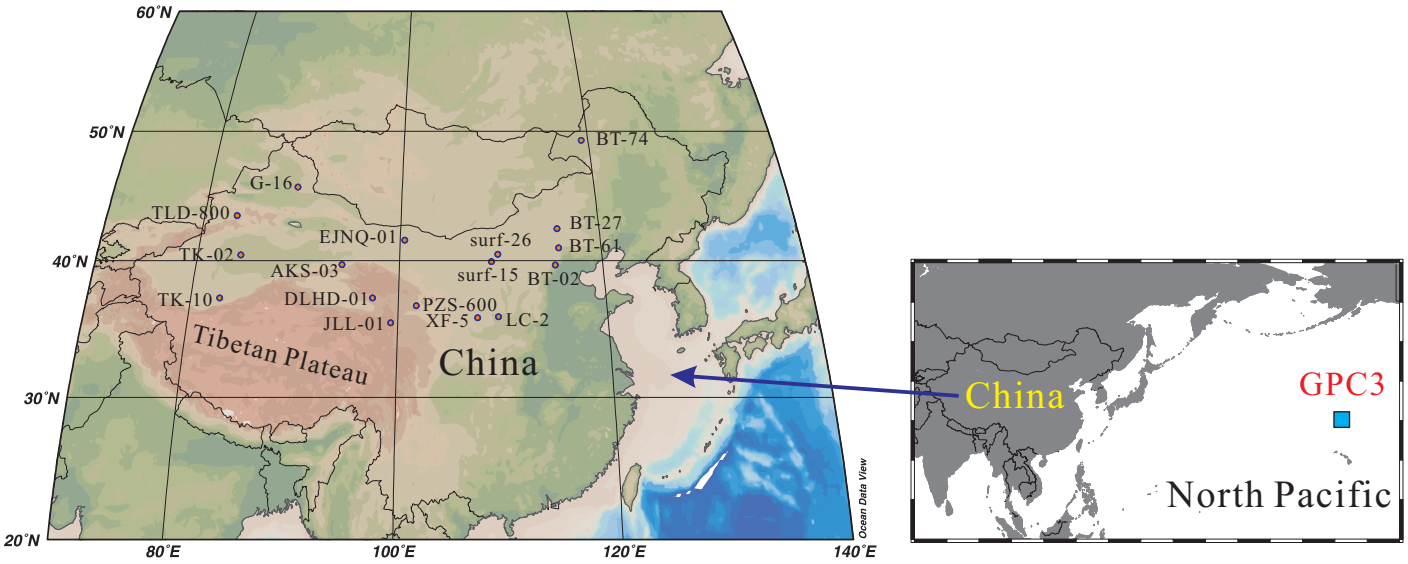

Figure A1: Sample location map showing the distribution of northern China loess and desert samples as well as the North Pacific dust core LL44-GPC3.

Table A1: Nd-Hf isotopes of the leachates and detrital fractions of dust samples from North China and the North Pacific

Region	sample name	Longitude (°E)	Latitude (°N)	size[a]	$^{143}Nd/^{144}Nd$ (2σ) leachate	leachate ε_{Nd}[b]	$^{176}Hf/^{177}Hf$ (2σ) leachate	leachate ε_{Hf}[b]	$^{143}Nd/^{144}Nd$ (2σ) detrital	detrital ε_{Nd}	$^{176}Hf/^{177}Hf$ (2σ) detrital	detrital ε_{Hf}
Taklimakan Desert	TK-10	82.79	37.23	<75 um	0.512242±5	-7.7	0.283253±3	17.1				
Loess, West China	TLD-800	83.27	43.41	<5 um	0.512289±6	-6.8	0.282780±2	0.4				
Taklimakan Desert	TK-02	84.25	40.43	<75 um	0.512264±5	-7.3	0.283179±3	14.5				
Gurbantunggut Desert	G-16	89.11	45.60	<75 um	0.512463±5	-3.4	0.282936±2	5.9	0.512439±3	-3.9	0.282708±3	-2.2
	duplicate run										0.282694±2	-2.7
Gurbantunggut Desert	G-16	89.11	45.60	<5 um	0.512445±4	-3.8	0.282909±2	5.0	0.512377±4	-5.1	0.282859±3	3.2
	duplicate run						0.282916±4	5.2				
	duplicate sample[c]								0.512386±4	-4.9	0.282872±2	3.6
Kumtag Desert	AKS-03	94.35	39.69	<5 um	0.512138±5	-9.8	0.282886±4	4.2				
Qaidam Desert	DLHD-01	97.52	37.23	<75 um	0.512056±3	-11.4	0.282927±4	5.6	0.511997±3	-12.5	0.282192±2	-20.4
Qaidam Desert	DLHD-01	97.52	37.23	<5 um	0.512012±4	-12.2	0.282796±3	1.0	0.512050±4	-11.5	0.282635±2	-4.8
Loess, West China	JLL-01	99.33	35.40	bulk	0.512267±4	-7.2	0.282966±3	7.0	0.512159±3	-9.3	0.282432±3	-11.9
	duplicate run										0.282424±2	-12.2
Loess, West China	JLL-01	99.33	35.40	<5 um	0.512254±3	-7.5	0.282875±3	3.7	0.512189±3	-8.8	0.282718±3	-1.8
Badain Jaran Desert	EJNQ-01	100.46	41.55	<75 um	0.512222±4	-8.1	0.283002±4	8.3	0.512114±4	-10.2	0.282520±2	-8.8
Badain Jaran Desert	EJNQ-01	100.46	41.55	<5 um	0.512175±3	-9.0	0.282881±3	4.0	0.512096±4	-10.6	0.282687±2	-2.9
Loess, West China	PZS-600	101.74	36.65	<5 um	0.512165±5	-9.2	0.282746±2	-0.8				
Loess, Loess Plateau	XF-5	107.60	35.78	<5um	0.512188±5	-8.8	0.282822±3	1.9				
Mu Us Desert	surf-15	109.05	39.92	<75 um	0.511905±4	-14.3	0.283046±9	9.8	0.511773±4	-16.9	0.282107±2	-23.4
	duplicate run										0.282101±2	-23.6
Mu Us Desert	surf-15	109.05	39.92	<5um	0.511908±5	-14.2	0.282914±4	5.1	0.511784±5	-16.7	0.282699±2	-2.5
	duplicate run				0.511913±5	-14.1						
Loess, Loess Plateau	LC-2	109.60	35.85	bulk	0.512236±6	-7.8	0.282916±3	5.2	0.512086±4	-10.8	0.282439±2	-11.7
	duplicate run								0.512098±3	-10.5		
Loess, Loess Plateau	LC-2	109.60	35.85	<5 um	0.512200±3	-8.5	0.282833±3	2.3	0.512094±3	-10.6	0.282710±3	-2.1
Hobq Desert	surf-26	109.70	40.47	<75 um	0.511902±6	-14.3	0.283026±3	9.1	0.511840±5	-15.6	0.282161±2	-21.5
	duplicate run										0.282169±3	-21.2
	duplicate sample								0.511844±4	-15.5	0.282165±3	-21.4
Hobq Desert	surf-26	109.70	40.47	<5um	0.511854±4	-15.3	0.282921±3	5.4	0.511735±4	-17.6	0.282719±2	-1.8
Loess, East China	BT-02	115.32	39.68	<5 um	0.512209±5	-8.4	0.282816±2	1.6				
	duplicate run				0.512213±5	-8.3						
Loess, East China	BT-27	115.77	42.40	bulk	0.512344±3	-5.7	0.282874±2	3.7	0.512208±4	-8.4	0.282536±3	-8.2

Loess, East China	BT-27	115.77	42.40	<5 um	0.512334±5	-5.9	0.282835±2	2.4	0.512199±4	-8.6	0.282755±3	-0.5
	duplicate run				0.512323±5	-6.1						
Loess, East China	BT-61	115.78	40.97	<5um	0.512256±3	-7.4	0.282838±2	2.4				
Hunlun Buir Sandy Land	BT-74	119.27	49.27	bulk	0.512436±4	-3.9	0.282877±2	3.8	0.512398±3	-4.7	0.282670±2	-3.5
Hunlun Buir Sandy Land	BT-74	119.27	49.27	<5 um	0.512445±5	-3.8	0.282874±2	3.7	0.512388±5	-4.9	0.282805±2	1.3
	duplicate run						0.282879±2	3.9				
North Pacific	dust core GPC3-55703[d]	-157.83	30.3	bulk	0.512445±5	-3.8	0.282954±2	6.6		*-10.7*[e]	*0.282683±6*[e]	*-3.0*
	duplicate run				0.512440±3	-3.9						

a. Because the particle size of Chinese loess is mostly less than 75 μm, whereas Asian dust deposited in the North Pacific is generally characterized by smaller grain sizes, usually less than 5 μm, leaching signatures from both size fractions are obtained in this study. The size separation of the samples (<75 μm and < 5μm) was carried out for previous studies [Chen et al., 2007, Li et al., 2009]. We surmise that the <75 μm and < 5μm fractions are more homogeneous than the coarser sand size fractions (>75 μm) due to extensive mixing through wind above the arid areas, which therefore will better represent average UCC. For consistency, the <5 μm fractions of loess samples were also investigated.

b. $\varepsilon_{Nd} = [(^{143}Nd/^{144}Nd)_{sample}/(^{143}Nd/^{144}Nd)_{CHUR} -1]*10^4$; where $(^{143}Nd/^{144}Nd)_{CHUR} = 0.512638$ [Jacobsen and Wasserburg, 1980]. $\varepsilon_{Hf} = [(^{176}Hf/^{177}Hf)_{sample}/(^{176}Hf/^{177}Hf_{CHUR})-1]*10^4$; where $(^{176}Hf/^{177}Hf)_{CHUR}=0.282769$ [Nowell et al., 1998]. Instrumental bias was corrected to $^{146}Nd/^{144}Nd$ of 0.7219 and $^{179}Hf/^{177}Hf$ of 0.7325, respectively, applying an exponential mass fractionation law. Hafnium and Nd isotope ratios were measured on a Nu instruments MC-ICP-MS at GEOMAR. The 2σ external reproducibility of repeated standard measurements was 0.40 (n=14) and 0.34 (n=38) epsilon units for Nd and Hf isotopes, respectively. The procedural blank during leaching and total dissolution for both elements was negligible (always less than 0.5% contribution for both Hf and Nd).

c. Duplicate samples were taken from the same sample powder.

d. This is a typical Asian dust sample recovered from the North Pacific core LL44-GPC3 [Pettke et al., 2002]. It was treated applying the same leaching protocol as the other dust samples in order to monitor whether the leaching protocol will indeed only extract the mobile Hf and Nd components rather than parts of the immobile component. The de-carbonation step has been omitted for this sample because it essentially contained no carbonate, given that this core was deposited below the carbonate compensation depth.

e. From Pettke et al., 2002 (GPC3-55704).

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