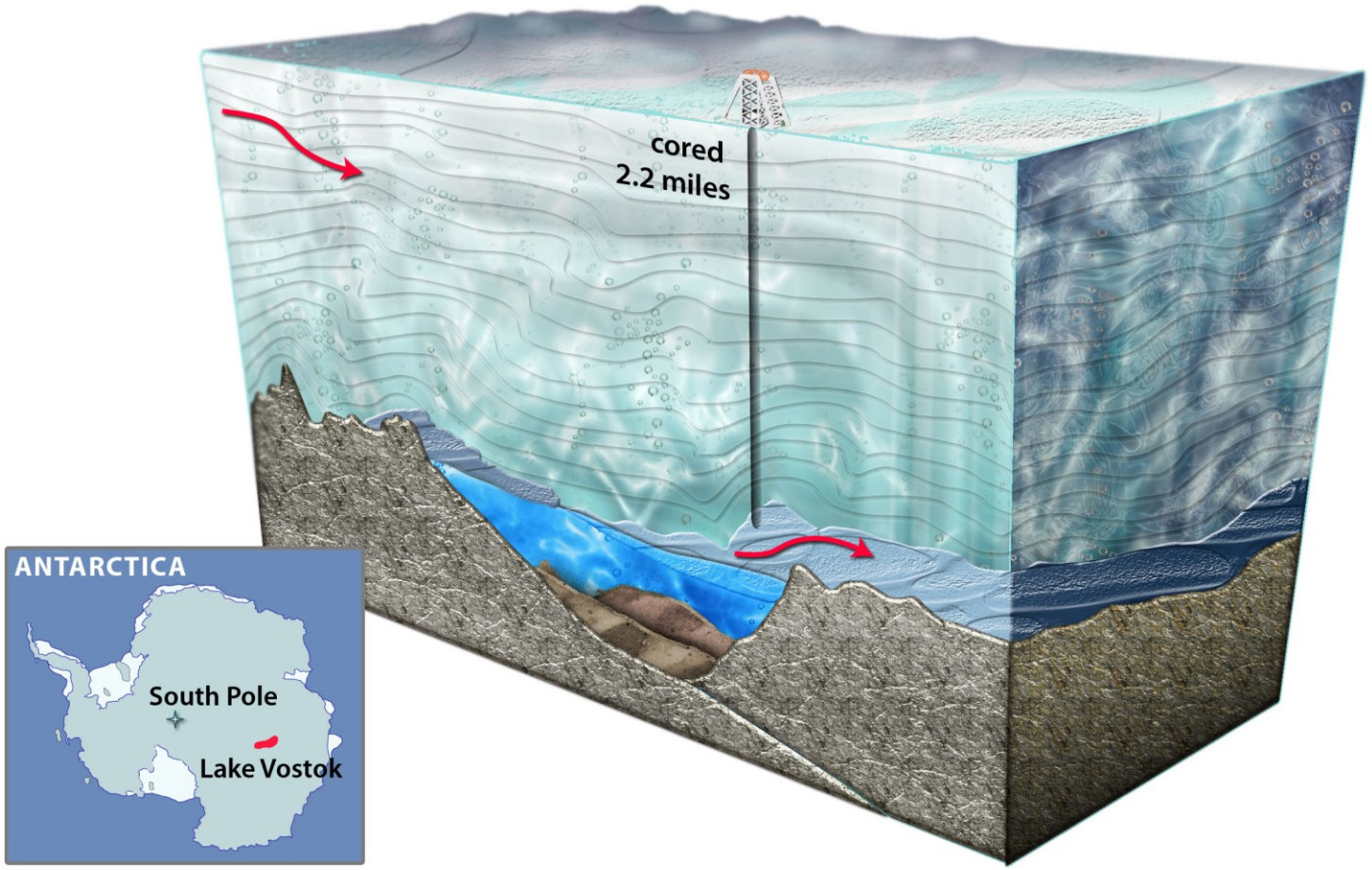


- Lake Whilland bottom

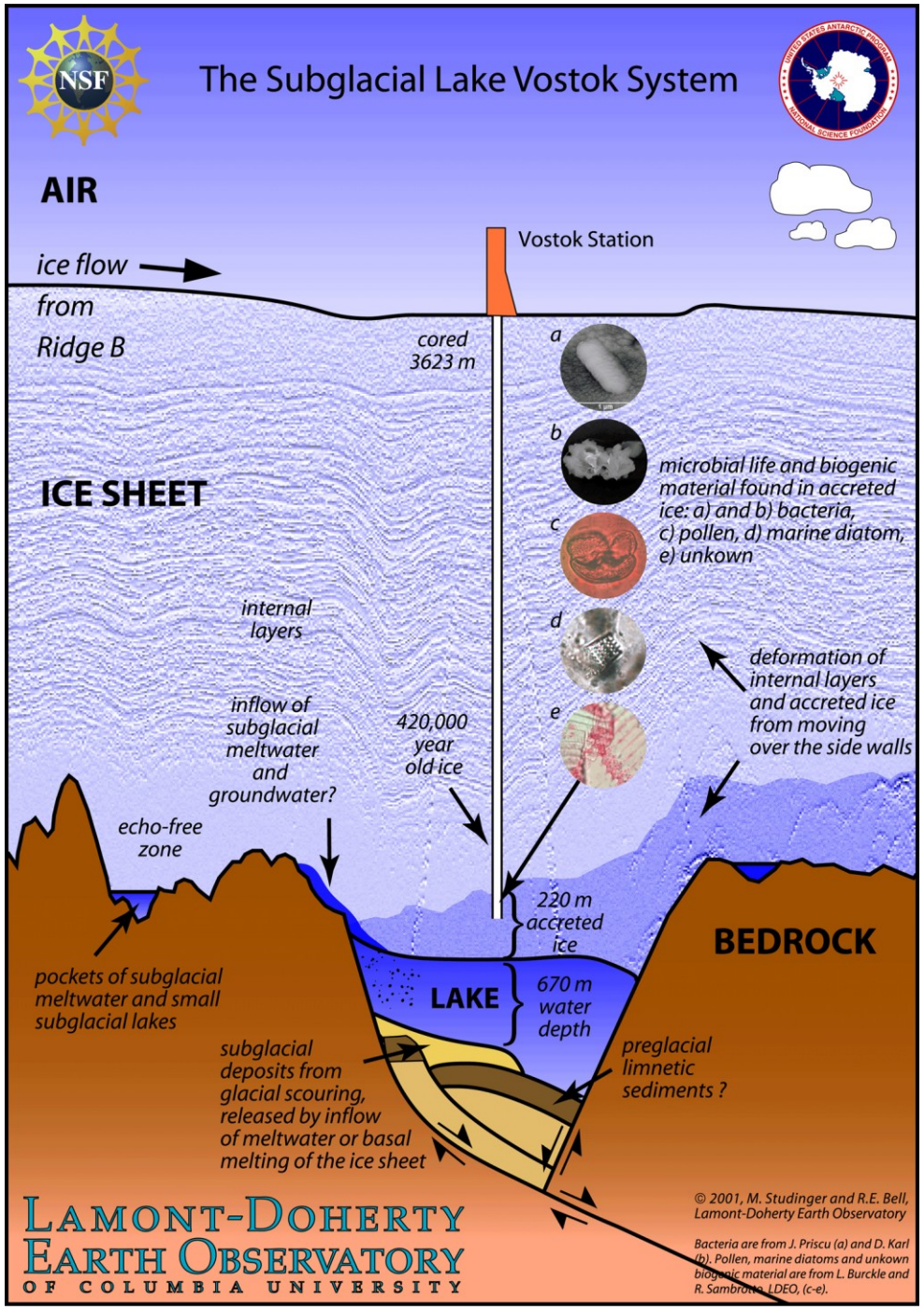
Dno jezera Whilland

Lake Vostok

- Source: http://www.wired.com/wiredscience/2012/02/lake-vostok-drilled/



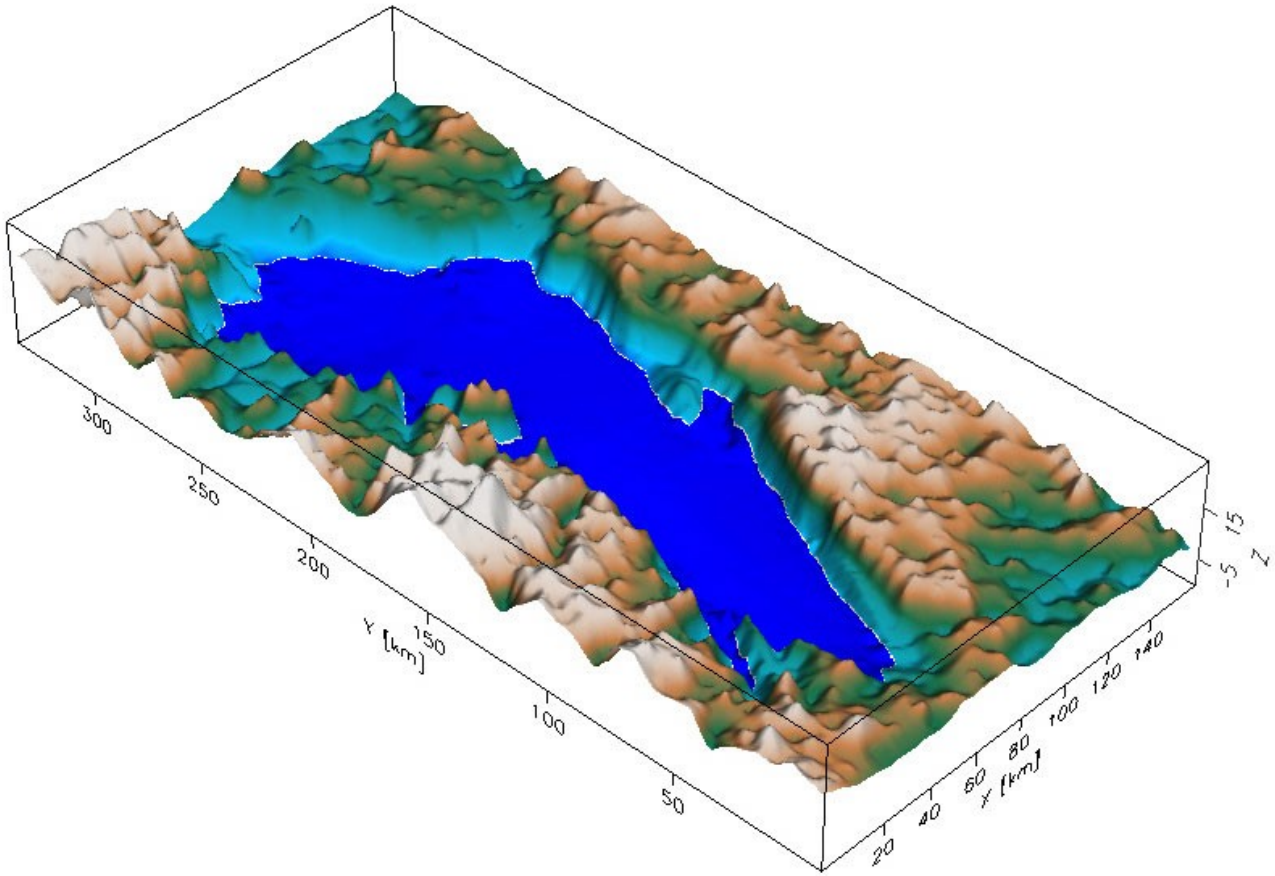
Russian news agency Ria Novosti has reported that the team penetrated Lake Vostok on Feb. 5, 2012. According to the report, the researchers stopped drilling at a depth of 3,768 meters as they reached the surface of the sub-glacial lake.

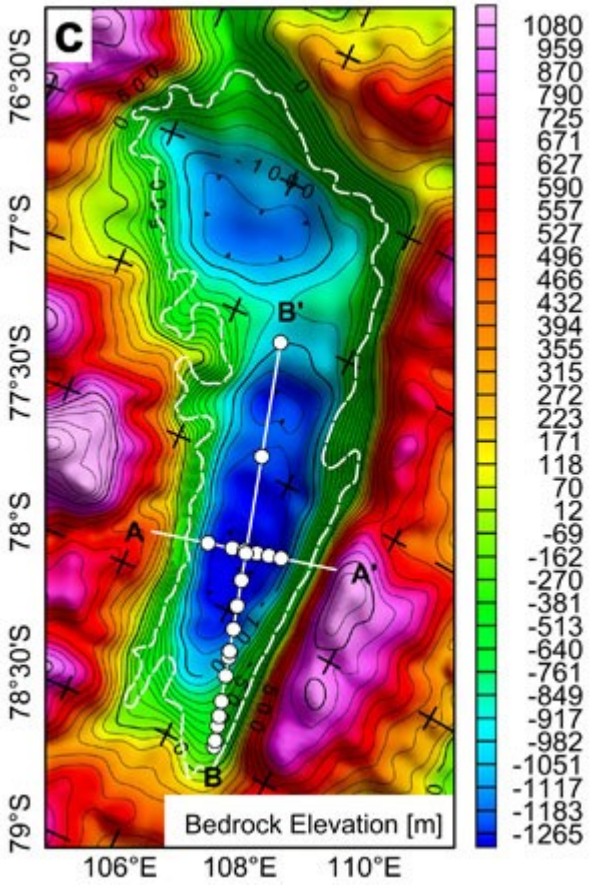

The Subglacial Lake Vostok System
AIR
Vostok Station
ice flow from Ridge B
cored 3623 m
a
b
c
d
e
microbial life and biogenic material found in accreted ice: a) and b) bacteria, c) pollen, d) marine diatom, e) unkown
ICE SHEET
internal layers
deformation of internal layers and accreted ice from moving over the side walls
inflow of subglacial meltwater and groundwater?
420,000 year old ice
echo-free zone
220 m accreted ice
BEDROCK
pockets of subglacial meltwater and small subglacial lakes
LAKE
670 m water depth
subglacial deposits from glacial scouring, released by inflow of meltwater or basal melting of the ice sheet
preglacial limnetic sediments ?
LAMONT-DOHERTY EARTH OBSERVATORY OF COLUMBIA UNIVERSITY
© 2001, M. Studinger and R.E. Bell, Lamont-Doherty Earth Observatory
Bacteria are from J. Priscu (a) and D. Karl (b). Pollen, marine diatoms and unkown biogenic material are from L. Burckle and R. Sambrotta, LDEO, (c-e).

5.2.2012


05.02.12
ст Восток
гл 3769,3 м
озеро

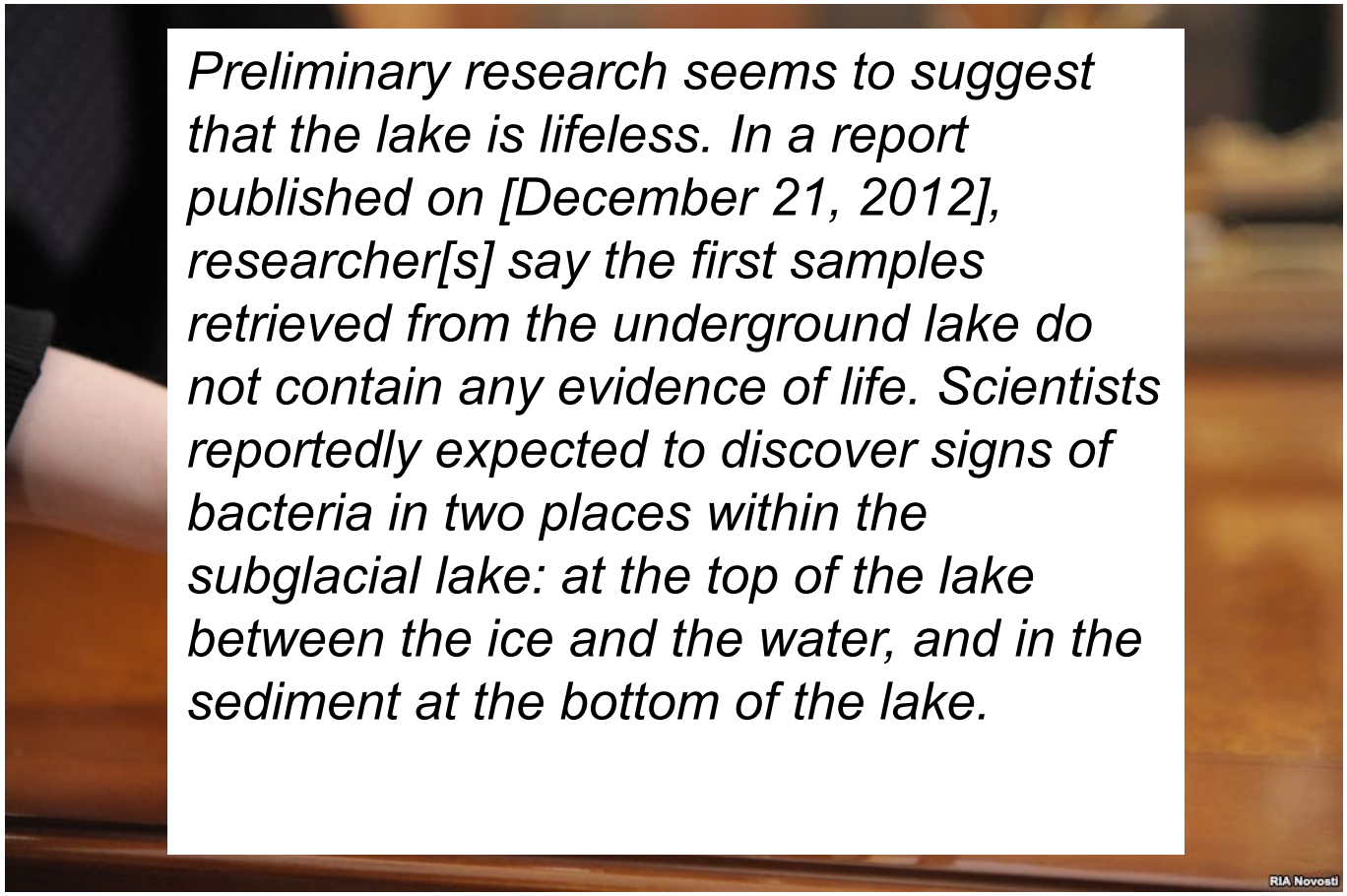
Lake Vostok





- Source: http://www.americanpolar.org/2011/01/13/russian-science-team-prepares-to-penetrate-lake-vostok/
- Lake bottom image source: [via RT, Images via The Earth Institute Columbia University]
- http://www.slashgear.com/lake-vostok-drilling-complete-earths-oldest-super-clean-water-system-reached-06212292/

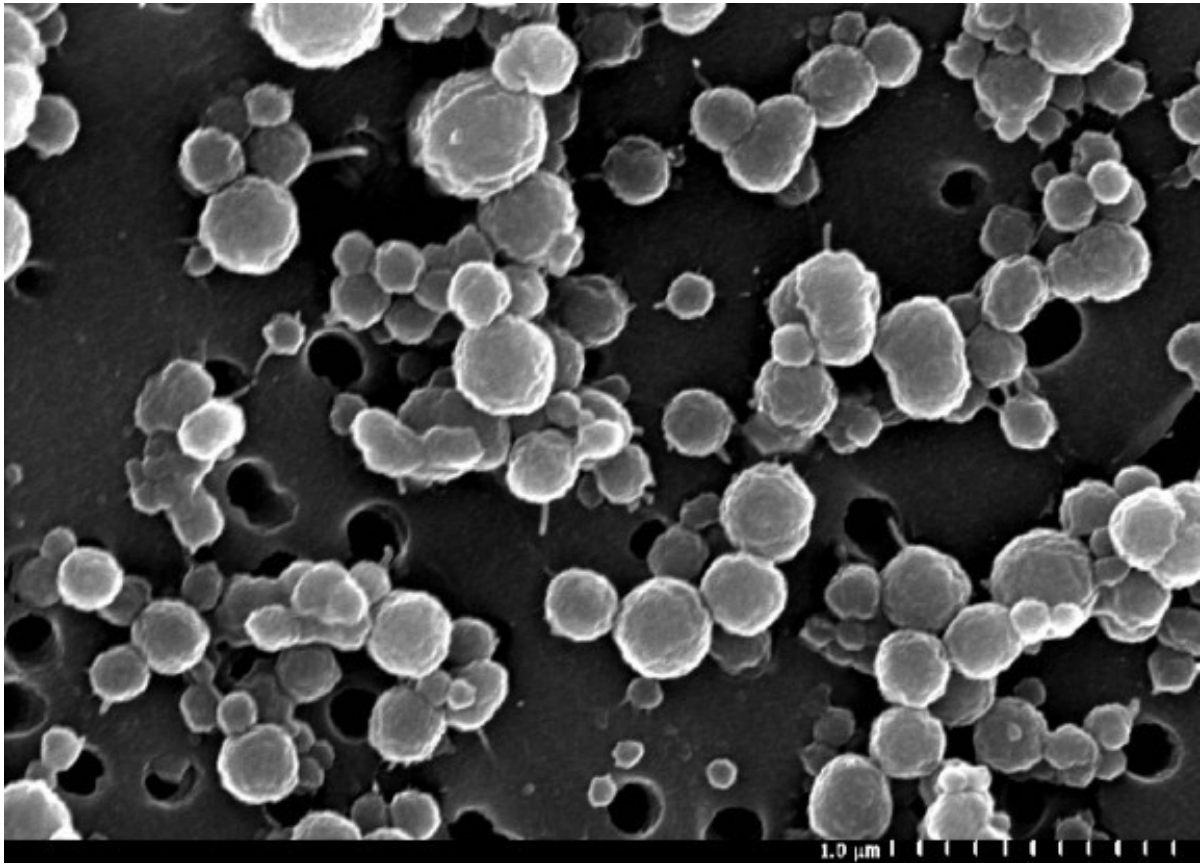
The first sample of water from subglacial Lake Vostok

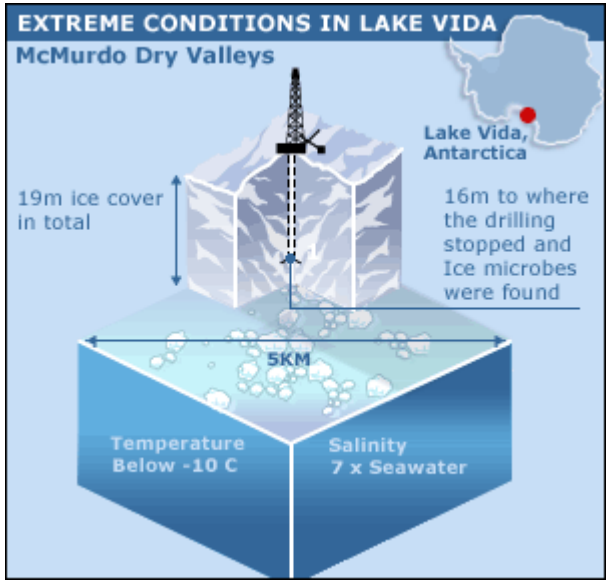


Preliminary research seems to suggest that the lake is lifeless. In a report published on [December 21, 2012], researcher[s] say the first samples retrieved from the underground lake do not contain any evidence of life. Scientists reportedly expected to discover signs of bacteria in two places within the subglacial lake: at the top of the lake between the ice and the water, and in the sediment at the bottom of the lake.

- **The first sample of water from subglacial Lake Vostok in Antarctica arrived in Russia in mid-2012, but scientists hope the new core samples produce different results.**
- **Source: http://www.rferl.org/content/russian-researchers-sample-antarctic-ice-lake-vostok-science/24821746.html**

Microbes from Lake Vida, Antarctica



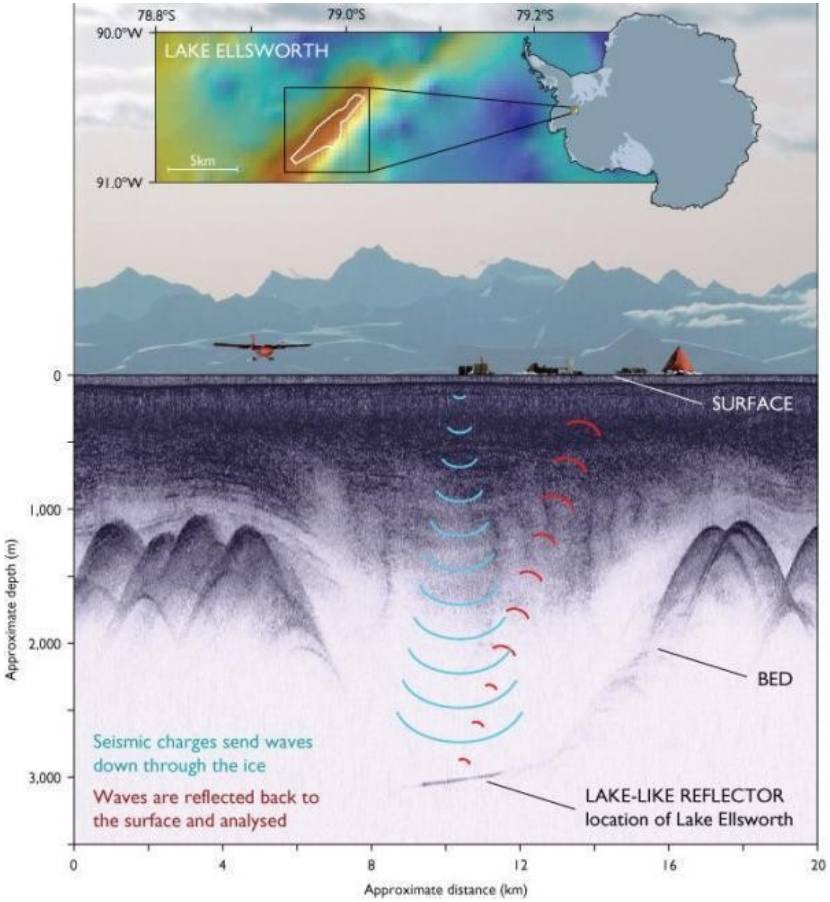


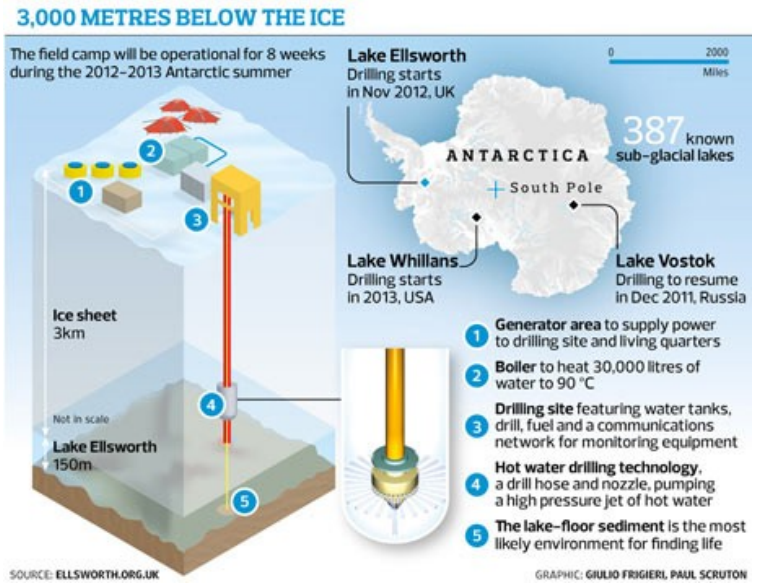
- But now, says Nature, reporting on a new study led by Alison Murray, scientists have found an abundance of life in the frigid Antarctic Lake Vida, a mostly-frozen salt water lake. Source: Smithsonian.org

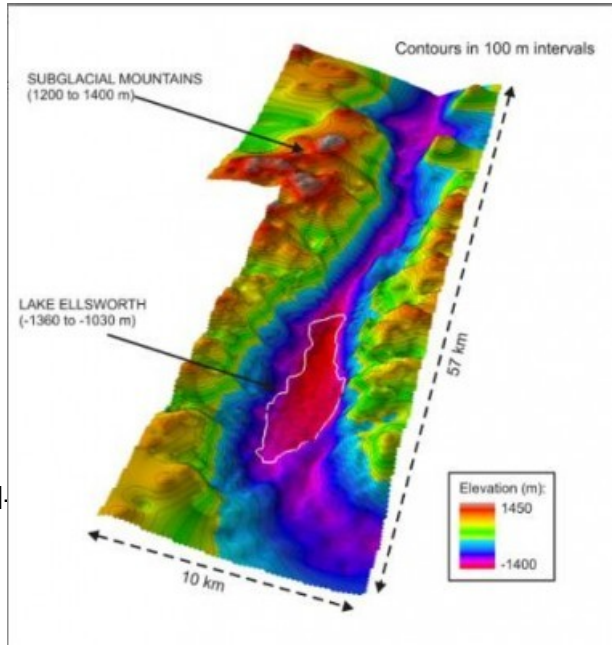
Lake Vida, Dry Valleys

- Source: http://www.daviddarling.info/encyclopedia/L/LakeVida.html

Lake Ellsworth

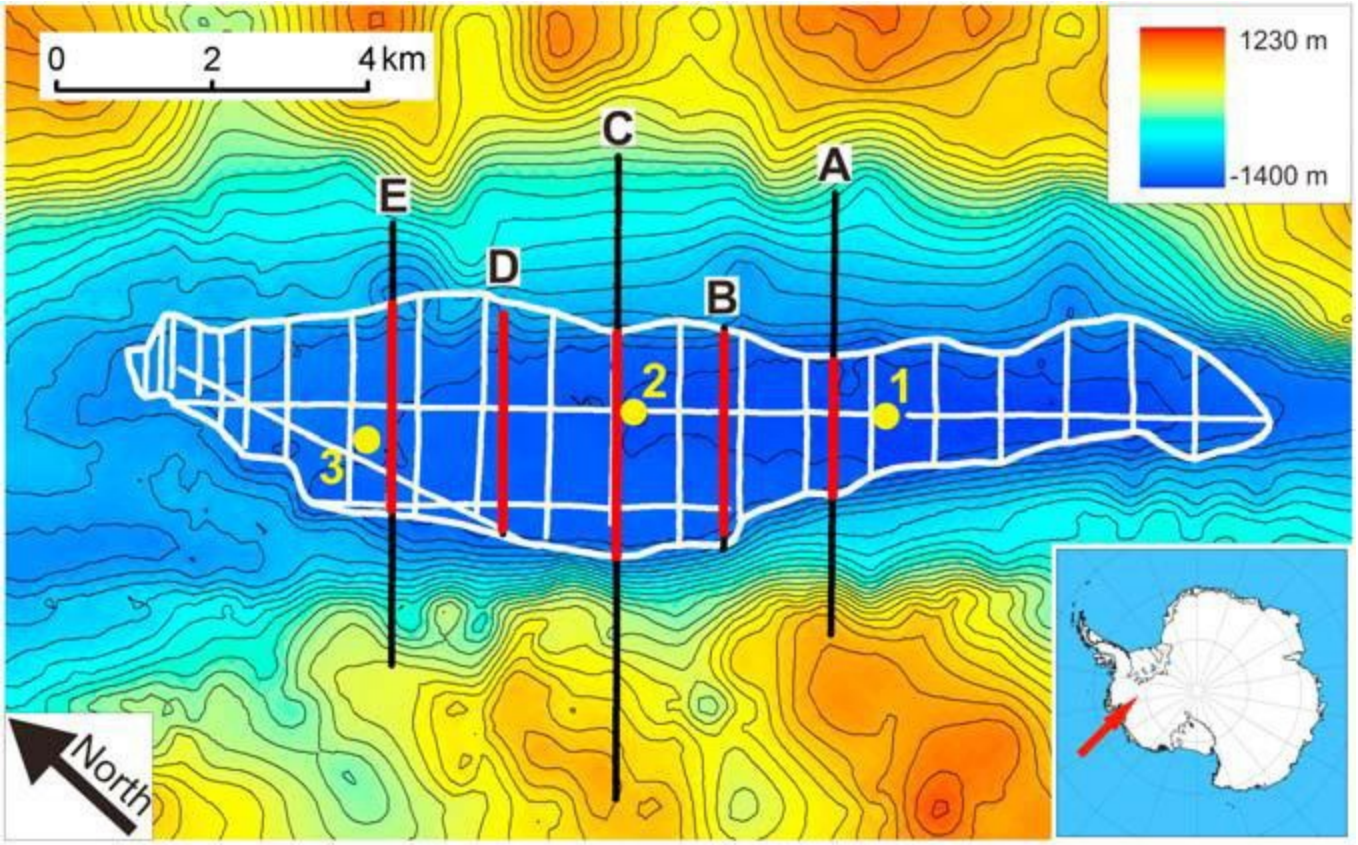




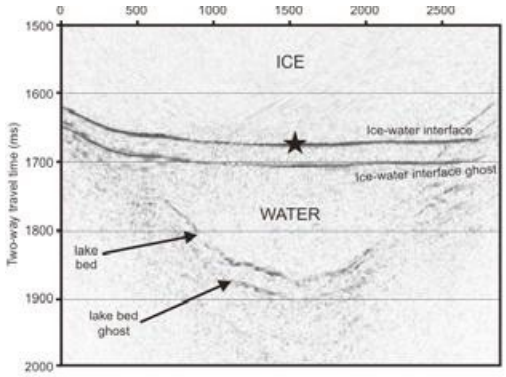


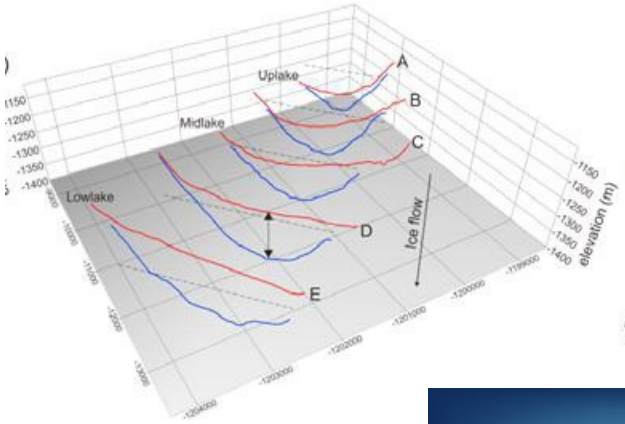
- http://www.guardian.co.uk/world/2011/oct/15/antarctic-mission-sub-glacial-

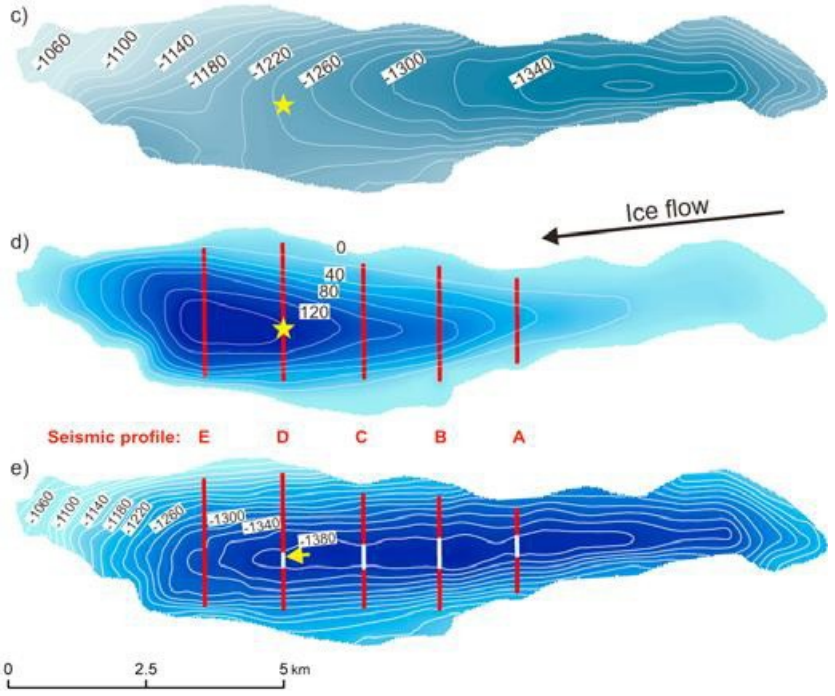
Ellsworth (Woodward et al. 2010)

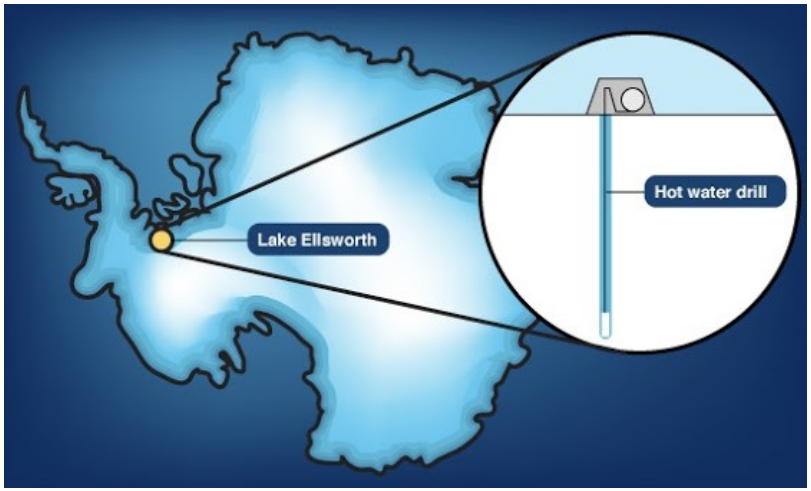


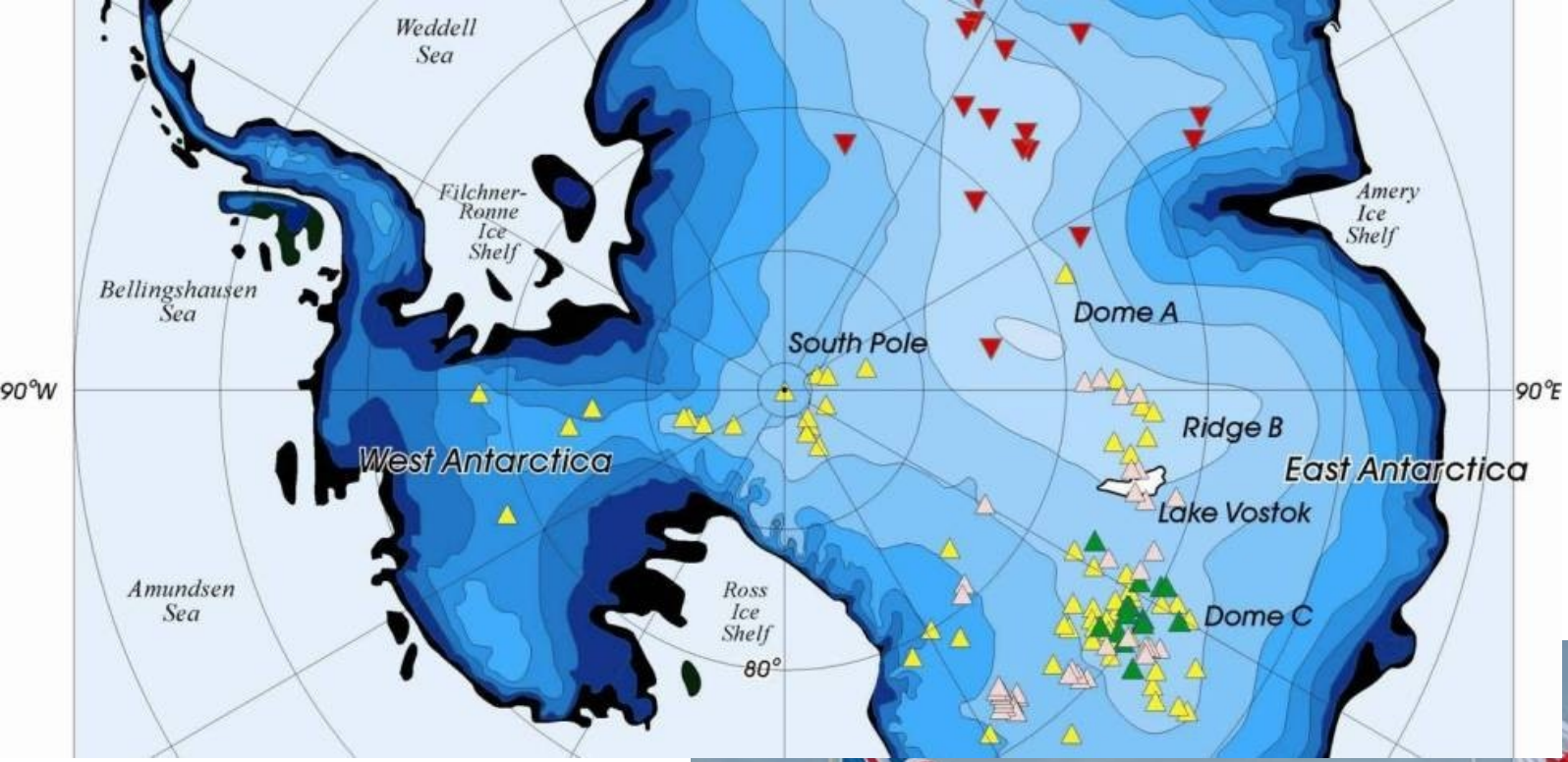
Lake Ellsworth





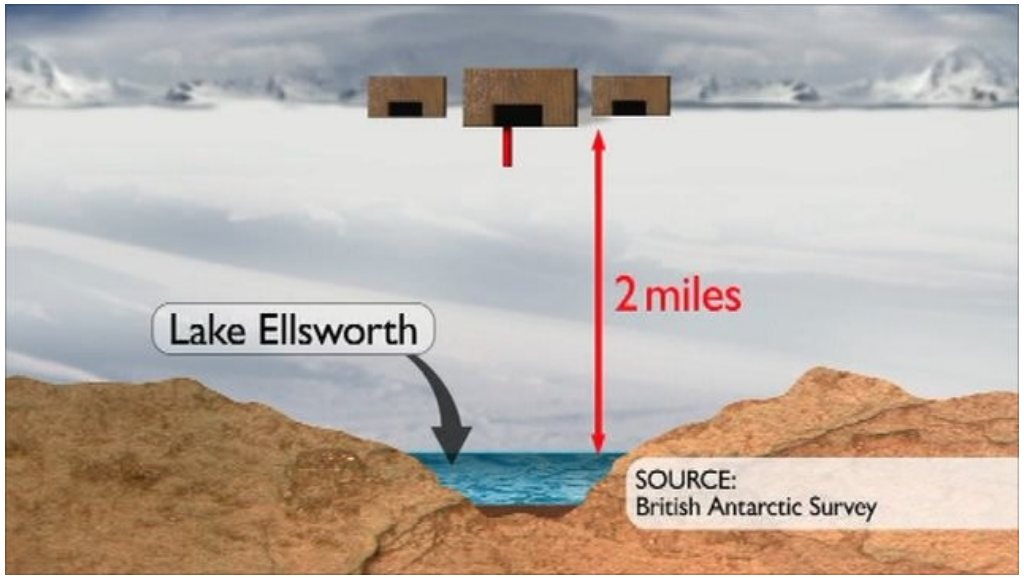


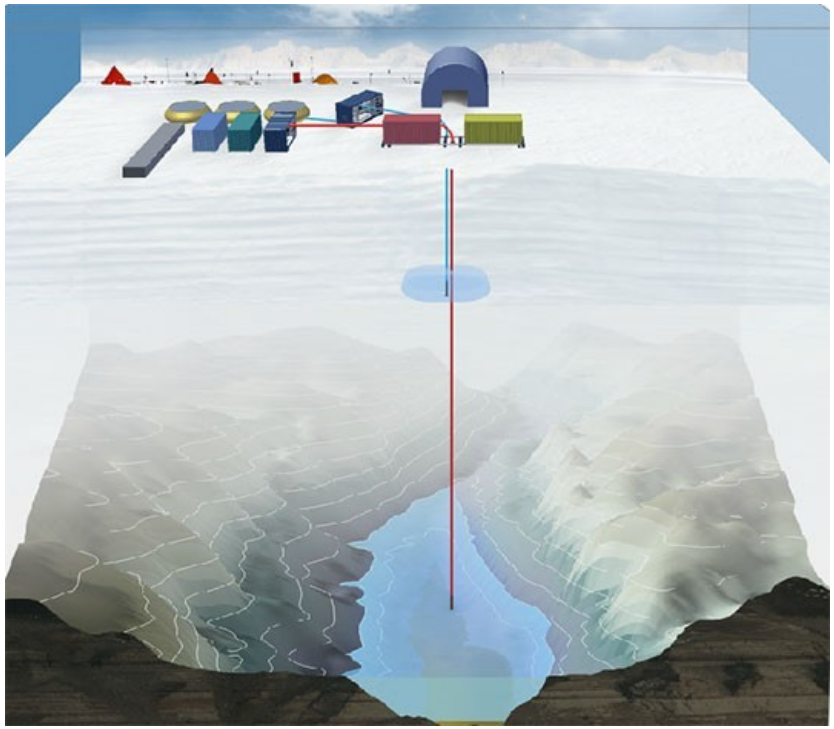



Weddell Sea
Filchner-Ronne Ice Shelf
Amery Ice Shelf
Bellingshausen Sea
Dome A
South Pole
90°W
90°E
Ridge B
West Antarctica
East Antarctica
Lake Vostok
Amundsen Sea
Ross Ice Shelf
Dome C
80°

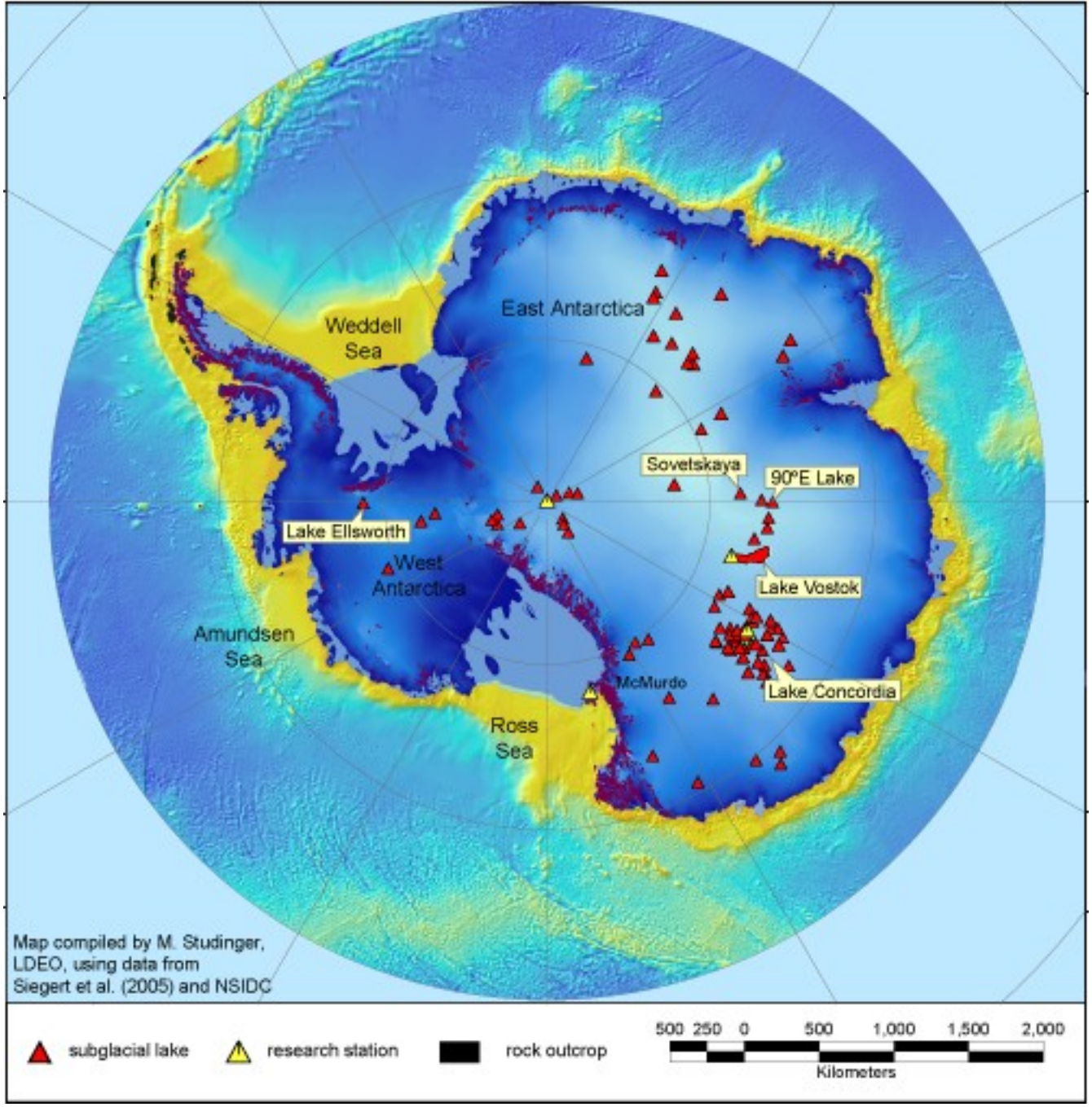

NATURAL
RE:RONMENT
-H COUNCIL

Researchers to bore through 3km of Antarctic ice, seek organisms isolated for 100K years



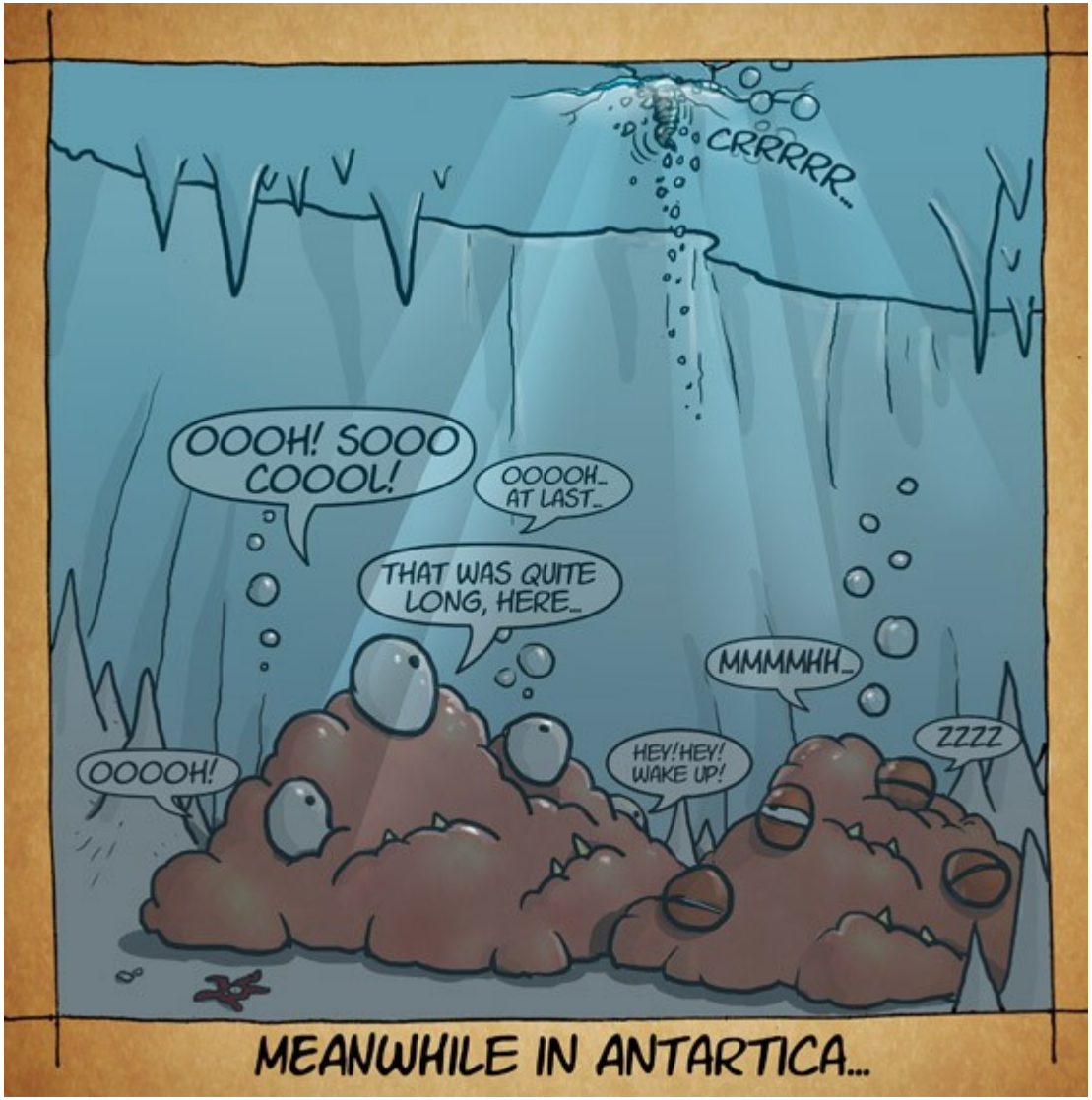


- Hoping to find microbial life forms that might provide new insight into the evolution of life on Earth, the scientists decided drill into Lake Ellsworth which they believe has been frozen over for thousands of years.
- They expected that the lake floor's sediments might yield a new record of the Earth's climate and studying some of Antarctica's hundreds of subglacial lakes will offer clues to whether ice-covered planets and moons could also support life.



http://on.aol.com/video/scientists-look-for-life-in-antarctic-subglacial-lake-517591327?icid=bottom_related_thumb_3

Podledovcový život v Antarktidě je přítomný (snad) všude
Subclacial life forms if Antarctica could be everywhere



Dámy a pánové, děkuji Vám za pozornost.