

$\delta^{13}\text{C}$

 W, *, W.

Key Laboratory of Cenozoic Geology and Environment, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China
 Environmental Change Research Centre, Department of Geography, UCL, Gower Street, London WC1E 6BT, UK
 Department of Geology, University of Leicester, Leicester LE1 7RH, UK
 NERC Isotope Geosciences Laboratory, British Geological Survey, Keyworth, Nottingham NG12 5GG, UK

ARTICLE INFO

Article history:

1, 2012
 2012 1
 24, 2012
 2, 2012

ABSTRACT

$\delta^{13}\text{C}$

 $\delta^{13}\text{C}$

 $\delta^{13}\text{C}$

() 42° 1', 12° 21'),
0.3 2 24 (1.1).
(0.4 2)
(2004).
Pinus koraiensis
(2012)
1000 Pinus
Quercus, Betula, Juglans, Ulmus,
Carpinus, Corylus, Tilia
Fraxinus.
2001,
0 0 3
1
(200). W
0
14 (2). 13 210
210
(100 -1)
14
Pinus
(200) 104 30 14 (2),
(200) 100 1030 (W
(2012).
210
(2).
(2001 (200).
(/) (2).
(W D. woltereckii D. stelligera Discostella pseudostelligera,
Discostella "
(4 (200).
(%)



$$\sum x / \sum_{i=1}^n x$$

()
%
-0.1% (1) . /

1) δ^{13}
()
-0.1‰ (1) .

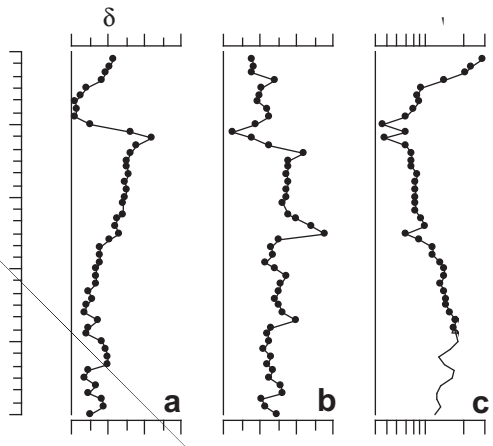
(0.012 / 2^2) 0 4 ()
41 3
-1.3).
10 (.00), (-1.3).
(0.00** 1),
(0.4**) / (1

2 10. 1 . .
13 (.1 00 1 0
-2.3‰ -2.0‰
(-2.0‰) 12 (-2.‰ .13 0
33 (.13 0 1 00),
" δ^{13}
(-0.314** 1). 12 ()

1 00), δ^{13}
(. -2 . ‰), 10 9
Discostella
Puncticulata praetermissa *Asterionella*
formosa (.1 .). δ^{13}
(-0.2 ** 1 -1.4) δ^{13}
(.1 .3),
Discostella (.1 .).

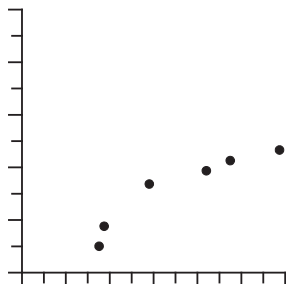
4. Discussion

δ^{13} -2 ‰ (.1 . 3),
3 () -1, -
 δ^{13} -22‰ -33‰ (, 9 1).
1000 (, 2004).
999), / (, 99 4)
200). -1.3
12. 1
/ 10 (, 999)
(.20 30 , 2003)
1 0 (, 999).
(0.4 ** 1 -1.4),
2 12 (1 00 1 00 -1.3)



d e

	δ^{13}								
δ^{13}	1								
/	0.201	1							
/	-0.2 **	-0.19	1						
/	-0.10	-0.14	0.0 **	1					
/	-0.9 *	-0.39 **	0.410 **	0.4 **	1				
/	-0.314 *	-0.2	0.422 **	0.4 **	0.0 **	1			
**	0.01	(2-)							
*	0.0	(2-)							



2012) (W
 „ 2012)
 „ 2004
 „ 200)
 210
 (0 „ .2)
 „ 2004
 „ 200)
 1 00)
 2 12
 (W

43
W 2011. X
40, 4 4 0.
30, 111 122.
13 14
2, 22 300.
2.
W
200 ().
14 1 4.
2004.
23, 11 31.
W., 2012. 1000-
X // 10.101 / . 2012.0 .2104.
W 200.
2, 1 3 1 4 ().
W.
W 2012.
41, 1 131.
4.
144, 2 302.
21, 34 3 2.
W.,
2004.
(00)
2002. 123 2, 13 14 .
(00 000)
1, 12 14 .
3 20,
W., 2012.
X // 10.101 / . 2012.0 .033.
2003.
4, 03 12.