

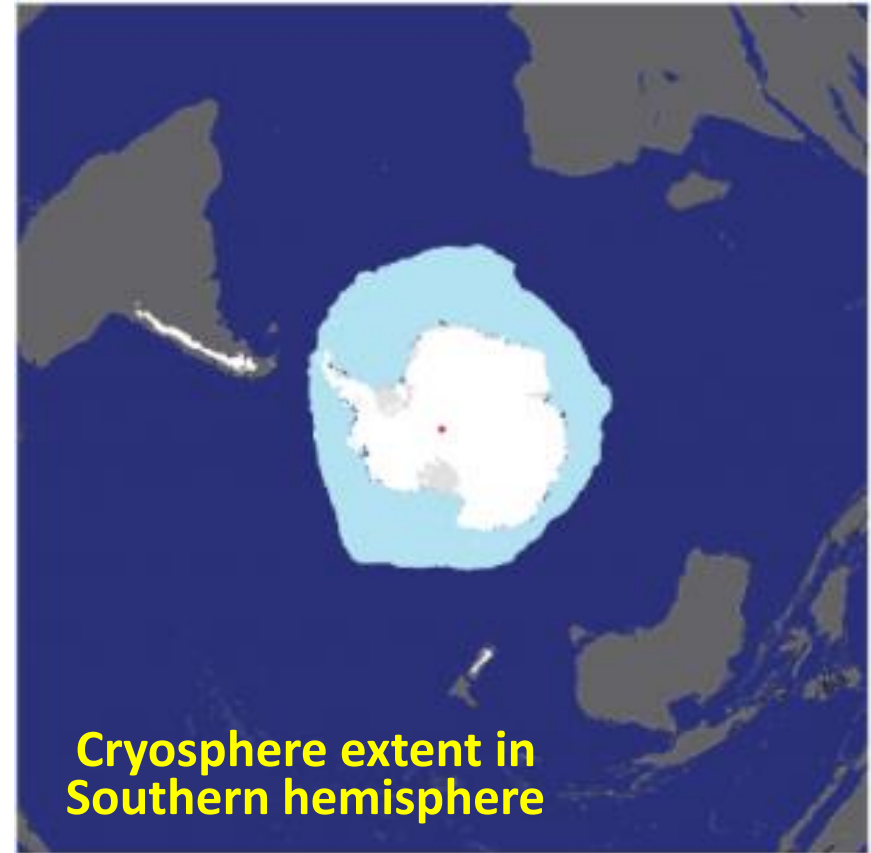
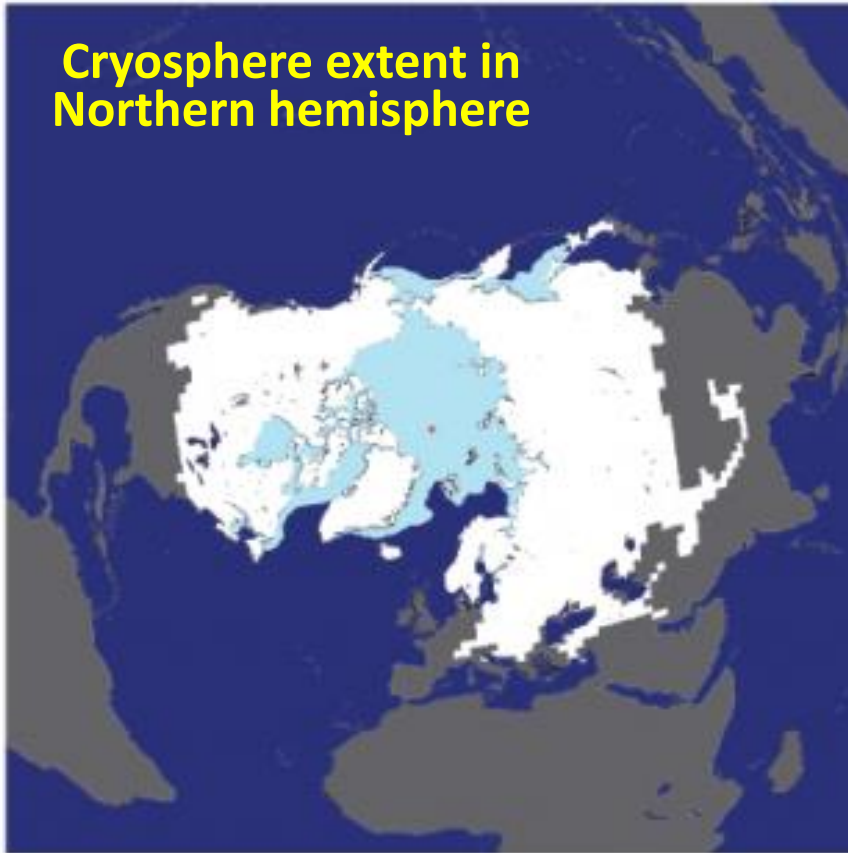


# CRYOSPHERE

## THE FROZEN EARTH

About **2/3** of the world's freshwater is **frozen** in ice sheets, glaciers, permafrost and sea ice.

# Freshwater: Frozen Water



The cryosphere consists mainly of the permanent ice caps of Antarctica and Greenland, with much smaller amounts in Arctic and mountain glaciers.

# Cryosphere Components

ICE SHEETS

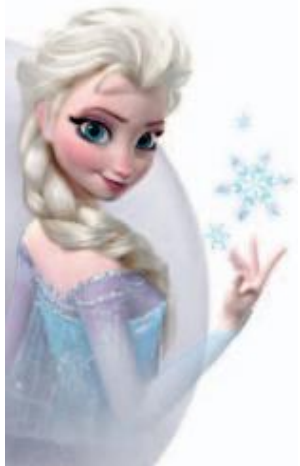
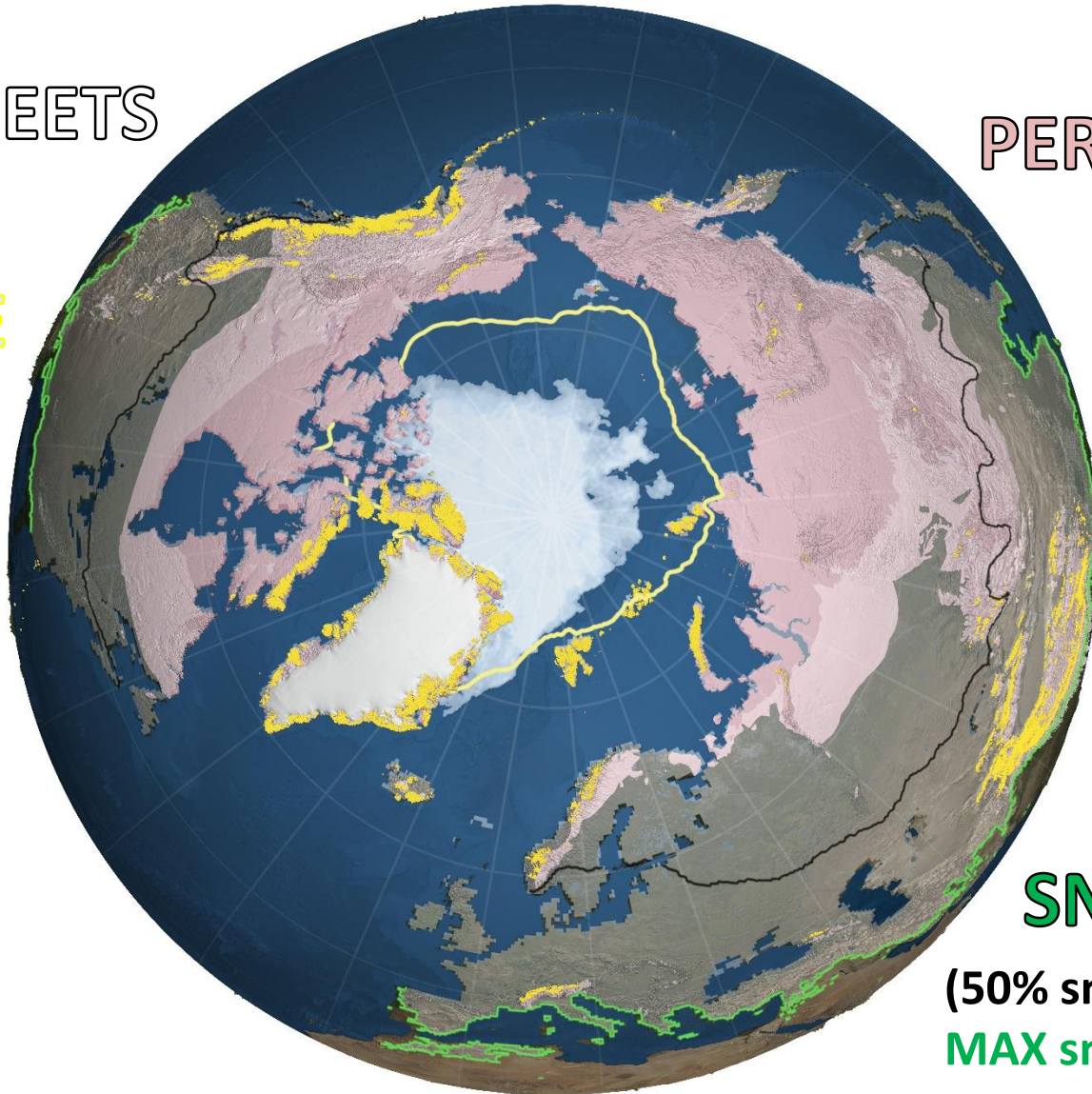
PERMAFROST  
(frozen ground)

SEA ICE

GLACIERS

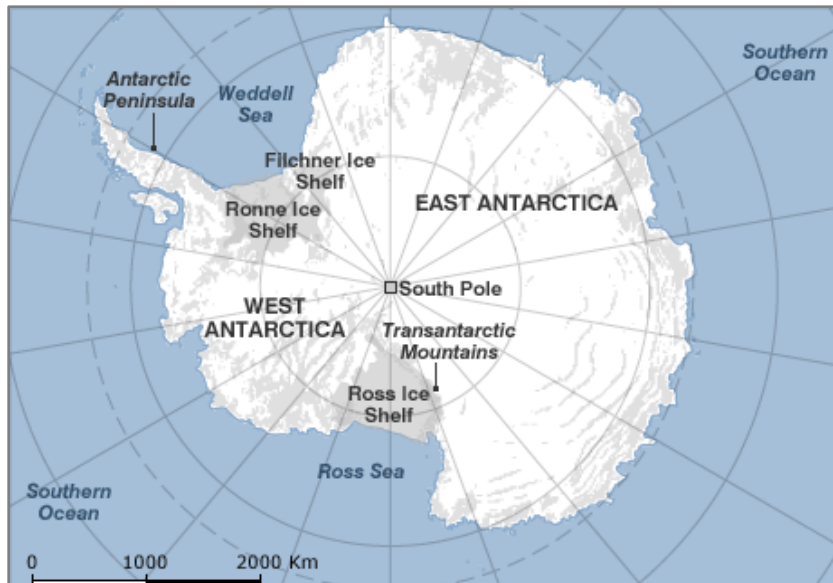
SNOW

(50% snow extent line  
MAX snow extent line)

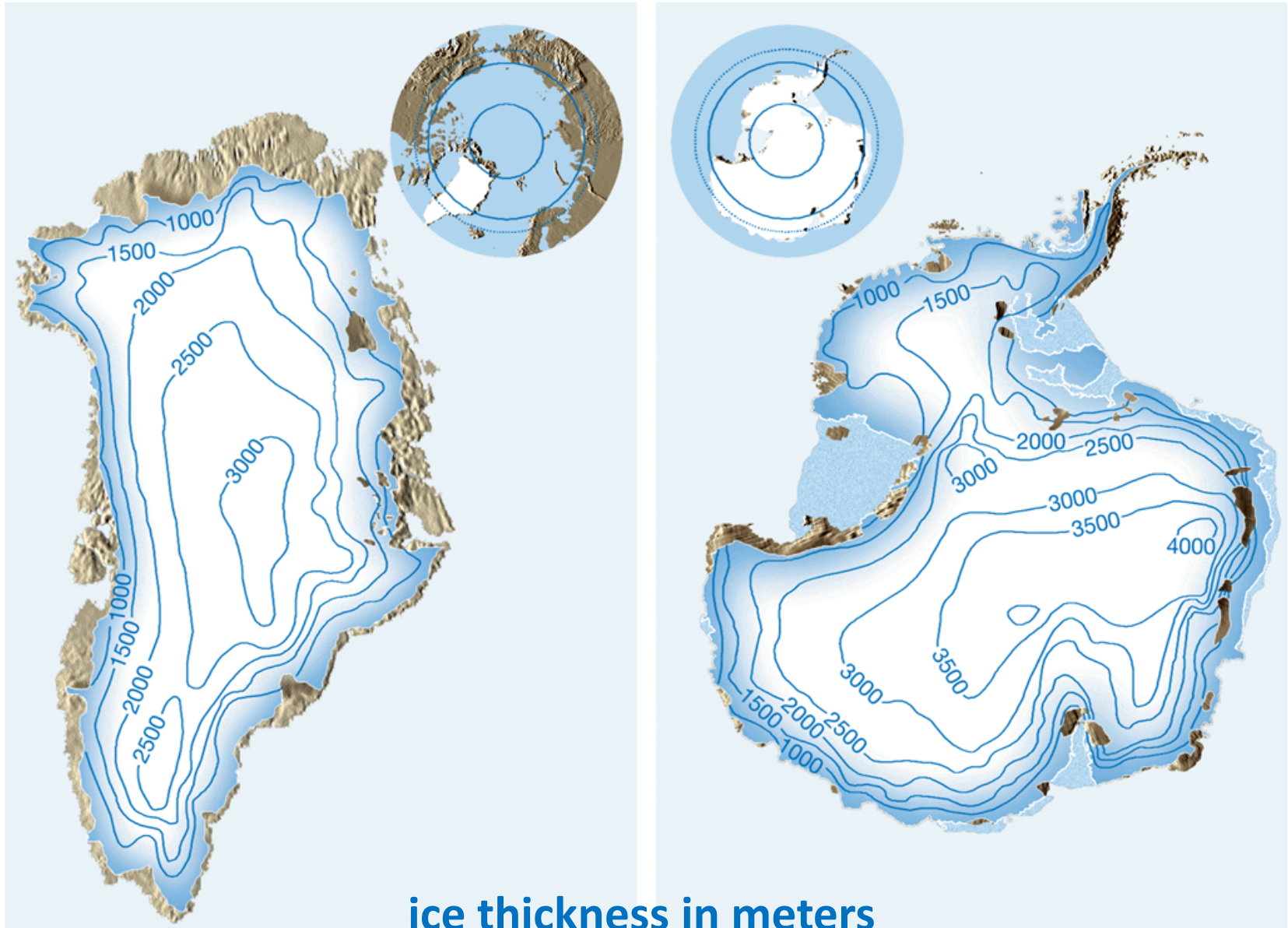


# Permafrost in Land Areas

- Land areas in polar regions, such as Antarctica and Greenland, and the northern parts of Alaska and Siberia, have zones below their surfaces in which **ground water remains frozen year-round**.
- Those regions are known as **permafrost** areas.



# Ice Cover of Greenland and Antarctica

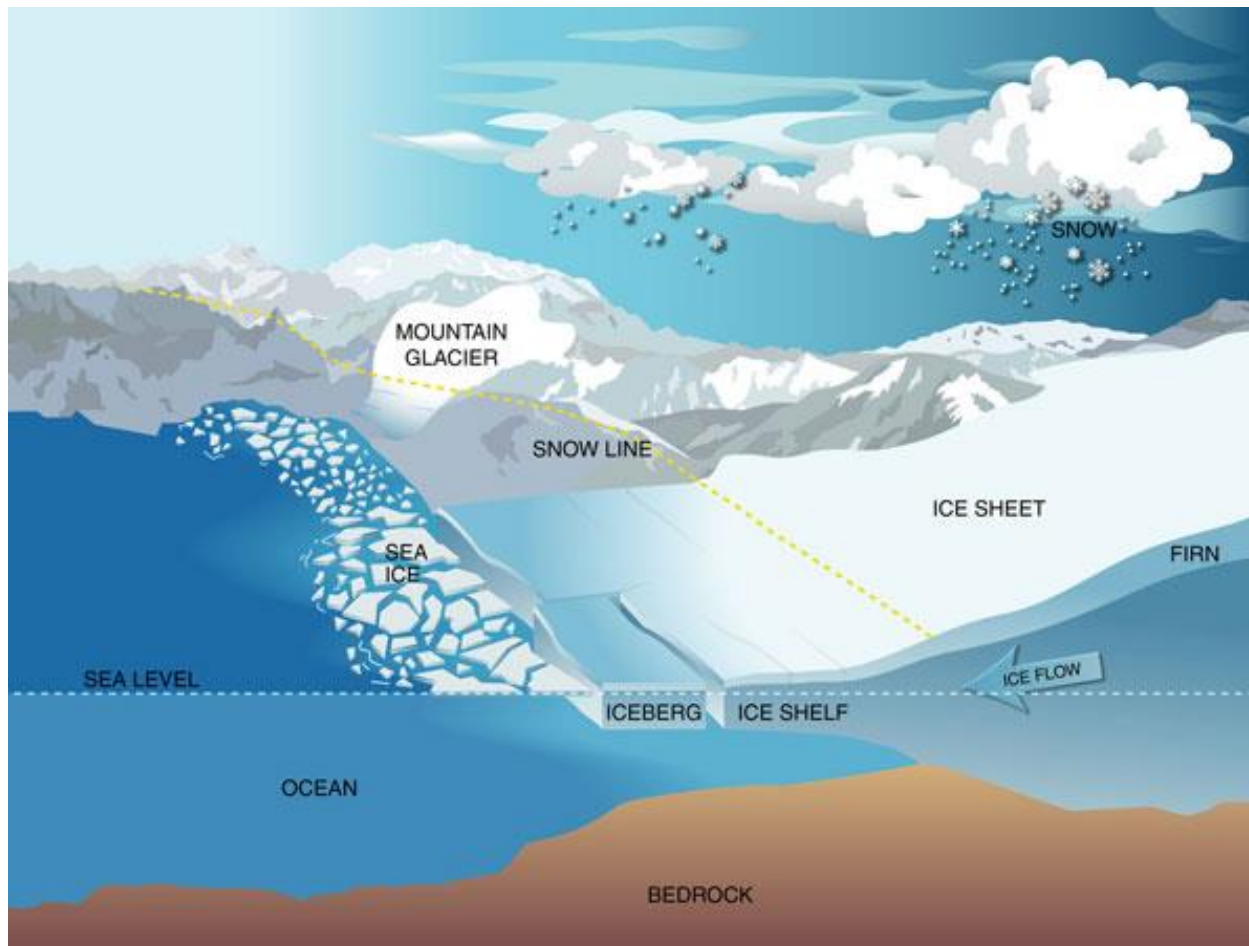


# What is Ice Age?

- During **ice ages**, ice sheets cover major parts of Earth's land area year-round for hundreds or thousands of years:
  - There have been at least **five major ice ages** in the Earth's past.
  - Within the ice ages, more temperate and more severe periods occur; the **colder periods** are called **glacials**, the **warmer periods** are called **interglacials**.
  - The advance and retreat of glaciers during these periods can produce major erosion and re-configuration of the landscape.
  - The most recent glacial period ended about 12,000 years ago, before the advent of civilized human history.
  - It is still not exactly clear what causes the advent of ice ages.
- Scientifically speaking, **we are currently living in an Ice Age** (we have ice sheets over Greenland and Antarctica), during an *interglacial period*!

# Frozen Water Locations: Glaciers

A glacier is any large mass of ice that forms on land and moves (flows) slowly due to gravity and the internal deformation of ice.



On Earth,  
~99% of glaciers  
are **ice sheets**  
**in the polar**  
**regions**  
(Antarctica  
and Greenland)  
and  
~1% is found  
in **mountain**  
**ranges** on  
every continent  
except  
Australia.

# Mountain (Alpine) Glaciers

