

Table DR1. feldspar Pb isotopic data

Spot#	Type ¹	feldspar microtexture ¹	$^{206}\text{Pb}/^{204}\text{Pb}$	$\pm 2\sigma$	$^{207}\text{Pb}/^{204}\text{Pb}$	$\pm 2\sigma$	$^{208}\text{Pb}/^{204}\text{Pb}$	$\pm 2\sigma$
<i>BC566, Albert Trough (-77°15'.81 S, -33°27'.90 W), water depth 925m</i>								
f1_2	kfs	patch	16.554	0.171	15.264	0.147	35.972	0.357
f8_3	kfs	patch	16.569	0.066	15.292	0.062	36.025	0.147
f16_1	kfs	film	16.643	0.089	15.261	0.082	35.979	0.195
f12_1	kfs	patch	16.652	0.047	15.284	0.043	36.031	0.102
f5_2	kfs	patch	16.670	0.082	15.249	0.076	36.001	0.181
f10_1	kfs	patch	16.682	0.158	15.274	0.146	36.011	0.350
f13_2	kfs	patch	16.694	0.063	15.322	0.058	36.117	0.139
f8_1	kfs	patch	16.696	0.019	15.340	0.018	36.169	0.043
f11_2	kfs	film	16.725	0.093	15.425	0.085	36.368	0.203
f4	kfs	film	16.791	0.212	15.332	0.193	36.211	0.465
f8_2	kfs	featureless	16.792	0.079	15.389	0.072	36.267	0.172
f10_3	kfs	patch	16.796	0.092	15.358	0.086	36.237	0.203
f5_1	kfs	patch	16.804	0.141	15.401	0.131	36.310	0.312
f15_1	kfs	featureless	16.807	0.050	15.431	0.047	36.376	0.111
f10_4	kfs	patch	16.849	0.155	15.409	0.142	36.423	0.337
f1_1	kfs	patch	16.904	0.040	15.384	0.036	36.269	0.086
f11_1	kfs	patch	16.965	0.158	15.394	0.138	36.394	0.337
f13_1	kfs	vein	17.334	0.144	15.424	0.122	36.732	0.295
<i>BC571, NE Berkner Island (-78°08'.73 S, -43°38'.75 W), water depth 442m</i>								
f8_1	kfs	patch	16.982	0.007	15.448	0.007	37.519	0.017
f15	kfs	patch	17.179	0.026	15.516	0.024	39.343	0.063
f15 rpt	kfs	patch	17.247	0.021	15.482	0.019	39.059	0.048
f7	kfs	film	17.399	0.013	15.485	0.011	37.510	0.028
f7 rpt	kfs	film	17.438	0.010	15.510	0.009	37.572	0.022
f3	kfs	featureless	17.509	0.067	15.510	0.060	36.717	0.143
f18_2	kfs	featureless	17.724	0.030	15.491	0.024	37.300	0.060
f10	kfs	featureless	17.744	0.061	15.500	0.054	37.553	0.132
f8_2	kfs	film	17.822	0.030	15.470	0.027	37.210	0.065
f18_1	kfs	film	17.852	0.129	15.626	0.113	37.605	0.274
f18_3	kfs	coarse mesoperthite	17.899	0.033	15.488	0.029	35.602	0.067
f9_2	kfs	film, vein	17.925	0.005	15.520	0.005	37.302	0.012
f14	kfs	featureless	17.954	0.022	15.549	0.019	37.205	0.046
f2	kfs	film	17.997	0.010	15.670	0.009	37.826	0.022
f11	kfs	featureless	18.020	0.020	15.587	0.017	38.044	0.043
f17	kfs	film	18.033	0.034	15.582	0.028	37.484	0.070
f9_1	kfs	patch	18.176	0.053	15.575	0.046	37.699	0.111
f16	kfs	patch	18.226	0.020	15.632	0.017	37.783	0.042
f6	kfs	film	18.490	0.009	15.579	0.007	37.536	0.018
f1	kfs	coarse mesoperthite, patch	18.700	0.110	15.672	0.093	38.483	0.230
<i>BC580, west Filchner Trough (-77°43'.99 S, -42°09'.90 W) water depth 650m</i>								
f12_2	kfs	featureless	14.162	0.034	14.519	0.035	36.440	0.089
f5	kfs	patch	16.602	0.066	15.338	0.060	36.159	0.143
f14	kfs	film	17.359	0.054	15.444	0.049	37.312	0.118
f6_3	kfs	film, patch	17.451	0.034	15.492	0.031	38.095	0.076
f8_3	kfs	featureless	17.460	0.040	15.475	0.036	37.186	0.087
f6_1	kfs	patch	17.483	0.034	15.478	0.030	37.273	0.074
p10_1	pl		17.552	0.074	15.405	0.065	36.942	0.157
f3_3	kfs	featureless	17.642	0.125	15.539	0.108	38.037	0.269
f13	kfs	coarse mesoperthite	17.740	0.062	15.487	0.054	37.253	0.132
f8_1	kfs	featureless	17.784	0.014	15.534	0.012	37.501	0.029
f3_1	kfs	patch	17.793	0.074	15.501	0.066	37.459	0.159
f7	kfs	film	17.972	0.047	15.547	0.041	37.409	0.099
f9	kfs	featureless	18.054	0.042	15.540	0.036	37.321	0.088
f11_2	kfs	vein	18.122	0.052	15.742	0.046	38.012	0.111
f10_2	kfs	patch, vein	18.266	0.039	15.589	0.033	38.271	0.084
f1_1	kfs	film	18.419	0.063	15.549	0.054	37.835	0.131
f6_2	kfs	film, patch	18.527	0.023	15.613	0.020	37.707	0.048
<i>BC591, Filchner Trough (-77°46'.03 S, -39°23'.57 W) water depth 1046m</i>								
f9	kfs	featureless	16.475	0.027	15.374	0.025	38.114	0.062
f4_1	kfs	film, vein	16.753	0.054	15.376	0.050	36.827	0.123
f15_3	kfs	featureless	17.365	0.058	15.474	0.052	37.144	0.126
f6	kfs	film	17.652	0.015	15.454	0.013	36.804	0.032

p10_3	pl		17.660	0.179	15.521	0.159	37.424	0.386
f15_2	kfs	film	17.661	0.045	15.535	0.040	37.307	0.097
p11_2	pl		17.670	0.130	15.492	0.115	37.425	0.280
f7_2	kfs	featureless	17.699	0.030	15.510	0.026	37.368	0.063
f1	kfs	film	17.711	0.213	15.387	0.214	36.984	0.485
f5	kfs	vein	17.767	0.014	15.532	0.013	37.499	0.031
f14	kfs	featureless	17.806	0.139	15.457	0.155	37.184	0.340
f12_1	kfs	vein	17.808	0.018	15.544	0.015	37.370	0.038
f2	kfs	vein	17.913	0.016	15.608	0.012	37.834	0.031
f12_2	kfs	featureless	18.011	0.013	15.557	0.011	37.467	0.027
f7_1	kfs	featureless	18.060	0.019	15.648	0.017	37.850	0.041
f13_3	kfs	two-stage	18.123	0.024	15.633	0.021	37.663	0.052
f4_2	kfs	featureless	18.186	0.119	15.595	0.103	37.709	0.252
f3	kfs	featureless	18.233	0.030	15.556	0.026	37.958	0.064
f13_2	kfs	featureless	18.351	0.060	15.535	0.051	37.558	0.126
f10_2	kfs	featureless	18.577	0.083	15.544	0.070	38.383	0.176
f4_3	kfs	featureless	18.632	0.049	15.600	0.041	38.268	0.101
f8_1	kfs	film	18.687	0.112	15.747	0.095	38.655	0.236
f11_1	kfs	featureless	18.860	0.085	15.511	0.065	37.420	0.159
f13_1	kfs	diagenesis	19.268	0.038	15.590	0.029	38.957	0.078
<i>BC607, Moeller Trough (-76°47'.67 S, -30°34'.02 W), water depth 424m</i>								
11	kfs	patch	16.787	0.070	15.373	0.064	36.226	0.153
1p	pl		16.795	0.076	15.309	0.070	36.125	0.167
8p	pl		16.804	0.077	15.317	0.071	36.162	0.170
3p	pl		16.833	0.114	15.337	0.104	36.161	0.249
21	kfs	featureless	16.915	0.075	15.418	0.069	36.415	0.164
23_2	kfs	vein	16.974	0.046	15.382	0.042	36.270	0.100
9p	pl		16.992	0.059	15.319	0.053	36.155	0.127
5	kfs in lithic	featureless	16.992	0.068	15.401	0.062	36.371	0.148
18p	pl		17.023	0.103	15.419	0.093	36.421	0.221
6p	pl in lithic		17.069	0.103	15.411	0.094	36.365	0.224
22	kfs	patch	17.096	0.040	15.394	0.036	36.340	0.085
4p	pl		17.139	0.127	15.557	0.115	36.713	0.275
19	kfs	patch	17.199	0.077	15.448	0.068	36.513	0.163
23_1	kfs	vein	17.221	0.151	15.491	0.138	36.646	0.327
12p	pl		17.413	0.142	15.313	0.128	35.890	0.297
9_2	kfs	patch	17.551	0.184	15.447	0.164	36.733	0.393
15p	pl		18.850	0.122	15.526	0.101	37.102	0.242
23_3	kfs	featureless	19.024	0.140	15.435	0.106	36.385	0.252
2	kfs	patch	19.812	0.146	15.617	0.099	36.627	0.235
<i>BC626, Caird Trough, (-76°01'.43 S, -26°54'.49 W), water depth 573m</i>								
f14_2	kfs	patch	16.898	0.022	15.413	0.021	36.379	0.048
f13_1	kfs	vein	16.912	0.022	15.408	0.020	36.370	0.048
f2	kfs	patch	16.919	0.024	15.428	0.022	36.405	0.052
f11_4	kfs	film	16.937	0.020	15.443	0.018	36.450	0.043
f10_4	kfs	patch	16.938	0.018	15.451	0.017	36.473	0.040
f12_2	kfs	patch	16.971	0.035	15.364	0.031	36.368	0.076
f11_2_2	kfs	patch	16.977	0.067	15.432	0.060	36.443	0.145
f13_2	kfs	vein	16.984	0.063	15.442	0.058	36.428	0.138
f18_1	kfs	patch	16.991	0.029	15.377	0.027	36.396	0.065
f12_6	kfs	patch	17.020	0.040	15.439	0.036	36.452	0.087
f16_1	kfs	patch	17.024	0.071	15.390	0.065	36.342	0.153
f10_6_2	kfs	patch	17.039	0.026	15.458	0.023	37.119	0.057
f18_4	kfs	patch	17.048	0.049	15.402	0.041	36.470	0.100
f11_3	kfs	film, patch	17.048	0.044	15.418	0.040	36.498	0.096
f13_3_1	kfs	patch	17.051	0.031	15.473	0.028	36.526	0.067
9_2	kfs	patch	17.051	0.058	15.387	0.053	36.624	0.129
f1	kfs	patch	17.057	0.038	15.440	0.035	36.545	0.082
f12_5	kfs	film	17.058	0.033	15.493	0.031	36.642	0.073
f10_6_1	kfs	featureless	17.063	0.036	15.445	0.032	36.556	0.077
f11_2_3	kfs	patch	17.064	0.051	15.431	0.046	36.444	0.110
f12_1	kfs	coarse mesoperthite	17.065	0.028	15.433	0.025	36.495	0.060
f12_3	kfs	vein	17.068	0.048	15.484	0.044	36.669	0.105
f15_1	kfs in clast	film	17.071	0.036	15.456	0.033	36.526	0.078
f18_2	kfs	patch	17.081	0.084	15.392	0.078	36.473	0.183
f5	kfs	patch	17.083	0.035	15.469	0.033	36.603	0.078

f3	kfs	mesoperthite, patch	17.084	0.026	15.486	0.024	36.570	0.057
f7_4	kfs	patch	17.099	0.036	15.447	0.033	36.467	0.079
f18_3	kfs	film, patch	17.118	0.032	15.500	0.030	36.664	0.071
f16_3	kfs	patch	17.122	0.061	15.471	0.056	36.626	0.133
f7_2	kfs	patch	17.133	0.039	15.515	0.035	36.706	0.084
f14_1_2	kfs	film	17.174	0.086	15.533	0.078	36.779	0.187
10_3	kfs	patch	17.243	0.086	15.685	0.077	37.099	0.185
f15_2	kfs	featureless	17.310	0.097	15.651	0.089	37.052	0.212
f8	kfs	film	17.380	0.081	15.549	0.068	36.950	0.167
Z.1301.29. Brunt Ice shelf, englacial moraine (-75.85 S, -25.50 W)								
f5	kfs	film	16.870	0.051	15.362	0.047	36.272	0.113
f21p	pl		16.918	0.073	15.423	0.067	36.411	0.158
f2	kfs	film, vein	16.927	0.038	15.419	0.035	36.390	0.083
f19	kfs	film	16.936	0.021	15.428	0.019	36.422	0.045
f37p	pl		16.938	0.077	15.406	0.070	36.401	0.167
f33	kfs	vein	16.947	0.026	15.437	0.024	36.453	0.057
f16 rpt	kfs	film, vein	16.950	0.036	15.445	0.033	36.459	0.079
f8p	pl		16.950	0.104	15.401	0.097	36.380	0.230
f16 rpt	kfs	film, vein	16.951	0.050	15.445	0.046	36.454	0.108
f7p	pl		16.951	0.099	15.383	0.091	36.324	0.215
f26	kfs	film, vein	16.962	0.030	15.453	0.027	36.474	0.065
f39	kfs	patch	16.962	0.057	15.402	0.052	36.367	0.125
f29	kfs	mesoperthite, vein	16.964	0.061	15.446	0.054	36.483	0.131
f28	kfs	film, vein	16.965	0.056	15.440	0.051	36.467	0.121
f3	kfs	vein	16.967	0.031	15.435	0.028	36.447	0.068
f17	kfs	patch	16.969	0.039	15.460	0.036	36.493	0.085
f22	kfs	film, vein	16.969	0.037	15.447	0.034	36.474	0.082
f27_1	kfs	film, vein	16.971	0.042	15.423	0.039	36.429	0.092
f31	kfs	film, vein	16.975	0.035	15.462	0.032	36.508	0.077
f47	kfs	film	16.975	0.041	15.465	0.038	36.516	0.090
f36	kfs	vein	16.980	0.049	15.454	0.045	36.486	0.108
f31 rpt	kfs	film, vein	16.983	0.037	15.468	0.034	36.525	0.081
f34_2	kfs	film	16.988	0.035	15.463	0.032	36.527	0.076
f46	kfs	patch	16.991	0.032	15.470	0.030	36.515	0.070
f12 rpt	kfs	film, vein	16.997	0.036	15.481	0.034	36.548	0.080
f11	kfs	film, vein	17.008	0.046	15.483	0.042	36.558	0.100
f24	kfs	patch	17.018	0.033	15.471	0.031	36.527	0.073
f35	kfs	vein	17.022	0.033	15.477	0.030	36.558	0.073
f16	kfs	film, vein	17.039	0.036	15.445	0.033	36.480	0.078
f43	kfs	patch	17.050	0.038	15.489	0.034	36.571	0.081
f25	kfs	patch	17.051	0.028	15.479	0.025	36.568	0.060
f20	kfs	patch	17.052	0.024	15.465	0.022	36.506	0.053
f12	kfs	film, vein	17.054	0.034	15.533	0.032	36.669	0.076
f6	kfs	film, vein	17.057	0.039	15.464	0.035	36.516	0.085
f34_1	kfs	vein	17.057	0.047	15.398	0.043	36.398	0.103
f9	kfs	patch	17.060	0.027	15.478	0.024	36.532	0.056
f38	kfs in lithic	film	17.077	0.039	15.485	0.036	36.583	0.086
f42	kfs	patch	17.094	0.041	15.488	0.036	36.595	0.088
f27_2	kfs	film, vein	17.096	0.042	15.501	0.039	36.600	0.093
f14	kfs	vein	17.103	0.050	15.507	0.045	36.609	0.107
f32	kfs	patch	17.117	0.078	15.566	0.068	36.763	0.166
f11	kfs	vein, patch	17.119	0.094	15.387	0.085	36.310	0.202
f45	kfs in lithic	film	17.124	0.027	15.524	0.024	36.675	0.058
f10p	pl		17.125	0.104	15.539	0.095	36.693	0.227
f23p	pl		17.145	0.100	15.605	0.091	36.850	0.219
f15p	pl		17.182	0.094	15.616	0.086	36.869	0.204
f48	kfs	patch	17.218	0.064	15.454	0.056	36.479	0.135
f41p	pl		17.223	0.106	15.629	0.096	36.932	0.232
f13	pl	antiperthite	17.238	0.118	15.457	0.106	36.543	0.253
f4	kfs	patch	17.287	0.046	15.571	0.038	36.788	0.092

1. Determined by imaging and chemical analysis by SEM

Standard-sample-standard bracketing was used for correction for external mass bias fractionation and was based on $^{203}\text{TI}/^{205}\text{TI}$ (true value = 0.418922) measured in each NIST612 standard in the sequence and assuming a linear stepped fractionation between each standard. To check corrections were appropriate, both NIST 612 and Shap K feldspar standard (Tyrrell et al. 2006) were intermittently treated as unknowns.

Isobaric interference corrections on ^{204}Pb were made assuming a $^{202}\text{Hg}/^{204}\text{Hg}$ ratio of 4.35. 94 ablations of the NIST 612 standard carried out during the period of analysis yielded $^{206}\text{Pb}/^{204}\text{Pb}$ and $^{207}\text{Pb}/^{204}\text{Pb}$ (\pm 2 standard deviations) of 17.101 ± 0.039 and 15.506 ± 0.030 , respectively.

16 ablations of the Shap feldspar (Tyrrell et al. 2006) carried out during the period of analysis yielded $^{206}\text{Pb}/^{204}\text{Pb}$ and $^{207}\text{Pb}/^{204}\text{Pb}$ (\pm 2 standard deviations) of 18.281 ± 0.047 and 15.640 ± 0.032 , respectively.

Tyrrell, S., Haughton, P.D.W., Daly, J.S., Kokfelt, T.F., and Gagnevin, D., 2006, The use of the common Pb isotope composition of detrital K-feldspar grains as a provenance tool and its application to Upper Carboniferous palaeodrainage, Northern England: Journal of Sedimentary Research, v. 76, p. 324–345.

Table DR2. ^{14}C carbon ages from surface sediment

Sample ID	Location	Dated material	Conventional ^{14}C age (yrs BP)	error (yrs)
BC566_SUR_B	Albert Trough	Acid insoluble organics*	5760	30
BC591_SUR_cp	Filchner ice front	planktonic foraminifera	1180	30
BC607_SUR_cb	Moeller Trough	benthic carbonate	1940	30
BC626_SUR_cb	Caird Trough	benthic carbonate	820	30