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# Restoration and Recovery of the Ocean and its Biodiversity

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# Restoration and Recovery of the Ocean and its Biodiversity

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## Recommendations

**(1) Not only conserve but restore and recover the ocean and its biodiversity**

- Shift to sustainable fishing practices
- Prevent alien species invasions
- Provide financial assistance and empower low-income states
- Promote the establishment of marine protected areas

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**(2) Create a sustainable marine environment**

- Develop a decarbonization roadmap and increase ocean carbon sinks
- Improve literacy on climate change, biodiversity and sustainable use of marine resources
- Adopt an ecosystem-based approach, prevent marine pollution and eliminate harmful subsidies

**(3) Achieve long-term success in conserving, restoring, and recovering the ocean and its biodiversity**

- Enhance human resource development for marine research
- Increase support for monitoring ecosystems, species and genetic diversity
- Promote open science and strengthen global observation networks
- Enhance marine biodiversity databases

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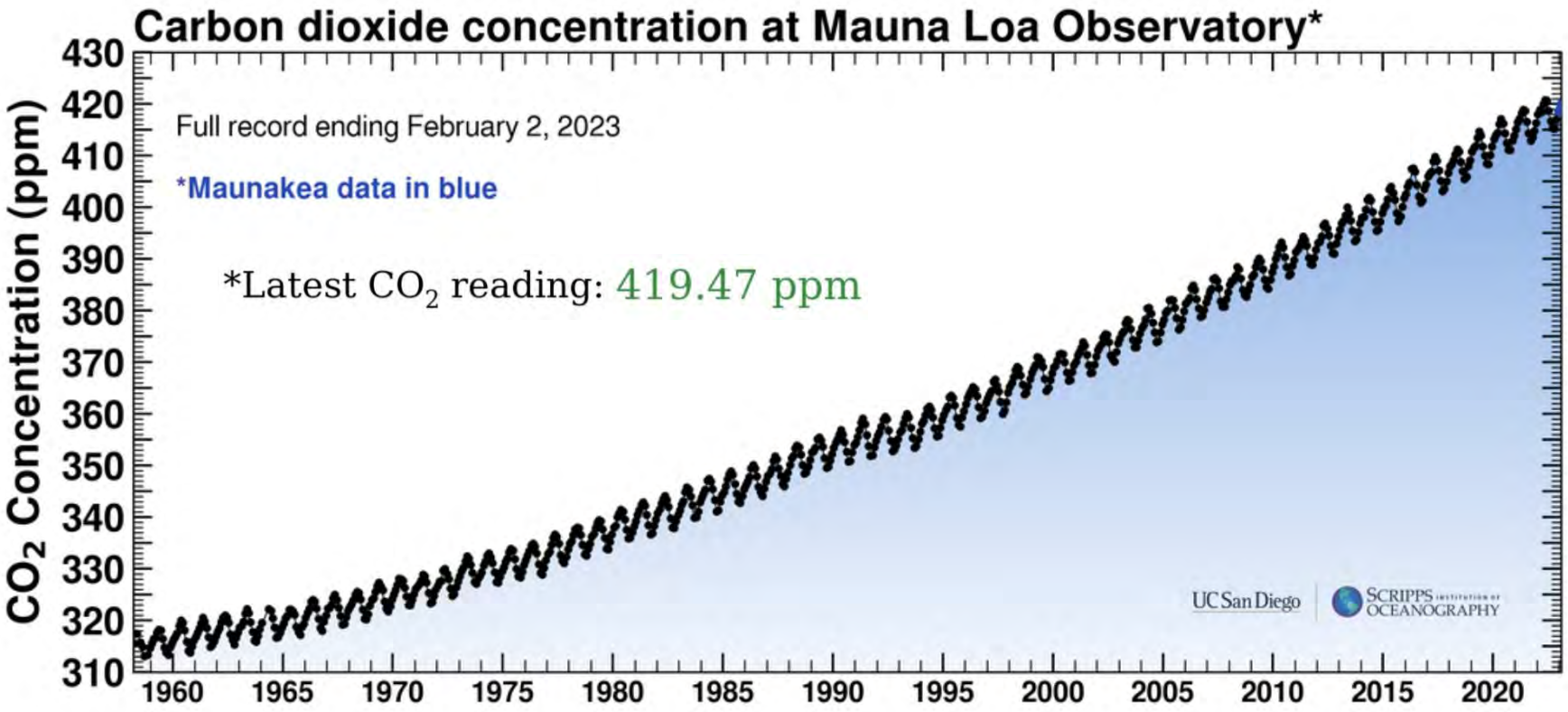
# Mauna Loa $CO_2$-Curve (Keeling Curve)



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# Atmospheric $CO_2$ Rise

**global T: +2.5˚C**

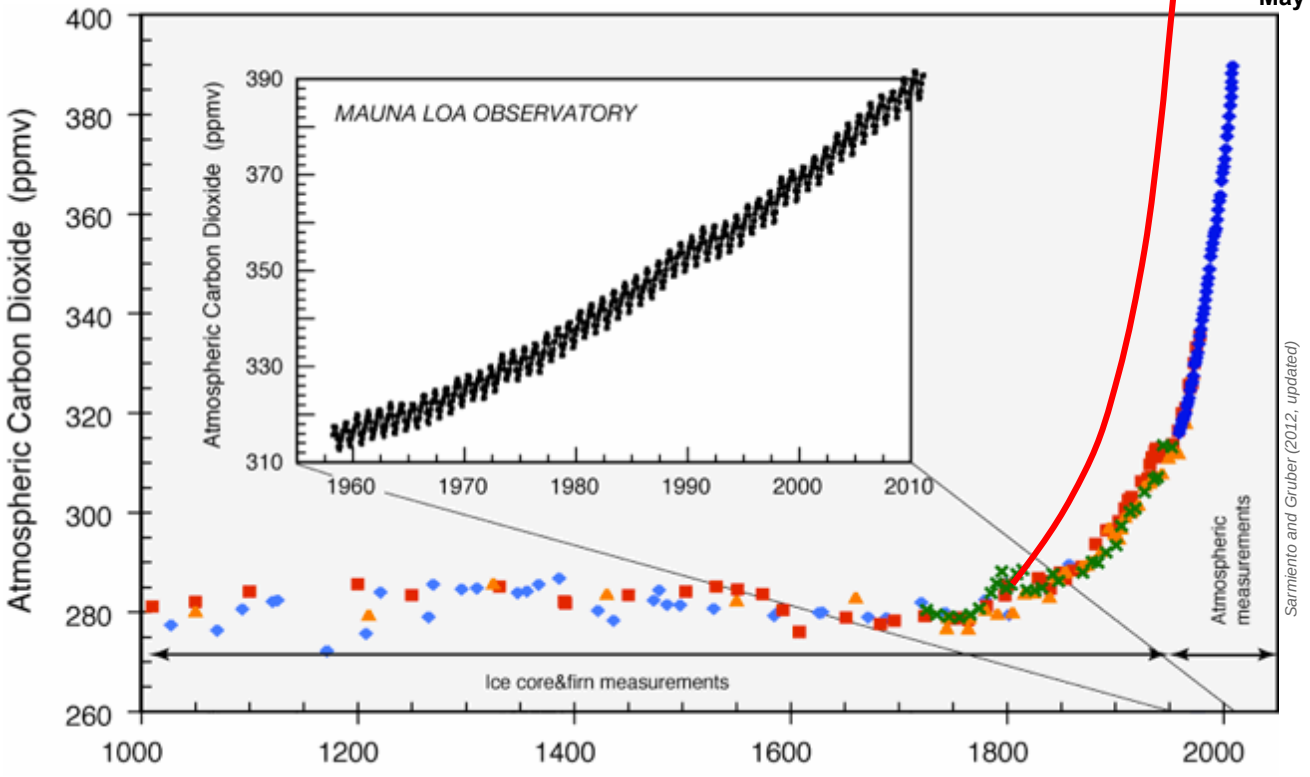
**Without sinks 535ppm**

**415ppm**
**May 2019**

**1750-2011: (IPCC 5)**

Fossil Fuels: 365 Pg C
Land Use: 180 Pg C
Totel Emissions: 545 Pg C

-> 2.13 ppm/Pg C



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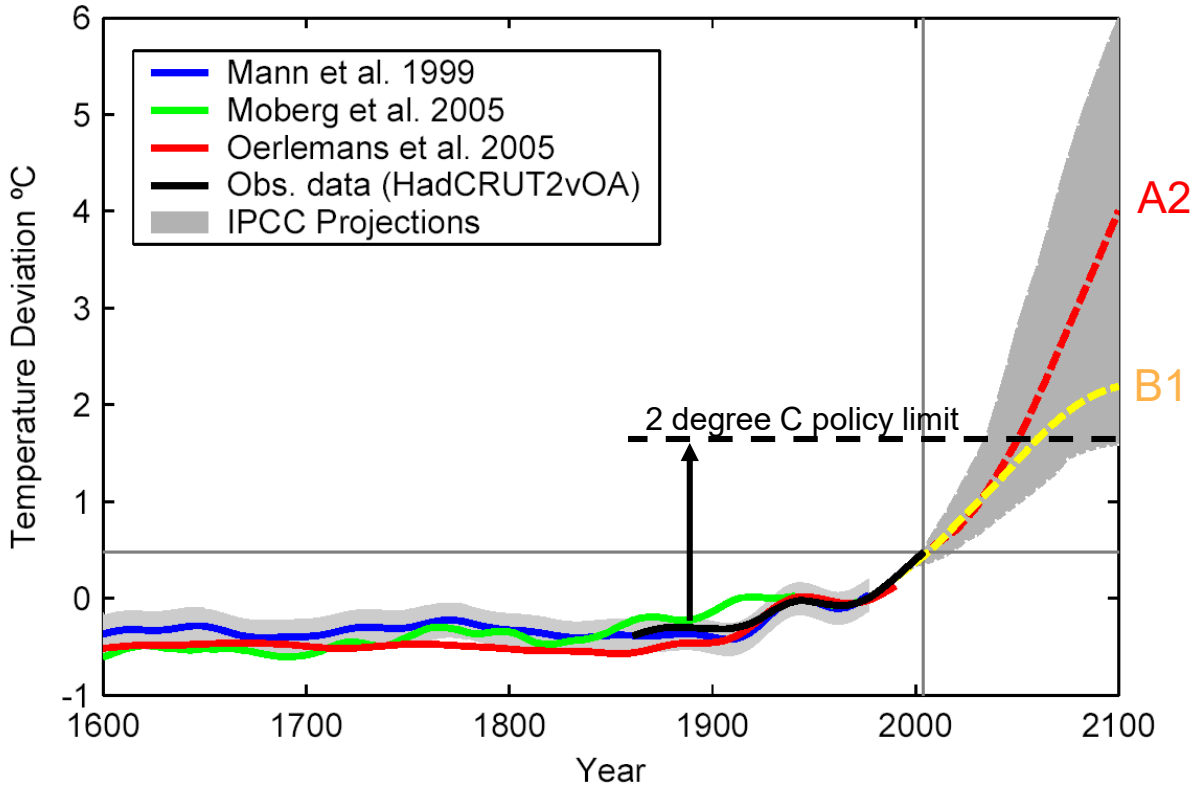
# IPCC: 4th assessment report

## Global warming until 2100




IPCC, 2007

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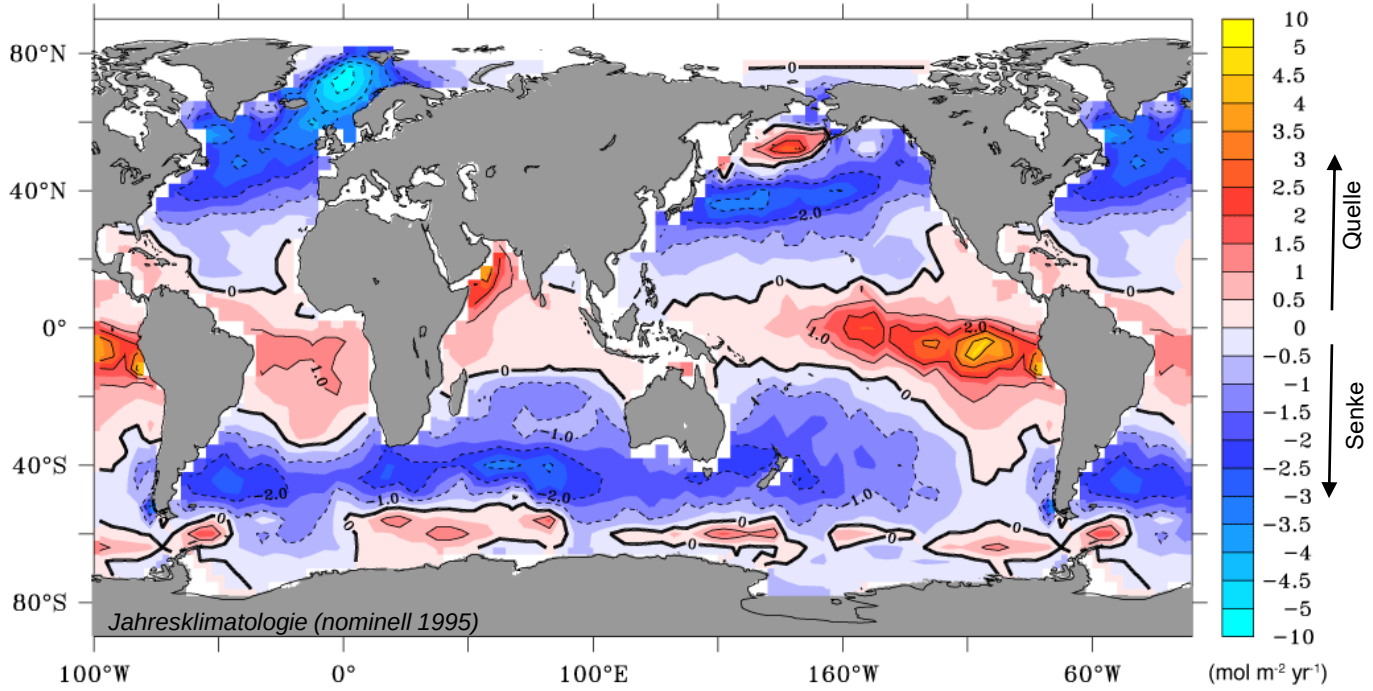
# Ocean sinks and sources of $CO_2$




**Global oceanic uptake of anthropogenic $CO_2$: ~2.2 Pg C $yr^{-1}$**

**Natural oceanic release of $CO_2$: 0.6 Pg C $yr^{-1}$**

**-> Net uptake of 1.6 Pg C $yr^{-1}$**

*Takahashi et al., Deep Sea Research (2009)*

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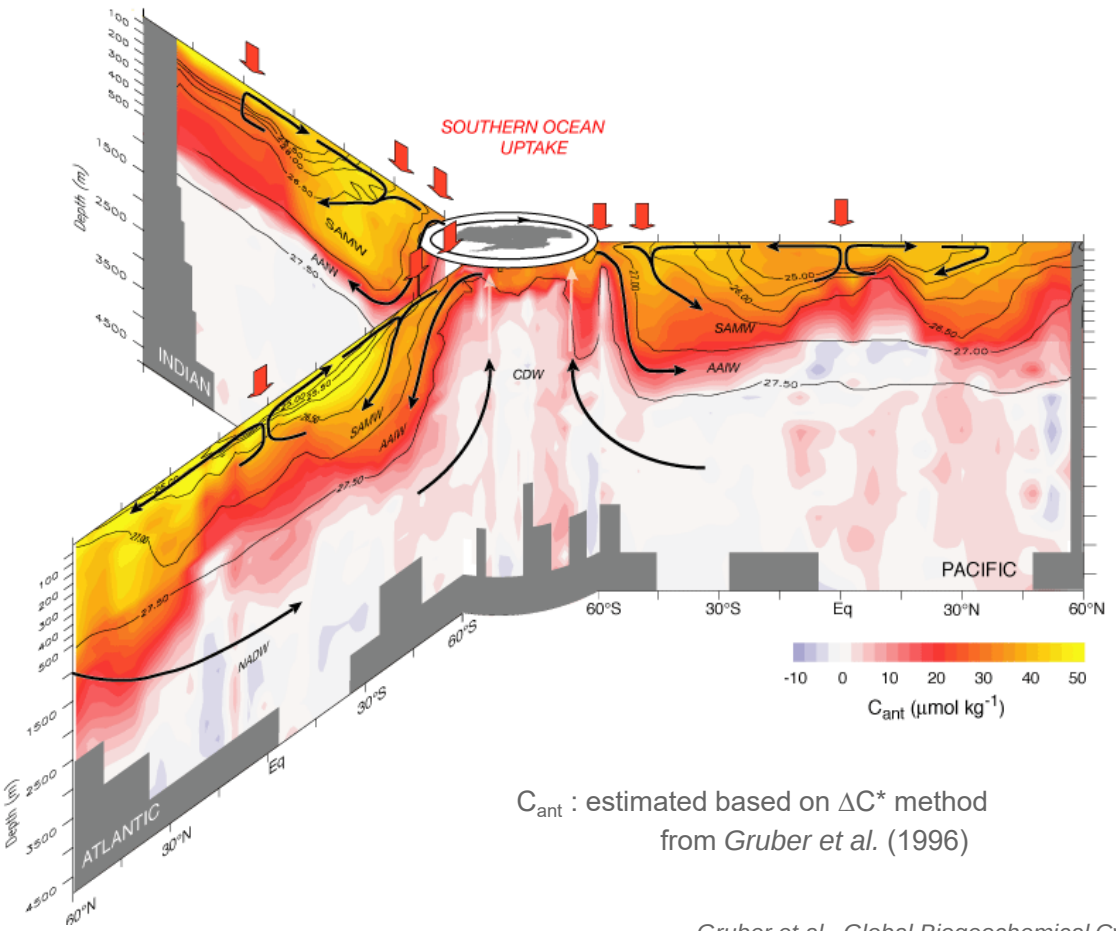
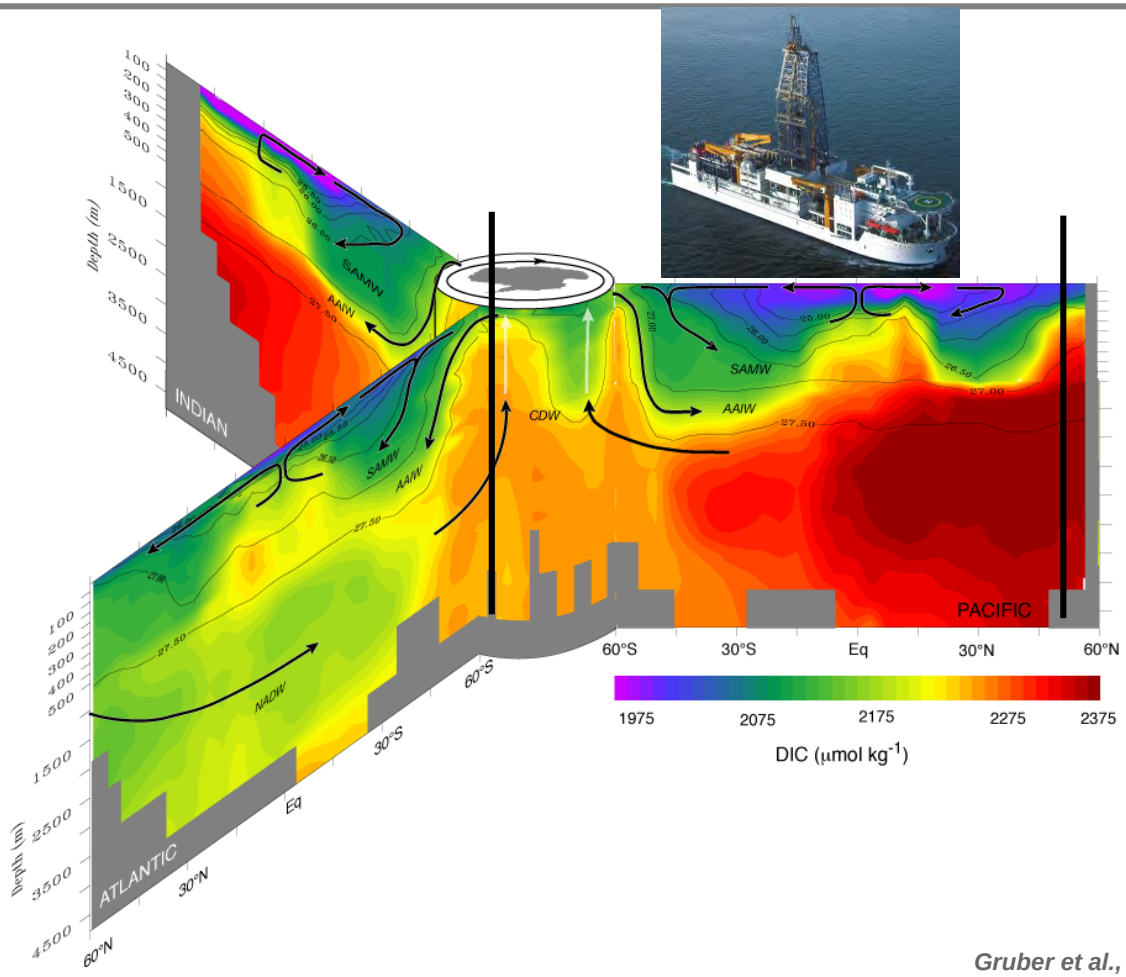
# Anthropogenic $CO_2$ distribution




$C_{ant}$ : estimated based on $\Delta C^*$ method
from *Gruber et al.* (1996)

*Gruber et al., Global Biogeochemical Cycles (2009)*

# Dissolved inorganic carbon ($CO_2$) in the ocean




*Gruber et al., GBC (2009)*

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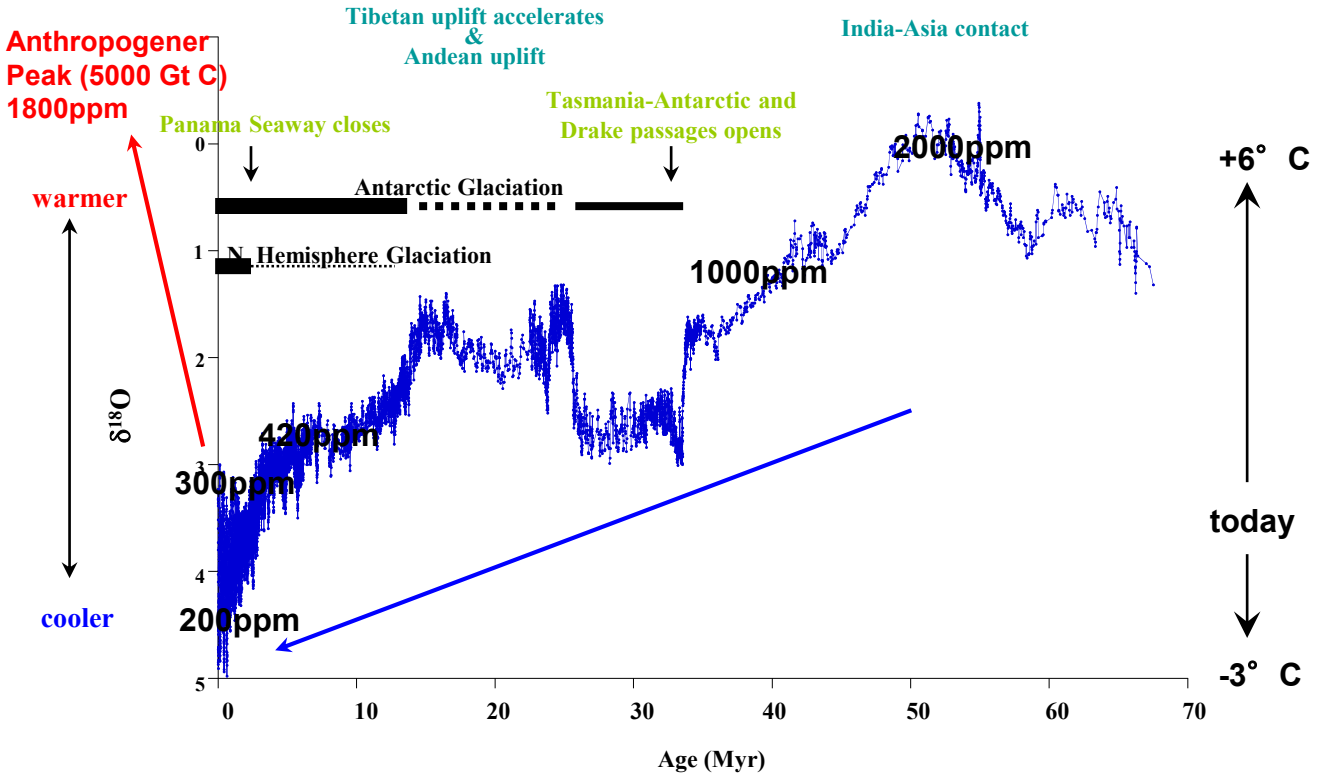
# Cenozoic climate evolution: cooling




Zachos et al., Science, 2001

# Conclusions

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To address global challenges:

(1) **multilateral cooperation** is essential **-> global price on CO2!**

(2) **science-based policy advice** from the independent voice of science is crucial

**Thank you** to the Science Council of Japan for coordinating the Science7 process 2023!

# Thank you!

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