



平成 20 年度 (第 17 回) ブループラネット賞  
受賞者記念講演会

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**2008 Blue Planet Prize  
Commemorative Lectures**

クロード・ロリウス 博士

講演スライド集

「気候と環境—半世紀にわたる南極大陸での探検と調査—」

ジョゼ・ゴールデンベルク 教授

講演スライド集

「持続可能なエネルギーの未来」

Dr. Claude Lorius

Slides for the Lecture

“Climate and Environment

–50 years of adventures and research in Antarctica–”

Professor José Goldemberg

Slides for the Lecture

“A sustainable energy future”

財団法人 旭硝子財団

**THE ASAHI GLASS FOUNDATION**



クロード・ロリウス博士

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「気候と環境—半世紀にわたる南極大陸での探検と調査—」

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Slides for the Lecture

“Climate and Environment

—50 years of adventures and research in Antarctica—”



# 50 years of adventures and research in Antarctica



The ice poles, north and south, are the records and sentinels of the environment and climate of our planet.

Claude Lorius

slide 1



## 50 years of adventures and research in Antarctica

### ➤ **Climate: Past and Future**

- Global Environment
- Mankind and Anthropocene

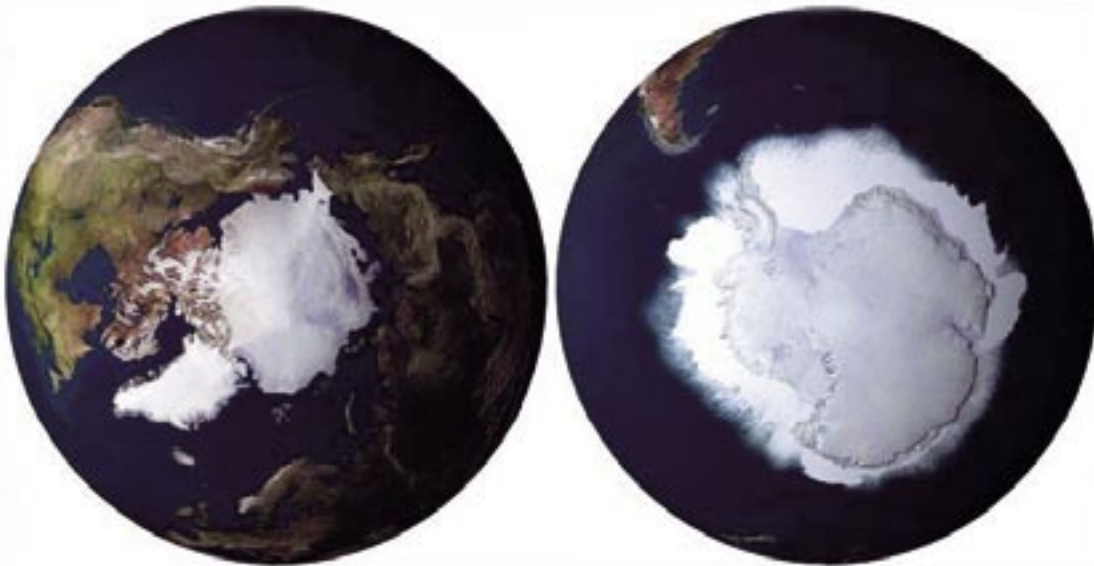


slide 2



## The White Planet: from pole to pole

### Ice: Climate and Environment

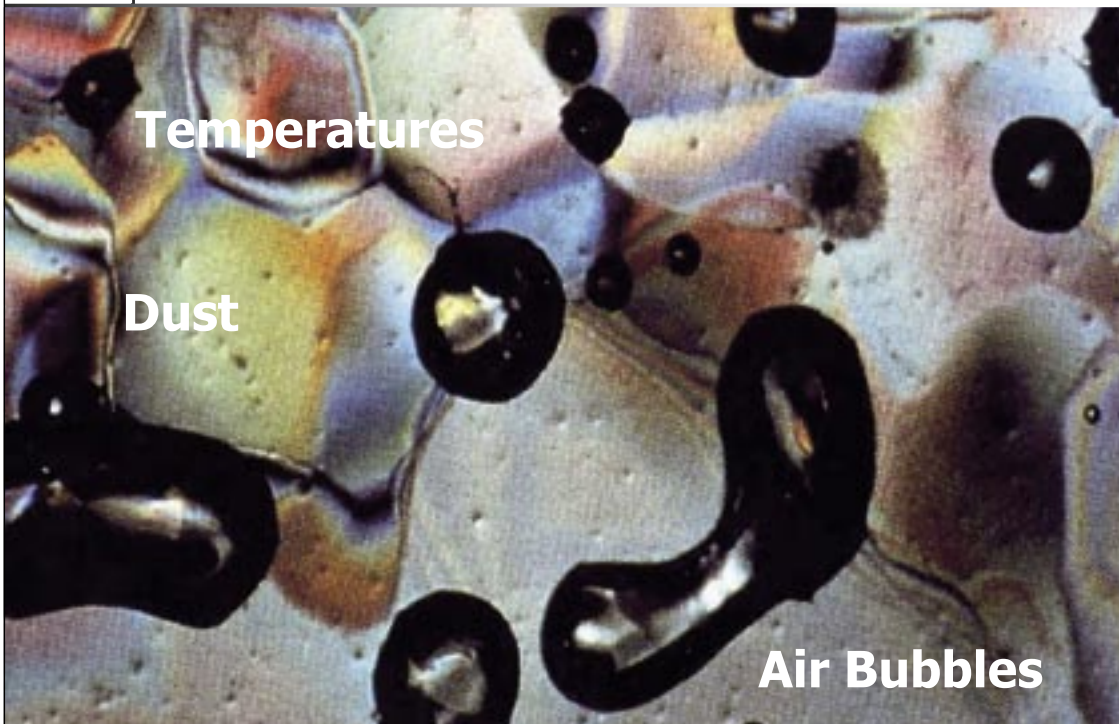


Ice pack and Ice sheets

slide 3



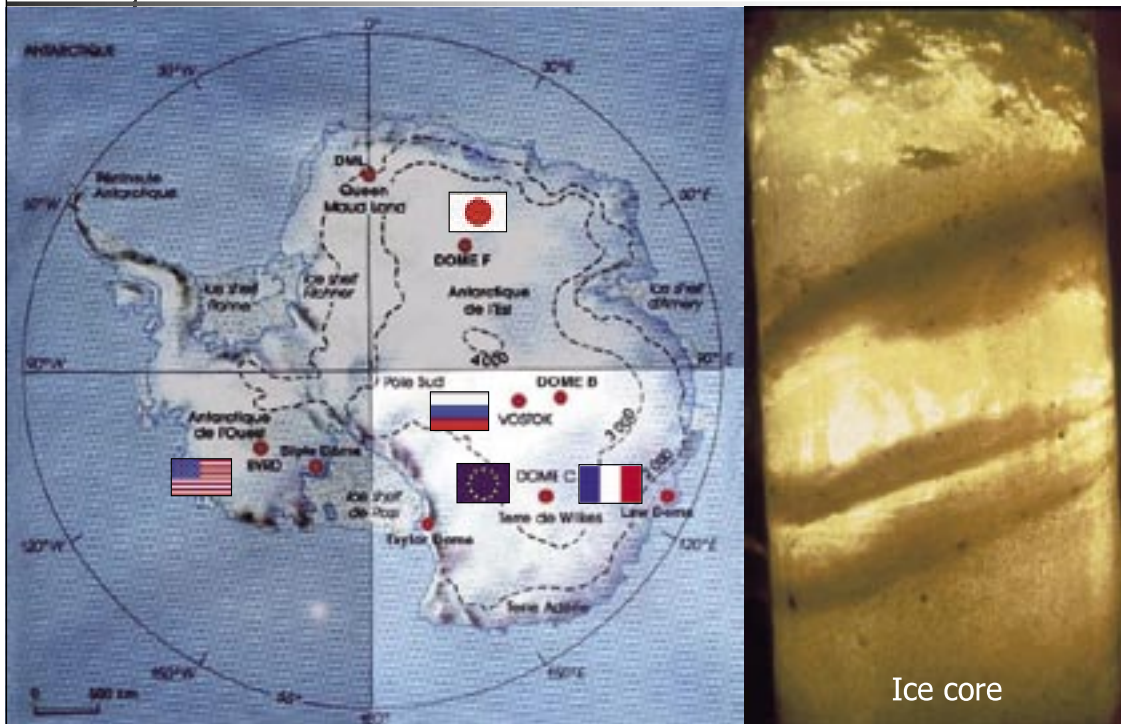
## Polar ice "archives"



slide 4



# Antarctica: 50 years of ice drilling

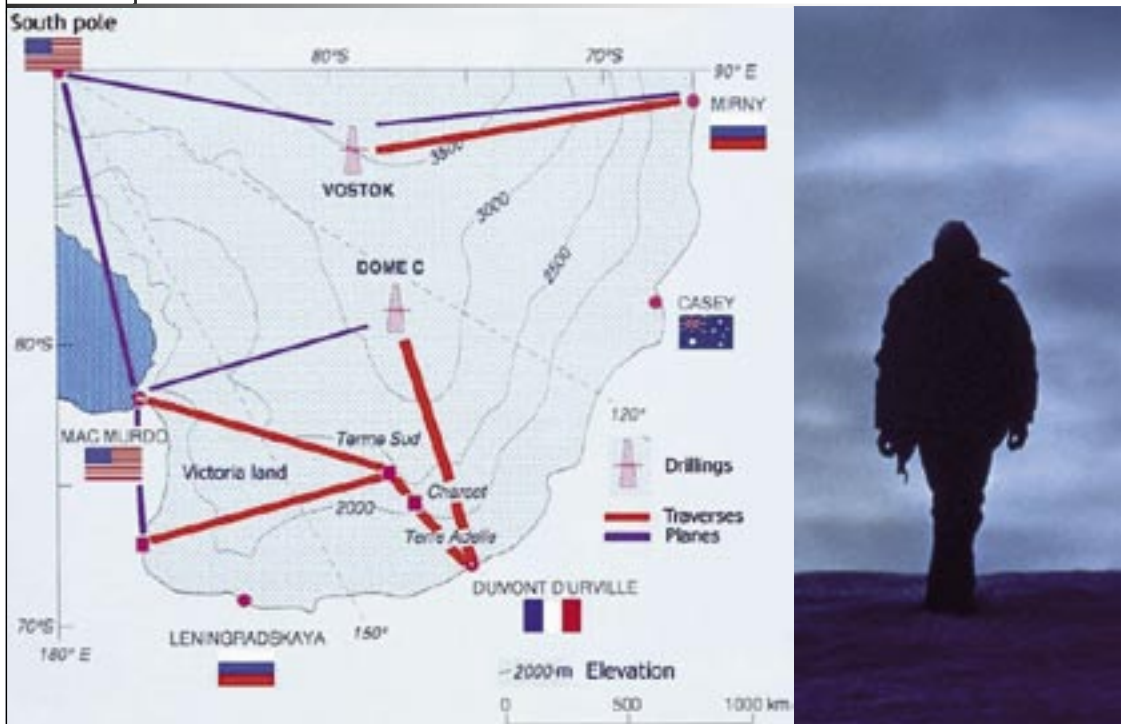


Ice core

slide 5



# Eastern Antarctica: 50 years of missions



slide 6



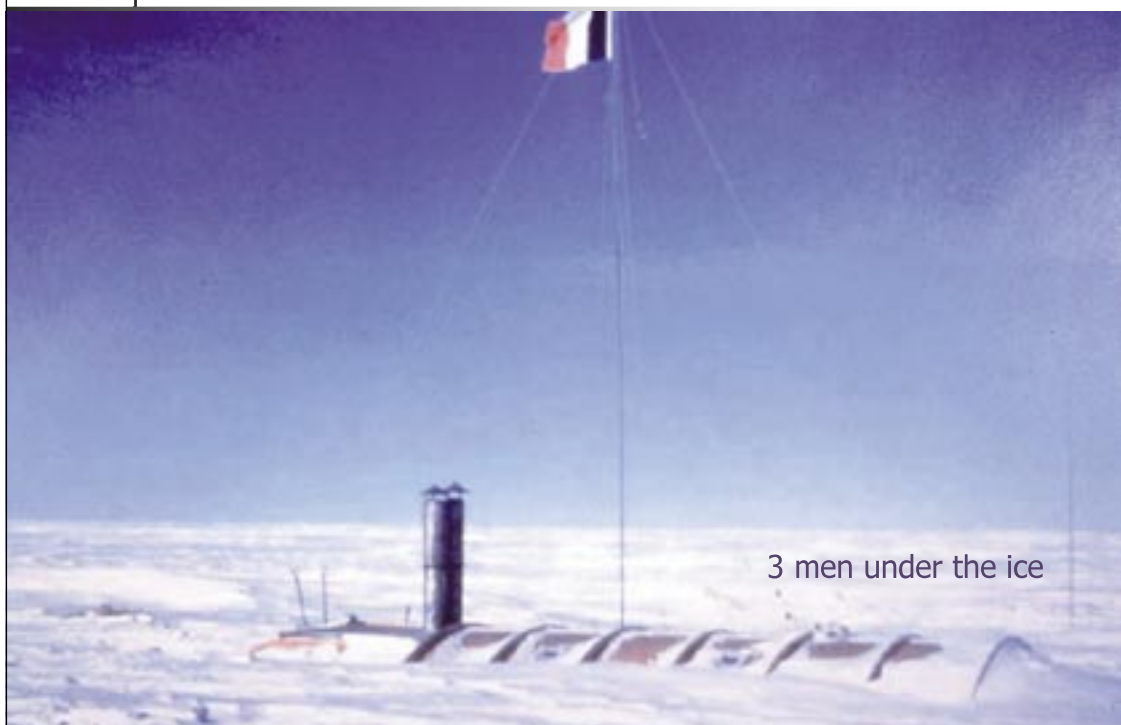
## 1956 : Towards « Terra Incognita »



slide 7



## 1957 : Overwintering at Charcot station



slide 8





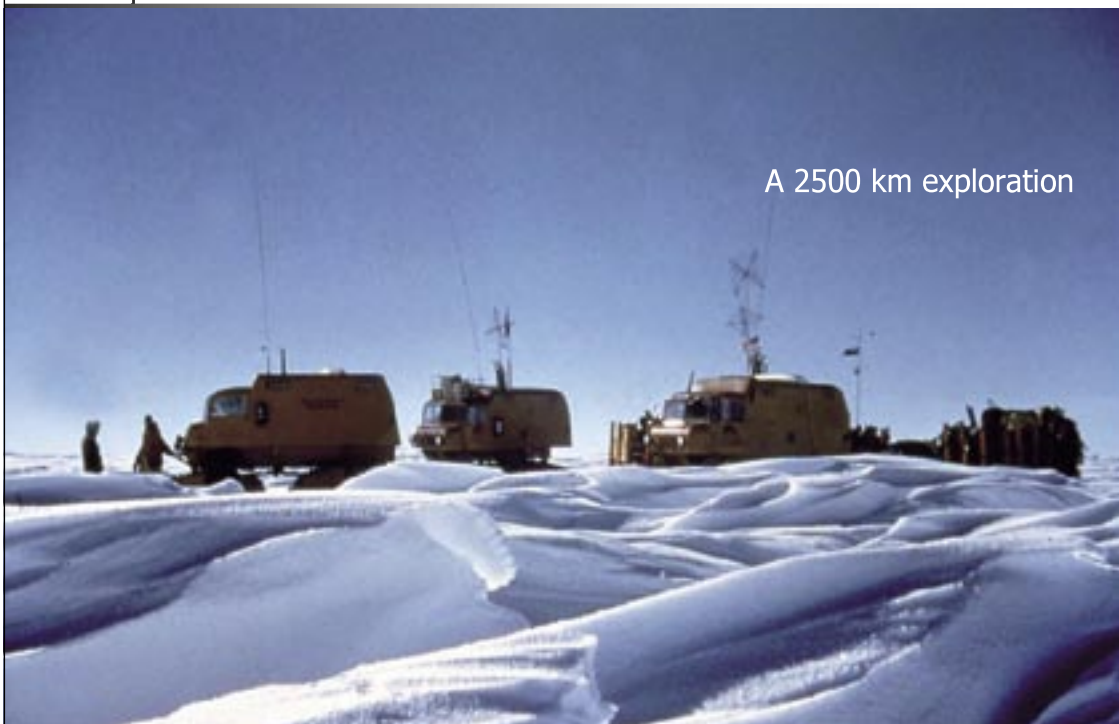
## 1957 : Overwintering at Charcot station



slide 9



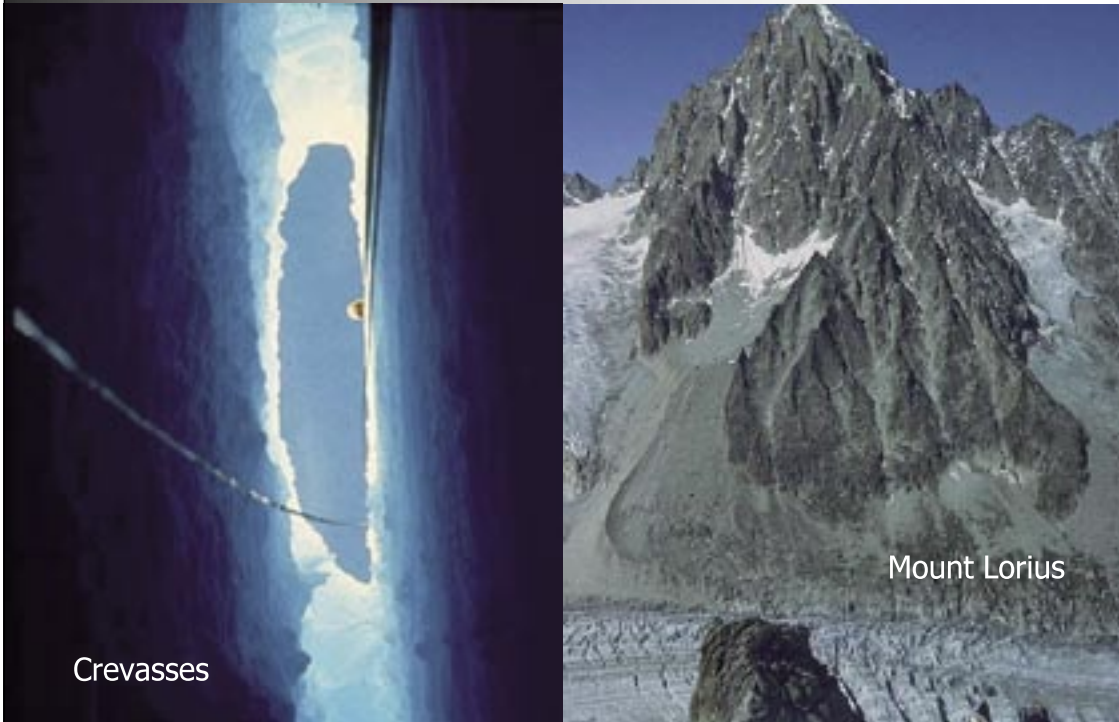
## 1959 : Victoria Land Traverse



slide 10



## 1959 : Victoria Land Traverse



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## 1957-59 : Records from decades to centuries

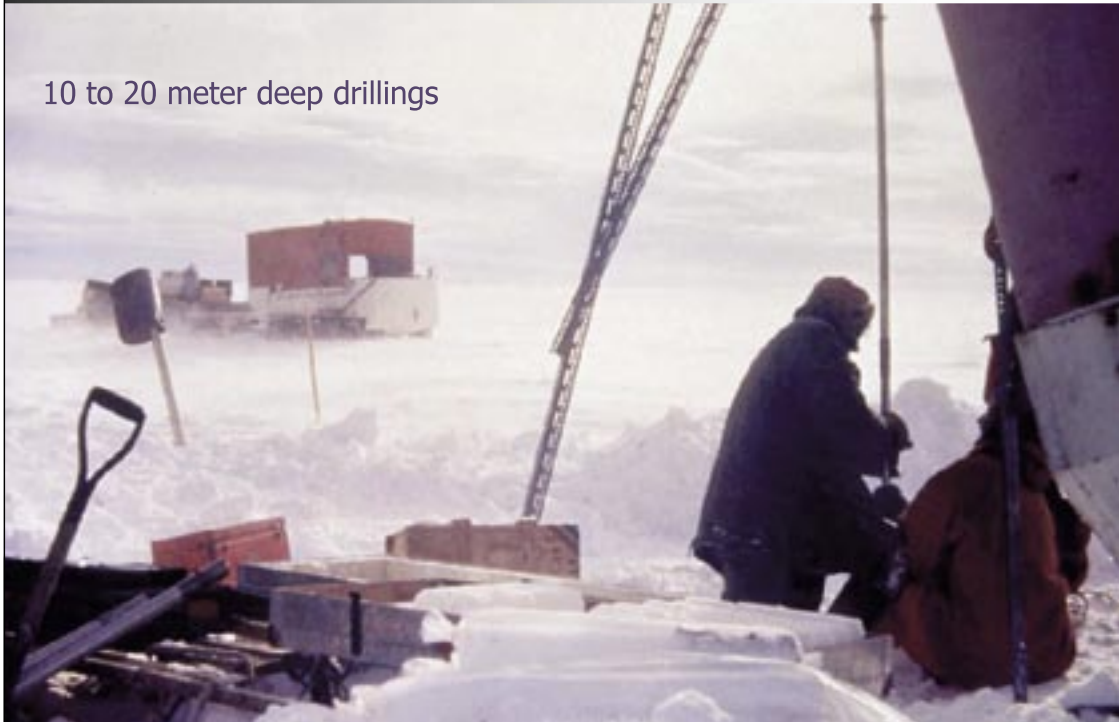


slide 12



## Hand drillings: towards the millennium

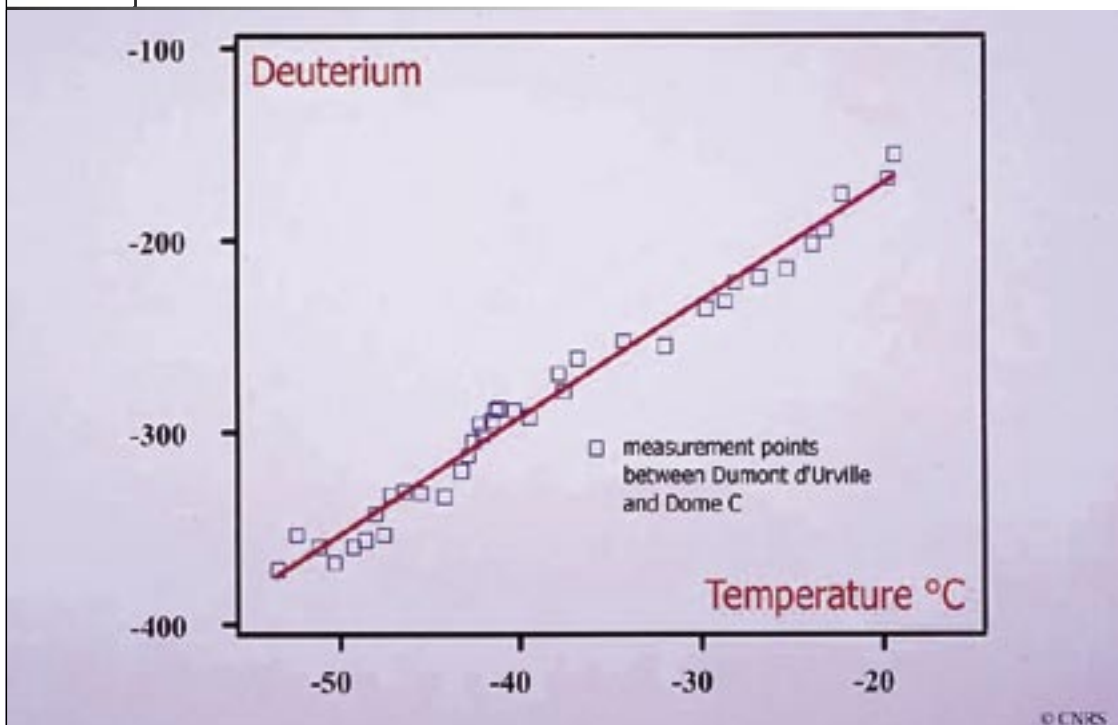
10 to 20 meter deep drillings



slide 13



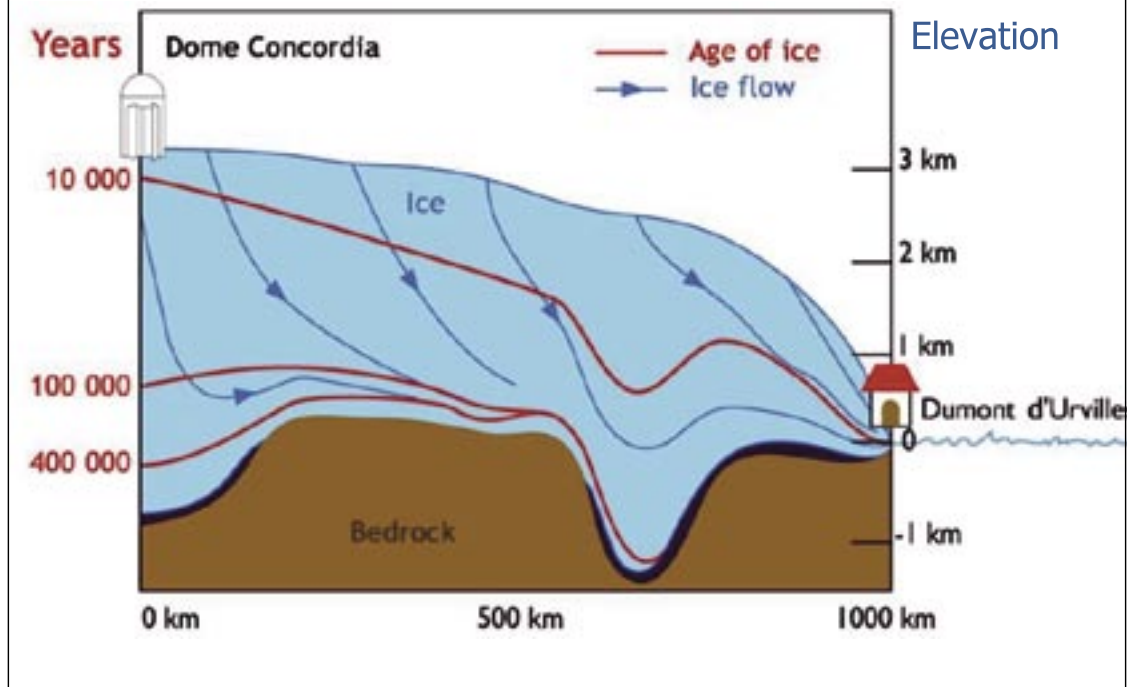
## The "isotopic thermometer"



slide 14



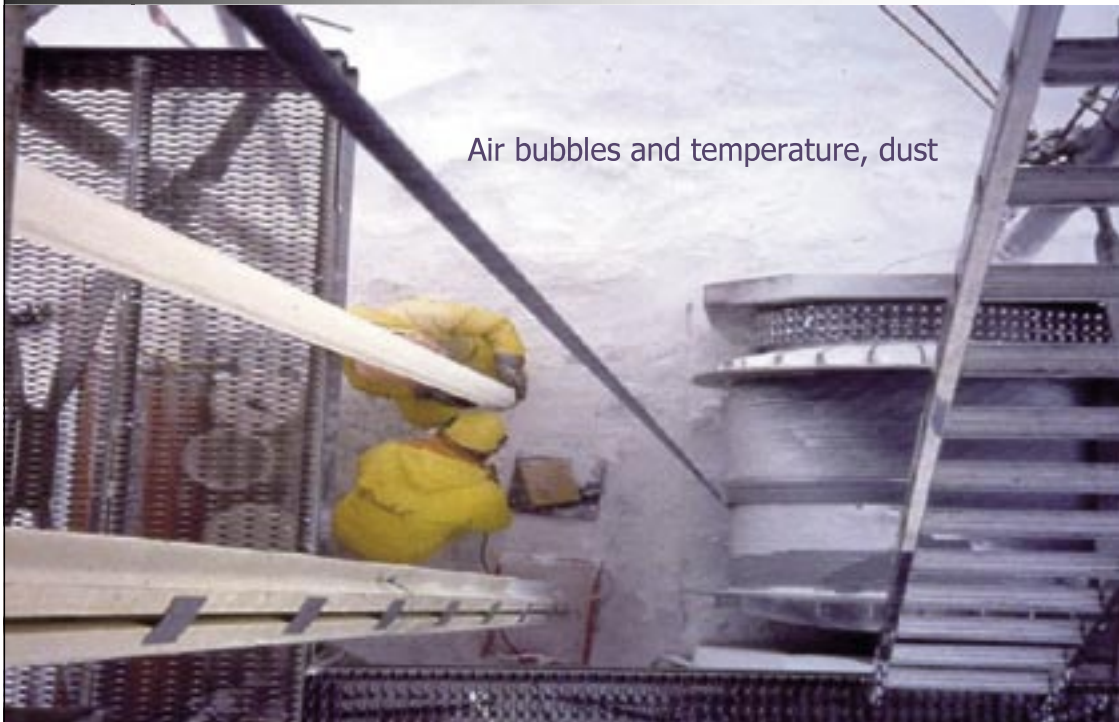
## At the core of polar ice: depths and ages



slide 15



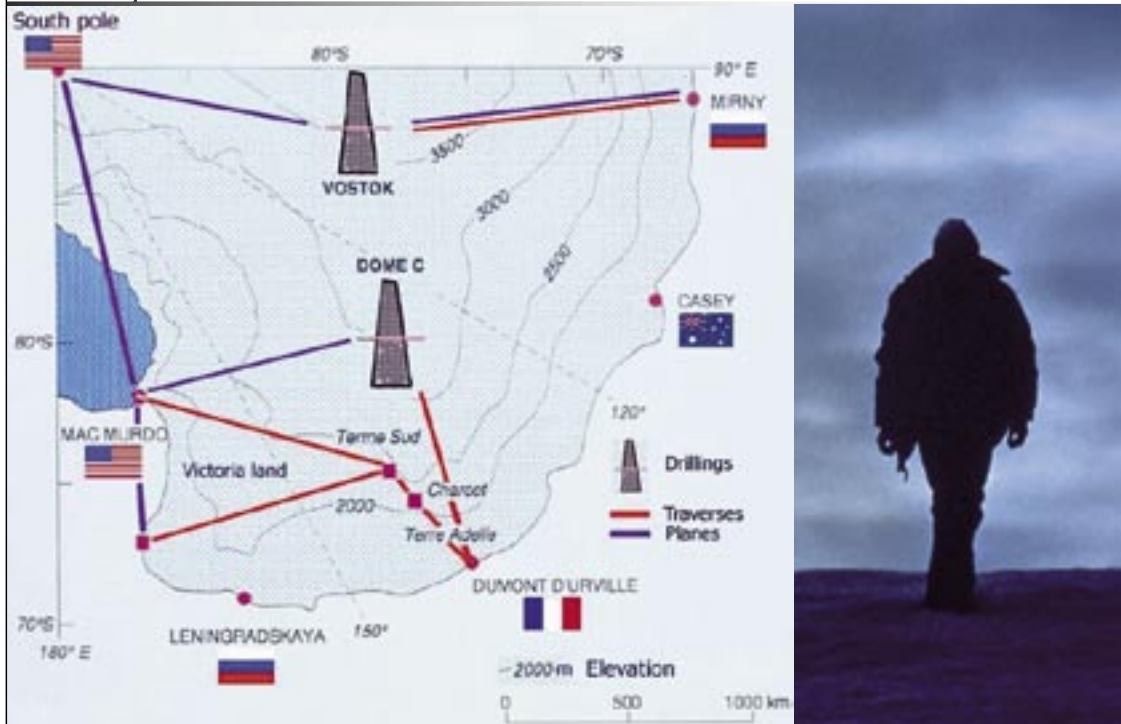
## Deep ice drillings



slide 16



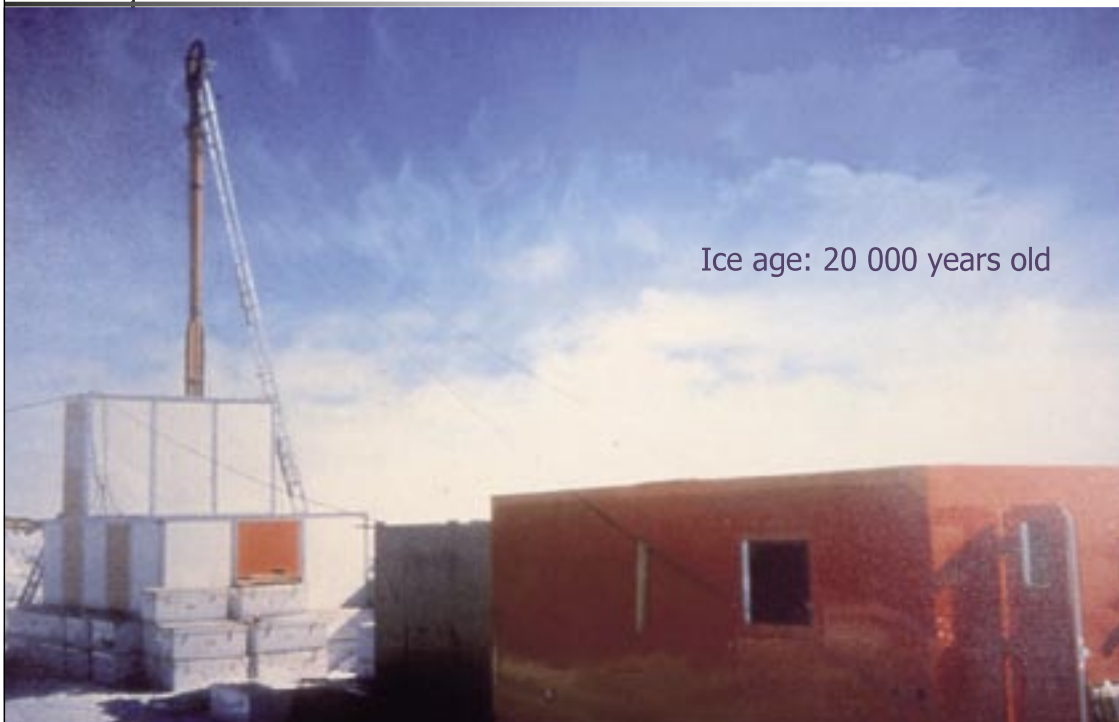
In the last 30 years, deep ice drillings



slide 17



1974 – 1978: Ice drilling at Dome C



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## 1974 : Leading site survey at Dome C



slide 19



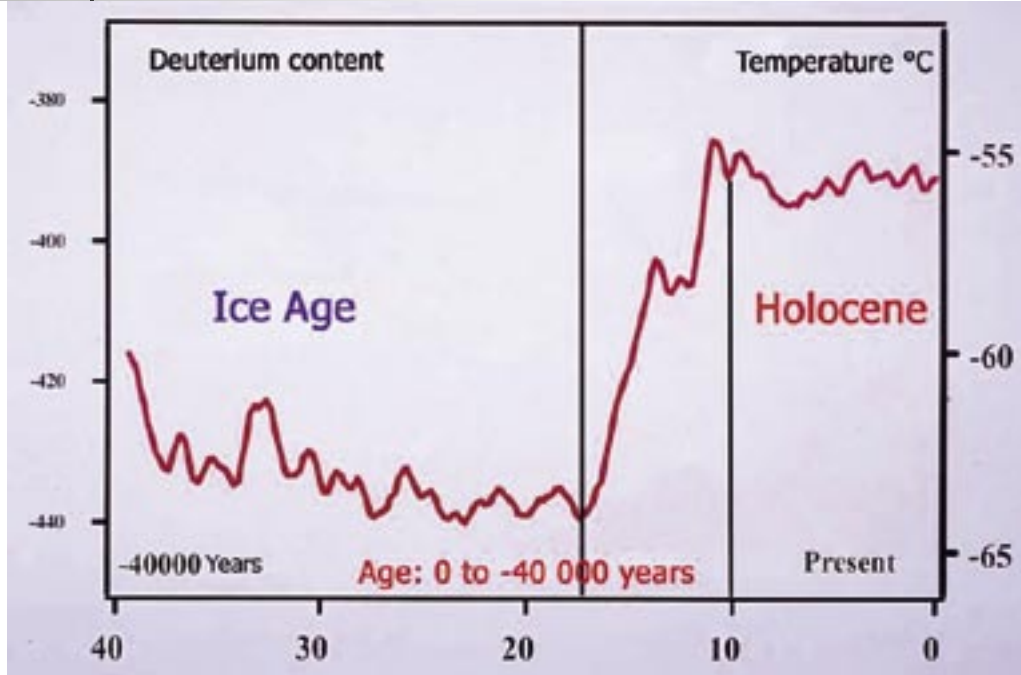
## 1974 : Leading site survey at Dome C



slide 20



## 1977: 900 m deep ice drilling at Dome C



T° C from today to -40 000 years

slide 21



## Vostok: the 1980's and 1990's

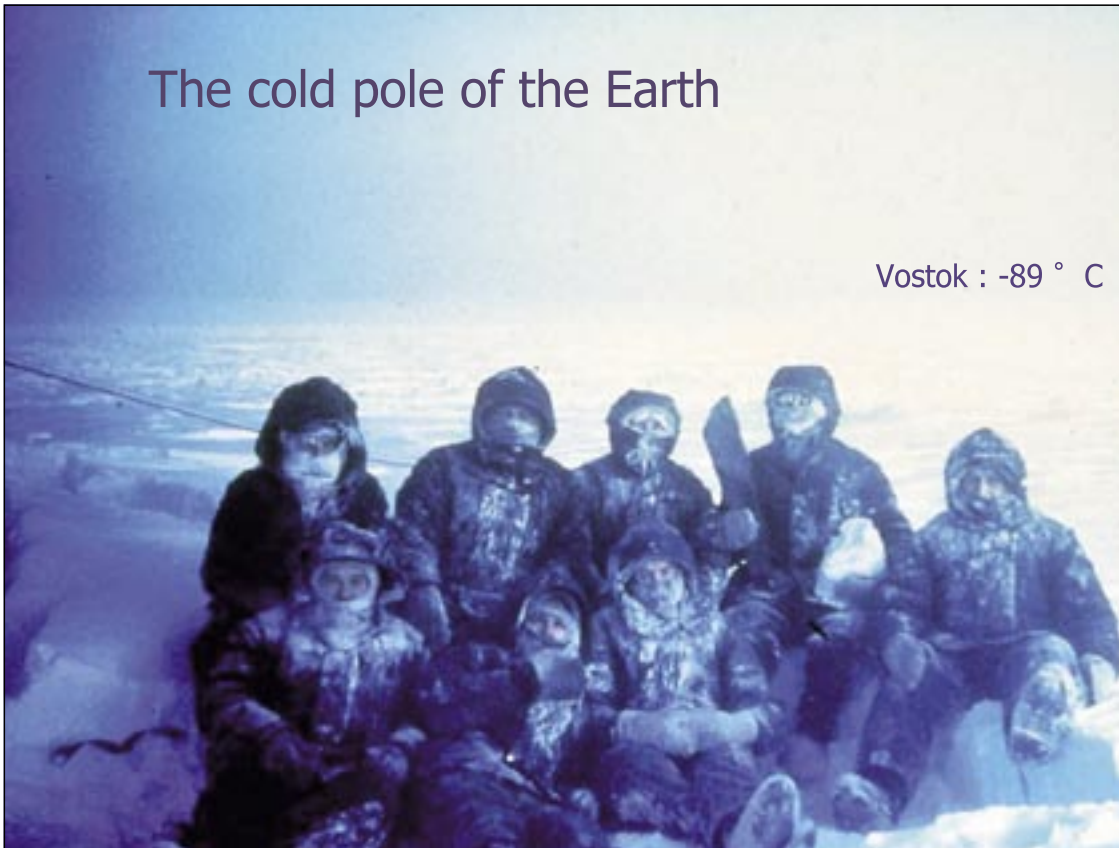
From 150 000 to 420 000 years



slide 22

# The cold pole of the Earth

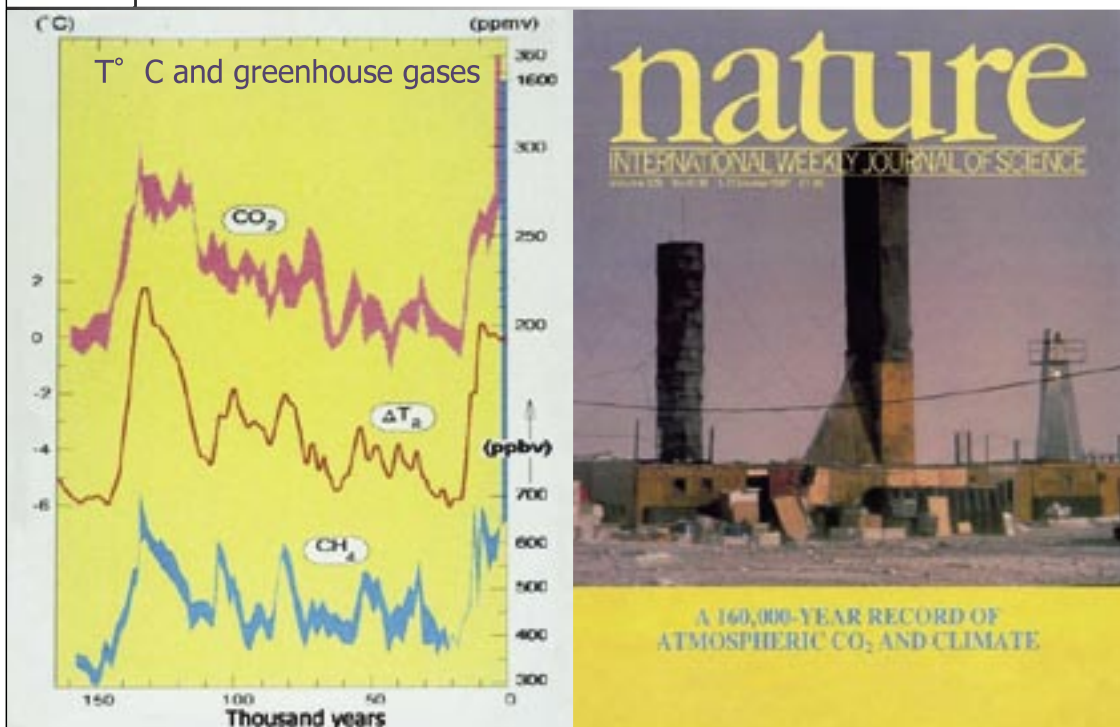
Vostok : -89 ° C



slide 23



## 1984: Vostok, 150 000-year-old records

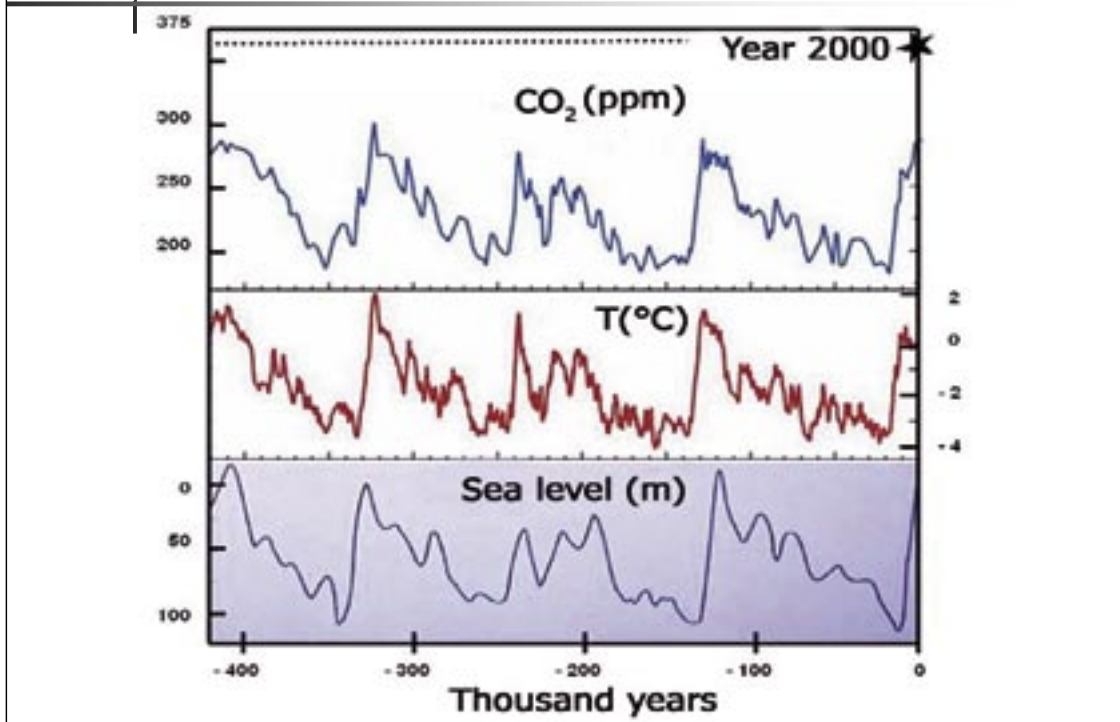


slide 24





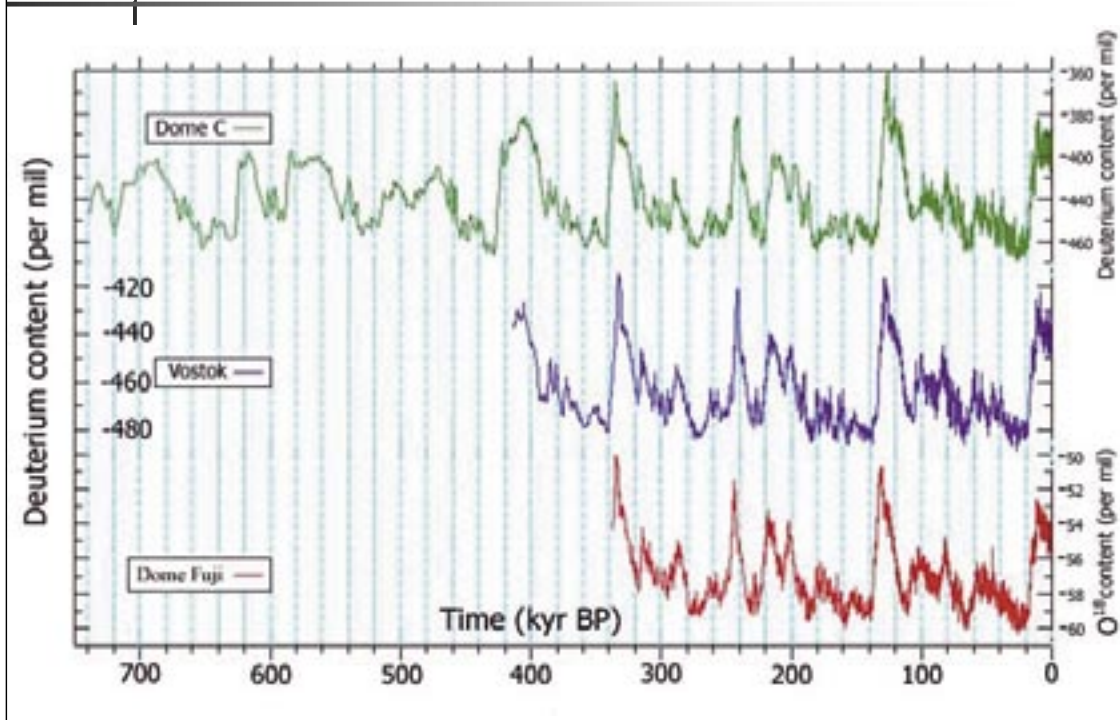
## 1998: Vostok, 420 000-year-old records



slide 25



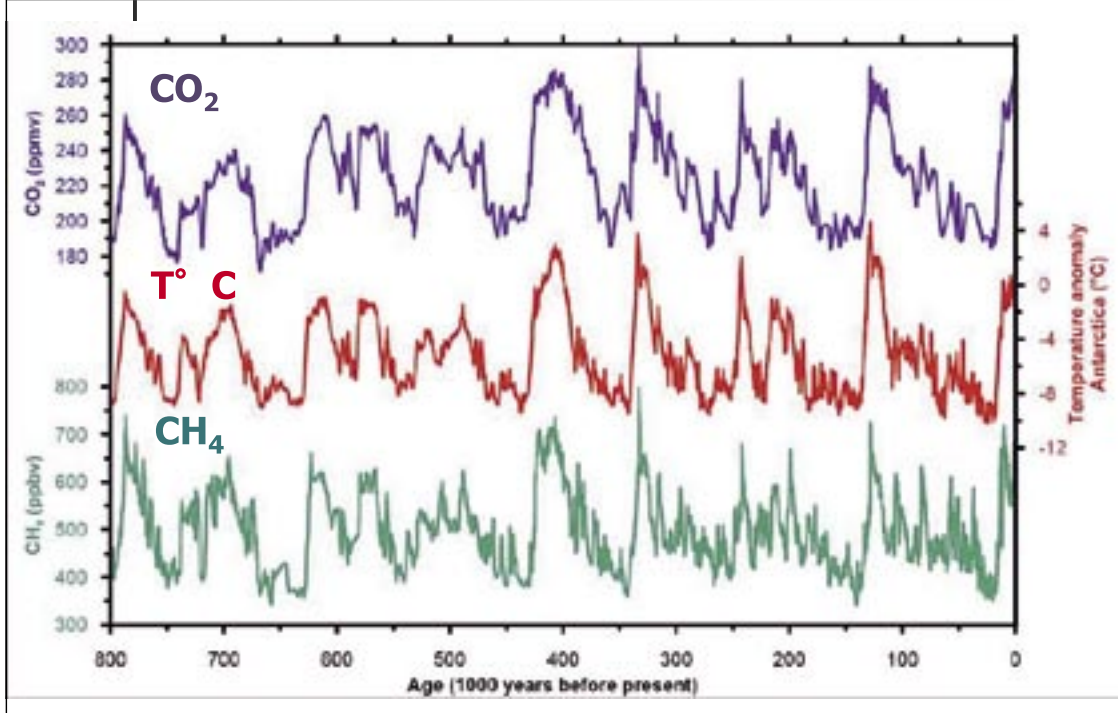
## Dome C, Vostok, Fuji: climate variability



slide 26



## Dome C, Epica: 800 000-year-old records



slide 27



## From 1974 to 2004: Dome C



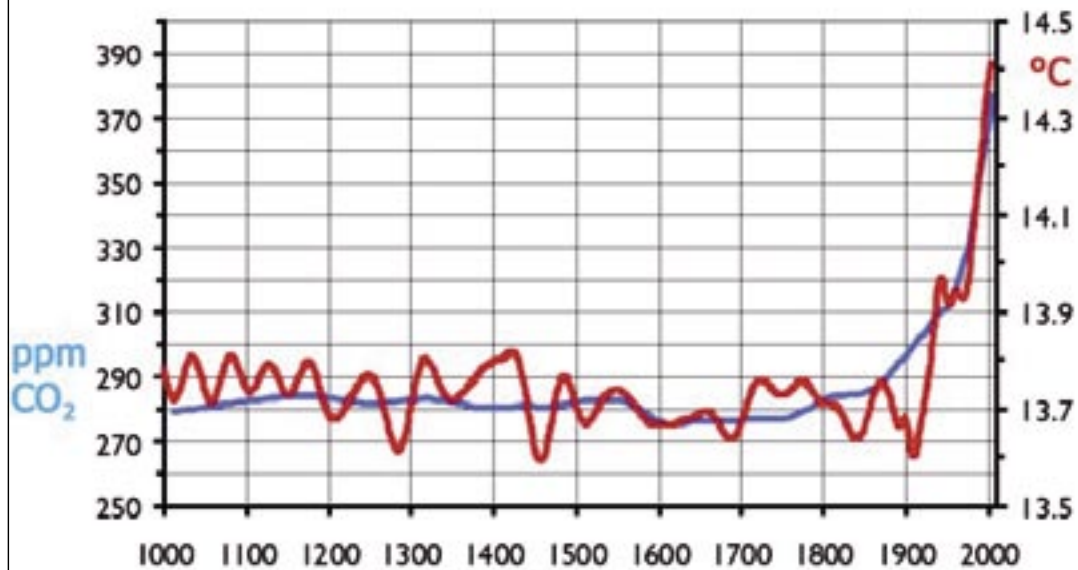
Dome C, 1974 : 40 000-year-old records

EPICA, 2004 : 800 000-year-old records

slide 28



## 1000 years: CO<sub>2</sub> and global warming



slide 29



## Climatic warming and ice pack

**A new navigation route between the Atlantic and the Pacific oceans? Who owns the North pole?**



slide 30



## Climatic warming and Inuit populations



Hunting on the ice pack

slide 31



## Climatic warming and polar bears



Polar bears

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## Climatic warming and Emperor penguins

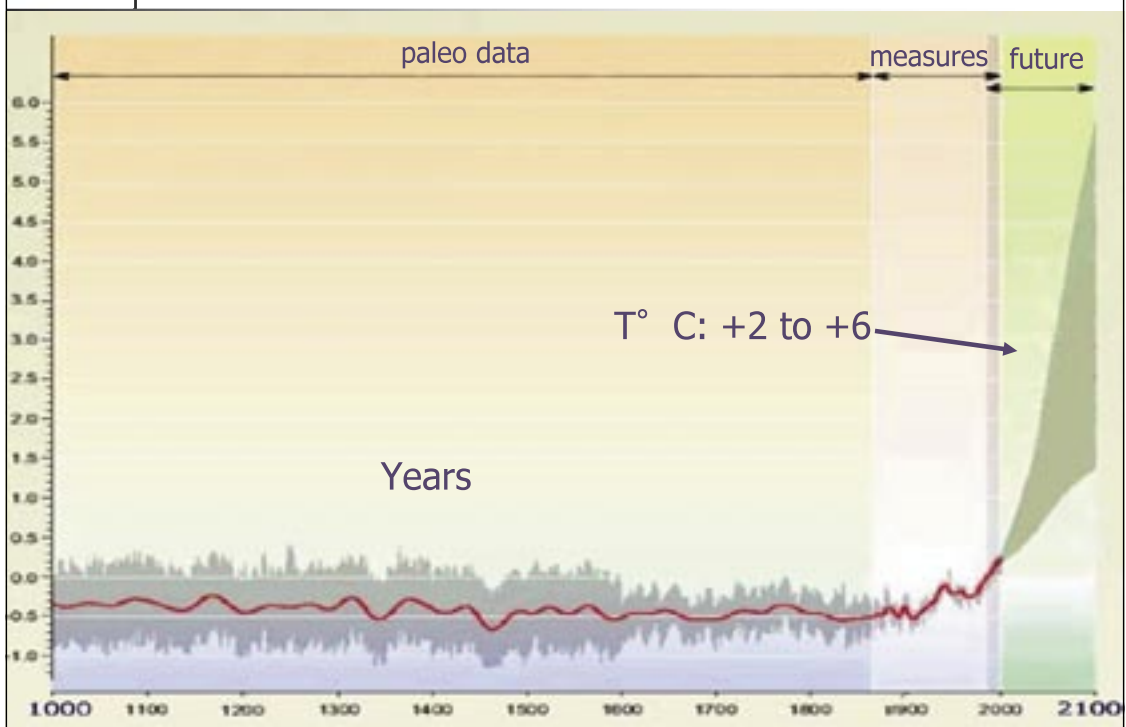


Adelie Land: Emperor migration

slide 33



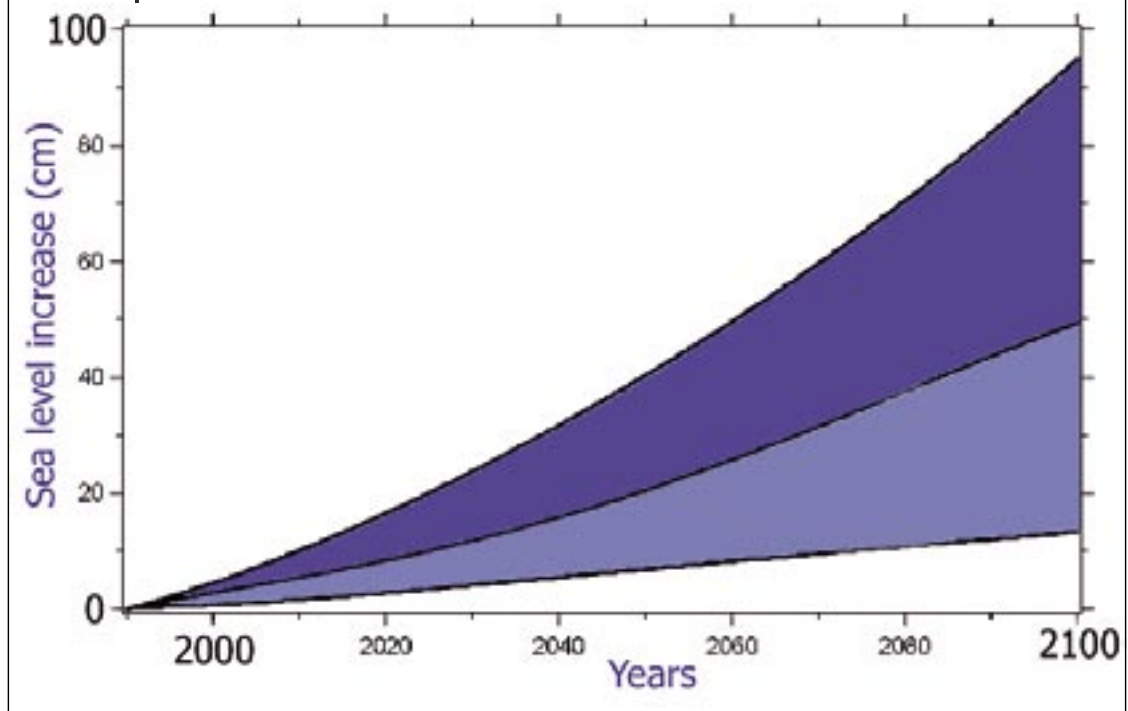
## Temperature: past and future



slide 34



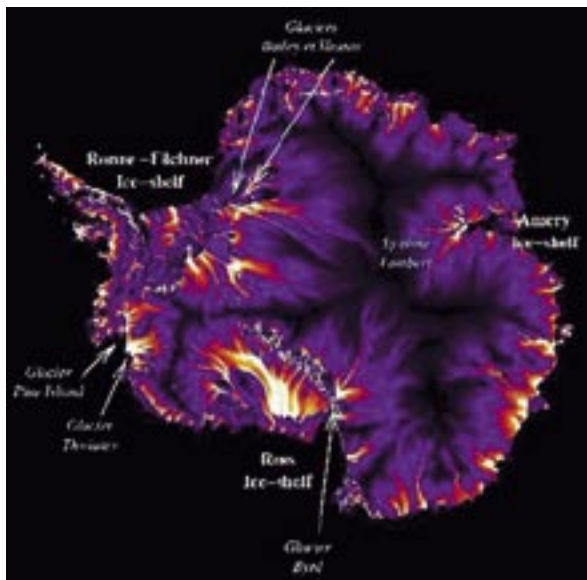
## Climatic warming and sea level



slide 35



## Antarctica: glaciers and mass balance



slide 36



## Ice and Climate, a close link

- Records: history of climate and atmosphere
- Testimony: extension or reduction / cold or hot
- Key elements: Temperature range / surfaces

Covering over tens of millions square kilometers, the white planet is both a testimony and a key element of climate change. The ice cores are a unique memory of climate and atmosphere.

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## 50 years of adventures and research in Antarctica

- Climate: Past and Future
- **Global Environment**
- Mankind and Anthropocene



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## North pole-South pole: only one planet

The magnetic field protects us from solar particles

South



Aurora polaris

North



slide 39



## North pole-South pole: only one atmosphere



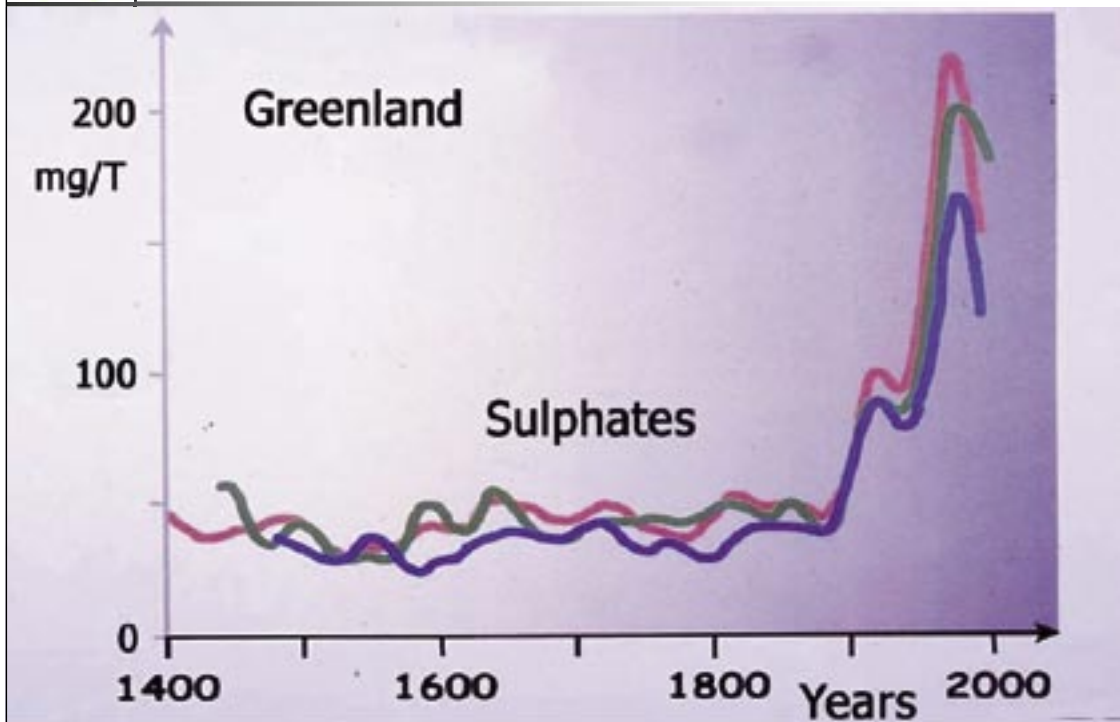
Arctic tern

slide 40





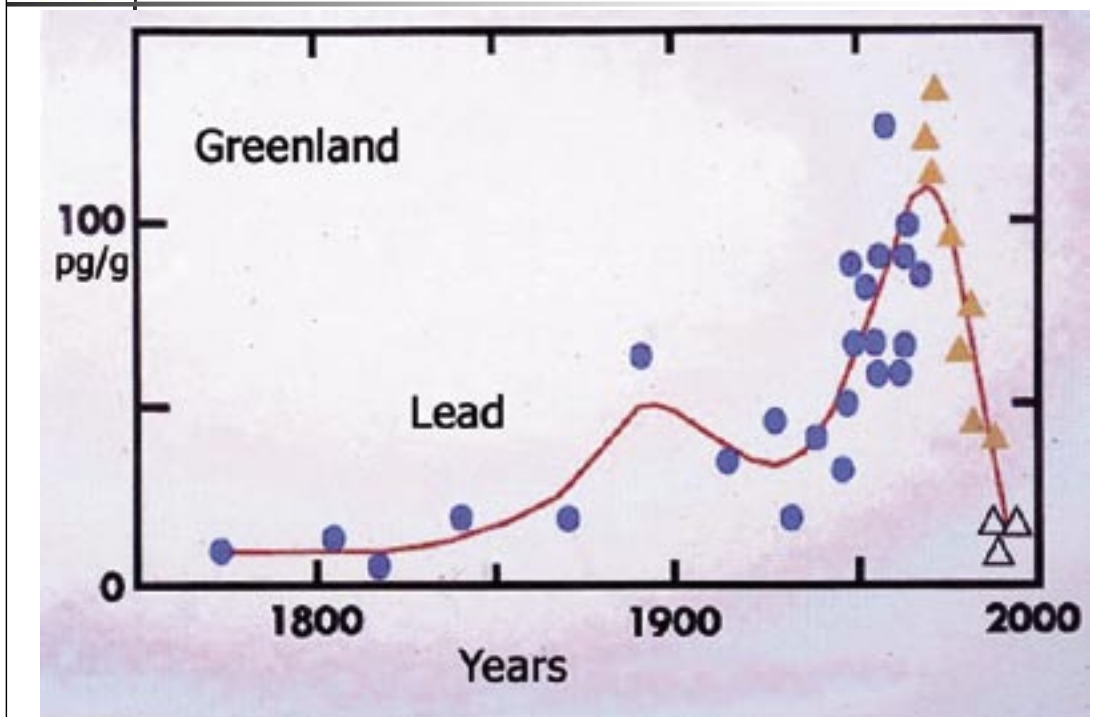
## Hemisphere pollution: Greenland



slide 41



## Hemisphere pollution: Greenland



slide 42



## Global pollution: radioactivity

In Antarctica,  
fallout from nuclear explosions launched in the North.



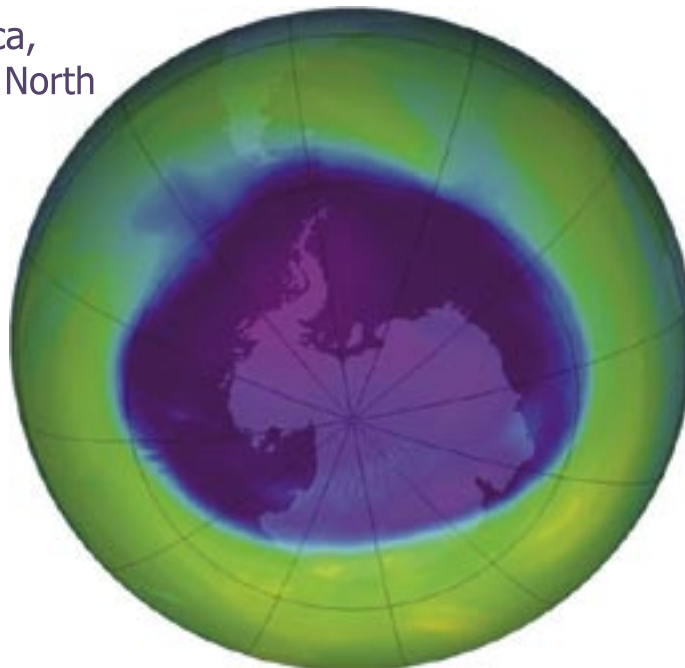
Nuclear test

slide 43



## Global pollution: "the ozone hole"

In Antarctica,  
CFC's from North



2005 "ozone hole" : 27 millions km<sup>2</sup>

slide 44



North pole-South pole: only one ocean



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Global pollution: sea as a dust-bin



slide 46



## 50 years of adventures and research in Antarctica



- Climate: Past and Future
- Global Environment
- **Mankind and Anthropocene**

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## Global warming challenges



- **Human life conditions:** hurricanes, biodiversity, droughts ...
- **Resources :** water, energy, food ...
- **Wars and conflicts :** sea level, population migration ...

The victims:  
those who already have their feet in water or are living in dry deserts

slide 48



## Climatic warming: what can be done ?

› **Energy**

› **Way of life**

› **Research:**

**Fundamental: climate**

**Applied: energy**

› **Solidarity**

**City lights of the world**

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## Climate and Environment: reactions

Le Monde, 4 Novembre 2006



The response of politicians, policy makers and citizens...

slide 50



## Environment: Mankind facing the challenge

- Other issues: health, AIDS, famine...
- Technology / consumption...

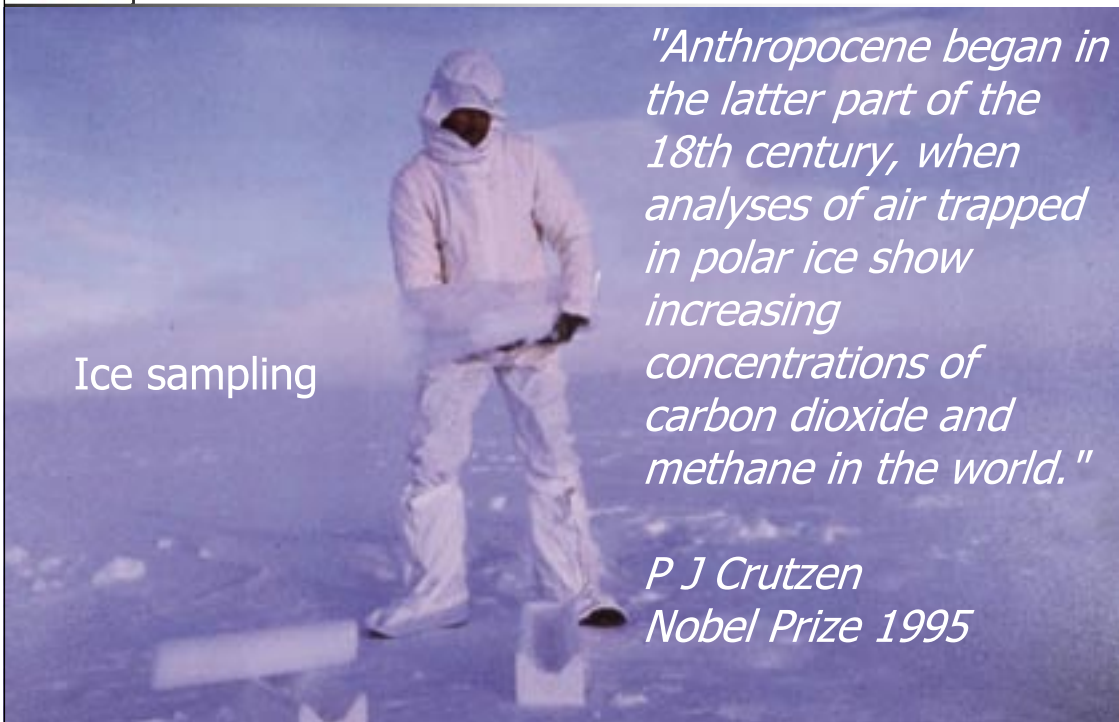


- People motivation: wealth, power, comfort...
- Policy makers / elections...
- Emergency / awareness...

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## Anthropocene: our tracks in the ice



Ice sampling

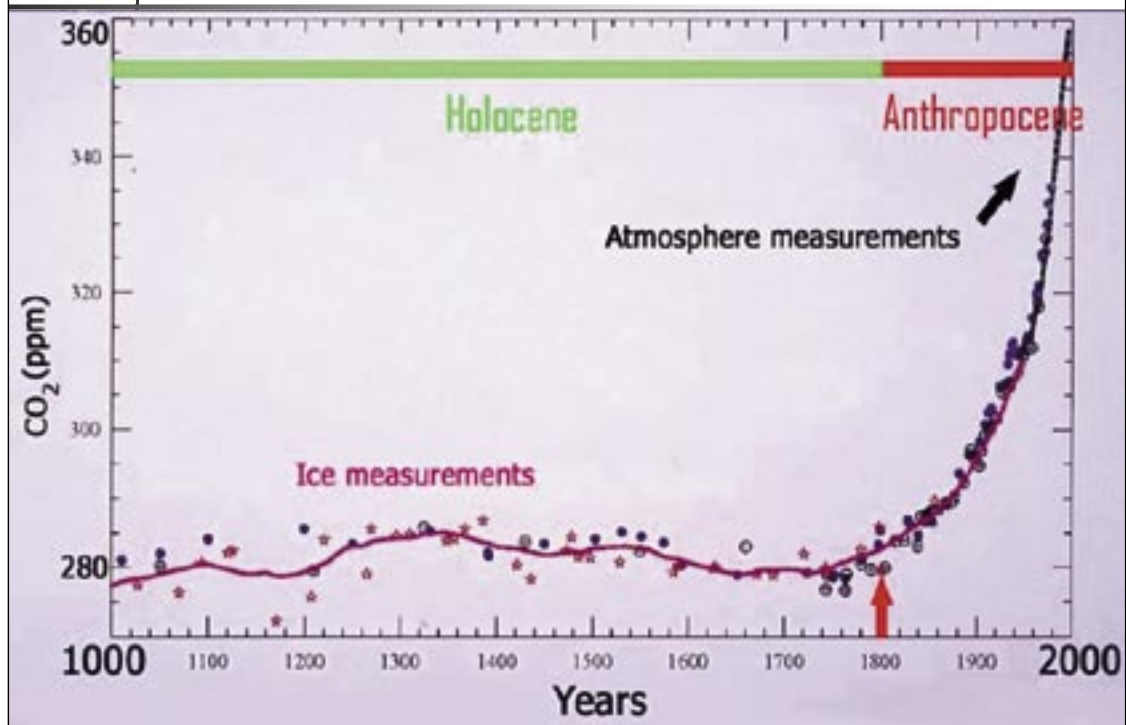
*"Anthropocene began in the latter part of the 18th century, when analyses of air trapped in polar ice show increasing concentrations of carbon dioxide and methane in the world."*

*P J Crutzen  
Nobel Prize 1995*

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## CO<sub>2</sub>: the birth of Anthropocene



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## Environment and International Governance

- Solidarity / national interests: developed Vs emerging countries
- Right for environment and conflicts of interest and cultures



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# Let us be in Peace with Nature



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## «Anthropocene»



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