

*Mass balance data
from Arctic Glaciers
2002*



Photo: P. Holmlund

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1. Alaska

Table 1. Mass balance (m w. eq.) of the Gulkana Glacier (from USGS database)

Balance Year	Winter Balance	Summer Balance	Net Balance
1966	0.93	1.03	-0.1
1967	1.1	1.02	0.08
1968	1.52	1.64	-0.12
1969	0.67	1.63	-0.96
1970	0.7	0.32	0.38
1971	1.26	0.96	0.3
1972	1.03	1.4	-0.37
1973	1.41	0.91	0.5
1974	0.54	1.67	-1.13
1975	1.09	1.37	-0.28
1976	0.95	1.92	-0.97
1977	1.36	1.65	-0.29
1978	0.96	1.22	-0.26
1979	1.33	1.93	-0.6
1980	1.09	1.22	-0.13
1981	0.95	0.95	0
1982	1.49	1.67	-0.18
1983	1.1	1.17	-0.07
1984	1.25	1.63	-0.38
1985	1.37	0.75	0.62
1986	1.07	1.07	0
1987	1.21	1.4	-0.19
1988	1.24	1.52	-0.28
1989	-	-	-1.9
1990	1.33	2.07	-0.74
1991	1.29	1.43	-0.14
1992	0.97	1.26	-0.29
1993	0.81	2.41	-1.6
1994	1.34	1.89	-0.55
1995	0.9	1.82	-0.92
1996	-	-	-0.87
1997	-	-	-1.76
1998	-	-	-0.76
1999	-	-	-1.24
Cumulative	-	-	-15.2
Average	1.11	1.41	-0.45

Table 2. Mass balance (m w. eq.) of the McCall Glacier (after pers. comm., Leif Cox, 2002)

Balance Year	Net Balance
1969	-0.53
1970	-0.13
1971	-0.23
1972	-0.25
1993	-0.5
1994	-0.77
1995	-0.55
1996	0.03
1997	-0.45
1998	-0.86
1999	-0.56
2000	-0.31
2001	-0.34
Cumulative	
Average	-0.42

Table 3. Mass balance (m w. eq.) of the Wolverine Glacier (from USGS database)

Balance Year	Winter Balance	Summer Balance	Net Balance
1966	1.63	2.41	-0.78
1967	1.55	3.64	-2.09
1968	1.83	2.68	-0.85
1969	1.73	2.29	-0.56
1970	3.37	1.86	1.51
1971	2.11	1.96	0.15
1972	0.84	2.37	-1.53
1973	1.59	1.34	0.25
1974	1.5	3.1	-1.6
1975	2.5	2.72	-0.22
1976	0.97	2.17	-1.2
1977	4.21	2.82	1.39
1978	3.34	2.89	0.45
1979	1.44	3.02	-1.58
1980	4.6	2.27	2.33
1981	5.83	4.23	1.6
1982	2.02	2.35	-0.33
1983	2.72	2.61	0.11
1984	2.34	2.71	-0.37
1985	1.87	1.45	0.42
1986	2.14	2.38	-0.24
1987	3.27	1.93	1.34
1988	3.33	1.31	2.02
1989	1.33	3.23	-1.9
1990	1.22	3.69	-2.47
1991	2.13	2.45	-0.32
1992	2.26	3.69	-1.43
1993	2.33	2.96	-0.63
1994	2.18	2.92	-0.74
1995	2.5	3.13	-0.63
1996	-	-	-1.18
1997	-	-	-2.53
1998	-	-	0.53
1999	-	-	-0.85
Cumulative	-	-	-11.93
Average	2.36	2.62	-0.35

2. Canadian Arctic

Table 4. Mass balance (m w. eq.) of the Devon Ice Cap (north-western side) (from the National Glaciology Programme, Geological Survey of Canada)

Balance Year	Winter Balance	Summer Balance	Net Balance
1961	0.109	0.306	-0.197
1962	0.097	0.456	-0.359
1963	0.15	0.106	0.044
1964	0.115	+0.01	0.125
1965	0.087	0.023	0.064
1966	0.104	0.239	-0.135
1967	0.151	0.178	-0.027
1968	0.112	0.287	-0.175
1969	0.115	0.29	-0.175
1970	0.115	0.076	0.039
1971	0.12	0.189	-0.069
1972	0.116	0.014	0.102
1973	0.106	0.201	-0.095
1974	0.11	0.187	-0.077
1975	0.094	0.163	-0.069
1976	0.111	+0.065	0.176
1977	0.134	0.233	-0.099
1978	0.107	0.08	0.027
1979	0.101	0.062	0.039
1980	0.101	0.158	-0.057
1981	0.115	0.261	-0.146
1982	0.108	0.203	-0.095
1983	0.147	0.042	0.105
1984	0.127	0.158	-0.031
1985	0.137	0.245	-0.108
1986	0.104	+0.081	0.185
1987	0.144	0.1	0.044
1988	0.086	0.302	-0.216
1989	0.113	0.182	-0.069
1990	0.144	0.31	-0.166
1991	0.084	0.314	-0.23
1992	0.139	0.043	0.096
1993	0.103	0.165	-0.062
1994	0.062	0.094	-0.032
1995	0.087	0.234	-0.147
1996	0.12	0.201	-0.08
1997	0.134	0.147	-0.013
1998	0.141	0.417	-0.276
1999	0.084	0.301	-0.217
2000	0.0099	0.418	-0.32
Cumulative	-	-	-2.70
Average	0.1	0.18	-0.07

Table 5. Mass balance (m w. eq.) of the Drambuie Glacier (from the National Glaciology Programme, Geological Survey of Canada)

Balance Year	Net Balance
1977	-0.26
1978	-0.4
1979	-0.2
1980	-0.21
1981	-0.47
1982	-0.45
1983	-0.3
1984	-0.37
1985	-0.46
1986	-0.07
1987	-0.425
1988	-0.425
1989	-0.35
1990	-0.51
1991	-0.64
1992	-0.19
1993	-0.74
1994	-0.41
1995	-0.47
1996	-0.38
1997	-0.46
1998	-0.66
1999	-0.6
2000	-0.54
Cumulative	-10.2
Average	-0.425

Table 6. Mass balance (m w. eq.) of the Meighen Ice Cap (from the National Glaciology Programme, Geological Survey of Canada)

Balance Year	Winter Balance	Summer Balance	Net Balance
1960	0.13	0.92	-0.79
1961	0.18	0.33	-0.15
1962	0.16	1.2	-1.04
1963	0.2	0.46	-0.26
1964	0.33	0	0.33
1965	0.18	0.15	0.03
1966	0.16	0.27	-0.11
1967	0.11	0.2	-0.09
1968	0.19	0.17	0.02
1969	0.18	0.14	0.04
1970	0.12	0.14	-0.02
1971	0.19	0.57	-0.38
1972	-	-	-0.01*
1973	-	-	-0.01*
1974	0.17	0.26	-0.09
1975	0.12	0.12	0
1976	0.16	0.12	0.04
1977	0.12	0.47	-0.35
1978	0.14	0.26	-0.12
1979	-	-	-0.03*
1980	-	-	-0.03*
1981	0.19	0.41	-0.22
1982	0.17	0.05	0.12
1983	0.1	0.34	-0.24
1984	0.2	+0.03	0.23
1985	0.17	0.23	-0.06
1986	0.2	0.02	0.18
1987	0.18	0.38	-0.2
1988	0.17	0.48	-0.31
1989	0.25	0	0.25
1990	0.15	0.45	-0.3
1991	0.13	0.39	-0.26
1992	0.15	0.17	-0.02
1993	0.1	0.7	-0.6
1994	0.15	0.35	-0.2
1995	0.41	0.36	0.05
1996	0.18	+0.01	0.19
1997	0.24	0.3	-0.06
1998	0.22	0.32	-0.1
1999	0.14	0.49	-0.35
2000	0.15	0.64	-0.49
Cumulative	-	-	-4.84
Average	0.17	0.29	-0.12

* Mean of 2 year balance.

Table 7. Mass balance (m w. eq.) of the Melville South Ice Cap (from the National Glaciology Programme, Geological Survey of Canada)

Balance Year	Winter Balance	Summer Balance	Net Balance
1963	0.17	0.295	-0.124
1964	0.31	0.023	0.288
1965	0.14	0.071	0.069
1966	0.15	0.303	-0.153
1967	0.14	0.01	0.13
1968	-	-	0.021*
1969	0.15	-	0.021*
1970	0.16	0.434	-0.284
1971	0.18	0.674	-0.491
1972	-	-	-0.402
1973	-	-	-0.402
1974	0.26	0.518	-0.258
1975	0.16		-0.08**
1976	-	-	-0.08**
1977	-	-	-0.08**
1978	-	-	-0.08**
1979	-	-	-0.08**
1980	-	-	-0.08**
1981	0.18	0.371	-0.188
1982	0.18	0.499	-0.319
1983	0.16	0.234	-0.074
1984	0.15	0.112	0.038
1985	0.15	0.26	-0.056
1986	0.24	0.032	0.208
1987	0.24	0.224	0.016
1988	0.2	0.829	-0.629
1989	0.18	0.522	-0.342
1990	0.19	0.452	-0.262
1991	0.25	0.051	0.199
1992	0.17	0.49	-0.32
1993	0.13	0.882	-0.752
1994	0.14	0.25	-0.11
1995	0.12	0.59	-0.47
1996	0.2	0.41	-0.21
1997	0.27	0.26	0.01
1998	0.147	0.927	-0.78
1999	0.17	0.69	-0.52
2000	0.18	0.92	-0.74
2001	0.17		
Cumulative	-	-	-6.86
Average	0.18	-0.36	-0.18

* Mean of a 2 year balance.

** Average of 6 year balance.

Table 8. Mass balance (m w. eq.) of the glaciers on Axel Heibergs Island

1) Baby Glacier

2) White glacier (from *Adams *et al.*, 1998; □ Cogley *et al.*, 1996; # Haerberli

et al., 1998; ^ Haerberli and Hoelze, 1999; ** *personal communication* J. Cogley, 2002)

Balance Year	Net Balance	Balance Year	Net Balance
1960	-0.878*	1960	-0.404□
1961	0.106*	1961	0.023□
1962	-0.979*	1962	-0.781□
1963	-0.15*	1963	-0.154□
1964	0.25*	1964	0.35□
1965	0.15*	1965	-0.009□
1966	0.07*	1966	-0.022□
1967	0.21*	1967	0.121□
1968	-0.506*	1968	-0.406□
1969	0.14*	1969	0.074□
1970	0.11*	1970	-0.004□
1971	-0.476*	1971	-0.184□
1972	0.321*	1972	0.115□
1973	.*	1973	0.19□
1974	0.132* ()	1974	-0.046□
1975	0.319*	1975	0.247□
1976	0.149*	1976	0.112□
1977	-0.480*	1977	-0.372□
1978	-	1978	-0.134□
1979	-	1979	-0.109□
1980	-	1980	-
1981	-	1981	-
1982	-	1982	-
1983	-	1983	-0.083□
1984	-	1984	-0.055□
1985	-	1985	-0.012□
1986	-	1986	-0.259□
1987	-	1987	-0.617□
1988	-	1988	0.128□
1989	-	1989	0.028□
1990	-0.351*	1990	-0.448□
1991	-0.162*	1991	-0.179□
1992	-0.091*	1992	-0.295#
1993	-0.633**	1993	-0.48#
1994	-0.183**	1994	-0.314#
1995	-0.566**	1995	-0.362#
1996	0.236**	1996	0.038^
1997	-0.111**	1997	-0.056^
1998	-0.026**	1998	-0.229**
1999	-0.971**	1999	-0.494**
2000	-0.56**	2000	-0.401**
Cumulative	-3.96	Cumulative	-5.88
Average	-0.13	Average	-0.14

() The balance listed for 1974 is a 2-year balance covering 1972-73 and 1973-74.

3. Iceland

Table 9. Mass balance (m w. eq.) of the Tungnaarjökull in Vatnajökull (after Björnsson *et al.*, 1998; Björnsson personal communication, 2000).

Balance Year	Winter Balance	Summer Balance	Net Balance
1986	1.51	1.48	0.03
1992	1.75	1.51	0.24
1993	1.87	1.74	0.13
1994	1.7	1.83	-0.13
1995			Surge
1996			Surge
1997	0.96	2.84	-1.88
1998	0.82	2.3	-1.48
Cumulative	-	-	-3.09
Average	1.44	1.95	-0.51

Table 10. Mass balance (m w. eq.) of the Satujökull in Hofsjökull (after Sigurðsson, 2000).

Balance Year	Winter Balance	Summer Balance	Net Balance
1988	1.31	2.27	-0.96
1989	1.74	1.24	0.5
1990	1.45	2.05	-0.6
1991	1.94	3.35	-1.41
1992	1.87	0.81	1.06
1993	1.77	0.86	0.91
1994	1.7	1.62	0.08
1995	1.72	2.3	-0.58
1996	1.6	2.37	-0.77
1997	1.13	2.18	-1.05
1998	1.17	1.73	-0.56
1999	1.44	1.7	-0.26
Cumulative	-	-	-3.64
Average	1.57	1.87	-0.3

4. Svalbard

Table 11. Mass balance (m w. eq.) of the Finsterwalderbreen (after Hagen, 1996)

Balance Year	Net Balance
1950-52	-1.35
1952-54	0.05
1954-56	-1.2
1956-58	0.2
1958-60	-0.05
1960-62	-1.15
1962-64	-0.1
1964-66	-0.4
1966-68	-0.55
Cumulative	-4.55
Average	-0.51

Table 12. Mass balance (m w. eq.) of the Austre Bröggerbreen (after Lefauconnier *et al.*, 1999; Kohler personal communication, 2001)

Balance Year	Winter Balance	Summer Balance	Net Balance
1967	0.77	1.42	-0.65
1968	0.57	0.67	-0.1
1969	0.4	1.33	-0.93
1970	0.37	0.91	-0.54
1971	0.65	1.23	-0.58
1972	0.95	1.26	-0.31
1973	0.74	0.82	-0.08
1974	0.75	1.67	-0.92
1975	0.78	1.09	-0.31
1976	0.72	1.17	-0.45
1977	0.76	0.87	-0.11
1978	0.75	1.31	-0.56
1979	0.77	1.48	-0.71
1980	0.75	1.27	-0.52
1981	0.46	1.01	-0.55
1982	0.64	0.68	-0.04
1983	0.7	0.97	-0.27
1984	0.69	1.42	-0.73
1985	0.93	1.48	-0.55
1986	0.98	1.3	-0.32
1987	0.82	0.6	0.22
1988	0.61	1.13	-0.52
1989	0.56	1.01	-0.45
1990	0.75	1.41	-0.66
1991	0.92	0.79	0.13
1992	0.69	0.89	-0.1
1993	0.54	1.57	-1.03
1994	0.79	0.95	-0.16
1995	0.56	1.34	-0.78
1996	0.78	0.95	-0.17
1997	0.5	1.12	-0.71
1998	0.5	1.36	-0.86
1999	0.51	0.87	-0.36
Cumulative	-	-	-14.68
Average	0.69	1.14	-0.44

Table 13. Mass balance (m w. eq.) of the Kongsvegen (after Lefauconnier *et al.*, 1999; Kohler personal communication, 2001)

Balance Year	Winter Balance	Summer Balance	Net Balance
1987	0.96	0.42	0.54
1988	0.7	0.75	-0.05
1989	0.55	0.7	-0.15
1990	0.8	1.1	-0.3
1991	0.88	0.45	0.43
1992	0.92	0.6	0.32
1993	0.74	1.12	-0.38
1994	1	0.5	0.5
1995	0.64	0.89	-0.25
1996	1.16	0.77	0.39
1997	0.7	0.6	0.1
1998	0.47	1.18	-0.71
1999	0.57	0.72	-0.15
Cumulative	-	-	0.29
Average	0.79	0.76	0.02

Table 14. Mass balance (m w. eq.) of the Bertilbreen (after Hagen, 1996)

Balance Year	Winter Balance	Summer Balance	Net Balance
1975	-	-	-0.29
1976	0.34	1.06	-0.72
1977	0.48	1.07	-0.59
1978	0.44	1.44	-1
1979	0.5	1.35	-0.85
1980	0.31	1.23	-0.92
1981	0.42	1.08	-0.66
1982	0.34	0.51	-0.17
1983	0.41	0.88	-0.47
1984	0.43	1.46	-1.03
1985	0.44	1.41	-0.93
Cumulative	-	-	-7.63
Average	0.41	1.15	-0.67

Table 15. Mass balance (m w. eq.) of the Hansbreen (after Jania and Glowacki, personal communication, 2000; 2001)

Balance Year	Winter Balance	Summer Balance	Net Balance
1989	0.91	1	-0.09
1990	0.9	1.45	-0.55
1991	1.16	1.03	0.13
1992	0.89	1.16	-0.27
1993	0.93	1.60	-0.67
1994	0.76	0.61	0.15
1995	0.76	1.17	-0.40
1996	0.82	-	-
1997	0.99	-	-
1998	1.11	1.71	-0.60
1999	1.01	1.37	-0.36
2000	0.93	1.41	-0.48
2001	0.78	1.84	-1.06
Cumulative	-	-	-4.2
Average	0.92	1.30	-0.38

5. Northern Scandinavia

Table 16. Mass balance (m w. eq.) of the Engabreen (after Haakensen, 1998; Elvehøy, 1999 and 2000).

Balance Year	Winter Balance	Summer Balance	Net Balance
1970	2.05	3.04	-0.99
1971	3.2	2.19	1.01
1972	3.22	3.29	-0.07
1973	4.37	1.65	2.72
1974	3.39	2.59	0.8
1975	3.18	1.57	1.61
1976	3.86	1.45	2.41
1977	2.08	1.2	0.88
1978	2.48	2.99	-0.51
1979	3.64	3.22	0.42
1980	2.68	3.18	-0.5
1981	2.91	1.93	0.98
1982	2.27	1.43	0.84
1983	2.34	1.28	1.06
1984	3.83	2.78	1.05
1985	1.5	2.4	-0.9
1986	2.7	2.45	0.25
1987	2.57	1.63	0.94
1988	2.26	4.05	-1.79
1989	4.62	1.45	3.17
1990	3.49	2.64	0.85
1991	2.83	2.14	0.69
1992	4.05	1.71	2.34
1993	3.06	2.02	1.04
1994	1.95	1.53	0.42
1995	2.39	1.91	0.48
1996	2.97	2.14	0.83
1997	4.44	3.22	1.22
1998	2.98	2.82	0.16
1999	2.12	2.2	-0.08
2000	2.76	1.27	1.50
Cumulative	-	-	22.83
Average	2.98	2.27	0.71

Table 17. Mass balance (m w. eq.) of the Märmaglacièren (after Holmlund and Jansson, 1999; Pettersson, 2000; Pettersson, pers. comm., 2002)

Balance Year	Winter Balance	Summer Balance	Net Balance
1990	1.29	1.4	-0.11
1991	1.15	1.39	-0.24
1992	1.31	1.22	0.09
1993	1.3	1.03	0.27
1994	0.82	1.16	-0.34
1995	1.11	1.01	0.1
1996	0.96	1.35	-0.39
1997	1.74	1.94	-0.2
1998	0.83	1.11	-0.28
1999	1.1	1.4	-0.3
2000	1.16	1.03	0.13
2001	0.77	1.18	-0.41
Cumulative	-	-	-1.68
Average	1.13	1.27	-0.14

Table 18. Mass balance (m w. eq.) of the Storglacièren (after Holmlund and Jansson, 1999; Jansson, 2000; Pettersson, pers. comm., 2002).

Balance Year	Winter Balance	Summer Balance	Net Balance
1946	1.13	2.26	-1.13
1947	1.03	3.10	-2.07
1948	1.45	1.45	0.00
1949	2.23	1.32	0.91
1950	1.42	2.71	-1.29
1951	0.81	1.45	-0.64
1952	0.87	1.03	-0.16
1953	1.94	2.74	-0.80
1954	1.13	2.10	-0.97
1955	1.61	1.77	-0.16
1956	1.29	1.77	-0.48
1957	1.61	1.94	-0.33
1958	1.45	2.10	-0.65
1959	0.97	1.94	-0.97
1960	0.68	2.29	-1.61
1961	0.81	1.90	-1.09
1962	1.10	0.77	0.33
1963	1.45	1.65	-0.20
1964	1.58	1.10	0.48
1965	1.47	1.06	0.41
1966	1.20	1.73	-0.53
1967	1.35	1.58	-0.23
1968	1.27	1.37	-0.10
1969	0.98	2.02	-1.04
1970	0.99	2.51	-1.52
1971	1.33	1.52	-0.19
1972	1.39	2.44	-1.05
1973	1.67	1.62	0.05
1974	1.31	1.65	-0.34
1975	1.98	0.81	1.17
1976	1.93	1.66	0.27
1977	1.23	1.03	0.20
1978	1.46	1.54	-0.08
1979	1.54	1.76	-0.22
1980	0.93	2.17	-1.24
1981	1.16	1.36	-0.20
1982	1.49	1.23	0.26

Balance Year	Winter Balance	Summer Balance	Net Balance
1983	1.47	1.19	0.28
1984	1.83	1.71	0.12
1985	0.99	1.71	-0.72
1986	1.62	1.68	-0.06
1987	1.69	1.22	0.47
1988	1.42	2.26	-0.84
1989	2.58	1.34	1.24
1990	2.26	1.67	0.59
1991	1.68	1.51	0.17
1992	2.24	1.36	0.88
1993	2.25	1.25	1.00
1994	1.06	1.43	-0.37
1995	1.93	1.23	0.70
1996	1.30	1.66	-0.36
1997	1.87	2.50	-0.63
1998	1.35	1.87	-0.52
1999	1.45	1.70	-0.18
2000	1.32	1.19	0.13
2001	1.14	1.84	-0.70
Cumulative	-	-	-14.01
Average	1.44	1.69	-0.25

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Table 19. Mass balance (m w. eq.) of the Vavilov Glacier (after Barkov *et al.*, 1992).

Balance Year	Winter Balance	Summer Balance	Net Balance
1975	0.12	0.33	-0.21
1976	0.39	0.04	0.35
1977	0.31	0.16	0.15
1978	0.17	0.7	-0.53
1979	0.21	0.82	-0.61
1980	0.16	0.32	-0.16
1981	0.38	0.13	0.25
1986	0.36	0.28	0.08
1987	0.31	0.38	-0.07
1988	0.44	0.02	0.46
Cumulative	-	-	-0.29
Average	0.29	0.31	-0.03

Table 20. Mass balance (m w. eq.) of the IGAN Glacier (after Voloshina, 1988).

Balance Year	Winter Balance	Summer Balance	Net Balance
1958	1.15	1.45	-0.3
1959	2.65	3	-0.35
1960	1.4	2.08	-0.68
1961	2.2	2.46	-0.26
1962	3.2	3.2	0
1963	2.1	3.37	-1.27
1964	1	2	-1
1965	2.5	3.16	-0.66
1966	1.75	1.95	-0.2
1967	3.14	2.86	0.28
1968	3.41	0.92	2.49
1969	1.42	2	-0.58
1970	1.78	1.77	0.01
1971	1.84	1.98	-0.14
1972	2.91	2.53	0.38
1973	3	2.68	0.32
1974	2.19	3.12	-0.93
1975	2.72	1.8	0.92
1976	2.51	3.83	-1.32
1977	2.36	4.02	-1.66
1978	-	-	0.89
1979	-	-	-0.37
1980	-	-	1.02
1981	-	-	-1.11
Cumulative	-	-	-4.52
Average	2.26	2.51	-0.19

Table 21. Mass balance (m w. eq.) of the Obruchev Glacier (after Voloshina, 1988).

Balance Year	Winter Balance	Summer Balance	Net Balance
1958	1.85	2.35	-0.5
1959	2.9	3.45	-0.55
1960	1.75	2.25	-0.5
1961	2.8	3.01	-0.21
1962	3.5	3.65	-0.15
1963	2.5	3.23	-0.73
1964	1.1	2.4	-1.3
1965	2.42	2.78	-0.36
1966	2.03	1.75	0.28
1967	3.76	3.56	0.2
1968	3.41	1.6	1.81
1969	1.48	2.03	-0.55
1970	2.2	1.86	0.34
1971	2.26	2.47	-0.21
1972	3.65	2.8	0.85
1973	3.08	2.9	0.18
1974	2.62	3.3	-0.68
1975	2.75	2.58	0.17
1976	3.52	4.87	-1.35
1977	3.35	4.99	-1.64
1978	3.76	2.2	1.56
1979	2.98	2.99	-0.01
1980	-	-	1.07
1981	-	-	-0.94
Cumulative	-	-	-3.22
Average	2.71	2.86	-0.13

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