

Table 1.

Sr isotope ratios and Rb and Sr concentrations in whole rock and acetic acid extractions of vein calcite from Snowbrook mine in Afon Hore catchment

<b>Sample</b>	<b>Rock type</b>	<b>Analysis type</b>	<b>Rb (ppm)</b>	<b>Sr (ppm)</b>	<b><sup>87</sup>Sr/<sup>86</sup>Sr</b>
PLR 1	Mudstone	Whole rock	101	101	0.736980
PLR 1	Mudstone	Illite fraction			0.736829
PLR 2	Greywacke	Whole rock	32.4	47	0.723350
PLR 3	Calcite vein	Whole rock	3.86	36	0.713533
PLR 4	Mudstone	Whole rock	151	106	0.736039
PLR 3	Calcite	Acetic acid extraction		–	0.711905
PLR 5	Calcite	Acetic acid extraction		–	0.711036
PLR 6	Calcite	Acetic acid extraction		–	0.711581

Table 2.

Strontium isotope and hydrochemical data for rainfall samples

<b>Sample</b>	<b>Date</b>	<b><math>^{87}\text{Sr}/^{86}\text{Sr}</math></b>	<b>Sr (<math>\mu\text{g l}^{-1}</math>)</b>	<b>Ca (<math>\text{mg l}^{-1}</math>)</b>	<b>pH</b>
Rainfall 1	26/9/95–2/10/95	0.709194	5.0	0.49	4.71
Rainfall 2	3/10/95–10/10/95	0.709178	2.8	0.08	5.37

Table 3.

Strontium isotope and hydrochemical data for soil porewaters

Soil and horizon	Depth (cm)	$^{87}\text{Sr}/^{86}\text{Sr}$	Sr ( $\mu\text{g l}^{-1}$ )	Ca ( $\text{mg l}^{-1}$ )	pH (lab.)
Podzol O + A	0–10	0.711373	12.1	1.9	4.95
Podzol B	10–48	0.718964	11.8	1.7	4.81
Podzol C	48–84	0.714309	13.4	2.2	6.07
Gley O + A	0–25	0.711158	13.2	1.4	4.50
Gley B/C	25–46	0.712784	5.7	0.6	6.07
Gley C	46–65	0.713585	3.7	0.3	6.41
Peat hag	0–20	0.709402	14.7	3.0	5.48
Peat	20–35	0.708154	11.6	4.5	5.45
Peat Ea	35–50	0.708877	13.6	3.8	6.77
Peat Bs	50–65	0.709733	9.9	2.0	6.33

Table 4.

Isotopic and geochemical data for 0.43 M HNO<sub>3</sub> soil extractions

Soil and horizon	<sup>87</sup> Sr/ <sup>86</sup> Sr	Sr (µg kg <sup>-1</sup> )	Ca (mg kg <sup>-1</sup> )	Log K <sub>d</sub> (Sr)
Podzol O + A	0.712343	4117	339	2.53
Podzol B	0.740503	126	15	1.03
Podzol C	0.716174	770	105	1.76
Gley O + A	0.710545	1050	97	1.90
Gley B/C	0.715887	103	6.8	1.41
Gley C	0.727782	71	3.0	1.28
Peat hag	0.709705	6804	129	2.67
Peat	0.709631	10,954	422	2.98
Peat Ea	0.711172	771	34	1.75
Peat Bs	0.712502	334	16	1.53

Log K<sub>d</sub> is the log of the solid/liquid partition coefficient between the exchangeable Sr and porewater Sr.

Table 5.

Strontium isotope data and selected hydrochemical data for stream water samples (baseflow to stormflow shown in consecutive rows for each site)

Sample	Site	Flow (cumecs)	Date	$^{87}\text{Sr}/^{86}\text{Sr}$	Sr ( $\mu\text{g l}^{-1}$ )	Ca ( $\text{mg l}^{-1}$ )	pH
PL1	Afon Hore (flume)	0.0399	22/6/95	0.713408	6.1	2.2	6.63
		0.1027	5/12/95	0.713408	5.6	1.6	5.76
		0.7590	8/12/94	0.713110	3.7	0.8	4.79
PL2	Severn (flume)	0.1233	22/6/95	0.713298	7.1	2.1	5.82
		0.2954	5/12/95	0.713206	6.4	1.5	5.65
		1.9576	8/12/94	0.712813	4.9	1.0	4.71
PL3	Afon Hafren (flume)	0.0492	22/6/95	0.712351	5.3	1.1	6.78
		0.1371	5/12/95	0.712575	5.4	1.0	5.41
		0.5860	8/12/94	0.712290	4.7	0.59	4.67
PL4	Afon Hore Snowbrook	No flume	22/6/95	0.712581	5.0	2.6	6.31
			5/12/95	0.712649	4.6	1.8	5.86
			8/12/94	0.712426	3.4	0.55	4.62
PL95	Afon Hafren (upper)	No flume	22/6/95	0.712023	4.7	0.78	6.51
			5/12/95	0.712024	4.8	0.67	5.60
			8/12/94	0.711586	4.0	0.48	4.67
PL98	Tanllwyth (flume)	0.01433	22/6/95	0.714399	19.7	5.2	6.98
		0.02689	5/12/95	0.714018	11.2	2.6	5.90
		0.1830	8/12/94	0.713384	5.5	0.91	4.56
PL 98	Tanllwyth	0.0610	2/11/94	0.714478	19.5	5.12	6.95
PL 98	(older samples)	0.0660	7/2/92	0.713422	5.3	0.94	4.40

Table 6.

Sr isotope and selected hydrochemical data for pumped and depth samples of groundwater

<b>Borehole number</b>	<b>Borehole depth (m)</b>	<b>Sample depth (m)</b>	<b><math>^{87}\text{Sr}/^{86}\text{Sr}</math></b>	<b>Sr (<math>\mu\text{g } \Gamma^{-1}</math>)</b>	<b>Ca (<math>\text{mg } \Gamma^{-1}</math>)</b>
US 1	2.70	Pumped	0.709326	11.9	3.1
US 3	14.10	Pumped	0.710951	11.3	2.0
LS 1	6.40	Pumped	0.712591	12.8	3.1
LS 3	8.00	Pumped	0.710995	9.6	2.9
LS 6	44.50	Pumped	0.714597	114	21
		12	0.714361	120	22
		24	0.714604	132	23
		29	0.714604	149	23
IS 1	10.20	Pumped	0.711231	55	10
VB 1	11.00	Pumped	0.715211	35	9.3
VB 2	47.40	Pumped	0.714621	56	14
		7	0.714477	250	58
		12	0.714339	320	72
		16	0.714195	341	77
		20	0.714054	346	81
		40	0.714900	263	58
VB 3a	7.00	Pumped	0.714943	44	14
VB 3	44.40	Pumped	0.714889	110	29
		7	0.714726	153	39
		9	0.714832	178	46
		16	0.714792	187	49
		27	0.714776	189	50
		38	0.714745	332	67
IS 4	27.50	18	0.713006	33	26
		23	0.713444	31	29

Table 7.

Sr isotope and selected hydrochemical data for bailed groundwater samples

<b>Borehole number</b>	<b>Borehole depth (m)</b>	<b><math>^{87}\text{Sr}/^{86}\text{Sr}</math></b>	<b>Sr (<math>\mu\text{g l}^{-1}</math>)</b>	<b>Ca (<math>\text{mg l}^{-1}</math>)</b>
IS 3	10.2	0.713959	5.3	1.77
LS 4	11	0.712638	8.1	2.01
LS 3	8	0.712626	6.6	1.09
LS 1	6.4	0.712591	6.1	1.33
VB 1	11	0.715211	7.9	1.67
IS 3	8.5	0.711757	4.9	1.49
US 1	2.7	0.710377	5.5	0.60

Table 8.

Weathering rates for the Afon Hafren and Afon Hore catchments based on  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios (flow weighted) and mass balance calculation ((Durand et al., 1994)

Stream	Estimate based on $^{87}\text{Sr}/^{86}\text{Sr}$		Estimate based on mass balance	
	Sr	Ca	Sr	Ca
Afon Hafren	57	8.5	51	10.6
Afon Hore	74	16.3	52.1	18.4

Weathering-derived  $^{87}\text{Sr}/^{86}\text{Sr}$  assumed to be 0.7149 and Sr and Ca fluxes based on long term stream output. Sr in  $\text{g ha}^{-1} \text{yr}^{-1}$  and Ca in  $\text{kg ha}^{-1} \text{yr}^{-1}$ .