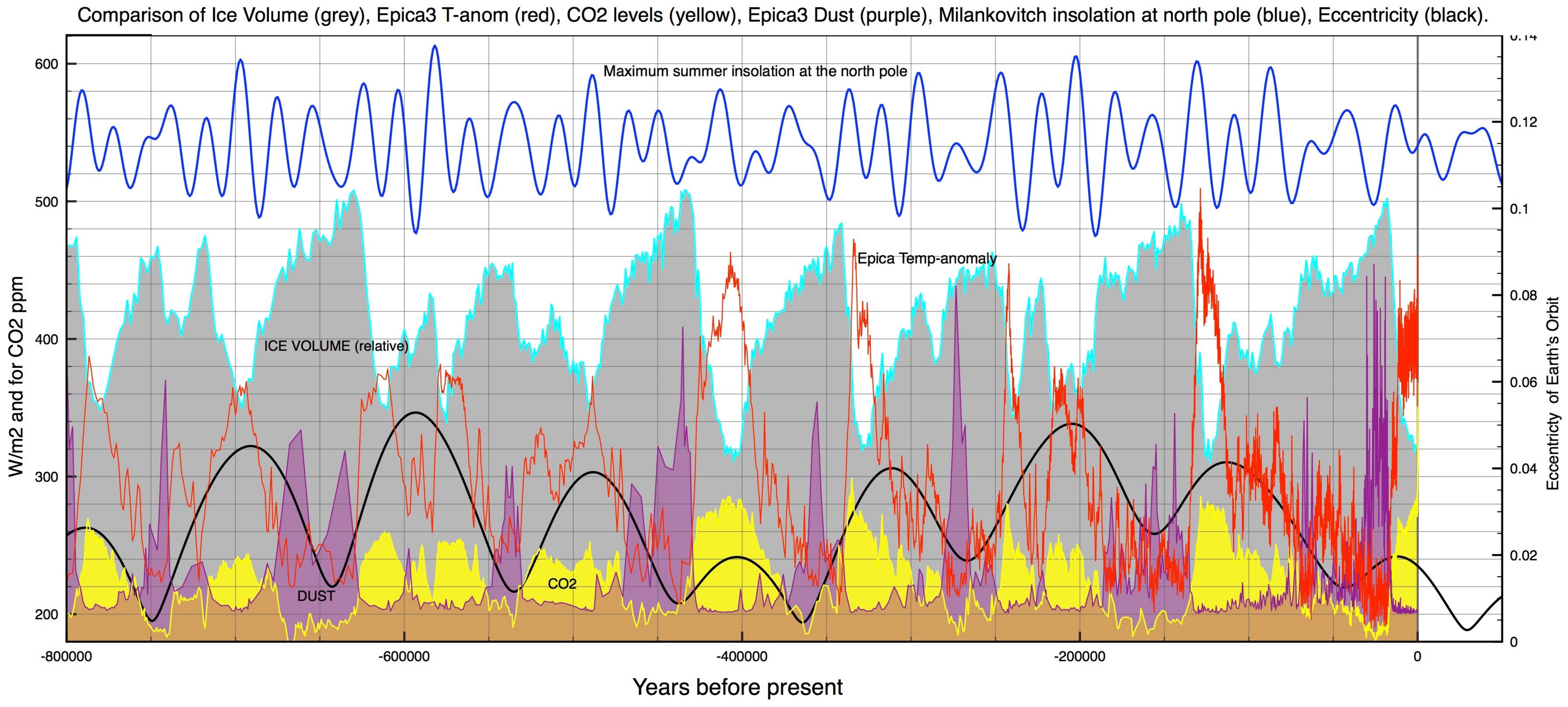
Comparison of Ice Volume (grey), Epica3 T-anom (red), CO2 levels (yellow), Epica3 Dust (purple), Milankovitch insolation at north pole (blue), Eccentricity (black).
Maximum summer insolation at the north pole
Epica Temp-anomaly
ICE VOLUME (relative)
DUST
CO2
W/m2 and for CO2 ppm
600
500
400
300
200
Eccentricty of Earth's Orbit
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-800000
-600000
-400000
-200000
0
Years before present

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Research paper

Modulation of ice ages via precession and dust-albedo feedbacks

CrossMark

Ralph Ellis [a,*], Michael Palmer [b]

[a] 105 – 6817 Route Pommier, St Martin Bellevue 74370, France
[b] University of Waterloo, Department of Chemistry, Waterloo, Ontario, Canada

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A B S T R A C T

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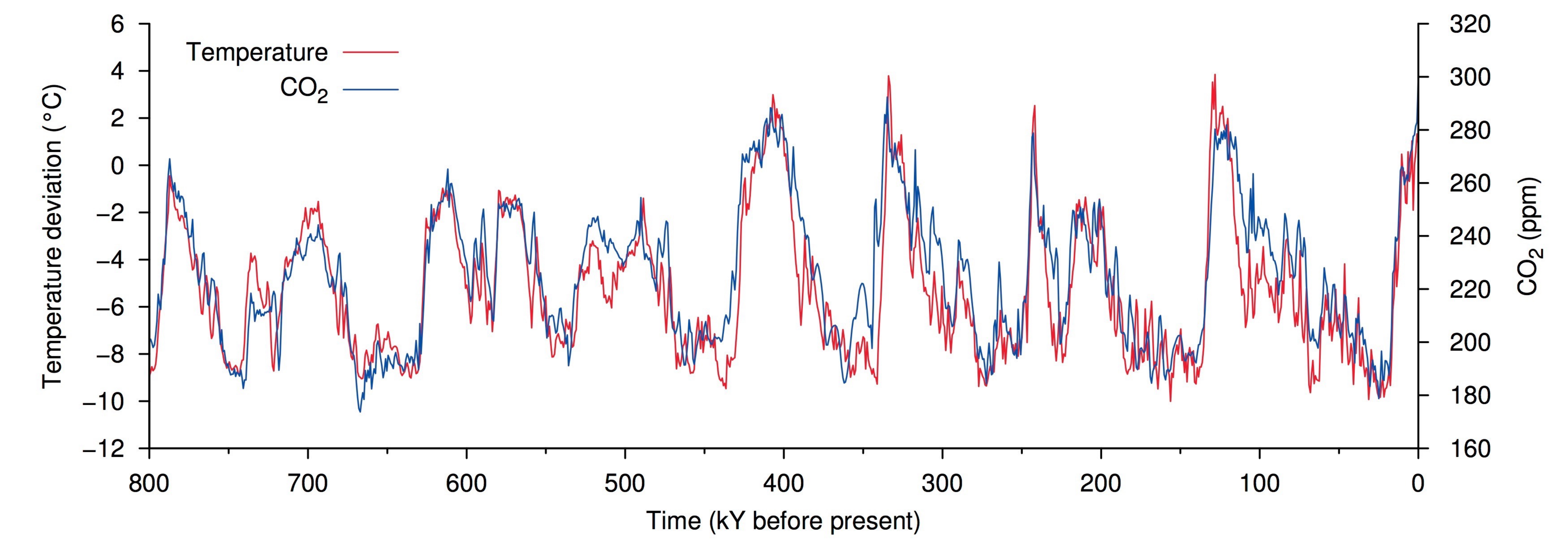
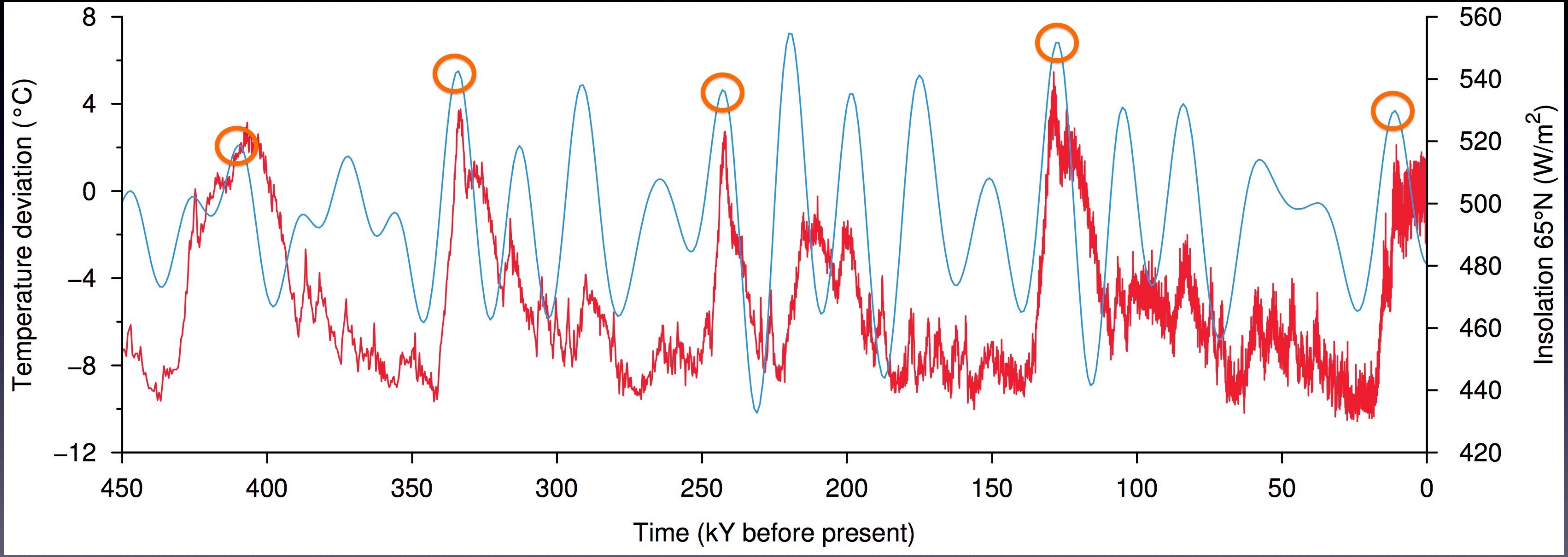
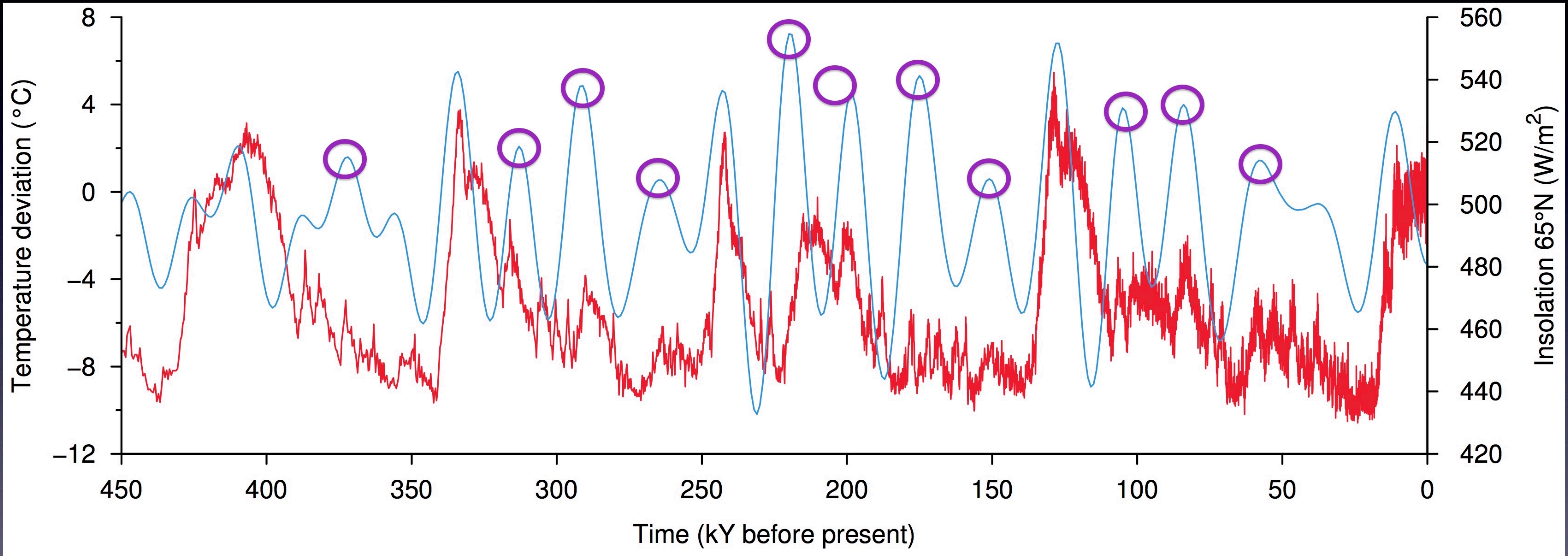


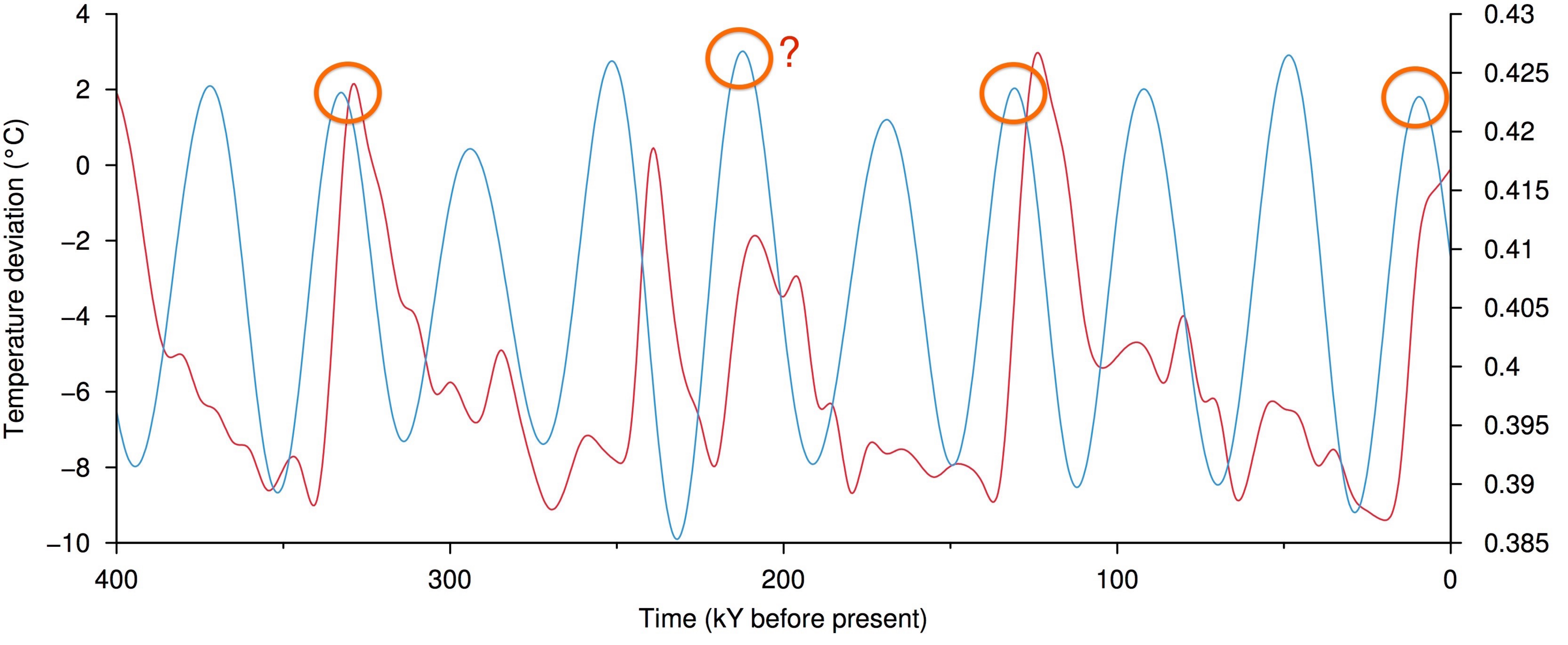
Temperature
CO_2
Temperature deviation (°C)
6
4
2
0
−2
−4
−6
−8
−10
−12
320
300
280
260
240
220
200
180
160
CO_2 (ppm)
800
700
600
500
400
300
200
100
0
Time (kY before present)



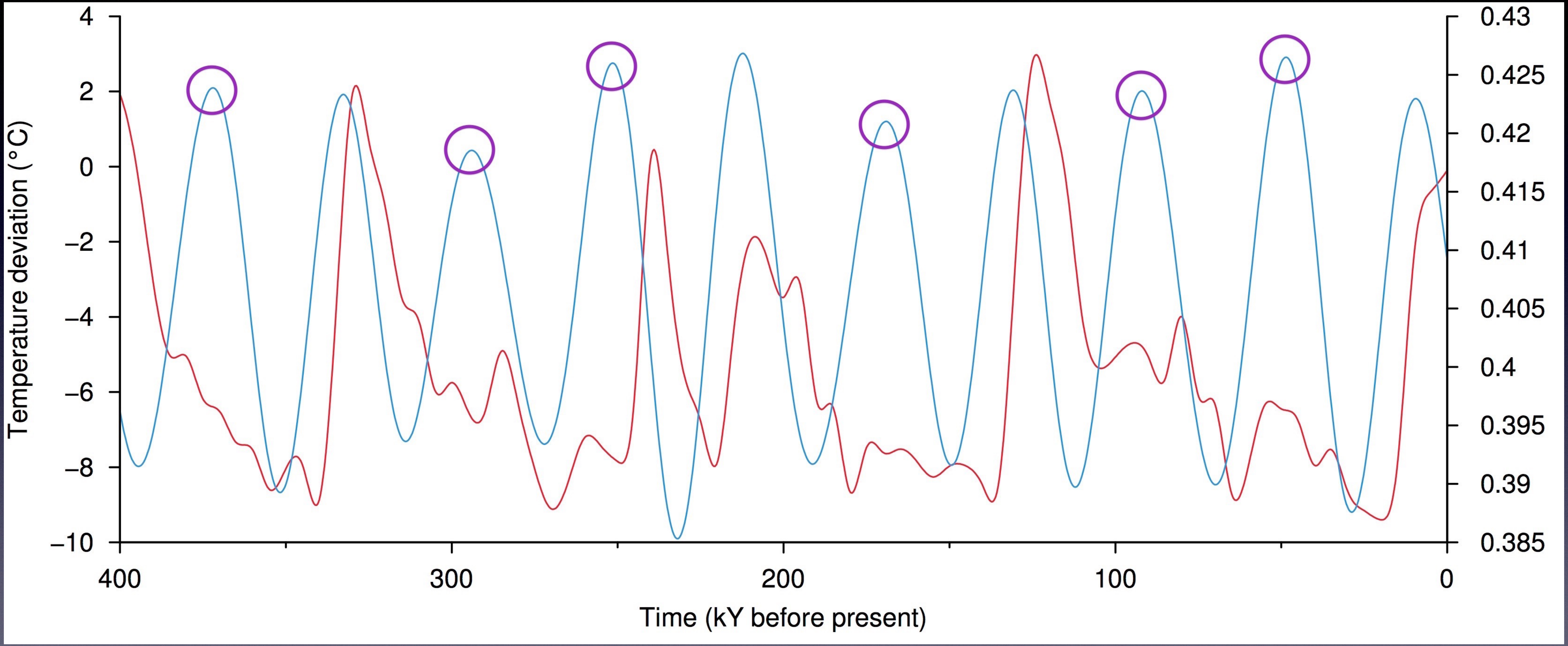
8
4
0
−4
−8
−12
Temperature deviation (°C)
560
540
520
500
480
460
440
420
Insolation 65°N (W/m2)
450
400
350
300
250
200
150
100
50
0
Time (kY before present)



8
4
0
–4
–8
–12
Temperature deviation (°C)
560
540
520
500
480
460
440
420
Insolation 65°N (W/m^2)
450
400
350
300
250
200
150
100
50
0
Time (kY before present)



Temperature deviation (°C)
4
2
0
−2
−4
−6
−8
−10
0.43
0.425
0.42
0.415
0.41
0.405
0.4
0.395
0.39
0.385
?
400
300
200
100
0
Time (kY before present)



Temperature deviation (°C)
4
2
0
−2
−4
−6
−8
−10
0.43
0.425
0.42
0.415
0.41
0.405
0.4
0.395
0.39
0.385
400
300
200
100
0
Time (kY before present)


NATIONAL GEOGRAPHIC
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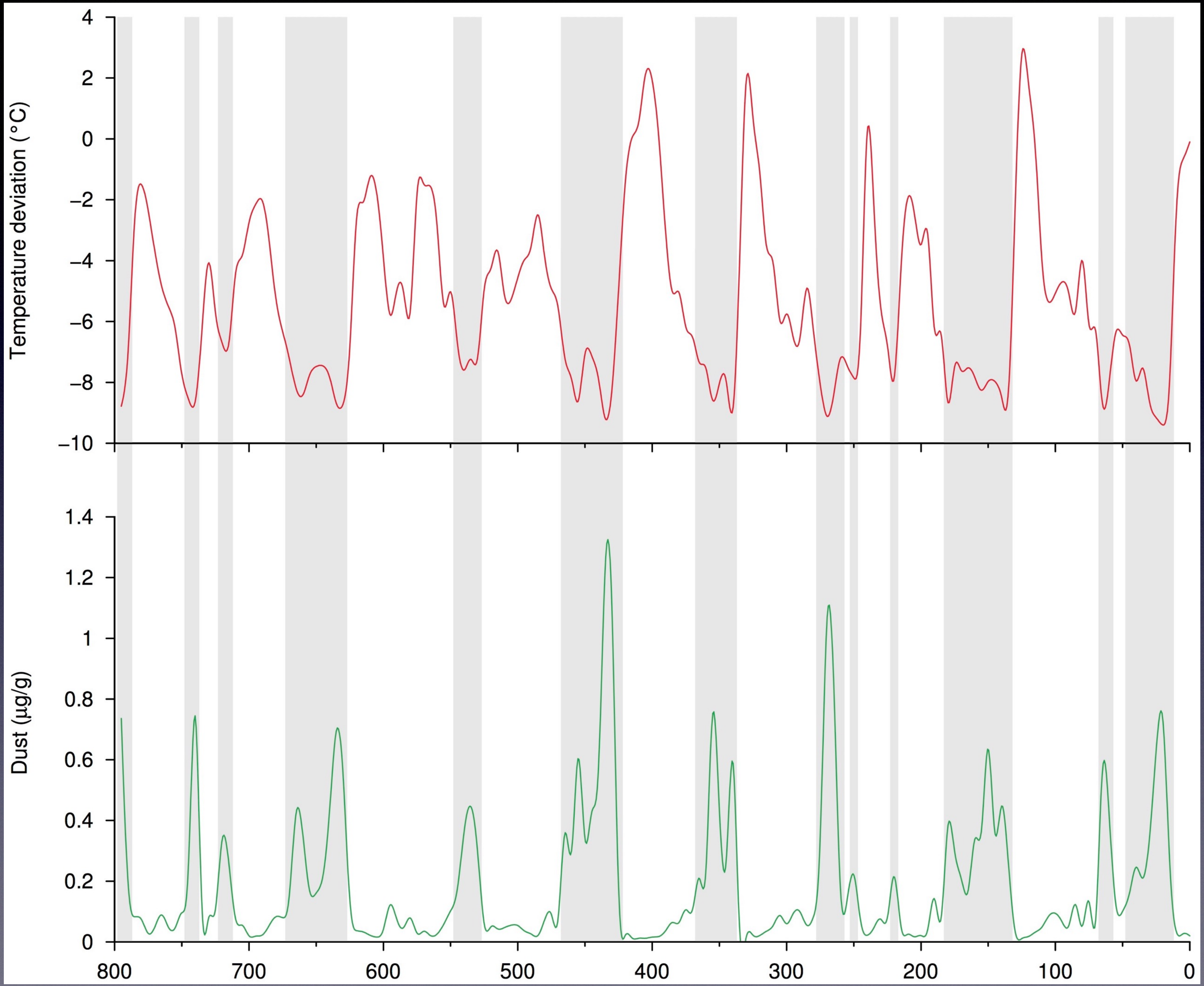
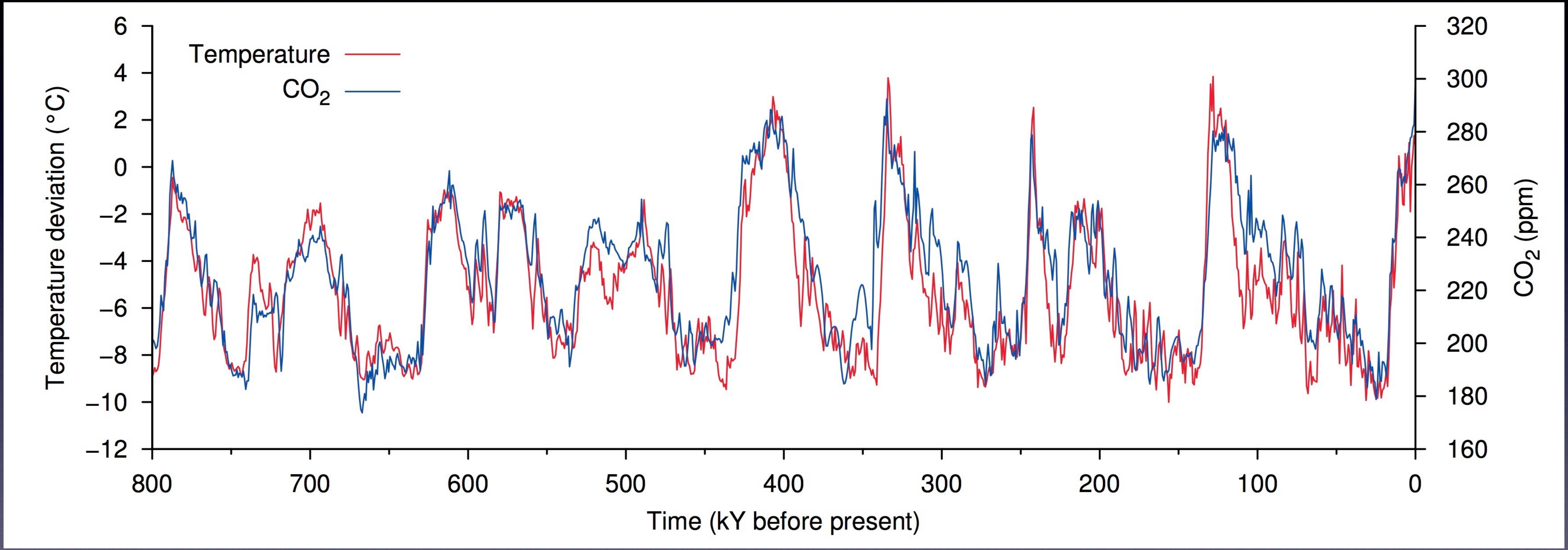
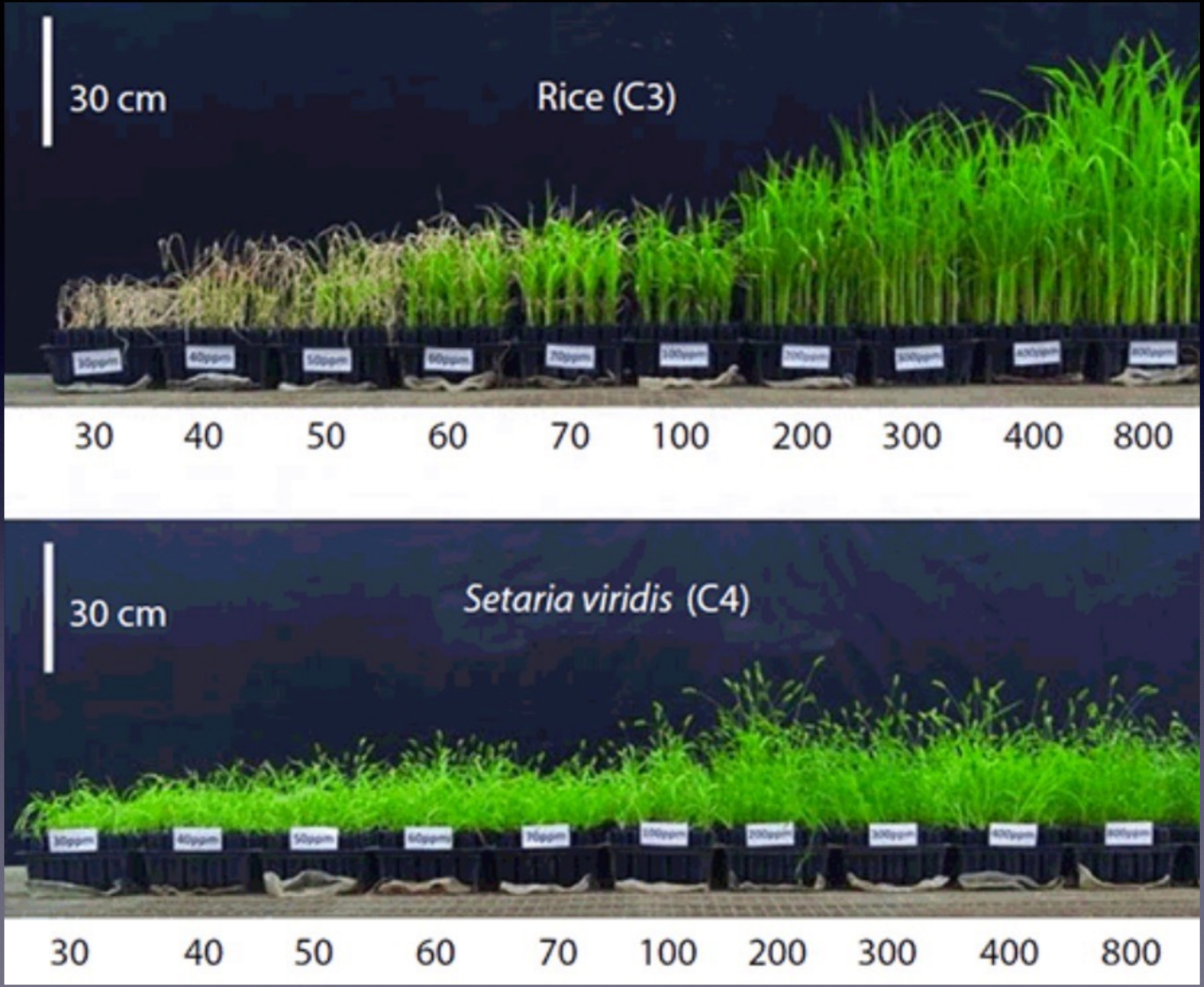
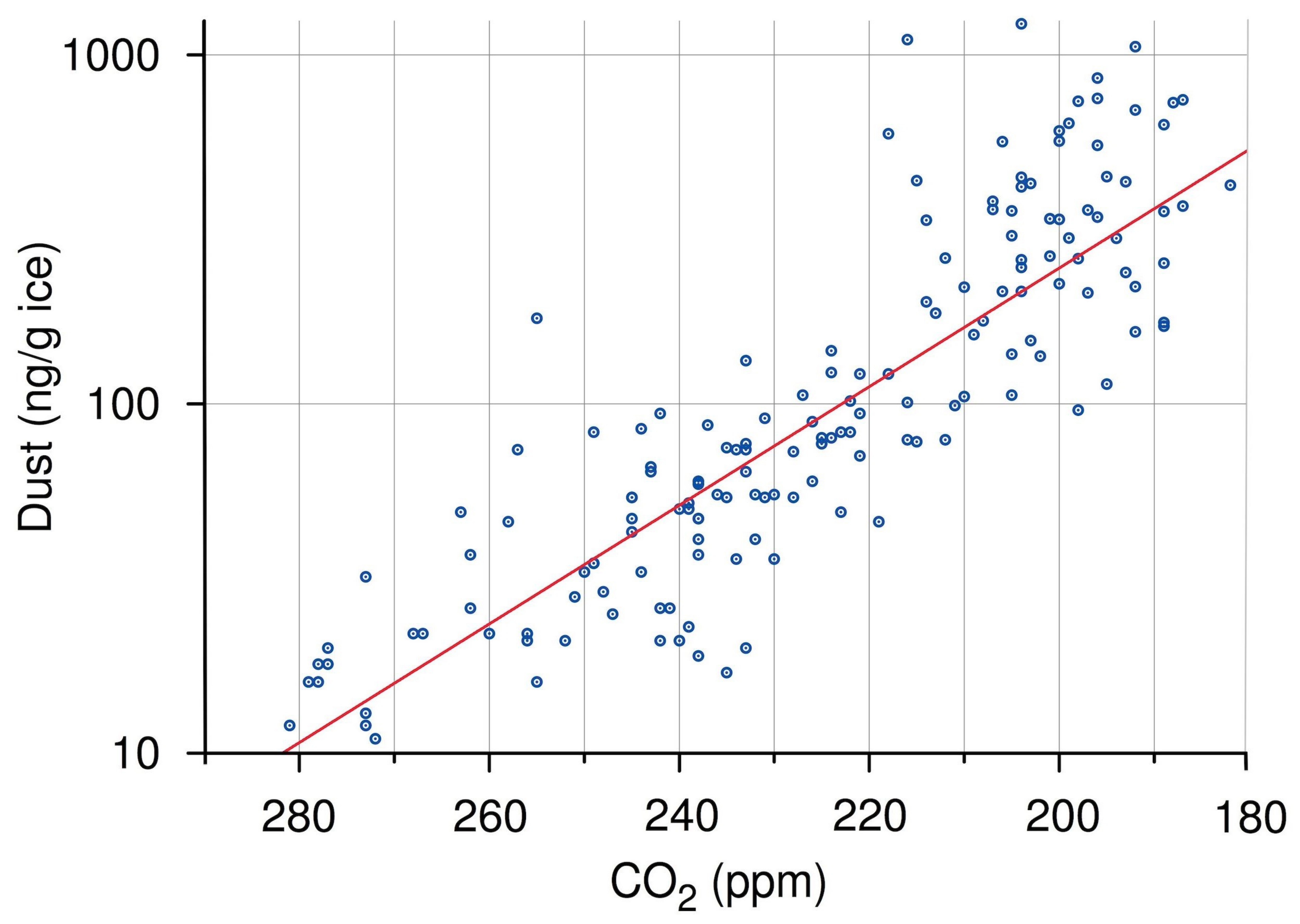


Temperature deviation (°C)
4
2
0
−2
−4
−6
−8
−10
Dust (µg/g)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
800
700
600
500
400
300
200
100
0

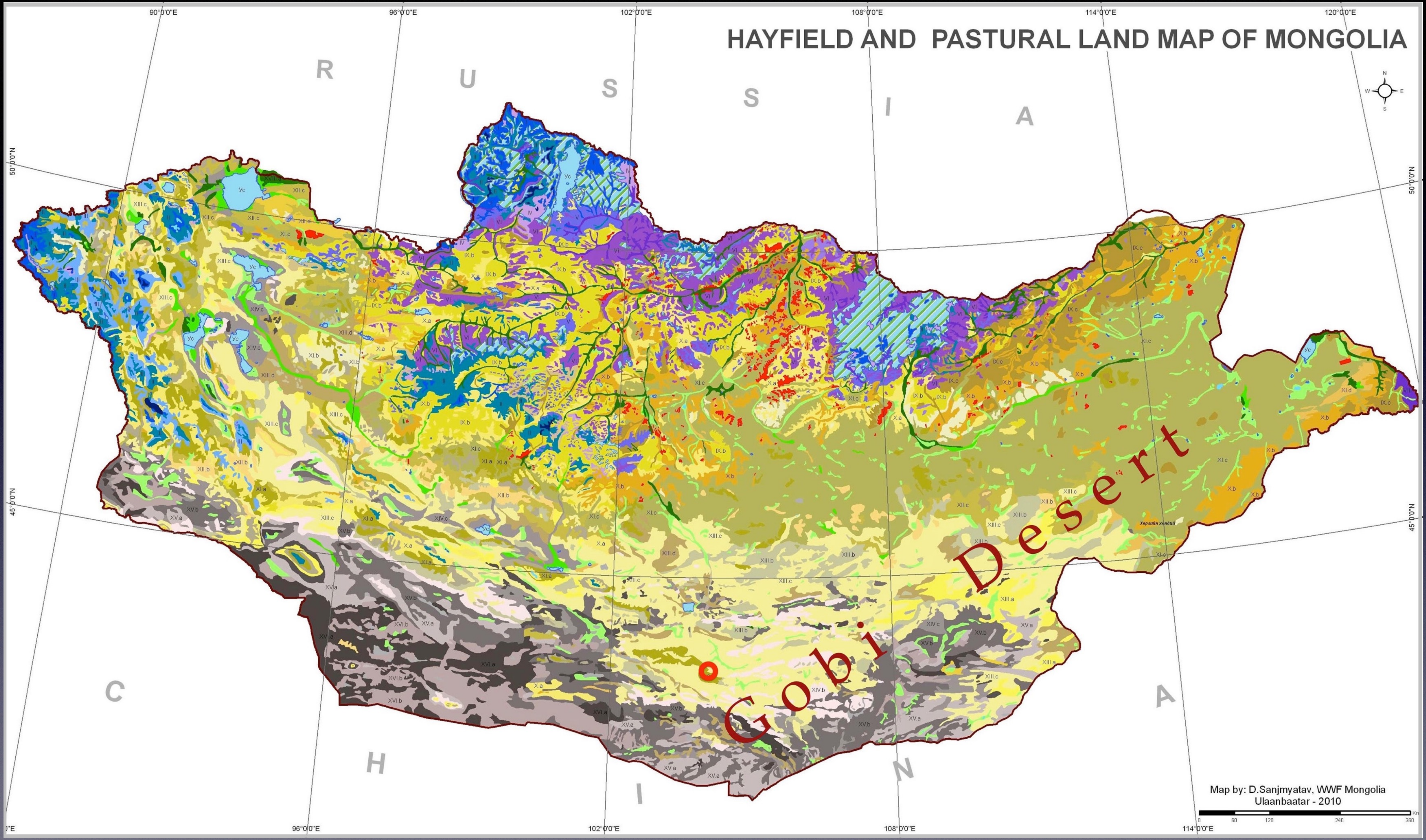


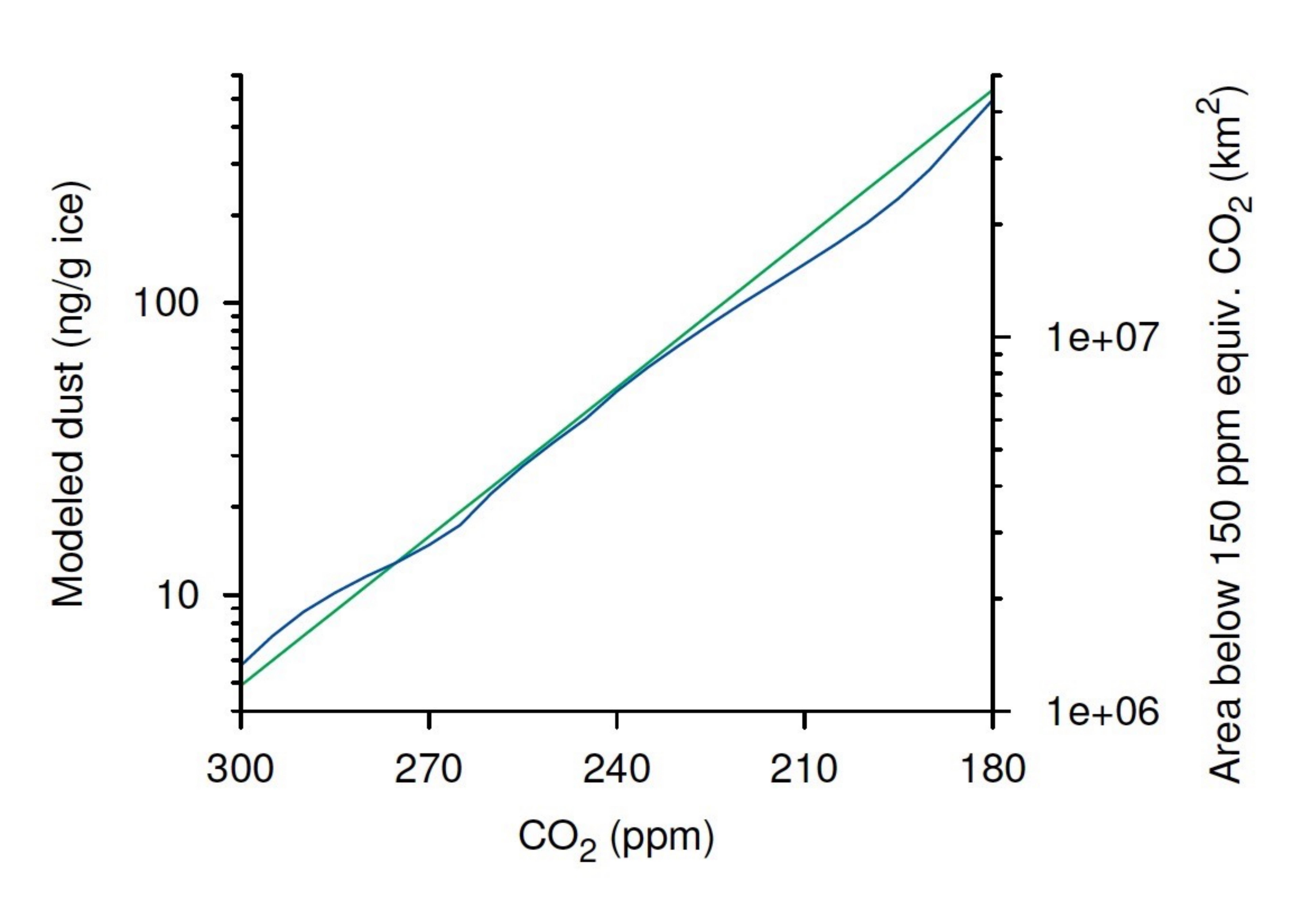
Temperature
CO_2
Temperature deviation (°C)
CO_2 (ppm)
Time (kY before present)
6
4
2
0
−2
−4
−6
−8
−10
−12
320
300
280
260
240
220
200
180
160
800
700
600
500
400
300
200
100
0


30 cm
Rice (C3)
30
40
50
60
70
100
200
300
400
800
30 cm
Setaria viridis (C4)
30
40
50
60
70
100
200
300
400
800



1000
100
10
Dust (ng/g ice)
280
260
240
220
200
180
CO_2 (ppm)


HAYFIELD AND PASTURAL LAND MAP OF MONGOLIA
R U S S I A
C H I N A
Gobi Desert
Map by: D.Sanjmyatav, WWF Mongolia
Ulaanbaatar - 2010
90°0'0"E
96°0'0"E
102°0'0"E
108°0'0"E
114°0'0"E
120°0'0"E
50°0'0"N
45°0'0"N


Modeled dust (ng/g ice)
100
10
300
270
240
210
180
CO2 (ppm)
1e+07
1e+06
Area below 150 ppm equiv. CO2 (km2)

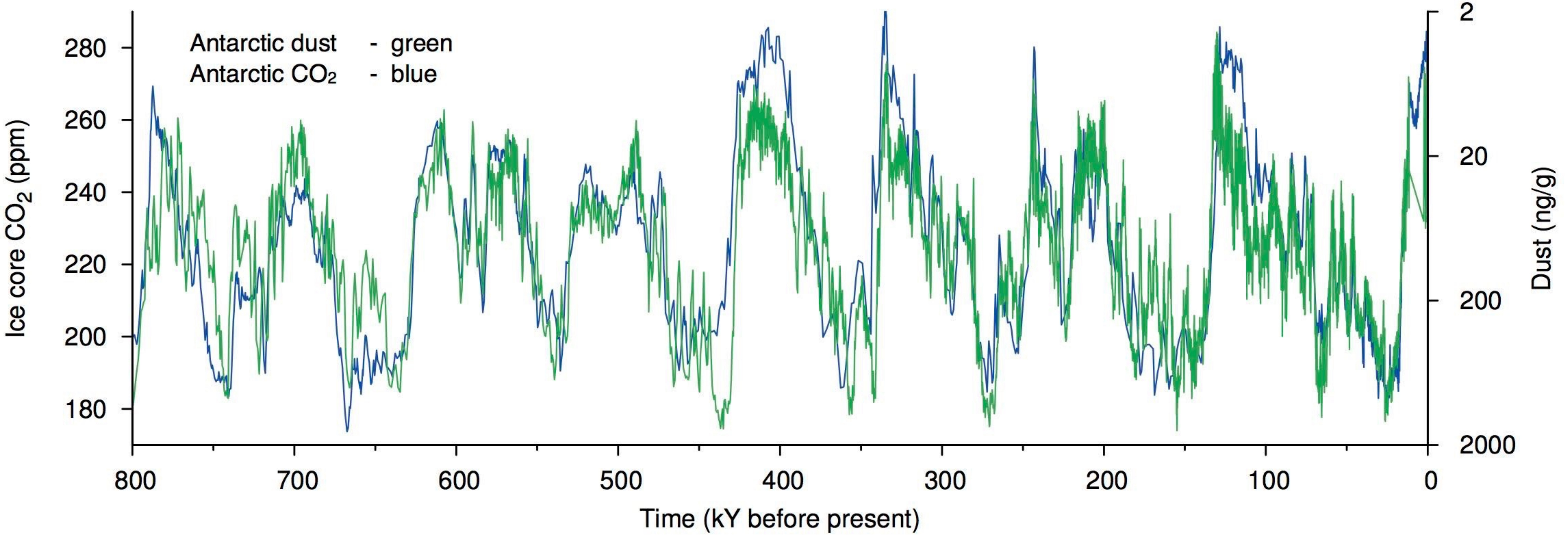
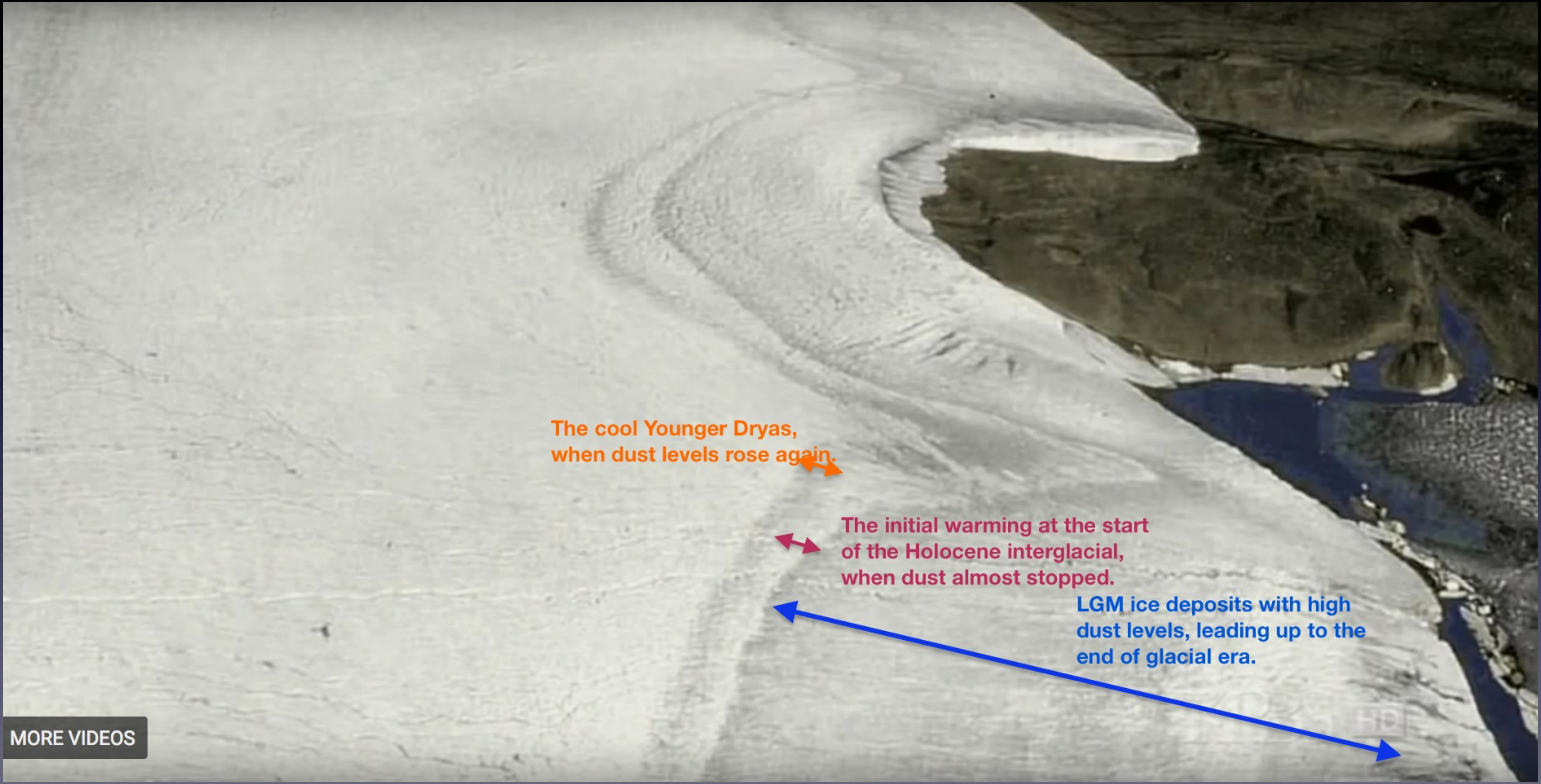
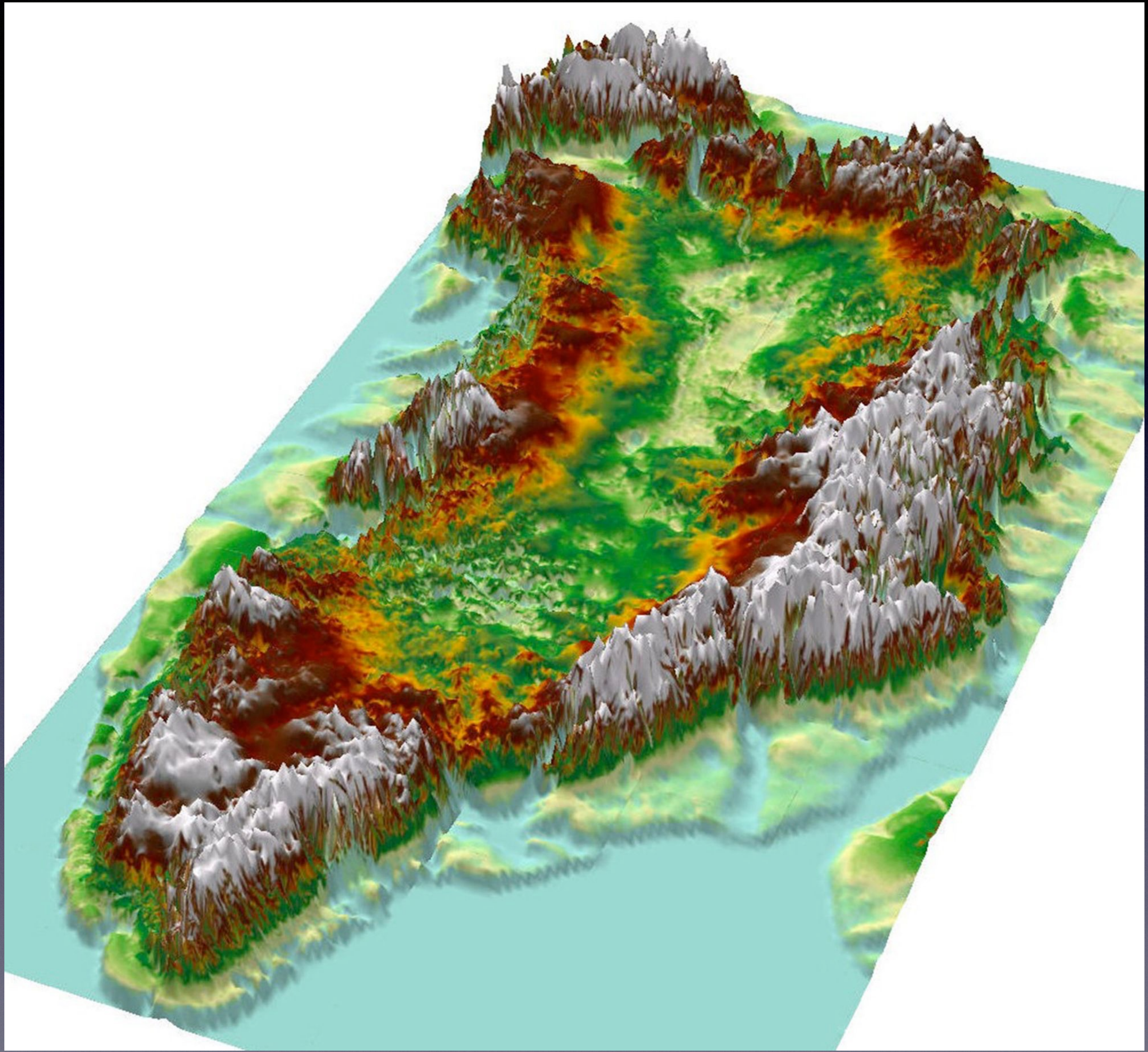
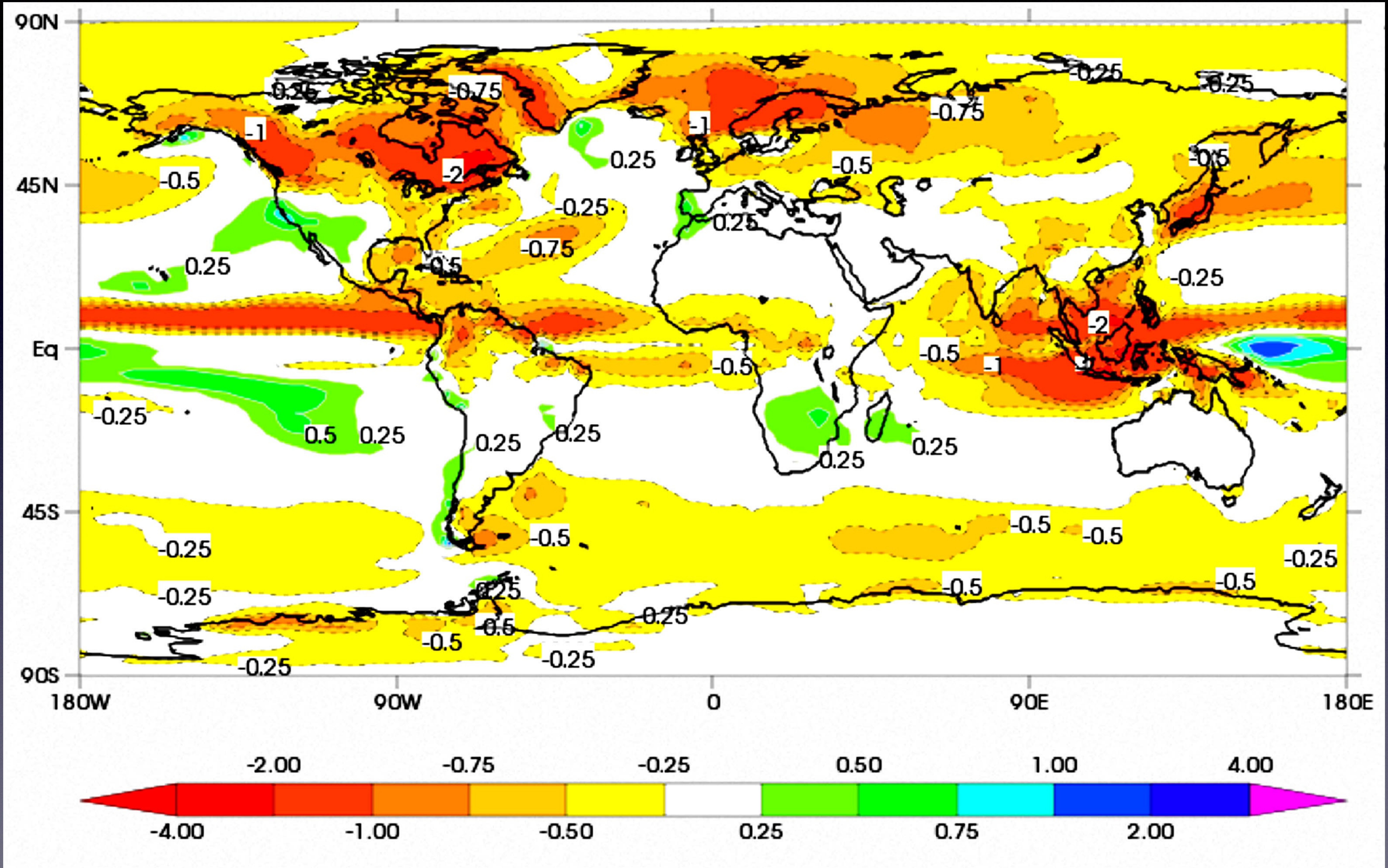

Antarctic dust - green
Antarctic CO_2 - blue
Ice core CO_2 (ppm)
280
260
240
220
200
180
Dust (ng/g)
2
20
200
2000
800
700
600
500
400
300
200
100
0
Time (kY before present)

Fig 9.

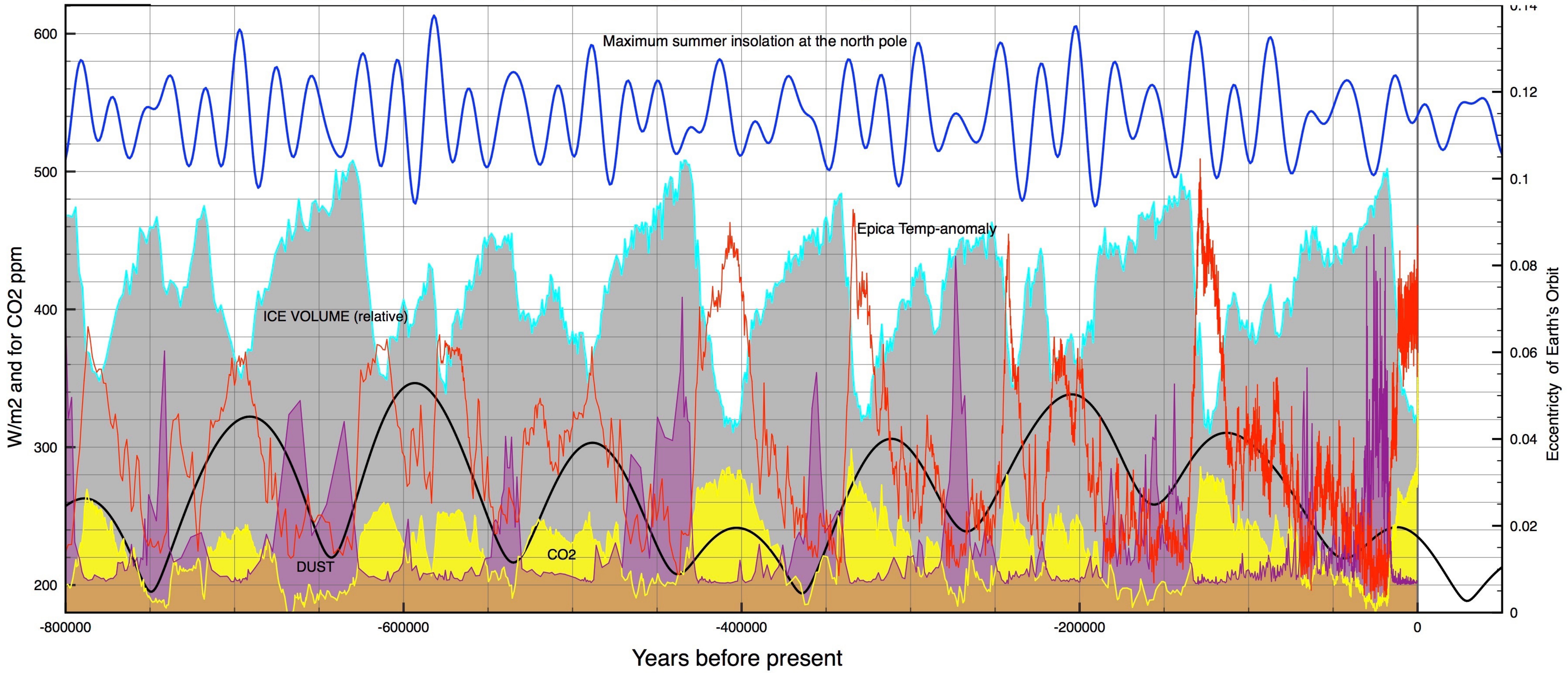
Great Winter (annual midsummer)	
Ice sheet insolation (less cloud & haze)	360 W/m^2
Fresh ice absorption at 0.90 albedo	36 W/m^2
Dusty ice absorption at 0.85 albedo	54 W/m^2
Increased absorption due 20 ppm dust	18 W/m^2
Great Summer (annual midsummer)	
Ice sheet insolation (less cloud & haze)	430 W/m^2
Fresh ice absorption at 0.90 albedo	43 W/m^2
Dusty ice absorption at 0.85 albedo	65 W/m^2
Increased absorption due 20 ppm dust	30 W/m^2 *3
Dusty ice absorption at 0.60 albedo	170 W/m^2
Increased absorption due 200 ppm dust	135 W/m^2 *3
Dusty ice absorption at 0.50 albedo	215 W/m^2
Increased absorption due 400 ppm dust	180 W/m^2 *3


The cool Younger Dryas,
when dust levels rose again.
The initial warming at the start
of the Holocene interglacial,
when dust almost stopped.
LGM ice deposits with high
dust levels, leading up to the
end of glacial era.
MORE VIDEOS




90N
45N
Eq
45S
90S
180W
90W
0
90E
180E
-2.00
-0.75
-0.25
0.50
1.00
4.00
-4.00
-1.00
-0.50
0.25
0.75
2.00

Comparison of Ice Volume (grey), Epica3 T-anom (red), CO2 levels (yellow), Epica3 Dust (purple), Milankovitch insolation at north pole (blue), Eccentricity (black).



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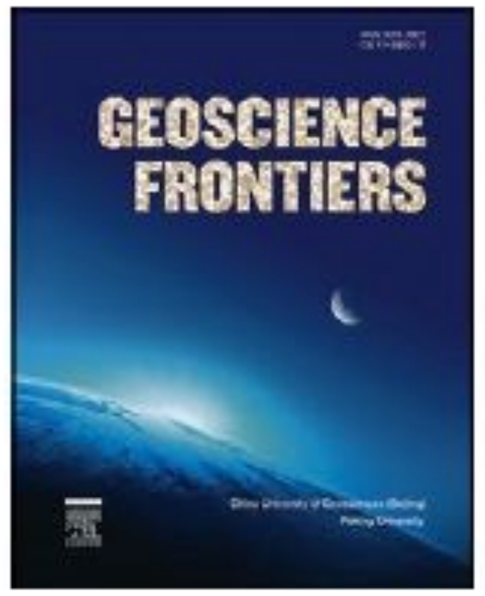

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