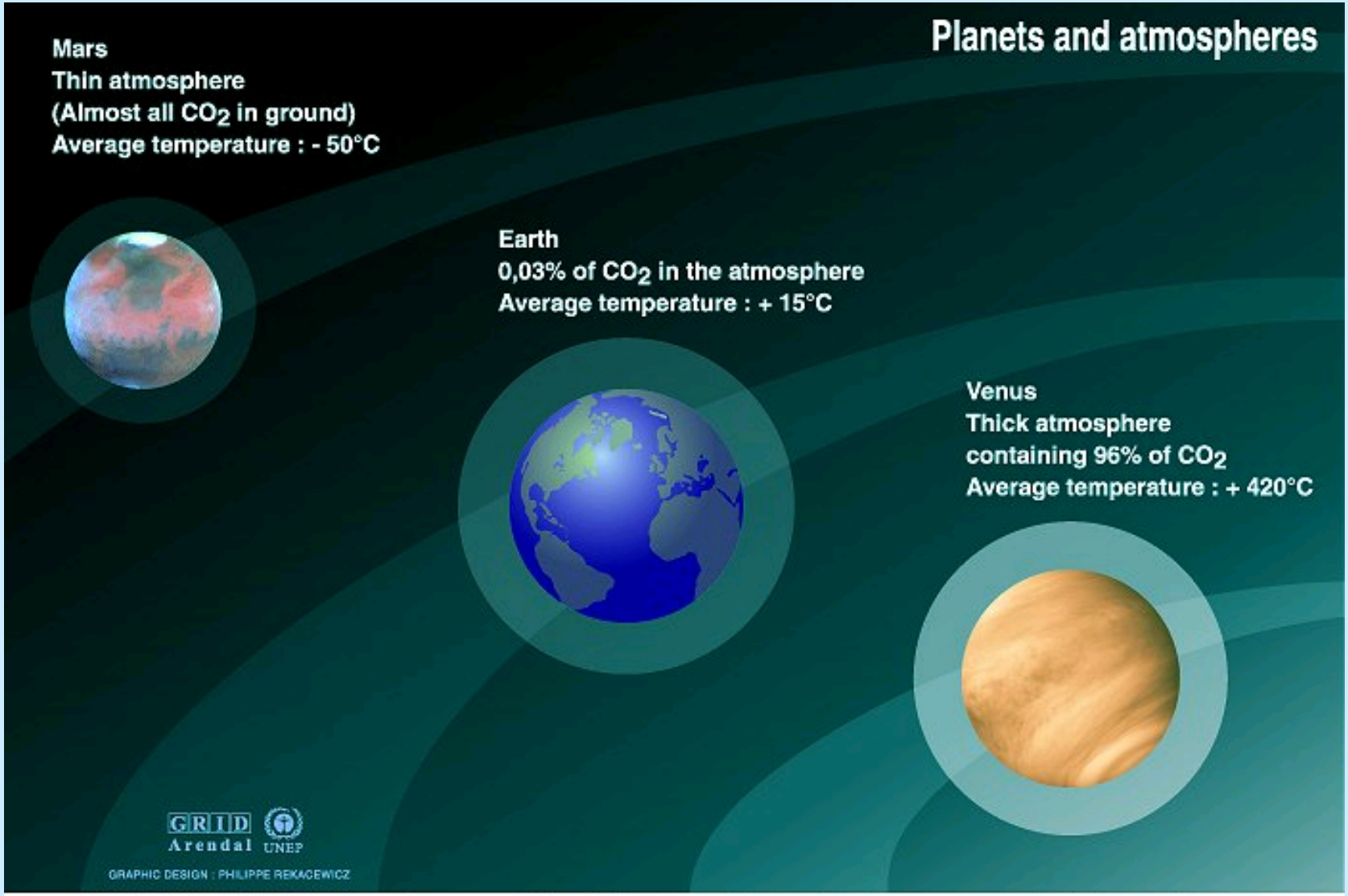


冰川退缩区植物的定居与植被演替

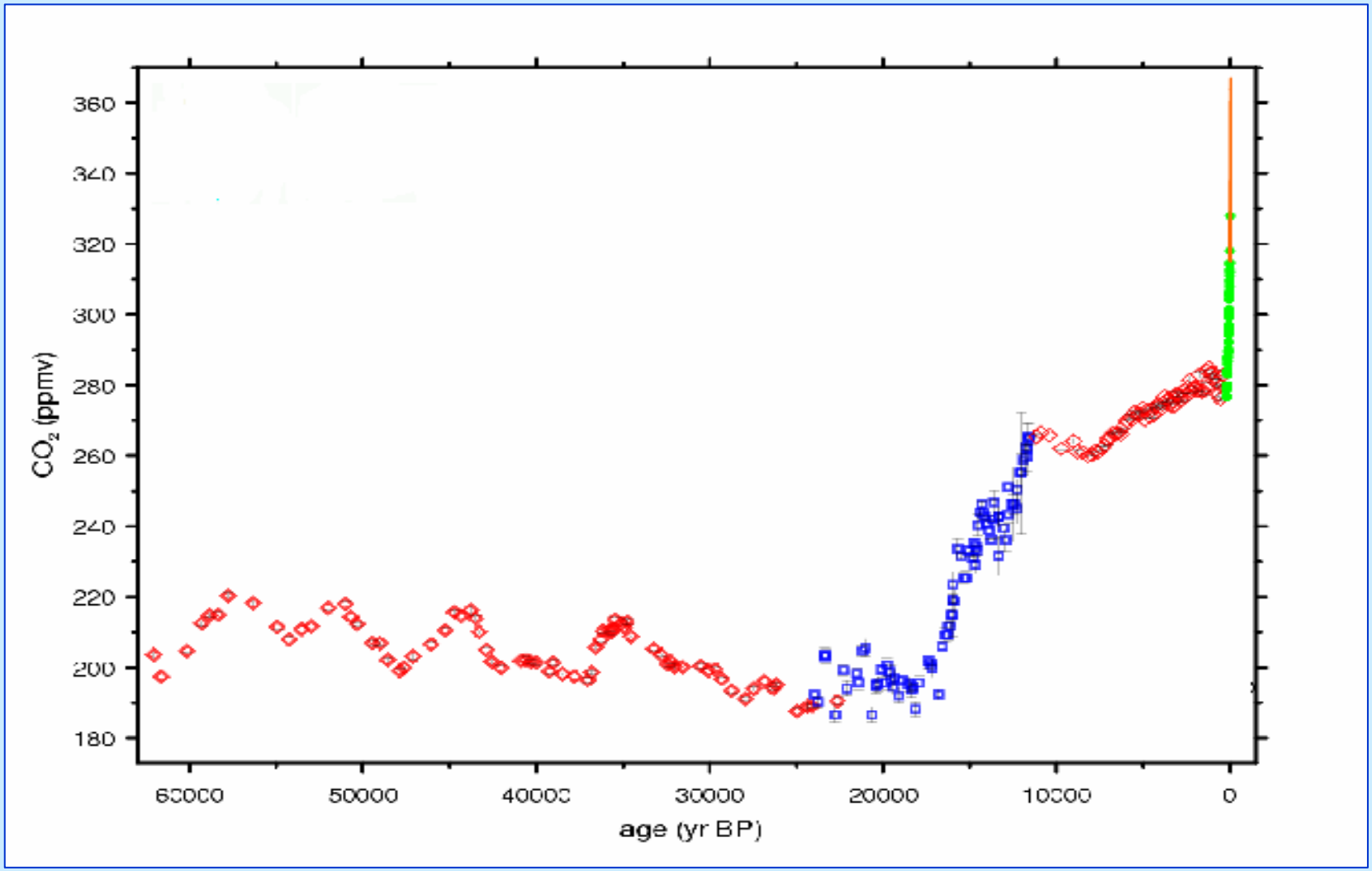
一、全球气候变化及其影响

Planets and atmosphere

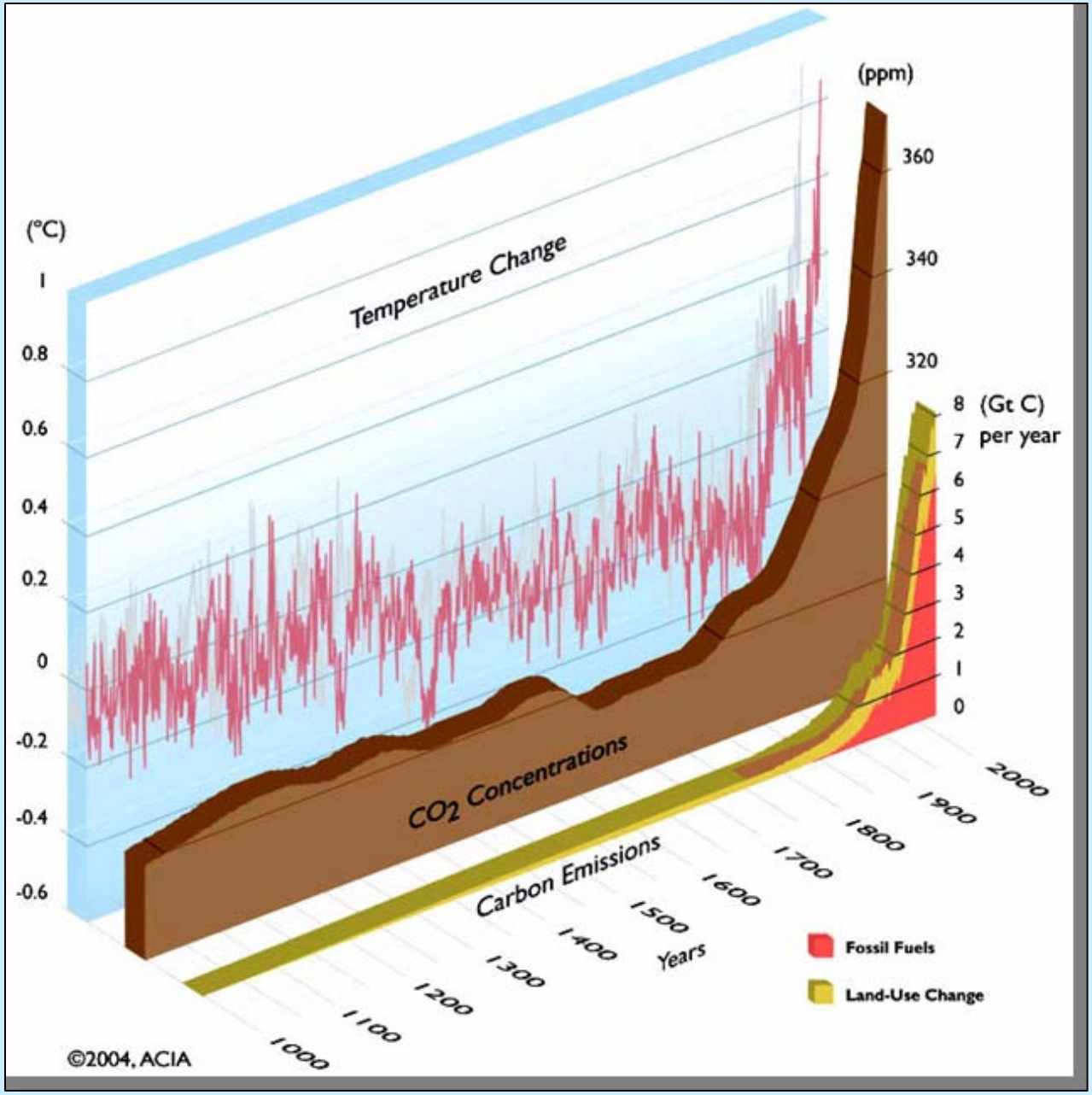


Sources: Calvin J. Hamilton, Views of the solar system, www.planetscapes.com; Bill Arnett , The nine planets, a multimedia tour of the solar system, www.seds.org/billa/tnp/nineplanets.html

Carbon Dioxide Levels over the last 60,000 Years



Source: University of Berne and National Oceanic and Atmospheric Administration



Observed warming

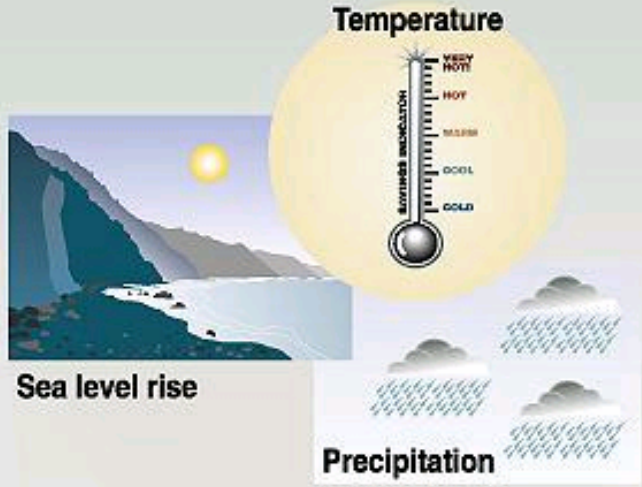
- ***Global temperatures rose 1.1 °F over the 20th Century.***
- IPCC ***AR4 models predict temperature to increase 3.2 - 7.2 °F by 2100 relative to 1980-1999.***



"The global environmental effects of the industrial era will cast a long shadow on future generations everywhere, for all time."

David Orr. 2005. *The Last Refuge.*

Potential climate changes impact



Impacts on...

Health



Weather-related mortality
Infectious diseases
Air-quality respiratory illnesses

Agriculture



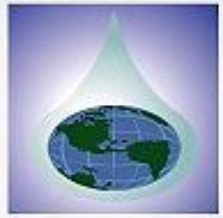
Crop yields
Irrigation demands

Forest



Forest composition
Geographic range of forest
Forest health and productivity

Water resources



Water supply
Water quality
Competition for water

coastal areas



Erosion of beaches
Inundation of coastal lands
additional costs to protect coastal communities

Species and natural areas

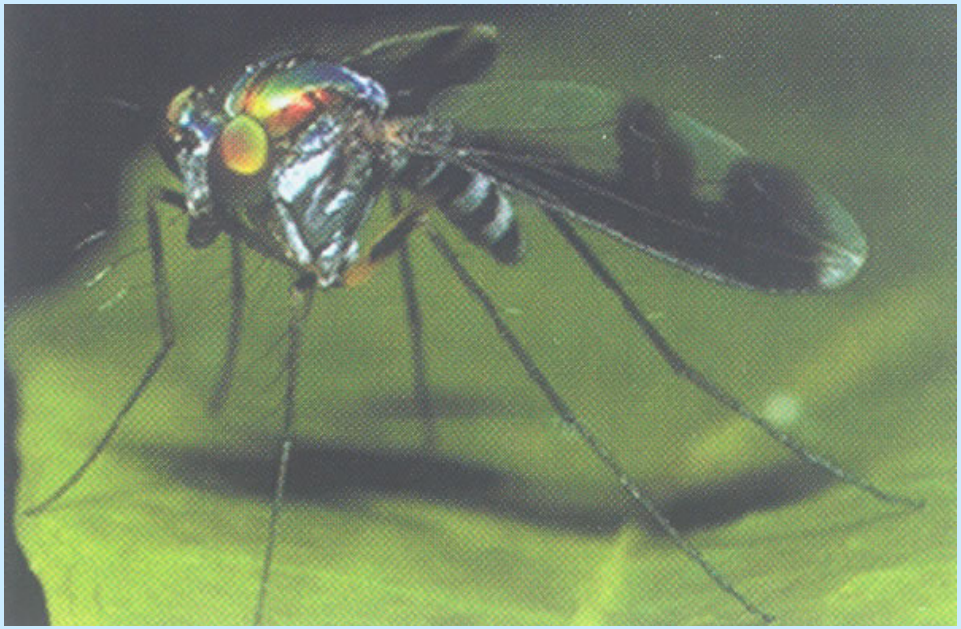


Loss of habitat and species
Cryosphere: diminishing glaciers

GRID Arendal UNEP

GRAPHIC DESIGN : PHILIPPE REKACEWICZ

Source: United States environmental protection agency (EPA).

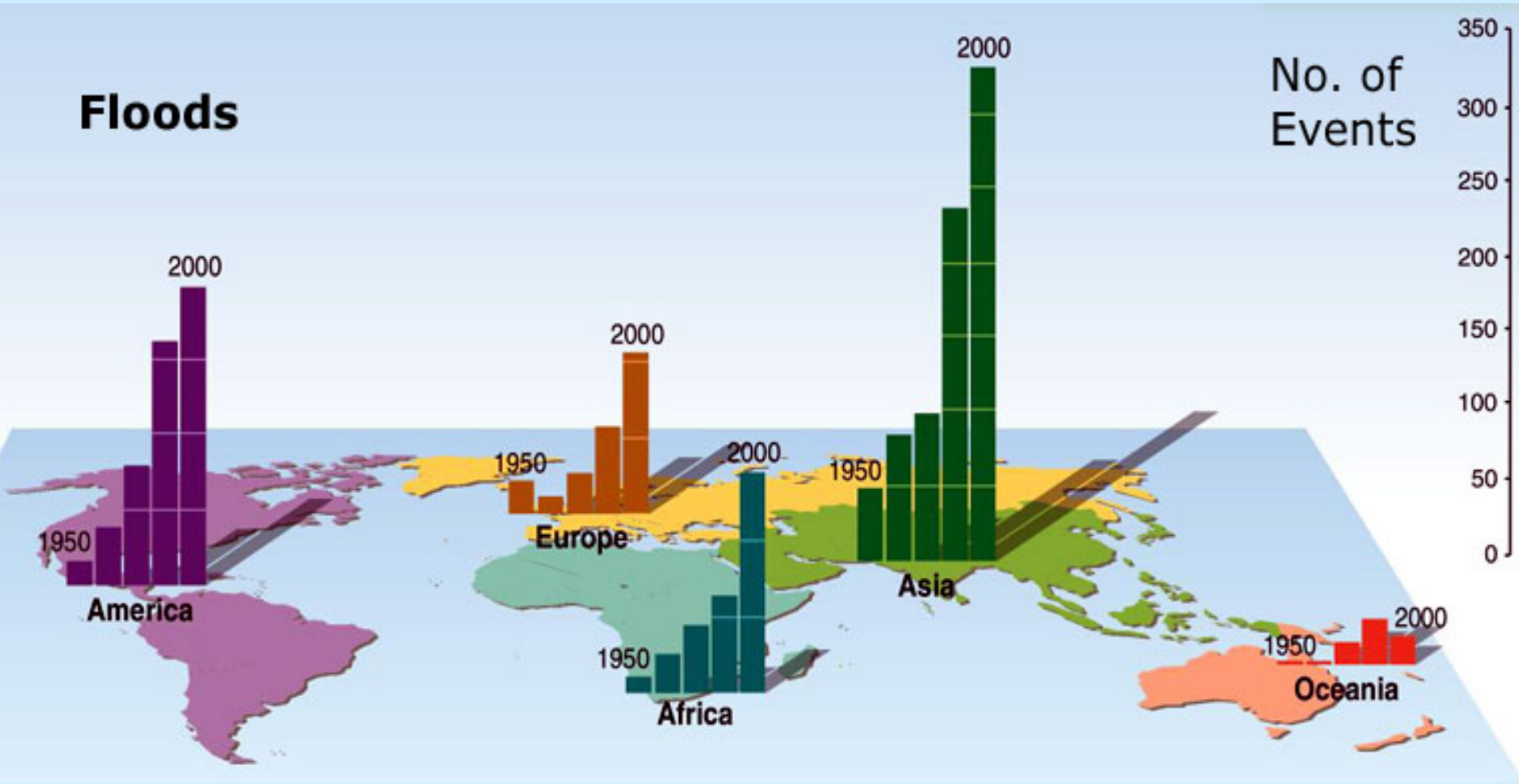


Malaria, Dengue Fever,Yellow Fever

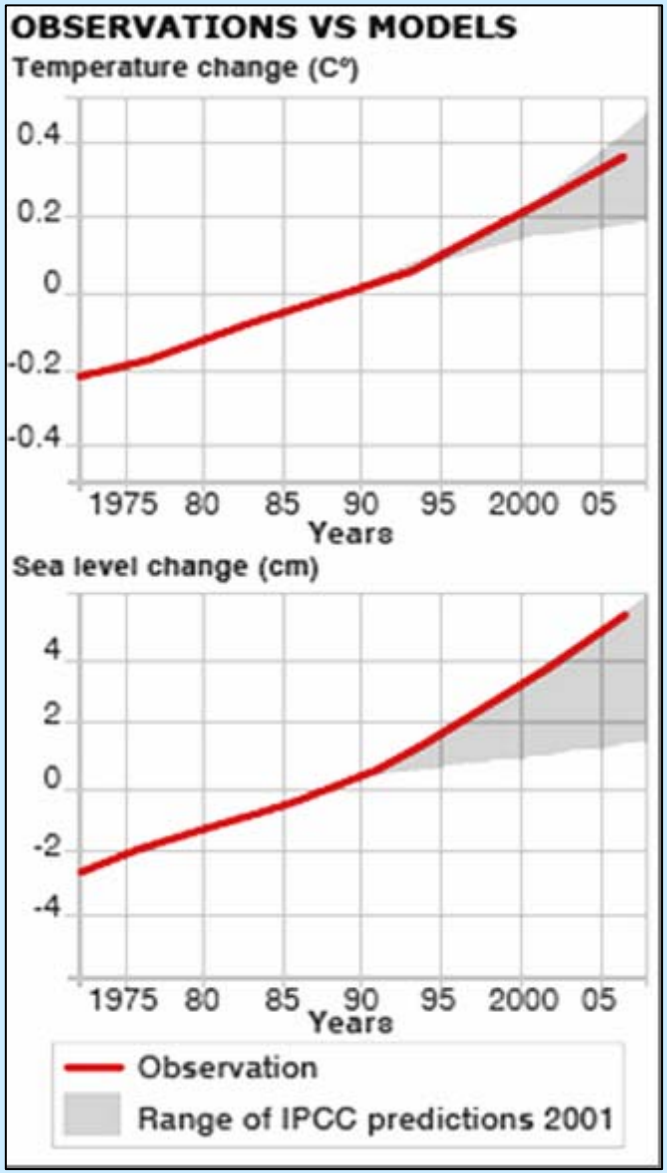
凤尾绿咬鹃Resplendent quetzals
(*Pharomachrus moccino*)







Consequences: extreme weather



Consequences: sea level rise

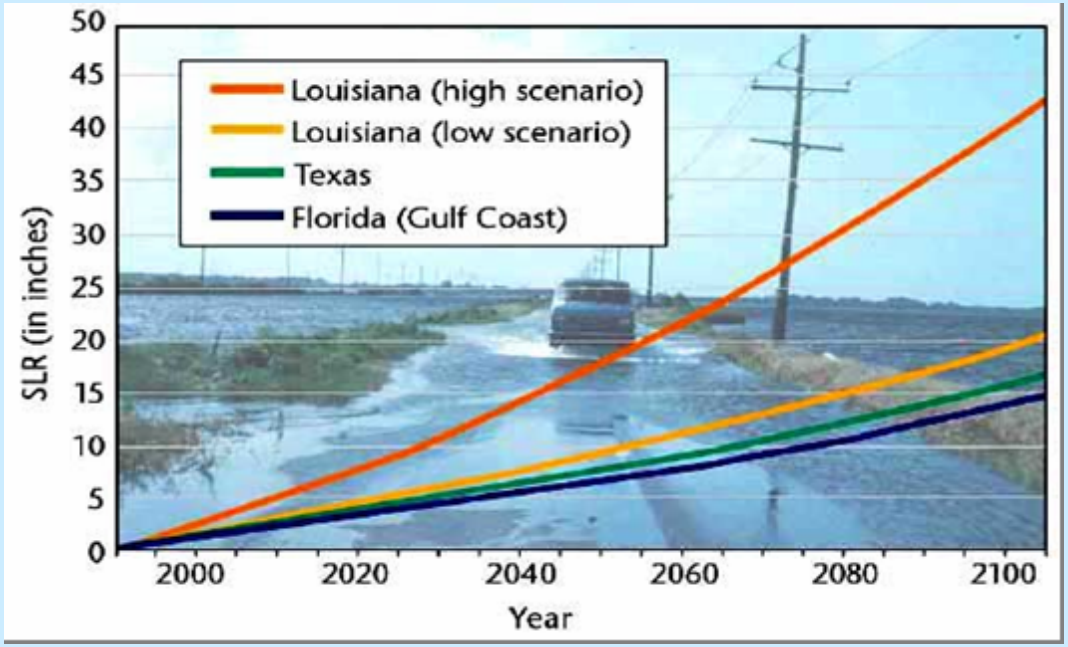


Figure 2: Potential Impact of Sea-level Rise on Bangladesh



Today

Total population: 112 Million

Total land area: 134,000 km^2



1.5 m - Impact

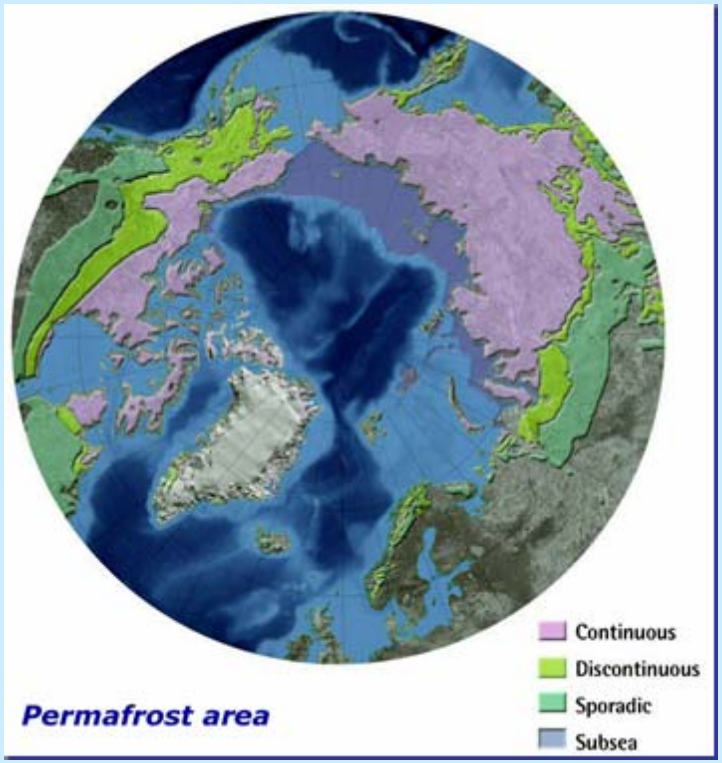
Total population affected: 17 Million (15%)

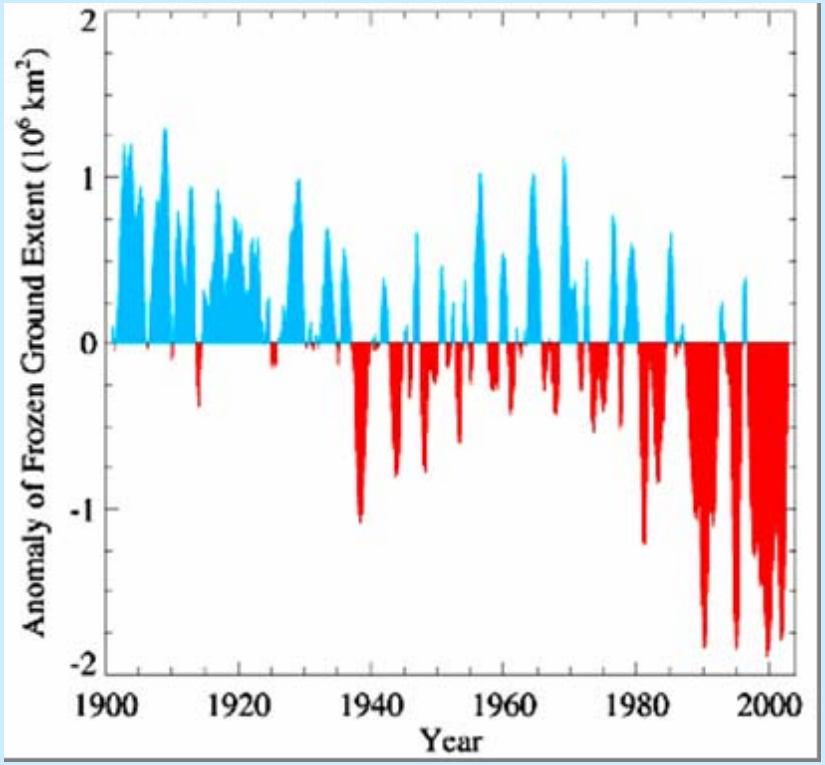
Total land area affected: 22,000 km^2 (16%)

Source: UNEP/GRID Geneva; University of Dacca; JRO Munich; The World Bank; World Resources Institute, Washington, DC

GRID Arendal UNEP

Consequences: amplification from defrosting the permafrost



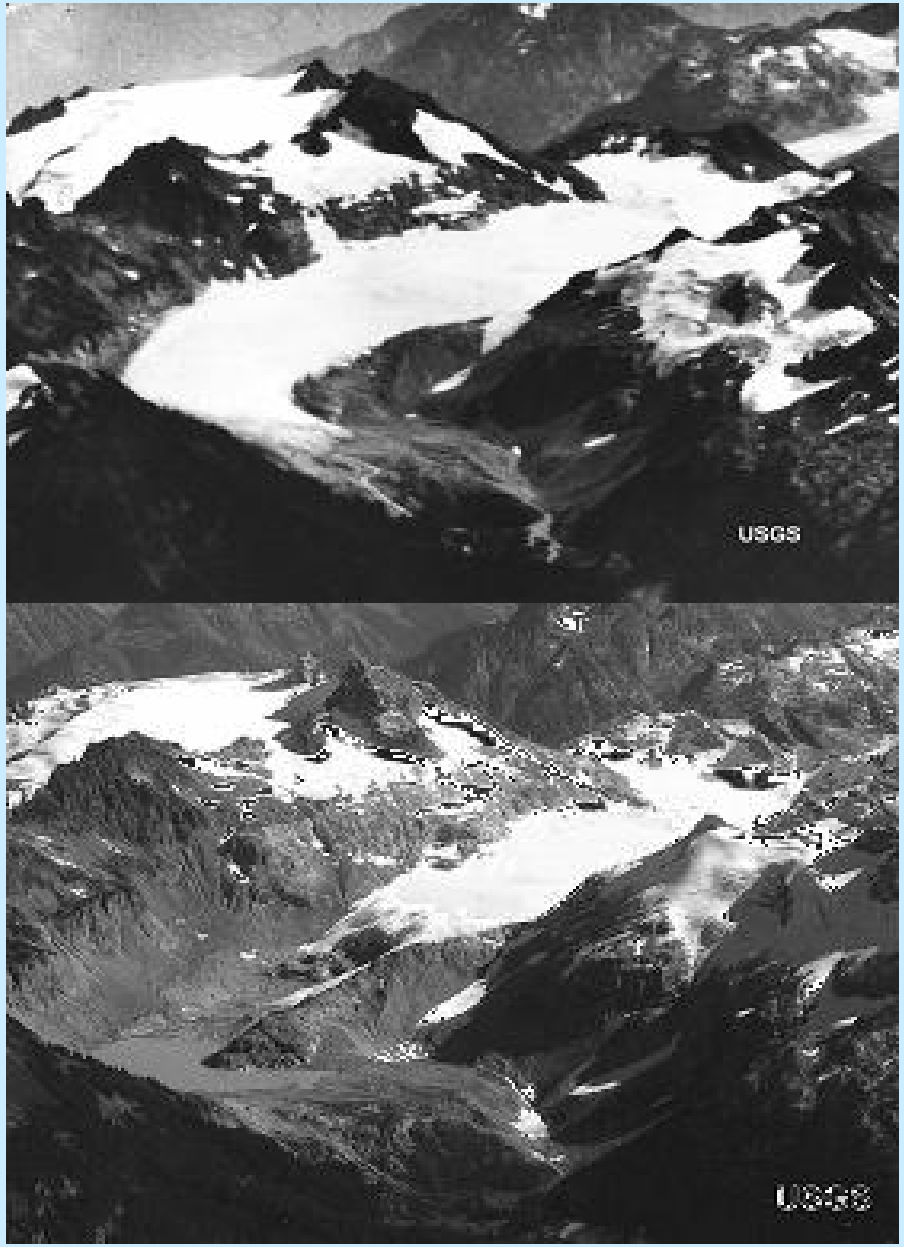




- **Official climate projections do not include CO_2 and CH_4 emissions from melting permafrost.**
- **Because of this carbon release, warming will be faster than predicted.** **(Davidson & Janssens *Nature* 2006)**



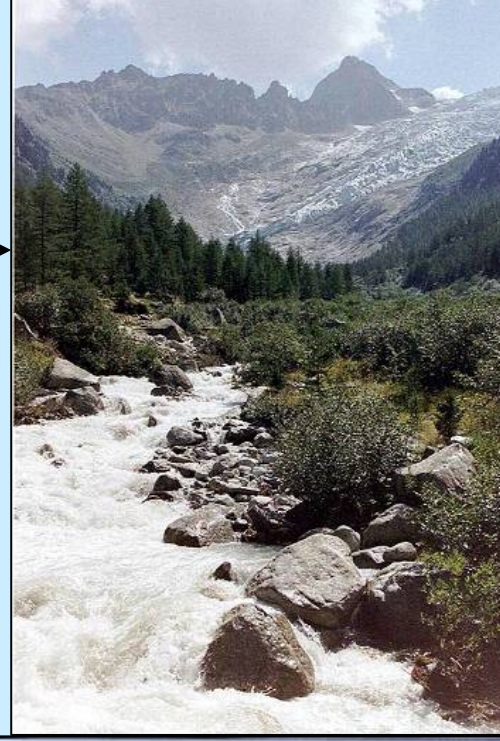
Mount Kilimanjaro, 1993-2000



South Cascade Glacier (Washington State), 1928 -2000



2003



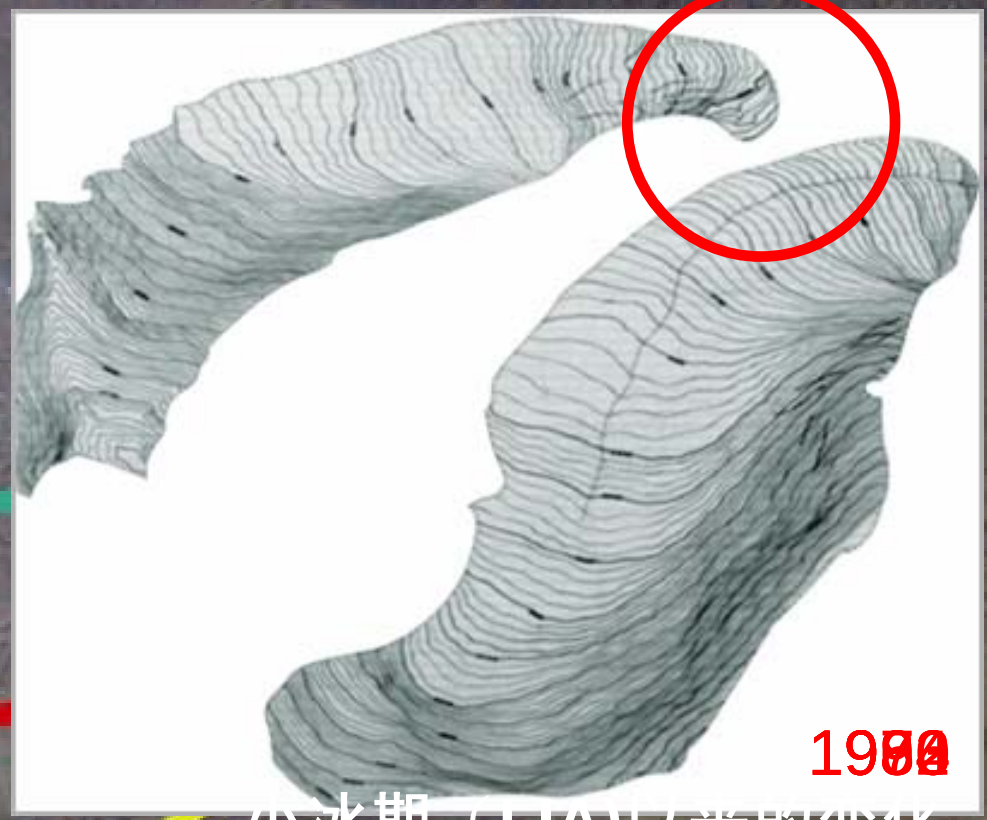
1985

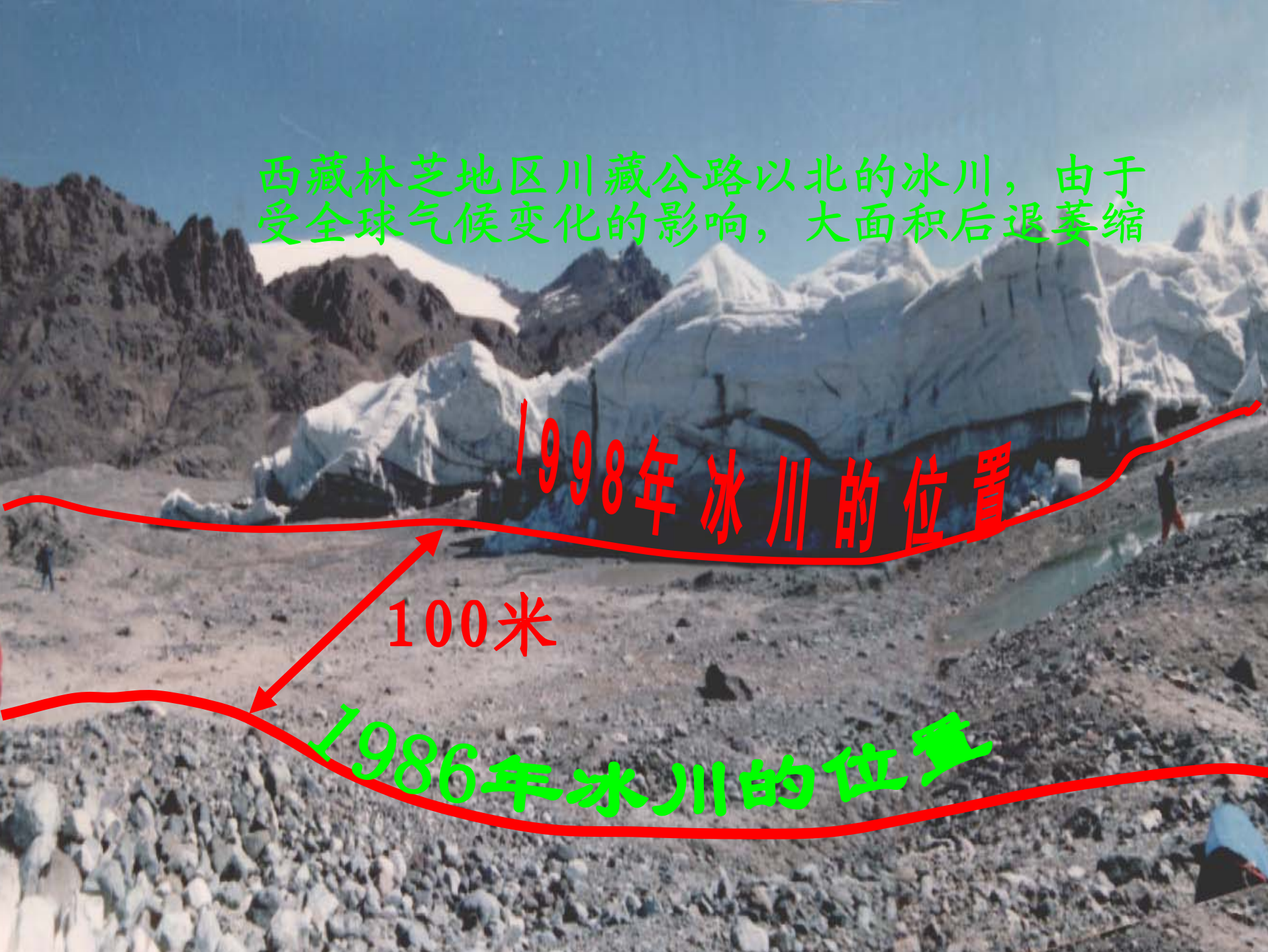


Glacier du Trient on the Swiss/French border

1995

乌鲁木齐河源1号冰川末端变化（地面立体摄影）




西藏林芝地区川藏公路以北的冰川，由于受全球气候变化的影响，大面积后退萎缩
1998年冰川的位置
100米
1986年冰川的位置

明永冰川 Mingyong Glacier

2002 白北利 Barry Baker



三江并流区主峰梅里雪山的冰川退缩

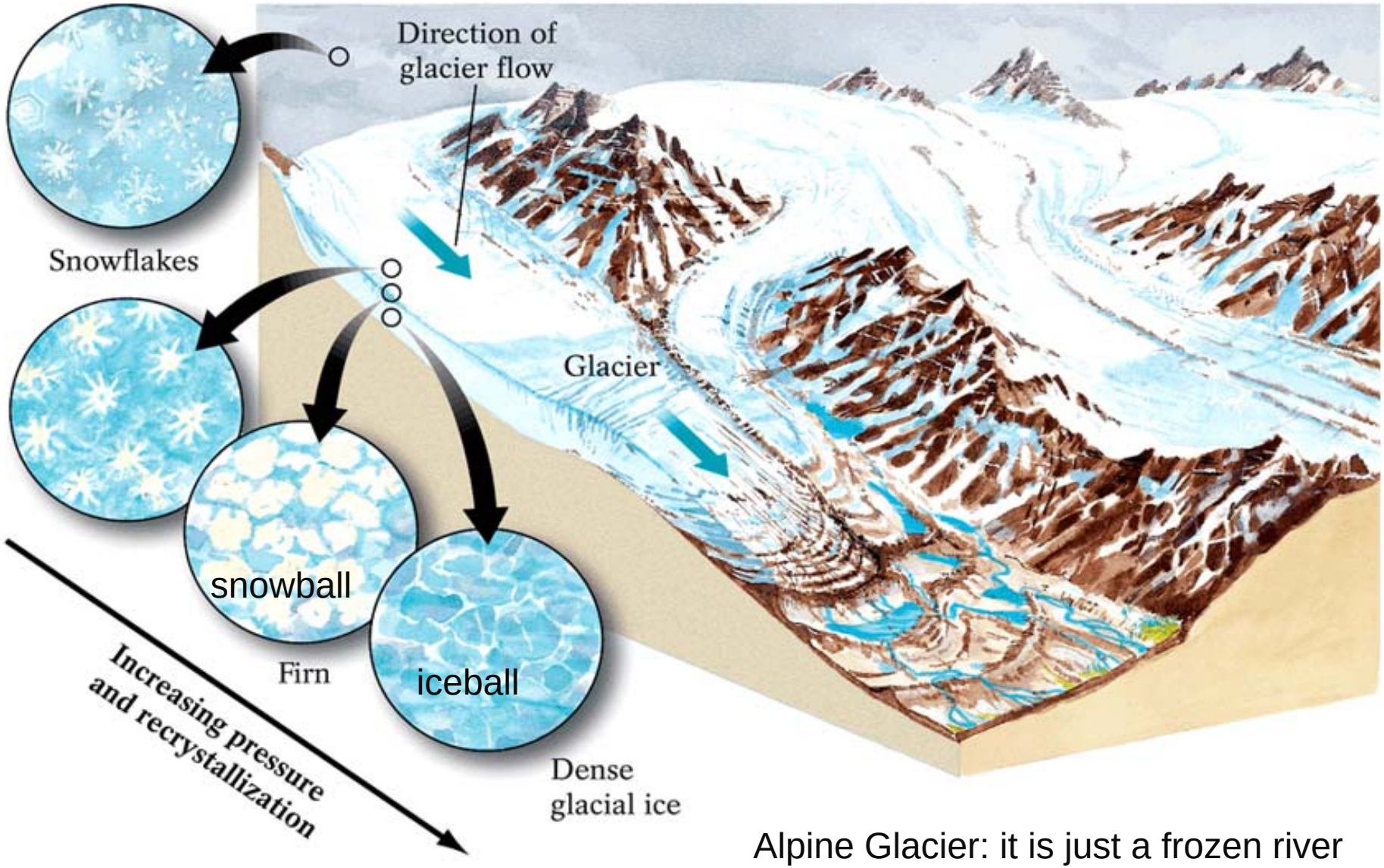




Business as usual: expectations by 2075

- Sea level at minimum 0.25 meters higher
- 200 million refugees - sea level rise & disasters
- Low crop yields & widespread hunger in developing world
- Up to 35% of existing biodiversity committed to extinction
- Loss of most coral reefs - ocean warming & acidification
- Increased infectious disease in tropics - 800 million with malaria
- Up to a third of the Amazon basin progressing to savanna
- Warmer, wetter, greater precipitation intensity, stronger dry periods
- 400 million people living with water shortage

二、冰川及其对气候变化的响应



Alpine Glacier: it is just a frozen river

Formation of Glacial Ice from Snow



Types of Glaciers

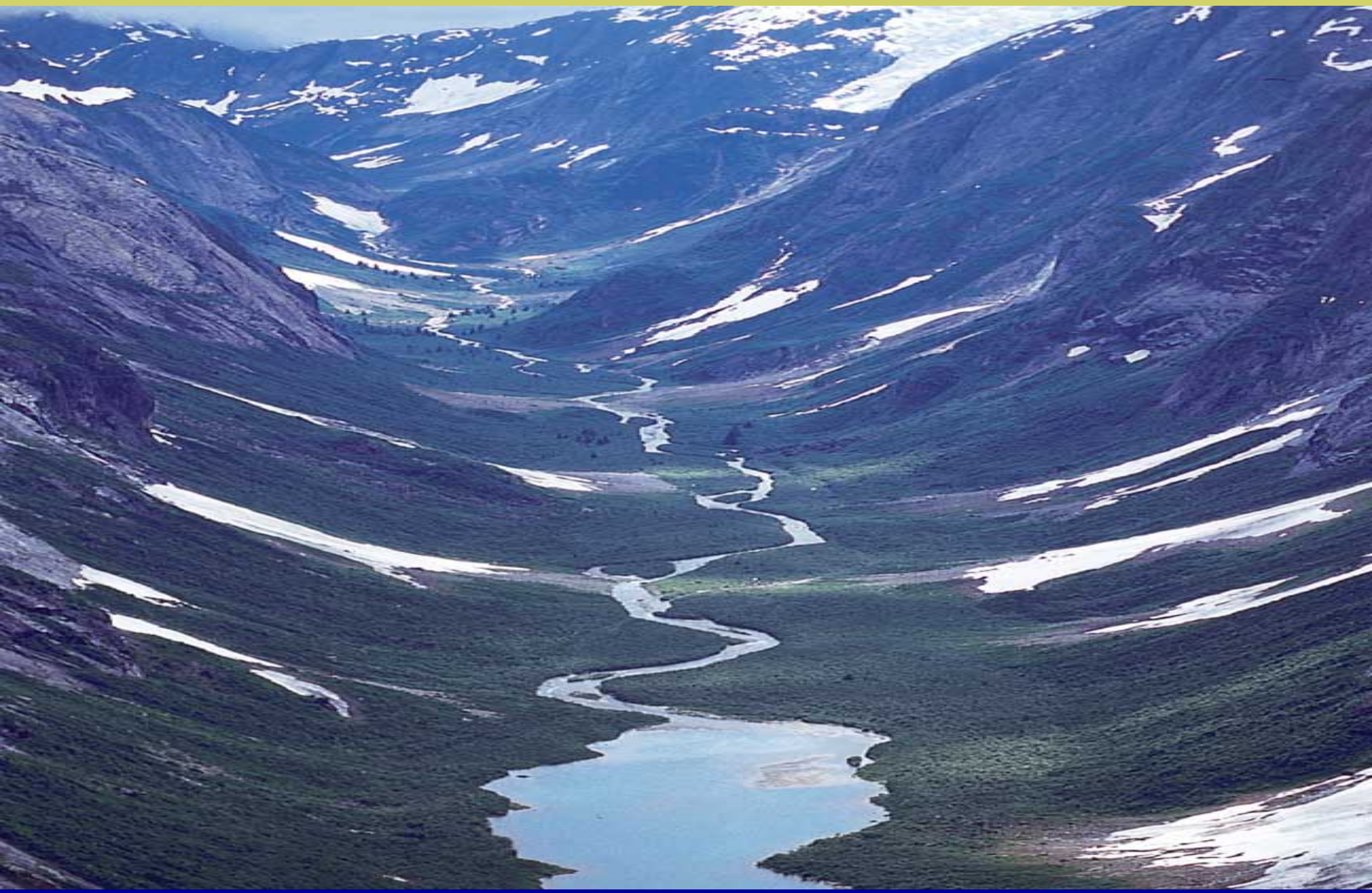

ice falls
plucking
glacier
lateral moraine
lateral moraine
zone of ablation
crevasses
snout
scale!
unsorted, angular moraine



Types of Glaciers– Cirque Glacier



Types of Glaciers – Valley Glacier



U-Shaped Valley in Tracy Wilderness, Southeastern Alaska

