



Fig. DR1

Table DR2: Re and Os elemental abundance and isotopic composition data.

	Batch/Sample	Re (ppb)	±	Os (ppt)	±	¹⁸⁷ Re/ ¹⁸⁸ Os	±	¹⁸⁷ Os/ ¹⁸⁸ Os	±	rho ^a	Osi ^b
A	F1408-15.6-A	21.78	0.07	698.32	10.34	227.5485	2.3900	4.0708	0.0972	0.4020	1.555
B	F1408-15.6-B	26.93	0.08	542.60	4.35	433.5642	2.5707	6.3595	0.0457	0.6282	1.566
C	F1408-15.6-C	29.10	0.10	438.38	3.90	702.2644	4.8242	9.2939	0.0707	0.6965	1.529
D	F1408-15.6-D	16.64	0.05	249.66	2.72	711.5407	7.4296	9.4431	0.1070	0.8514	1.576
E	F1408-15.6-E	32.84	0.08	429.64	7.96	935.2667	4.1180	11.9262	0.2546	0.8030	1.586
F	F1408-15.6-F	31.46	0.08	402.28	3.89	977.4649	7.5815	12.3445	0.1030	0.8319	1.537
G	F1408-15.6-G	28.36	0.07	325.52	3.61	1257.4349	12.5328	15.4249	0.1605	0.8945	1.522
H	F1408-15.6-H	32.79	0.08	350.49	5.43	1536.0020	13.9777	18.5838	0.1758	0.9436	1.601

GPS co-ordinates for sample F1408-15.6: 27.96968, 108.83760

Stated significant figures are required for isochron reproduction. Uncertainties are given as 2σ for ¹⁸⁷Re/¹⁸⁸Os and ¹⁸⁷Os/¹⁸⁸Os and ¹⁹²Os.

The uncertainty includes the 2 SE uncertainty for mass spectrometer analysis plus uncertainties for Os blank abundance and isotopic composition.

^a Rho is the associated error correlation.

^b Osi = initial ¹⁸⁷Os/¹⁸⁸Os isotope ratio calculated 660 Ma.

Table DR3: Re-Os and initial isotope data for the post-glacial Twitya, Taishir and Datangpo formations

Section - Formation	Height (m) from contact with Sturtian diamictite	Re (ppb)	±	Os (ppt)	±	$^{187}\text{Re}/^{188}\text{Os}$	±	$^{187}\text{Os}/^{188}\text{Os}$	±	ρ^a	Osi^b	% of UCC Os	% of mantle Os	F of cont. weathering = (Rsw-Run)/(Rucc-Run)
Twitya Fm														
64°32'03.8"N 129°23'42.0"W														
F1173	0.1	1.88	0.006	35.7	0.3	470.3	3.9	6.65	0.06	0.84	1.44	95.9	4.1	0.96
F1173	0.5	2.28	0.007	39.8	0.4	515.7	5.1	6.77	0.08	0.72	1.05	70.0	30.0	0.67
F1173	1.0	1.83	0.006	32.4	0.4	483.9	5.1	6.07	0.08	0.74	0.71	47.2	52.8	0.42
F1173	1.6	1.09	0.004	27.3	0.3	285.2	3.1	3.81	0.05	0.73	0.64	42.9	57.1	0.38
F1173	2.0	0.65	0.002	16.0	0.2	282.7	3.9	3.59	0.06	0.78	0.45	30.2	69.8	0.24
F1173	2.6	0.97	0.003	21.9	0.7	322.1	15.5	4.00	0.28	0.68	0.42	28.3	71.7	0.21
F1173	3.1	1.30	0.004	28.9	0.3	338.5	3.6	4.39	0.06	0.73	0.64	42.4	57.6	0.37
F1173	3.7	2.00	0.006	43.6	0.3	347.7	2.3	4.51	0.03	0.69	0.65	43.5	56.5	0.38
F1173	4.9	1.00	0.003	23.2	0.2	322.4	3.8	4.29	0.06	0.75	0.72	47.7	52.3	0.43
F1173	8.5	1.27	0.004	24.8	0.2	406.8	3.6	5.14	0.06	0.66	0.62	41.3	58.7	0.36
F1173	15.5	0.59	0.002	17.1	0.1	231.3	2.0	3.06	0.04	0.66	0.50	33.2	66.8	0.27
F1173	22.5	0.59	0.002	16.1	0.1	248.3	2.2	3.28	0.04	0.65	0.53	35.2	64.8	0.29
Taishir Fm														
46°40'19.9"N 96°33'38.9"E														
A1310	0.2	0.96	0.02	334.9	3.3	16.6	0.4	1.63	0.03	0.424	1.44	96.2	3.8	0.96
A1310	0.6	0.73	0.01	142.1	1.5	30.4	0.7	1.83	0.04	0.412	1.49	99.5	0.5	0.99
A1310	0.7	0.19	0.01	46.9	0.5	23.4	0.8	1.56	0.03	0.320	1.30	86.9	13.1	0.86
A1310	0.9	0.30	0.00	83.5	0.8	20.2	0.4	1.48	0.03	0.483	1.25	83.6	16.4	0.82
A1309	1.2	1.89	0.01	95.7	0.4	116.8	1.2	1.89	0.01	0.969	0.60	39.7	60.3	0.34
F1218	1.3	0.30	0.00	89.3	1.0	17.5	0.4	0.81	0.02	0.698	0.61	40.8	59.2	0.35
A1310	1.6	1.04	0.01	81.5	0.3	71.9	0.5	1.42	0.01	0.861	0.62	41.5	58.5	0.36
A1310	2.1	2.02	0.01	124.8	0.5	93.4	0.4	1.66	0.01	0.939	0.63	41.7	58.3	0.36
F1218	2.3	1.03	0.01	70.7	0.9	80.9	1.7	1.28	0.04	0.680	0.38	25.3	74.7	0.18
F1420	3.0	11.99	0.03	329.1	1.9	247.0	1.1	3.25	0.02	0.591	0.52	34.5	65.5	0.28
F1420	3.4	12.75	0.03	324.0	2.0	274.6	1.3	3.56	0.02	0.604	0.53	35.1	64.9	0.29
F1420	3.6	8.76	0.03	211.7	1.5	299.5	1.9	3.97	0.03	0.605	0.66	43.7	56.3	0.38
F1420	3.8	6.62	0.03	173.8	1.3	265.9	1.9	3.56	0.03	0.537	0.61	40.8	59.2	0.35
F1420	4.0	29.10	0.07	595.4	4.1	382.0	1.9	4.89	0.03	0.619	0.67	44.7	55.3	0.40
F1420	4.2	5.56	0.01	163.3	2.7	226.5	4.3	3.05	0.10	0.571	0.55	36.5	63.5	0.31
F1420	4.4	22.33	0.05	475.2	3.3	364.9	1.8	4.81	0.03	0.614	0.78	51.9	48.1	0.47
F1420	4.6	15.57	0.04	377.9	2.3	289.7	1.4	3.65	0.02	0.601	0.45	29.9	70.1	0.23
F1420	5.4	4.54	0.01	188.2	1.2	148.3	0.9	2.24	0.02	0.607	0.60	39.7	60.3	0.34
F1420	5.6	22.04	0.05	659.8	3.9	227.4	1.1	3.29	0.02	0.599	0.78	51.7	48.3	0.47
F1420	5.8	9.31	0.02	438.9	2.3	131.7	0.6	2.34	0.01	0.589	0.88	58.7	41.3	0.55
F1420	6.2	2.52	0.01	154.8	0.8	95.2	0.5	1.75	0.01	0.528	0.69	46.3	53.7	0.41
F1218	6.5	0.83	0.01	45.6	0.5	107.9	1.8	1.91	0.04	0.682	0.71	47.6	52.4	0.43
F1420	6.6	2.50	0.01	126.8	0.2	115.1	0.6	1.75	0.01	0.540	0.47	31.6	68.4	0.25
F1420	6.8	3.01	0.01	186.7	0.2	96.1	0.5	1.96	0.01	0.553	0.89	59.5	40.5	0.56
F1420	8.6	2.34	0.01	125.6	0.2	110.1	0.7	1.87	0.01	0.537	0.65	43.3	56.7	0.38
F1218	9.4	0.37	0.01	57.3	0.7	36.5	1.1	1.46	0.04	0.501	1.05	70.2	29.8	0.67
F1420	9.8	3.34	0.01	244.4	1.1	77.9	0.4	1.52	0.01	0.553	0.66	43.8	56.2	0.39
Datangpo Fm														
28°30'52.6"N 109°50'26.9"E														
F1406-0.1	0.1	12.97	0.03	160.14	1.72	1045.1	7.3	13.00	0.12	0.652	1.44	96.0	4.0	0.96
F1406-0.3	0.3	3.18	0.01	37.79	0.41	1122.7	9.6	13.66	0.13	0.663	1.25	83.2	16.8	0.82
F1406-0.5	0.5	0.54	0.01	27.09	0.17	125.1	2.7	2.41	0.02	0.148	1.03	68.6	31.4	0.66
F1406-0.7	0.7	4.65	0.01	52.78	0.69	1213.3	11.9	14.35	0.18	0.700	0.94	62.3	37.7	0.59
F1406-1.0	1.0	6.03	0.02	129.02	0.83	362.9	1.7	4.83	0.03	0.556	0.81	54.2	45.8	0.50
F1406-1.1	1.1	3.79	0.01	78.24	0.51	377.1	1.8	4.85	0.03	0.552	0.68	45.7	54.3	0.41
F1406-1.3	1.3	2.58	0.01	52.37	0.36	384.5	2.1	4.90	0.03	0.545	0.65	43.2	56.8	0.38

Uncertainties are given as 2σ for $^{187}\text{Re}/^{188}\text{Os}$ and $^{187}\text{Os}/^{188}\text{Os}$ and ^{187}Os composition.

^a ρ is the associated error correlation.

^b Osi = initial $^{187}\text{Os}/^{188}\text{Os}$ isotope ratio calculated 660 Ma.