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A revised inventory of Antarctic subglacial lakes

MARTIN J. SIEGERT[1]*, SASHA CARTER[2], IGNAZIO TABACCO[3], SERGEY POPOV[4] and DONALD D. BLANKENSHIP[2]

[1]*Bristol Glaciology Centre, School of Geographical Sciences, University of Bristol, Bristol BS8 1SS, UK*
[2]*Institute for Geophysics, John A. and Katherine G. Jackson School of Geosciences, The University of Texas at Austin, 4412 Spicewood Springs Road, Austin, TX 78759, USA*
[3]*University of Milan, Department of Earth Sciences, via Cicognara 7, 20129 Milano, Italy*
[4]*Polar Marine Geological Research Expedition (PMGRE), 24 Pobeda str., St. Petersburg, Lomonosov, 188512, Russia*
**corresponding author: m.j.siegert@bristol.ac.uk*

Abstract: The locations and details of 145 Antarctic subglacial lakes are presented. The inventory is based on a former catalogue of lake-type features, which has been subsequently reanalysed, and on the results from three additional datasets. The first is from Italian radio-echo sounding (RES) of the Dome C region of East Antarctica, from which 14 new lakes are identified. These data also show that, in a number of occasions, multiple lake-type reflectors thought previously to be individual lakes are in fact reflections from the same relatively large lake. This reduces the former total of lake-type reflectors by six, but also adds a significant level of information to these particular lakes. The second dataset is from a Russian survey of the Dome A and Dome F regions of East Antarctica, which provides evidence of 18 new lakes and extends the coverage of the inventory considerably. The third dataset comprises three airborne RES surveys undertaken by the US in East Antarctica over the last five years, from which forty three new lakes have been identified. Reference to information on Lake Vostok, from Italian and US surveys taken in the last few years, is now included.

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Introduction

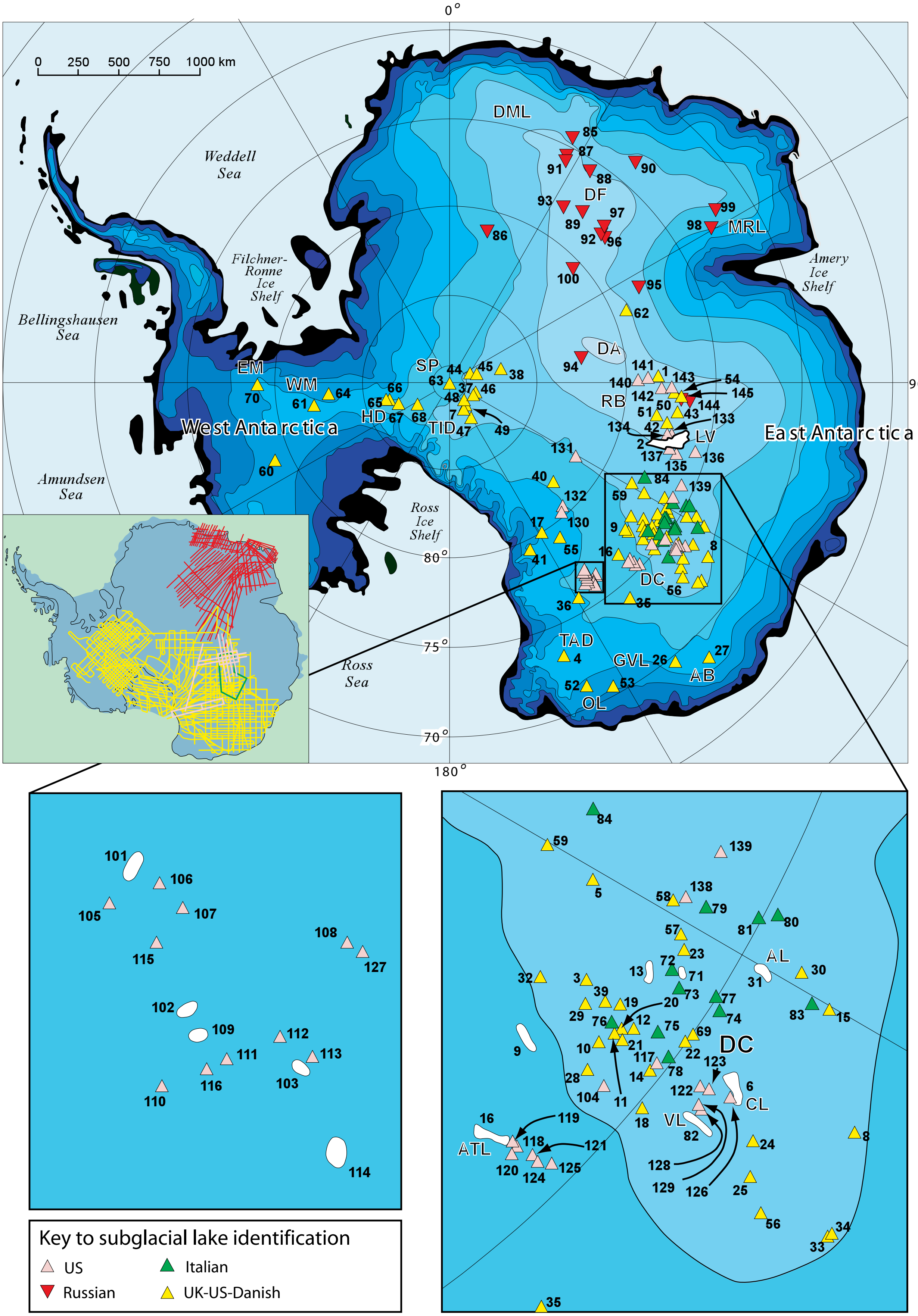
Antarctic subglacial lakes were first identified on radio-echo sounding data in the late 1960s (Robin *et al.* 1970), from the recognition of three characteristics. First, the radio reflections from subglacial lakes are strong and typically 10–20 dB greater than from the ice-bedrock boundary. Second, the echoes have constant strength along the record track, which is indicative of an interface that is smooth on the scale of the radio wavelength. Third the reflections from a lake are very flat compared with the surrounding topography and have a slope which is around ten times, and in opposite direction to, the ice surface slope (which is required if the lake is in hydrostatic equilibrium). These criteria were used to compile the first inventory of seventeen subglacial lakes from data collected up to 1971/72 (Oswald & Robin 1973). Twenty-three years later, Siegert *et al.* (1996) analysed RES data acquired in four other 1970s field campaigns to locate and catalogue 77 lake-type reflectors, which comprise the most recent inventory of subglacial lakes.

Three advances make it now appropriate to construct a revised inventory of subglacial lakes. First, Siegert *et al.*'s (1996) inventory contained subglacial lake records from a single dataset, namely the SPRI-TUD-NSF (Scott Polar Research Institute, Technical University of Denmark, US National Science Foundation) survey of around 40% of East and 70% of West Antarctica. Since this time, new data have been acquired by Italian and US scientists (e.g. Tabacco *et al.* 2003, Studinger *et al.* 2003), and Russian data collected in the 1980s have been reanalysed (Popov & Masolov 2003). The combination of these datasets means that both the area of coverage of the inventory and the number of lakes identified are significantly increased. Second, satellite altimetry has revealed that a number of lakes previously identified as being individual occur beneath the same flat ice surface feature, which suggests strongly that they are in fact records of the same, larger lake (Siegert & Ridley 1998a, Tabacco *et al.* 2003). Third, our understanding of Lake Vostok has improved greatly since 1996, and a huge amount of new data is available for this particular lake, which should be noted (Masolov *et al.* 1999, 2001, in press, Studinger *et al.* 2003).

Here we present a revised inventory of Antarctic subglacial lakes, which provides the location and glaciological details for 145 distinct subglacial lake features (Fig. 1, Table I).

Corrections to the previous inventory

Reanalysis of the SPRI-TUD-NSF data since 1996 has resulted in three alterations to the previous inventory of subglacial lakes. First, a number of errors have been corrected. The most important is that the length of subglacial lake record at South Pole (lake no. 63) is 500 m, and not 50 000 m as was previously given. This mistake was made because although the lake record is long in the RES



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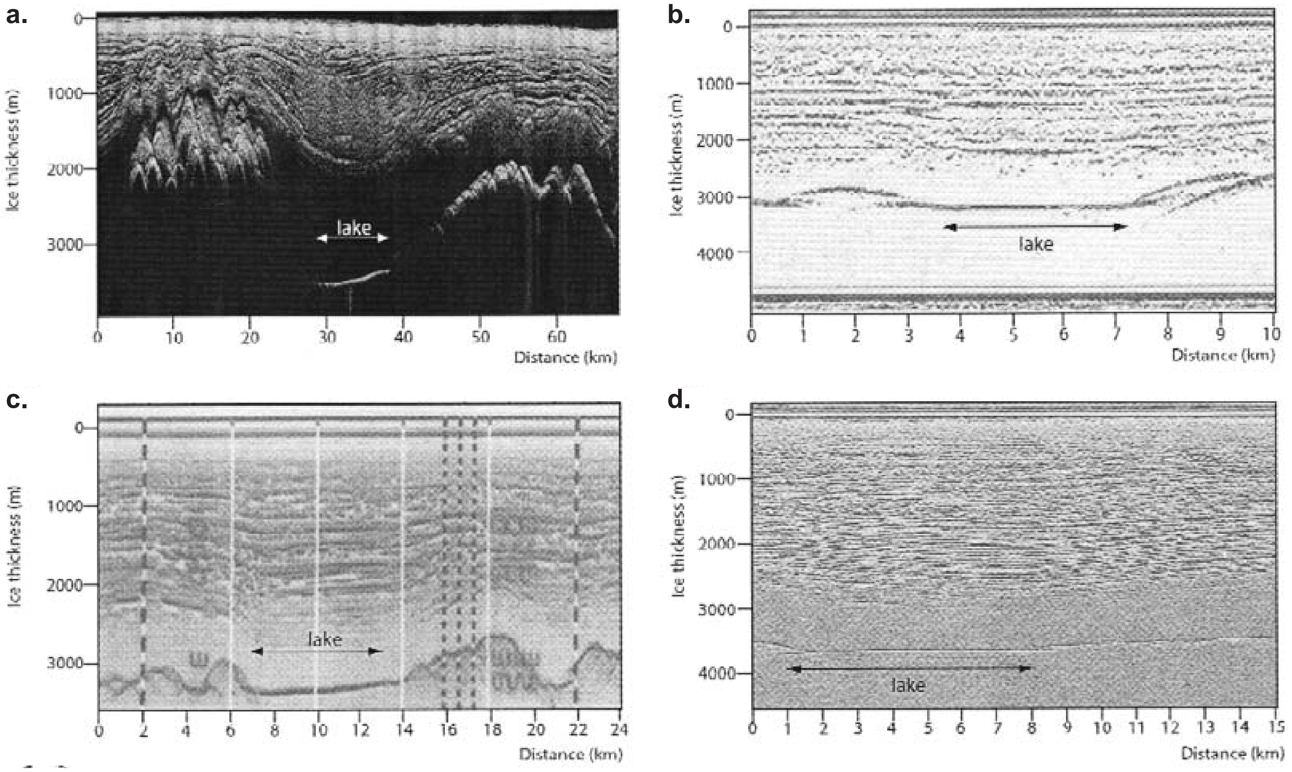

Fig. 2. Examples of RES data from four subglacial lakes; one from each of the datasets used to build the inventory. **a.** Lake no. 70 (from SPRI RES data), named Subglacial Lake Ellsworth. **b.** Lake no. 75 (from Italian RES data). **c.** Lake no. 91 (from Russian RES data). **d.** Lake no. 103 (from UTIG RES data).

data, the plane was not airborne, and was taxiing on the ski-way at South Pole with a much-reduced speed. Second, reanalysis of the SPRI-TUD-NSF data reveals an additional lake close to the Ellsworth Mountains in West Antarctica (lake no. 70). Third, inspection of ERS-1 altimeter data shows that several lakes thought previously to be individuals are located beneath a distinct flat surface feature (Siegert & Ridley 1998a, Tabacco *et al.* 2003). As in Lake Vostok, these multiple lake reflectors are likely to be derived from the same lake and results in the reduction of the former total of seventy-seven lakes by six. Tabacco *et al.* (2003) used the connection between ice surface slopes and subglacial lake RES reflections to define two particularly large lakes at Dome C; namely lakes referred to (unoffcially) as Concordia Lake (lake no. 6) and Aurora Lake (lake no. 31). Further information on these two large lakes is available in US data (Table I).

New RES data

Subglacial lakes detected within three RES datasets are now available for inclusion in the inventory. The identification of lakes in these new datasets was undertaken using the criteria defined in Siegert *et al.* (1996). Examples of subglacial lakes from all four RES datasets are provided in Fig. 2.

The first of these new datasets is an Italian survey of the Dome C and Lake Vostok regions of East Antarctica (Tabacco *et al.* 2003) undertaken in the 1999–2000 season. From these data, fourteen new subglacial lakes have been identified, including the Vincennes Lake (no. 82), which has five transects across it and is associated with a flat ice surface feature (Table I).

The second dataset is derived from Russian RES fieldwork between 1987 and 1990, across the Dome A and Dome F regions of East Antarctica. Interpretation of these data resulted in the identification of eighteen new lakes in

Fig. 1. (opposite) Locations of 145 Antarctic subglacial lakes. The identifying numbers, associated with each lake location, are referred to in Table I. Yellow lakes are those identified from SPRI data, green lakes are from the Italian dataset, pink lakes were located in US RES data and red lakes have been identified from Russian data. Insets illustrate the coverage of RES data used in the inventory (note that the US and Italian surveys comprise multiple RES transects within boxed areas) and enlargements of two regions of subglacial lakes around Dome C. Abbreviations to place names are as follows: AB = Astrolabe Subglacial Basin, AL = Aurora Lake, ATL = Adventure Trench Lake, CL = Concordia Lake, DA = Dome A, DC = Dome C, DF = Dome F, DML = Dronning Maud Land, EM = Ellsworth Mountains, GVL = George V Land, HD = Hercules Dome, LV = Lake Vostok, MRL = Mac Robertson Land, OL = Oates Land, RB = Ridge B, SP = South Pole, TAD = Talos Dome, TID = Titan Ice Dome, VL = Vincennes Lake, WM = Whitmore Mountains.

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Table I. Revised inventory of Antarctic sub-glacial lakes.

Tally	Lake record no. (and name of lake where available)	Lat.°S	Long°E	Length of RES record m	Ice thickness m	Notes
1	SPRI-1	78.1	88.5	35 000	4200	Located beneath Sovetskaya Station. This was the first subglacial to be discovered (Robin *et al.* 1970).
2	SPRI-2 'Lake Vostok'	Between 77.8 and 78.5	Between 101.5 and 107.5	Dimensions: Max lgth 250 000, Max wdth 80 000, Area 14 000 km^2	3741–4150	Identified from 12 short SPRI transects 1971–78 (Siegert & Ridley 1998b), 5 long Italian RES lines in 1999–2000 (Tabacco *et al.* 2003) and a comprehensive US survey in 2000–2001 (Studinger *et al.* 2003).
3	SPRI-3	76.57	124.8	5000	3621	Dome C
4	SPRI-4	73.28	157.28	3500	2827	Talos Dome
5	SPRI-5	77.2	119.27	10 000	3835	Dome C
6	SPRI-6	74.13	124.58	10 000	4094	Lake no. 6 was identified as 'Concordia Lake' by Tabacco *et al.* (2002) and Tikku *et al.* (2002)
	ITL-15	74.06	124.9	49 758	4053	
	ITL-15	74.17	124.91	15 079	4082	
	ITL-15	74.05	125.05	16 069	4041	
	ITL-15	74.15	124.89	24 215	4084	
	ITL-15	74.03	125.18	7600	4022	
	ITL-15	73.94	125.46	10 307	3953	
	ITL-15	73.9	125.6	1648	3824	
	RTZ9/WLK/Wx/X08a	74.19	124.8565	15 000	4110	
	RTZ9/WLK/Wx/X09b	74.1075	124.9844	17 000	4076.4	
	RTZ9/WLK/Wx/X10a	74.0289	125.1539	17 000	4050	
	RTZ9/WLK/Wy/Y55a	74.0348	125.1155	57 310	4101.51	
	RTZ9/WLK/Wx/X11a	73.9288	125.2533	25 000	3992.95	
	RTZ9/WLK/Wy/Y55a	74.1818	124.753	8943	4102.86	
7	(SPRI-7)	88.3	150	5000	2807	Titan Dome
8	SPRI-8	72.31	123.94	10 000	3254	E of Dome C
9	SPRI-9	76.94	129.4	5000	3811	Three lake records covered by a conspicuous flat ice surface (Siegert & Ridley 1998a).
	SPRI-16	76.75	129.82	2000	3661	
	SPRI-20	76.63	129.92	1843	3009	
10	SPRI-10	75.94	127.41	5000	3449	W of Dome C
11	SPRI-11	75.81	126.56	8500	3860	Lake no. 11 was re-surveyed by RES line 'ITL7' by Tabacco *et al.* (2003)
	ITL-7	75.81	126.53	10 725	3408	
12	SPRI-12	75.65	125.6	5000	3399	W of Dome C
13	SPRI-13	75.84	122.66	5000	3364	Lakes nos.13 & 14 were re-surveyed by RES line 'ITL10' by Tabacco *et al.* (2003)
	SPRI-14,	75.87	122.82	5000	3490	
	ITL-10	75.95	122.04	11 465	3489	
14	SPRI-15	75.14	126.98	2000	3447	W of Dome C
15	SPRI-17	73.45	119.54	15 000	3924	E of Dome C
16	SPRI-18	76.28	135.31	8040	3714	Lake no. 16 is a large lake within the Adventure Subglacial Trench,
	RTZ9/WLK/WSx/X01a	76.4162	135.6135	5000	3607.12	Length = 70 km
	RTZ9/WLK/Wy/Y19a	76.3875	135.9992	17 000	3703	Width = 15 km
	RTZ9/WLK/Wx/X02b	76.3519	135.4909	8000	3698.81	Major axis of the lake trends sub-parallel to 76th meridian
	RTZ9/WLK/WSx/X02a	76.2916	135.4132	14 000	3711.18	
	RTZ9/WLK/WSx/X04a	76.0495	135.0826	4000	3960	
	RTZ9/WLK/WSx/X04a	76.035	134.9569	1000	3892.94	
	RTZ9/WLK/Wx/X01a	76.4796	135.7252	2000	3576	
	RTZ9/WLK/Wx/X03a	76.238	135.3953	13 000	3775	
	RTZ9/WLK/Wx/X04a	76.081	134.9014	6000	3882	
17	SPRI-19	79.93	148.27	8375	2333	East of Byrd Glacier and Transantarctic Mountains
18	(SPRI-21)	74.91	128.9	670	3890	(Dome C)
19	SPRI-22	75.97	124.95	3685	3168	Dome C
20	SPRI-23	75.78	125.97	3015	3162	Dome C
21	SPRI-24	75.69	126.48	4188	3650	Dome C
22	SPRI-25	74.96	124.61	1340	3360	One lake at Dome C covered by two SPRI records
	SPRI-76	74.92	124.65	3484	3360	
23	SPRI-26	75.61	120.39	2680	3057	Dome C
24	(SPRI-27)	73.4	126.9	6700	4010	(W of Dome C)
25	SPRI-28	73.17	128.35	15 075	4148	Twolake records covered by a conspicuous flat ice surface (Siegert & Ridley 1998a)
	SPRI-63	73.14	128.41	20 010	4171	
26	SPRI-29	69.71	140.95	2848	2269	George V Land
27	SPRI-30	68.44	136.87	2680	4011	Lake at the mouth of the Astrolabe Subglacial Basin, Terre Adélie, covered by two SPRI records
	SPRI-58	68.8	136.2	43 550	4224	

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Tally	Lake record no. (and name of lake where available)	Lat.°S	Long°E	Length of RES record m	Ice thickness m	Notes
28	SPRI-31	75.82	129.03	3015	3069	W of Dome C
29	SPRI-32	76.4	126.03	2881	3500	W of Dome C
30	SPRI-33	74.03	118.5	8543	4092	E of Dome C
31	SPRI-34	74.46	119.37	6700	3932	SPRI-34 was resurveyed as 'Aurora Lake' in 1999–2000 by two lines (Tabacco *et al.* 2003)
	ITL16	74.41	119.5	14 675	4055	
	'Aurora Lake'	74.6	119.3	18 275	4019	
32	SPRI-35	77.12	126.3	8375	3741	W of Dome C
33	SPRI-36	71.81	128.35	1340	2994	NE of Dome C
34	SPRI-37	71.79	128.2	1340	3021	NE of Dome C
35	SPRI-38	74.04	139.92	1608	3285	W of Dome C
36	SPRI-39	75.73	148.86	6700	3010	W of Dome C
37	SPRI-40	88.5	120	3350	3100	Titan Dome
38	SPRI-41	87	75	3183	2943	W of Titan Dome
39	SPRI-42	76.19	125.18	4958	3881	Two lake records covered by a conspicuous flat ice surface (Siegert & Ridley 1998a)
	SPRI-43	76.2	125.3	10 050	3886	
40	SPRI-44	81.84	133.47	2680	2641	E of Trans Antarctic Mts
41	(SPRI-45)	79.43	154.13	6700	2036	(E of Trans Antarctic Mts)
42	SPRI-46	77.4	100.4	2412	3709	W of Ridge B
43	SPRI-47	76.8	97.5	1608	3715	W of Ridge B
44	SPRI-48	88.73	64.52	3350	2997	S of Titan Dome
45	SPRI-49	88.36	70.54	5360	3027	S of Titan Dome
46	SPRI-50	88.37	112.68	3350	3068	Titan Dome
47	SPRI-51	87.61	148.62	8040	3062	Titan Dome
48	SPRI-52	88.71	136.88	1876	3070	Titan Dome
49	SPRI-53	88.42	144.5	1675	2741	Titan Dome
50	SPRI-54	77.1	92.5	3350	3784	Ridge B
	SPRI 59	77.1	92.5	1340	3781	
51	(SPRI-55)	78	99	11 725	3399	(Ridge B)
52	(SPRI-56)	71.13	155.68	10 050	2347	(Oates Land)
53	(SPRI-57)	70.47	151.6	1675	2418	(Oates Land)
54	SPRI-60	76.8	93.5	1340	3426	Ridge B
55	SPRI-61	79.15	144.3	5025	2580	W of Trans Antarctic Mts.
56	SPRI-62	72.74	129.41	2010	3828	Dome C
57	(SPRI-64)	75.76	119.71	2512	3574	(Dome C)
58	SPRI-65	76.07	118.11	5025	3733	Dome C
59	SPRI-66	78	118.6	14 070	3341	S of Dome C
60	SPRI-67	79.09	113.50 W	2010	2700	Upstream of Byrd Station
61	SPRI-68	82.06	98.95 W	1675	2894	Whitmore Mts
62	SPRI-69	79.04	67.73	6700	2500	Dome A
63	SPRI-70	89.97	161.56 W	500	2778	South Pole Lake. Two further transects over South Pole Lake were acquired by UTIG during 1998–99, which reveal it to be > 2 km long
64	SPRI-71	82.99	94.92 W	1340	3200	Whitmore Mts.
65	SPRI-72	86.36	106.17 W	1675	2814	Hercules Dome
66	SPRI-73	86.43	105.56 W	1340	2906	Hercules Dome
67	SPRI-74	86.77	111.26 W	1675	3960	Hercules Dome
68	SPRI-75	87.77	125.30 W	5025	2315	Hercules Dome
69	SPRI-77	74.92	124.19	1943	3925	Dome C
	RTZ9/WLK/Wy/Y52a	74.894	124.25	1000	3915	
70	SPRI-78 'Subglacial Lake Ellsworth'	78.99	90.57 W	10 000	3400	West of the Ellsworth Mountains (this lake was not in the inventory of Siegert *et al.* 1996)
71	ITL-1	75.46	121.63	2178	3570	Dome C
		75.509	121.379	1163	3587	
72	ITL-2	75.624	121.607	1142	3513	Dome C
73	ITL-3	75.422	122.315	1712	3030	Dome C
74	ITL-4	74.785	122.284	3086	3769	Dome C
75	ITL-5	75.345	125.022	4486	3150	Dome C
76	ITL 6	75.954	126.028	4453	2975	Dome C
77	ITL 8	74.913	121.732	1993	3416	Dome C
78	ITL 9	75.024	125.918	3296	3461,	Dome C
		75.03	125.748	3188	3463	
	RTZ9/WLK/WSx/X02a	75.00	125.875	2500	3450	

Table I. Revised inventory of Antarctic sub-glacial lakes.

Tally	Lake record no. (and name of lake where available)	Lat.°S	Long°E	Length of RES record m	Ice thickness m	Notes
79	ITL 11	75.608	117.686	3369	4457	Dome C
80	ITL 12	74.673	116.421	27,229	4155	Dome C
81	ITL 13	74.881	116.936	11,828	4460	Dome C
82	ITL 14 'Vincennes Lake'	74.359	127.712	6245	4082	Vincennes Lake (Tabacco *et al.* 2003)
		74.005	127.767	26 608	4126	
		73.957	127.73	13 814	4029	
		74.201	127.677	12 738	4040	
		74.336	127.798	11 442	4049	
	RTZ9/WLK/Wx/X11a	74.3559	127.7026	3182	4090	
	RTZ9/WLK/Wy/Y46a	74.3015	128.2038	2000	3931.26	
83	ITL 17	73.702	119.715	9573	4034	Dome C
84	ITL 18	77.626	115.191	5914	3500	Dome C
85	M-310	74.300	26.939	10 000	2427	North-west of Dome F
86	M-511	80.903	14.467	8000	2340	South of Dome F and West of Dome A
87	M-511	75.167	27.289	10 000	2770	Dome F
88	M-610	75.745	33.091	5000	2560	Dome F
89	M-2011	77.499	37.432	20 000	3125	Dome F
90	M-2710	73.424	39.892	18 000	2180	North of Dome F
91	M-2713	75.463	27.032	20 000	2830	North-west of Dome F
92	M-3112	77.704	44.461	15 000	2860	Dome F
93	M-3710	77.962	32.617	15 000	3070	Dome F
94	M-3010	82.343	77.891	5000	3575	Dome A
95	M-3510	77.958	62.728	5000	2834	Between Dome A and Dome F
96	M-3112	77.700	45.766	5000	2640	Dome F
97	M-3809	77.236	43.698	8000	3130	Dome F
98	M-3809	72.784	58.797	15 000	1750	Mac Robertson Land
99	M-3211	72.096	56.768	8000	2535	Mac Robertson Land
100	SAE35	80.302	45.825	7000	3240	Between Dome A and Dome F
101	RTZ9/WLK/Ey/Y49a	77.1569	144.7403	7000	3391.11	Wilkes Subglacial Basin
	RTZ9/WLK/Ex/X01a	77.184	144.5499	15 000	3417.9	
102	RTZ9/WLK/Ex/X06a	76.7273	145.1211	7000	3539.86	Wilkes Subglacial Basin
	RTZ9/WLK/Ey/Y49a	76.7253	145.2366	8000	3545.89	
103	RTZ9/WLK/Ex/X09a	76.3914	144.4474	7850	3592.5	Wilkes Subglacial Basin
	RTZ9/WLK/Ey/Y52a	76.3672	144.3919	7000	3600.0	
104	RTZ9/WLK/WSx/X02a	75.507	129.0827	2146	3648.68	Dome C
105	RTZ9/WLK/Ex/X02b	77.1238	145.199	12 000	3395.18	Wilkes Subglacial Basin
106	RTZ9/WLK/Ex/X02b	77.0817	144.4817	4000	3396.17	Wilkes Subglacial Basin
107	RTZ9/WLK/Ex/X03a	76.9806	144.4377	1500	3489	Wilkes Subglacial Basin
108	RTZ9/WLK/Ex/X06a	76.5911	142.9935	4418	3522.96	Near lake no. 127, Wilkes Subglacial Basin
	RTZ9/WLK/Wx/X06a	76.591	142.9949	1000	3530.21	
109	RTZ9/WLK/Ex/X07a	76.635	145.2232	4000	3517	Wilkes Subglacial Basin
	RTZ9/WLK/Ey/Y49a	76.6519	145.3173	1000	3481.66	
110	RTZ9/WLK/Ex/X08a	76.5836	146.0299	3406	3393.94	Wilkes Subglacial Basin
111	RTZ9/WLK/Ex/X08a	76.5334	145.1649	8000	3488.03	Wilkes Subglacial Basin
112	RTZ9/WLK/Ex/X08a	76.4894	144.446	5417	3512.59	Wilkes Subglacial Basin
113	RTZ9/WLK/Ex/X09a	76.38	144.2725	3000	3573.32	Wilkes Subglacial Basin
114	RTZ9/WLK/Ex/X12a	76.1157	144.7526	5000	3573.33	Wilkes Subglacial Basin
	RTZ9/WLK/Ey/Y52a	76.0864	144.6924	4000	3537.03	
	RTZ9/WLK/Ey/Y52a	76.1327	144.6413	500	3540	
	RTZ9/WLK/Ey/Y52a	76.124	144.6509	500	3540	
115	RTZ9/WLK/Ey/Y49a	76.936	144.9983	1000	3558.41	Wilkes Subglacial Basin
116	RTZ9/WLK/Ey/Y49a	76.5423	145.4375	4000	3461.32	Wilkes Subglacial Basin
117	RTZ9/WLK/WSx/X02a	75.0945	126.4149	1500	3480	Dome C
118	RTZ9/WLK/Wx/X06a	75.8784	134.9548	1000	3987.46	Near to Adventure Trench lake no. 16
119	RTZ9/WLK/Wx/X05a	75.9757	134.8916	778	3903.22	Near to Adventure Trench lake no. 16
120	RTZ9/WLK/Wx/X07a	75.8318	135.4812	7000	3809.35	Near to Adventure Trench lake no. 16
121	RTZ9/WLK/Wx/X08a	75.6365	134.6583	1000	4100.27	Near to Adventure Trench lake no. 16
122	RTZ9/WLK/Wx/X08a	74.4245	126.1192	478	4029.68	Dome C
123	RTZ9/WLK/Wx/X09b	74.2885	125.9878	2416	3960.09	Dome C
124	RTZ9/WLK/Wx/X09b	75.5318	134.6562	732	4145	Near to Adventure Trench lake no. 16
125	RTZ9/WLK/Wx/X10a	75.3769	134.2231	2624	4183.4	Near to Adventure Trench lake no. 16

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Tally	Lake record no. (and name of lake where available)	Lat.°S	Long°E	Length of RES record m	Ice thickness m	Notes
126	RTZ9/WLK/Wx/X11a	73.9934	125.6055	2220	4007.01	Near Lake Concordia, no. 6
127	RTZ9/WLK/Wy/Y01a	76.5445	142.8975	669	3426.33	Near lake no. 108, Wilkes Subglacial Basin
128	RTZ9/WLK/Wy/Y49a	74.2714	127.039	1001	4119.09	Dome C
129	RTZ9/WLK/Wy/Y49a	74.3105	126.9492	25 000	4097.95	Dome C
130	DCS/DCSx/X02b	80.4134	139.2326	2025	3063.06	South of Dome C
	DCS/DCSx/X02e	80.4156	139.2146	2262	3056.41	
131	DCS/DCSx/X01c	81.8384	120.0842	5390	2933.25	South of Dome C
132	DCS/DCSx/X01d	80.6501	137.545	975	2981.45	South of Dome C
133	LVS/CCx/X21a	77.3351	103.3487	4356.6	3637.325	Near Lake Vostok
134	LVS/CCx/X24a	77.1088	103.351	3140.1	3777.628	Near Lake Vostok
135	LVS/CCx/X25a	76.5825	107.5137	5787.1	3361.044	Near Lake Vostok
136	LVS/CCx/X40a	75.5948	106.1037	4805.2	3738.53	Near Lake Vostok
137	LVS/CCy/Y11a	77.0734	106.7382	6296.8	4194.212	Near Lake Vostok
138	LVS/ECx/X19a	75.8474	117.9871	700	4663.08	Near lake nos. 58 and 79, between Dome C and Lake Vostok
	LVS/ECx/X19b	75.9226	117.5808	1000	4093.22	
139	LVS/ECx/X28a	75.7505	114.3252	600	3787.72	Between Dome C and Lake Vostok
140	LVS/WCx/X10b	79.304	88.8753	1200	3890.08	Ridge B
141	LVS/WCx/X19b	78.702	88.5595	700	3712.2	Ridge B
142	LVS/WCx/X28a	77.9806	91.4348	7000	3787.21	Ridge B
143	LVS/WCx/X37b	77.3789	91.0805	8800	4087.29	Ridge B
144	C25SAE1	76.750	94.566	Not determined	~ 3500	Ridge B
145	C25SAE2	77.083	94.833	30 km^2	3560	Ridge B

Notes. Dates during when subglacial lakes were first sounded are as follows: SPRI 1 (1967–68), SPRI 2-17 (1971–72), SPRI 18–67 (1974–75), SPRI 68-69 and SPRI 78 (1977–78), SPRI 70–77 (1978–79), ITL 1–18 (1999–2000), M310–M3211 (1987–90), lakes termed 'WLK' and 'DCX' (1999–2000), lakes termed 'LVS' (2000–2001). Subglacial lakes named SPRI 1–17 make up the first compilation of subglacial lakes across Dome C published by Oswald & Robin (1973), SPRI 1–77 make up the inventory published by Siegert *et al.* (1996), lakes named ITL 1–18 are taken from Tabacco *et al.* (2003), M310–M3211 are taken from Popov & Masolov (2003), and lakes C25SAE1 and C25SAE2 were taken from Bogorodskiy & Sheremet'yev (1981). The accuracy of the positions of subglacial lake records varies between datasets. For SPRI data, the maximum navigational error is within 5 km, and often considerably less (Siegert *et al.* 1996). For the Russian RES data, navigation accuracy was within 4.7 km in 1987/88 (M-100s), 150 m in 1988/89 (M-1000s) and < 100 m in 1989/90 (35 SAE). In Italian and US RES surveys, modern global positioning systems were used for navigation that are accurate to within 50 m. Note that the minimum length of RES record for a 'lake' to be recorded in this inventory is 0.5 km.

regions unaccounted for in the previous inventory (Bogorodskiy & Sheremet'yev 1981, Popov & Masolov 2003).

The third RES dataset comprises three surveys undertaken by the US National Science Foundation's Support Office for Aerogeophysical Research (SOAR) at the University of Texas Institute for Geophysics (UTIG) in consecutive seasons between 1998 and 2001. The first is a survey from the Transantarctic Mountains to South Pole (1998–99), which produced two new RES transects across the subglacial lake at South Pole (no. 63, Table I). The second is a survey across the Transantarctic Mountains and the adjacent Wilkes Subglacial Basin, completed in 1999–2000, from which twenty nine lakes were identified (referred to in Table I by 'WLK'). This survey was extended in the same season to cover other parts of Dome C (referred to as the Dome C Extension, DCX in Table I), from which three lakes were located. The third survey in 2000–2001 was over Lake Vostok and its locale. The surface extent and glaciological setting of Lake Vostok itself was characterized well by this survey (Studinger *et al.* 2003). The survey also showed eleven new subglacial lakes (referred to in Table I by 'LVS').

Lake Vostok

The former inventory of subglacial lakes (Siegert *et al.* 1996) referred to the 12 RES transects available across Lake Vostok. These data, in combination with ERS-1 satellite altimetry, allowed the lake to be defined as over 200 km long and 50 km wide (Kapitsa *et al.* 1996, Siegert & Ridley 1998b). Subsequently, there have been two RES surveys of the lake [five transects from an Italian survey (Tabacco *et al.* 2003) and a dense grid of transects acquired by the US (Studinger *et al.* 2003)], as well as a long-term remote sensing programme [more then three hundred Russian RES sections (Masolov *et al.* 1999, 2001, in press, Popov *et al.* in press)], which confirm Lake Vostok to be a ~5400 km^3 body of water (Studinger *et al.* 2004), and which allow the extent of the lake (14 000 km^2) to be defined accurately within its topographic setting. These investigations allow us to include an outline of Lake Vostok within Fig. 1. Full details of the data available for this lake are not included, however, as there are now too many transects to include in Table I. Instead, reference to each of the Italian and US airborne geophysics campaigns are provided, from which further details on Lake Vostok can be obtained.

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The revised lake inventory

The new inventory of 145 subglacial lakes includes geographical coordinates, observed length and the thickness of overlying ice (Table I). As in Siegert *et al.* (1996) parentheses indicate that the RES record may contain a subglacial lake reflection, but identification is not certain.

The previous inventory listed lakes in the chronological order they were discovered. While this is of interest historically, it caused a problem in that records for Lake Vostok were scattered about the inventory. It is now more appropriate to mention Lake Vostok once in the inventory, and refer to all the data available for the lake in a single entry. This principle is applied to a number of other lakes, where more than one RES transect is available. In the original inventory of subglacial lakes, only two lakes other than Lake Vostok were covered by more than one RES transect. In the new inventory, this number is increased to twenty-three. Fifteen of these lakes are each located in two RES transects; four lakes (including the Aurora Lake) are identified in three transects; one lake is characterized by four RES lines; the Vincennes Lake is covered by seven RES lines; a lake within the Adventure Subglacial Trench is covered by ten RES transects; and Concordia Lake has been measured by fourteen transects.

Subglacial lakes have now been identified across the majority of Antarctica (Fig. 1). In West Antarctica, the inventory records four subglacial lakes. One of these is new, and is located near the Ellsworth Mountains (named Subglacial Lake Ellsworth, Siegert *et al*. 2004). In East Antarctica, clusters of lakes around Dome C, Ridge B and South Pole may be coincident with the dense network of RES flightlines that have been taken from these regions. Nevertheless, the distribution of subglacial lakes demonstrates that warm subglacial conditions occur across much of the continent, which will have implications for understanding the flow of ice, and for the purpose of validating numerical ice sheet models.

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