

Lesen im Gedächtnis der Erde

- oder -

wie durchbohrt man einen Eisschild?

Expedition report of the research project EPICA in 2002,
presentation for the public

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KOHNEN 760KM



EPICA

European Project for Ice Coring in Antarctica









СТЕПНИК ЛИФТЛЪТ 300
ВЪРХОВЪТ АРСЕНАЛ !
ПРЕДНАМЕРИТЕЛСТВО, ИЗДАНИЕ 1
ТРАНСФОРМАЦИЯ 2016 Г.
ЛАЗЪР СЪЛЪЗНОУСЪТВОРЕНИЕ !

СТЕПНИК SUPER









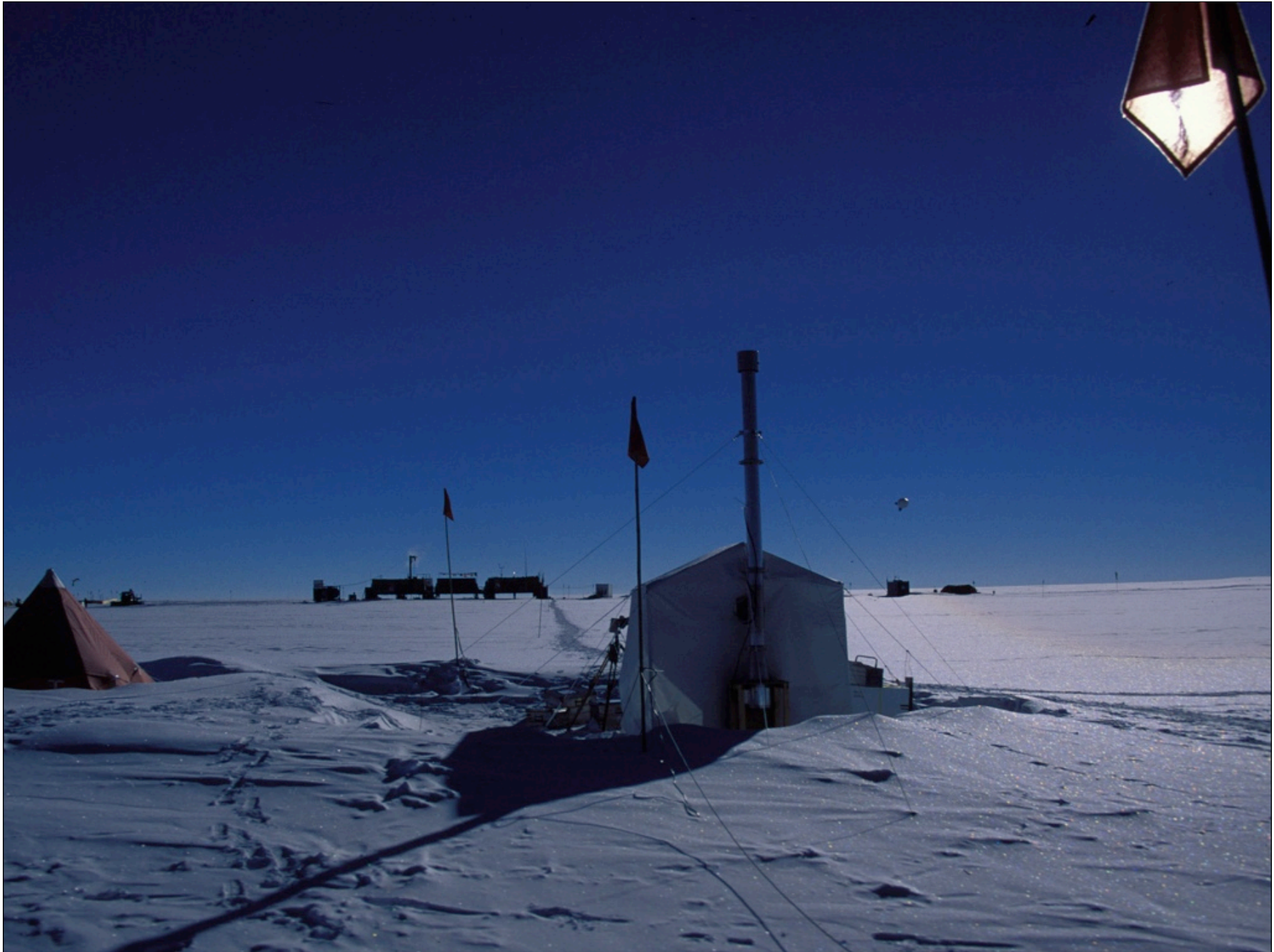








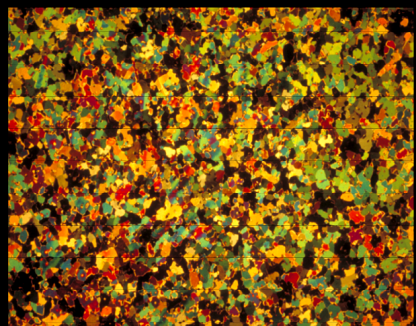




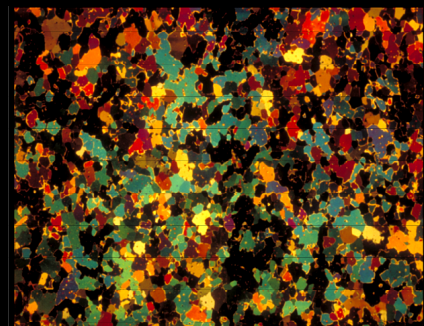




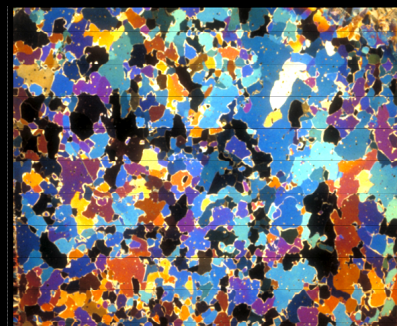




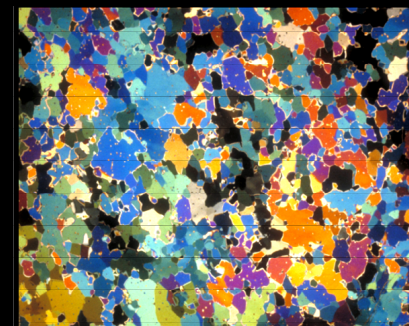
47 m



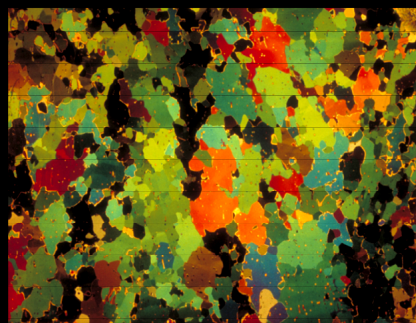
62 m



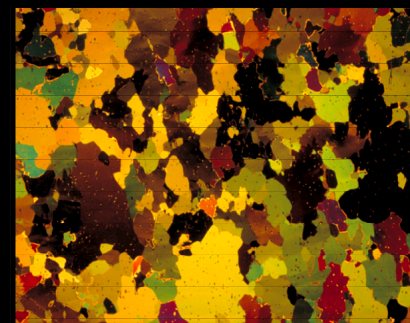
71 m



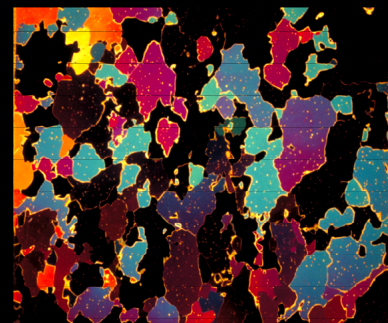
89 m



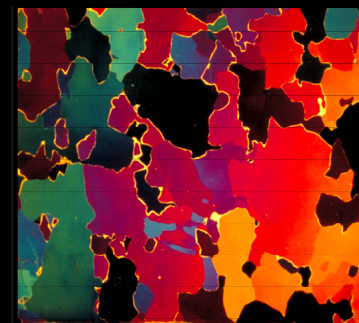
95 m



114 m



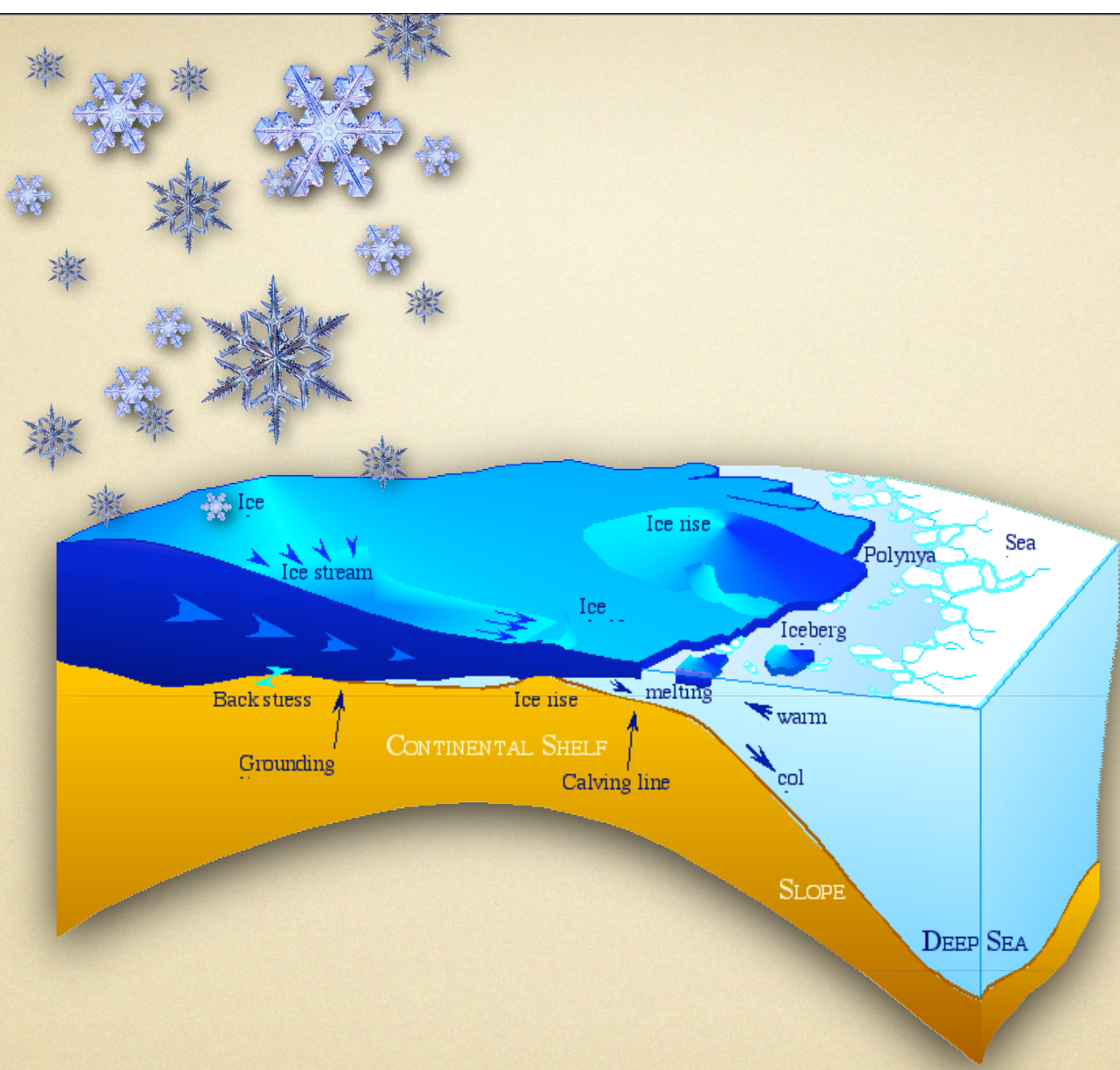
148 m

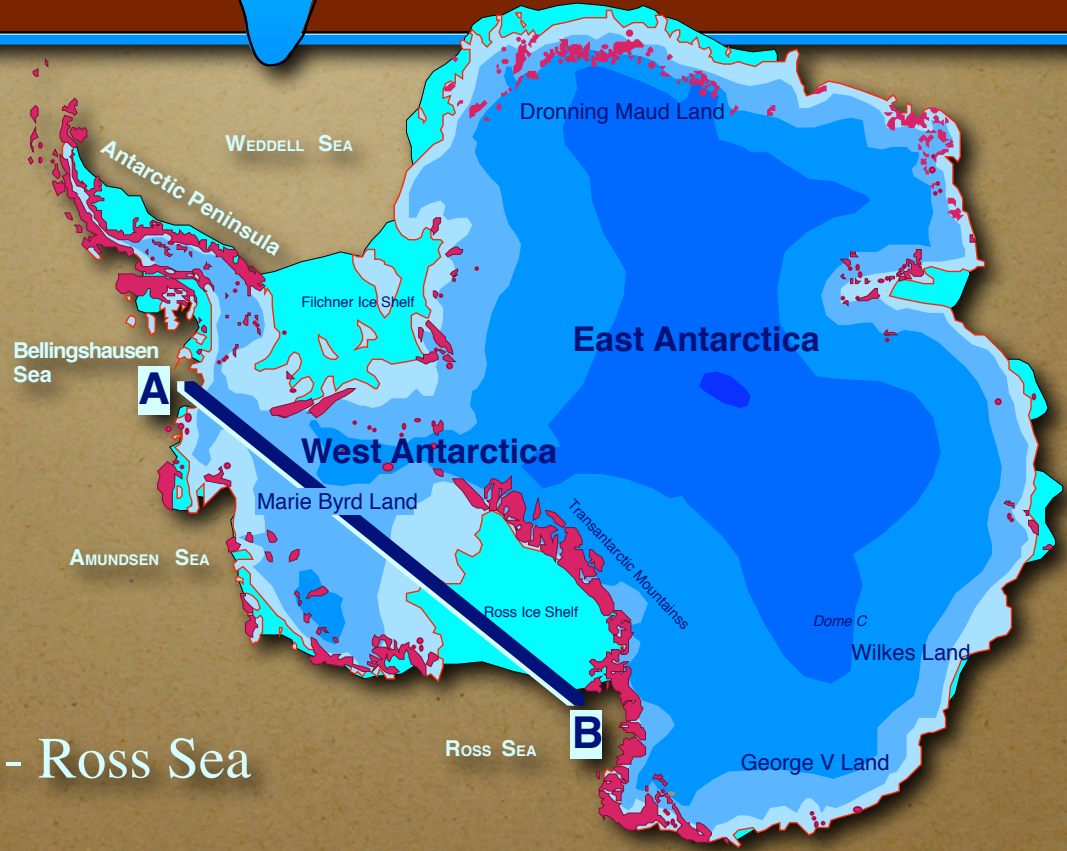
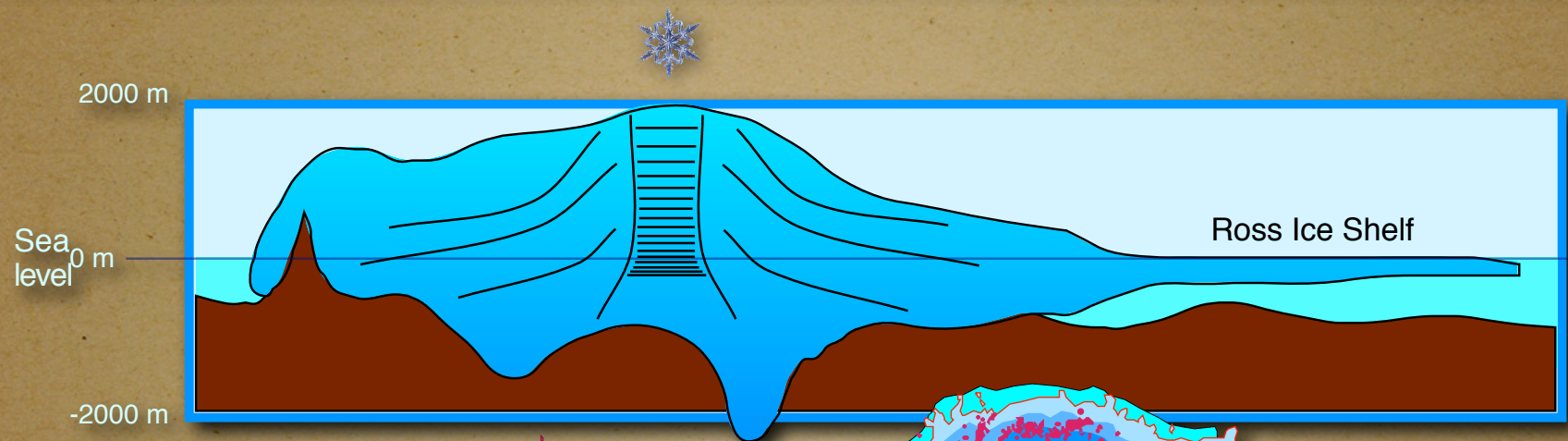


153 m

10 cm



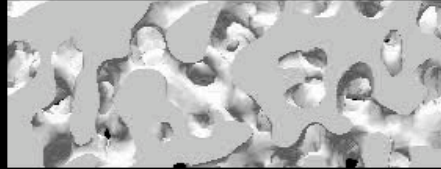




Profil Bellingshausen - Ross Sea



0 m



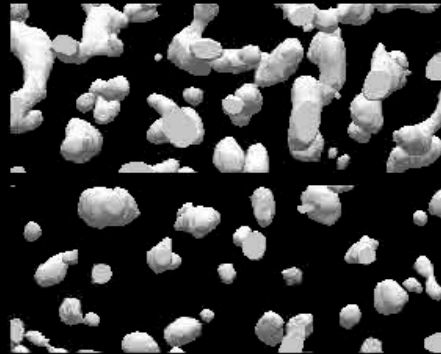
Schnee

50 m



Firn

100 m



Eis



Poren = weiss



The CO₂ record from the EPICA Dome C ice core reveals that atmospheric CO₂ variations during glacial-interglacial cycles had a notably different character before and after 430 kyr B.P. Before MIS 11, the amplitude of temperature was lower, and the duration of the warm phases has been much longer since then. In spite of these differences, the significant covariation of δD and CO₂ is valid in both periods. Before MIS 11, CO₂ concentrations did not exceed 260 ppmv. This is substantially lower than the maxima of the last four glacial cycles. The lags of CO₂ with respect to the Antarctic temperature over glacial terminations V to VII are 800, 1600, and 2800 years, respectively, which are consistent with earlier observations during the last four glacial cycles.

Our measurements have revealed an unexpected stable climate phase (MIS 15.1) during which the atmospheric CO₂ concentration was 251.5 ± 1.9 ppmv for many millennia (28,000 years, based on the EDC2 time scale), although the duration of MIS 15.1 is uncertain because of possible inaccuracies in the Dome C EDC2 time scale between MIS 12 and 15. However, the roughly 30,000-year duration of MIS 11 (and possibly MIS 15.1) demonstrates that long interglacials with stable conditions are not exceptional. Short interglacials such as the past three therefore are not the rule and hence cannot serve as analogs of the Holo-

cene, as postulated recently (24). Examining δD as a function of CO₂, we observe that the slope during the two new glacial cycles compared to the last four cycles is essentially the same. Therefore, the coupling of Antarctic temperature and CO₂ did not change significantly during the last 650 kyr, indicating rather stable coupling between climate and the carbon cycle during the late Pleistocene.

References and Notes

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Atmospheric Methane and Nitrous Oxide of the Late Pleistocene from Antarctic Ice Cores

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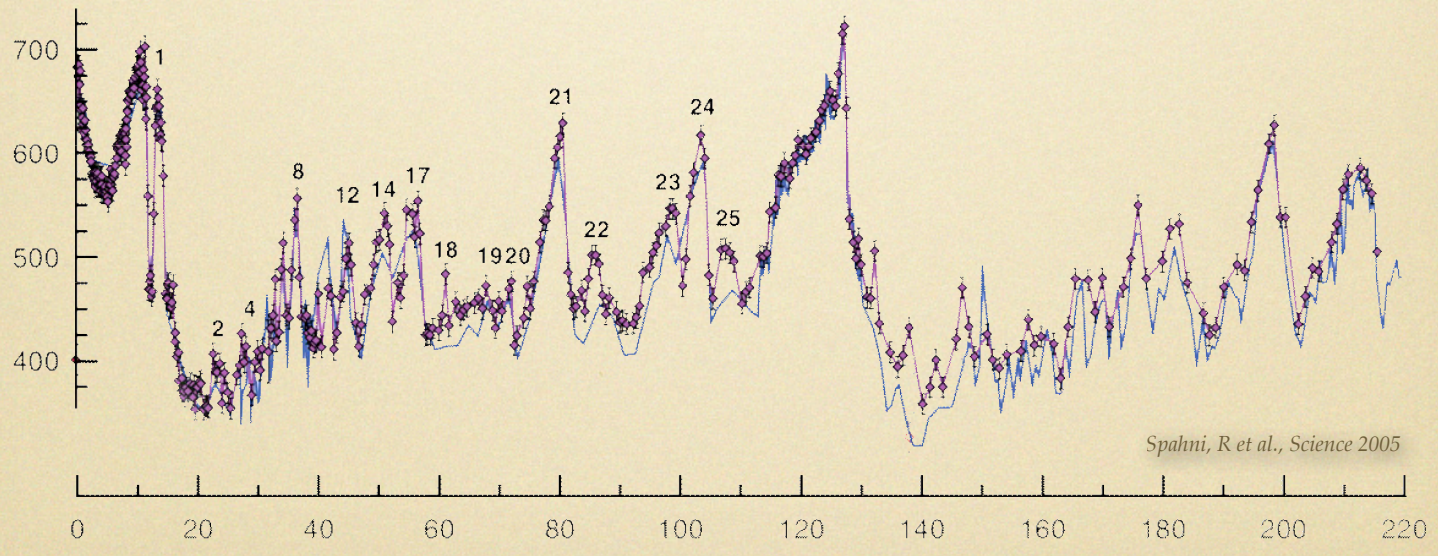
The European Project for Ice Coring in Antarctica Dome C ice core enables us to extend existing records of atmospheric methane (CH₄) and nitrous oxide (N₂O) back to 650,000 years before the present. A combined record of CH₄ measured along the Dome C and the Vostok ice cores demonstrates, within the resolution of our measurements, that preindustrial concentrations over Antarctica have not exceeded 773 ± 15 ppbv (parts per billion by volume) during the past 650,000 years. Before 420,000 years ago, when interglacials were cooler, maximum CH₄ concentrations were only about 600 ppbv, similar to lower Holocene values. In contrast, the N₂O record shows maximum concentrations of 278 ± 7 ppbv, slightly higher than early Holocene values.

Earth's climate during the late Pleistocene was characterized by ice age cycles with relatively short warm periods (interglacials) and longer cold periods (glacials) (1). The Vostok ice core provided an archive of climate and atmospheric composition over

the past four climatic cycles back to marine isotope stage (MIS) 11, about 420 thousand years before the present (420 kyr B.P.) (2). That record demonstrated the high correlation of temperature changes with greenhouse gas concentration changes in the atmo-

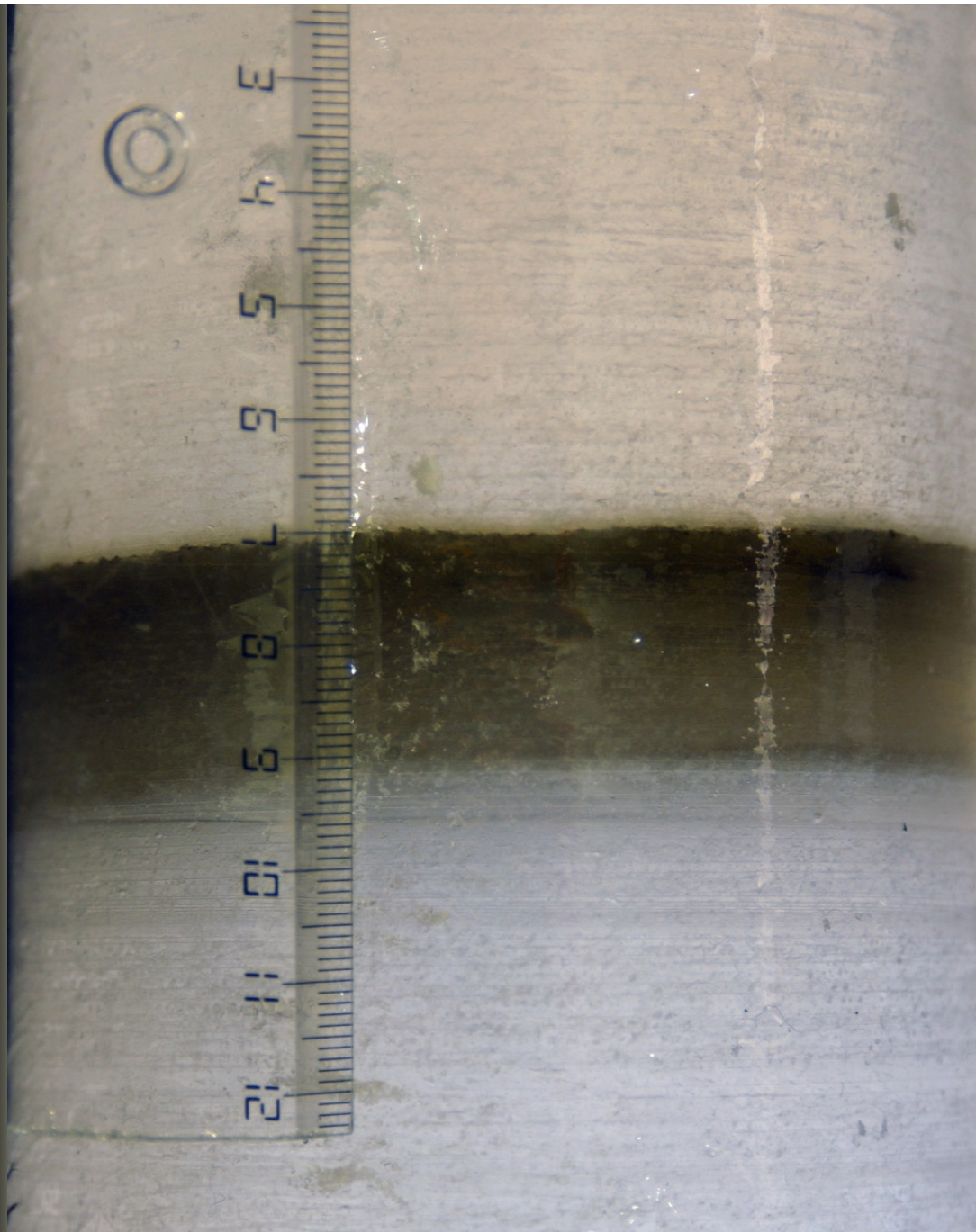
aktueller Wert
1700 (ppbv)

Methan (ppbv)



Spahni, R et al., Science 2005

Alter in 1000er Jahren (kyr)

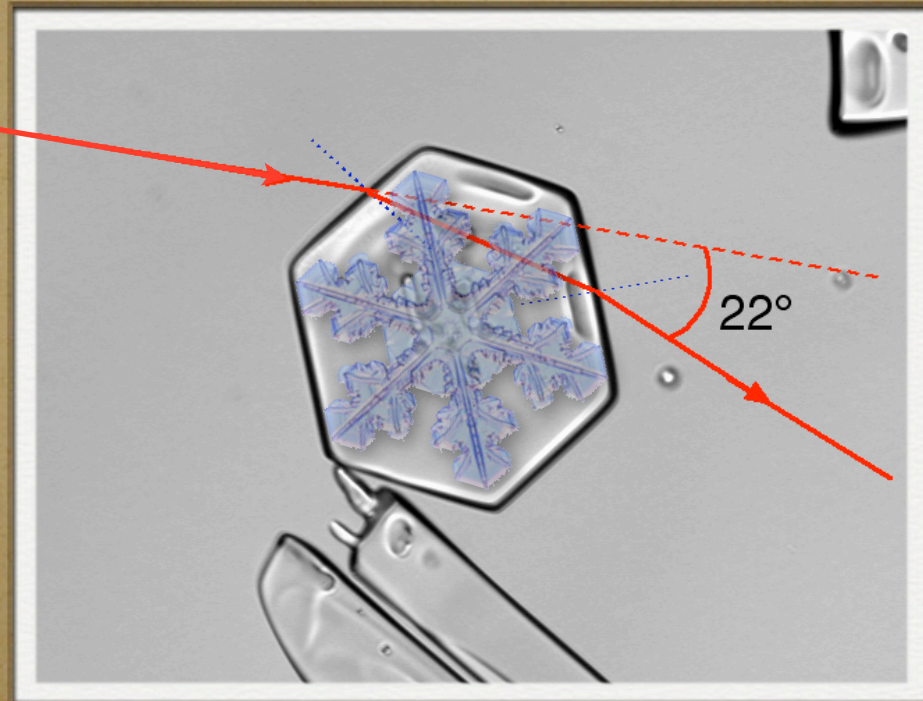


Aschenlage
eines
Vulkanausbruchs
vor 12 000 Jahren









Lichtbrechung am
hexagonalen Eiskristall

Zirkumzenitalbogen

22°-Halo

Horizontalkreis

Nebensonne

Lichtsäule

Horizontalkreis

Nebensonne



