

# Monthly Summaries of Soil Temperature and Soil Moisture at Oil Contamination Sites in Antarctica, Version 1

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## USER GUIDE

### How to Cite These Data

As a condition of using these data, you must include a citation:

Paetzold, R., ed. 2003. *Monthly Summaries of Soil Temperature and Soil Moisture at Oil Contamination Sites in Antarctica, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NSIDC: National Snow and Ice Data Center. <https://doi.org/10.7265/t8tb-3c87>. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT [NSIDC@NSIDC.ORG](mailto:NSIDC@NSIDC.ORG)

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/GGD626>



National Snow and Ice Data Center

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# 1 DATA DESCRIPTION

To determine the effects of oil spills on soil temperature and moisture, soil climate stations were built at existing contamination sites -- Scott Base, Marble Point, Bull Pass, and nearby control sites in the Ross Sea Region, Antarctica. Sensors recorded soil temperature, soil moisture, air temperature, relative humidity, solar radiation, net radiation, wind speed, and wind direction. Data extend from January 1999 through December 2001. Data from individual stations are available in tab-delimited ASCII text files. An Excel spreadsheet contains the same data compiled together in a single file. NSIDC currently provides these summary data via ftp; the full soil temperature and moisture data set is available from Ron Paetzold, USDA.

This project investigates the impacts of hydrocarbon spills on soils of the Ross Sea region. Accidental fuel spills in the region occur mainly near scientific stations, where storage and refueling of aircraft and vehicles often results in spills. To determine the effects of spills on soil temperature and moisture, soil climate stations were built at existing contamination sites: Scott Base, Marble Point, Bull Pass, and nearby control sites.

A Campbell Scientific CR10X-2M datalogger records day, time, battery (voltage), and internal temperature. A combination of the following below-ground sensors are attached to the datalogger: Vitel Hydra dielectric constant soil moisture and temperature sensors, Campbell 107 soil temperature sensors, and MRC soil temperature probes.

At Bull Pass, two additional Vitel sensors were installed under a rock at about 40-cm depth. One of the three Campbell 107 temperature sensors was placed under a white rock, one under a black rock, and another between the Vitel sensors under the rock at 42-cm depth.

At Scott Base Oil station, one additional Vitel sensor and six Campbell 107 sensors were placed in an adjacent control site.

Above-ground sensors at all sites include Licor LI200X pyranometer (solar radiation) sensors and Met One wind speed and direction sensors, which are mounted 3 m above the ground. Vaisala HMP45C air temperature and relative humidity sensors are mounted approximately 1.6 m above the ground.

See section 0 for a table of active-layer depths at the three primary stations, and graphs of soil temperatures at all six stations.

## 1.1 File Information

### 1.1.1 Format

Each of the six station files contains average, median, standard deviation, maximum, and minimum values for the following variables. Not all stations have all of these columns.

Table 1. Sample Data

Column No.	Column Name	Description	Units	Location	Sensor
1	BATT VOLT	Battery voltage	Volts	Datalogger	Campbell CR10X-2M
2	INT TEMP	Datalogger temperature	°C	Datalogger	Campbell CR10X-2M
3	AIR TEMP	Air temperature	°C	Air 1.6 m	Vaisala HMP45C
4	RH	Relative humidity of soil	%	Soil. Depth varies among stations.	Vaisala HMP45C
5	SOLAR RADIATION		W/m <sup>2</sup>	Air 3 md	LiCor
6	NET RADIATION		W/m <sup>2</sup>	Air 3 m	LiCor
7	WIND SPEED		mph	Air 3 m	Met One
8	WIND DIRECTION		Azimuth	Air 3 m	Met One
9	WIND SPEED		m/s	Air 3 m	Met One
10	SOIL T	Soil temperature at 2-cm depth, measured with Campbell 107 sensor	°C	Soil 2 cm	Campbell 107
11	SOIL T	Soil temperature at 15-cm depth, measured with Campbell 107 sensor	°C	Soil 15 cm	Campbell 107
12	SOIL T	Soil temperature at 25-cm depth, measured with Campbell 107 sensor	°C	Soil 25 cm	Campbell 107

Column No.	Column Name	Description	Units	Location	Sensor
13	COR SOIL T	Corrected soil temperature at 2-cm depth, measured with Campbell 107 sensor	°C	Soil 2 cm	Campbell 107
14	COR SOIL T	Corrected soil temperature at 15-cm depth, measured with Campbell 107 sensor	°C	Soil 15 cm	Campbell 107
15	COR SOIL T	Corrected soil temperature at 25-cm depth, measured with Campbell 107 sensor	°C	Soil 25 cm	Campbell 107
16	MRC	Surface soil temperature, measured with MRC sensor	°C	Soil 0 cm	MRC
17	MRC	Soil temperature at 7.5-cm depth, measured with MRC sensor	°C	Soil 7.5 cm	MRC
18	MRC	Soil temperature at 15-cm depth, measured with MRC sensor	°C	Soil 15 cm	MRC
19	MRC	Soil temperature at 22.5-cm depth, measured with MRC sensor	°C	Soil 22.5 cm	MRC
20	MRC	Soil temperature at 30-cm depth, measured with MRC sensor	°C	Soil 30 cm	MRC
21	MRC	Soil temperature at 45-cm depth, measured with MRC sensor	°C	Soil 45 cm	MRC
22	MRC	Soil temperature at 60-cm depth, measured with MRC sensor	°C	Soil 60 cm	MRC
23	MRC	Soil temperature at 75-cm depth, measured with MRC sensor	°C	Soil 75 cm	MRC
24	MRC	Soil temperature at 90-cm depth, measured with MRC sensor	°C	Soil 90 cm	MRC

Column No.	Column Name	Description	Units	Location	Sensor
25	MRC	Soil temperature at 105-cm depth, measured with MRC sensor	°C	Soil 105 cm	MRC
26	MRC	Soil temperature at 120-cm depth, measured with MRC sensor	°C	Soil 120 cm	MRC
27	Rep 1	Soil temperature at 2-cm depth, measured with Vitel sensor, Stack 1	°C	Soil 2 cm	Vitel
28	Rep 1	Water volumetric content at 2-cm depth, measured with Vitel sensor, Stack 1	H <sub>2</sub> O v/v	Soil 2 cm	Vitel
29	Rep 1	Soil temperature at 15-cm depth, measured with Vitel sensor, Stack 1	°C	Soil 15 cm	Vitel
30	Rep 1	Water volumetric content at 15-cm depth, measured with Vitel sensor, Stack 1	H <sub>2</sub> O v/v	Soil 15 cm	Vitel
31	Rep 1	Soil temperature at 25-cm depth, measured with Vitel sensor, Stack 1	°C	Soil 25 cm	Vitel
32	Rep 1	Water volumetric content at 25-cm depth, measured with Vitel sensor, Stack 1	H <sub>2</sub> O v/v	Soil 25 cm	Vitel
33	Rep 1	Soil temperature at 40-cm depth, measured with Vitel sensor, Stack 1	°C	Soil 40 cm	Vitel
34	Rep 1	Water volumetric content at 40-cm depth, measured with Vitel sensor, Stack 1	H <sub>2</sub> O v/v	Soil 40 cm	Vitel
35	Rep 2	Soil temperature at 35-cm depth, measured with Vitel sensor, Stack 2	°C	Soil 2 cm	Vitel

Column No.	Column Name	Description	Units	Location	Sensor
36	Rep 2	Water volumetric content at 2-cm depth, measured with Vitel sensor, Stack 2	H <sub>2</sub> O v/v	Soil 2 cm	Vitel
37	Rep 2	Soil temperature at 15-cm depth, measured with Vitel sensor, Stack 2	°C	Soil 15 cm	Vitel
38	Rep 2	Water volumetric content at 15-cm depth, measured with Vitel sensor, Stack 2	H <sub>2</sub> O v/v	Soil 15 cm	Vitel
39	Rep 2	Soil temperature at 25-cm depth, measured with Vitel sensor, Stack 2	°C	Soil 25 cm	Vitel
40	Rep 2	Water volumetric content at 25-cm depth, measured with Vitel sensor, Stack 2	H <sub>2</sub> O v/v	Soil 25 cm	Vitel
41	Rep 2	Soil temperature at 40-cm depth, measured with Vitel sensor, Stack 2	°C	Soil 40 cm	Vitel
42	Rep 2	Water volumetric content at 40-cm depth, measured with Vitel sensor, Stack 2	H <sub>2</sub> O v/v	Soil 40 cm	Vitel
43	Rep 3	Soil temperature at 1-cm depth, measured with Vitel sensor, Stack 3	°C	Soil 1 cm	Vitel
44	Rep 3	Water volumetric content at 2-cm depth, measured with Vitel sensor, Stack 3	H <sub>2</sub> O v/v	Soil 2 cm	Vitel
45	Rep 3	Soil temperature at 15-cm depth, measured with Vitel sensor, Stack 3	°C	Soil 15 cm	Vitel

Column No.	Column Name	Description	Units	Location	Sensor
46	Rep 3	Water volumetric content at 15-cm depth, measured with Vitel sensor, Stack 3	H <sub>2</sub> O v/v	Soil 15 cm	Vitel
47	Rep 3	Soil temperature at 25-cm depth, measured with Vitel sensor, Stack 3	°C	Soil 25 cm	Vitel
48	Rep 3	Water volumetric content at 25-cm depth, measured with Vitel sensor, Stack 3	H <sub>2</sub> O v/v	Soil 25 cm	Vitel
49	Rep 3	Soil temperature at 40-cm depth, measured with Vitel sensor, Stack 3	°C	Soil 40 cm	Vitel
50	Rep 3	Water volumetric content at 40-cm depth, measured with Vitel sensor, Stack 3	H <sub>2</sub> O v/v	Soil 40 cm	Vitel

### 1.1.2 File Sizes

ggd626\_bullpass.txt: 64 KB

ggd626\_bullpassoil.txt: 18 KB

ggd626\_marblepoint.txt: 68 KB

ggd626\_marblepointoil.txt: 35 KB

ggd626\_scottbase.txt: 62 KB

ggd626\_scottbaseoil.txt: 24 KB

ggd626\_ant\_soiltemp.xls: 634 KB

### 1.1.3 Naming Convention

ggd626\_bullpass.txt: data from Bull Pass station (control site)

ggd626\_bullpassoil.txt: data from Bull Pass Oil station (contamination site)

ggd626\_marblepoint.txt: data from Marble Point station (control site)

ggd626\_marblepointoil.txt: data from Marble Point Oil station (contamination site)

ggd626\_scottbase.txt: data from Scott Base station (control site)

ggd626\_scottbaseoil.txt: data from Scott Base Oil station (contamination site)

ggd626\_ant\_soiltemp.xls: Excel spreadsheet of data from all stations

## 1.2 Spatial Information

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### 1.2.1 Coverage

Data were collected from six sites in Antarctica. Coordinates below are averaged from multiple GPS readings:

Northwest latitude: 77.45 S

Northwest longitude: 161.8806 E

Southeast latitude: 77.9806 S

Southeast longitude: 166.7806 E

## 1.3 Temporal Information

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### 1.3.1 Coverage

Bull Pass: 23 January 1999 through 31 December 2001

Bull Pass Oil: 23 January 1999 through 31 December 2001

Marble Point: 21 January 1999 through 31 December 2001

Marble Point Oil: 21 January 1999 through 31 December 2001

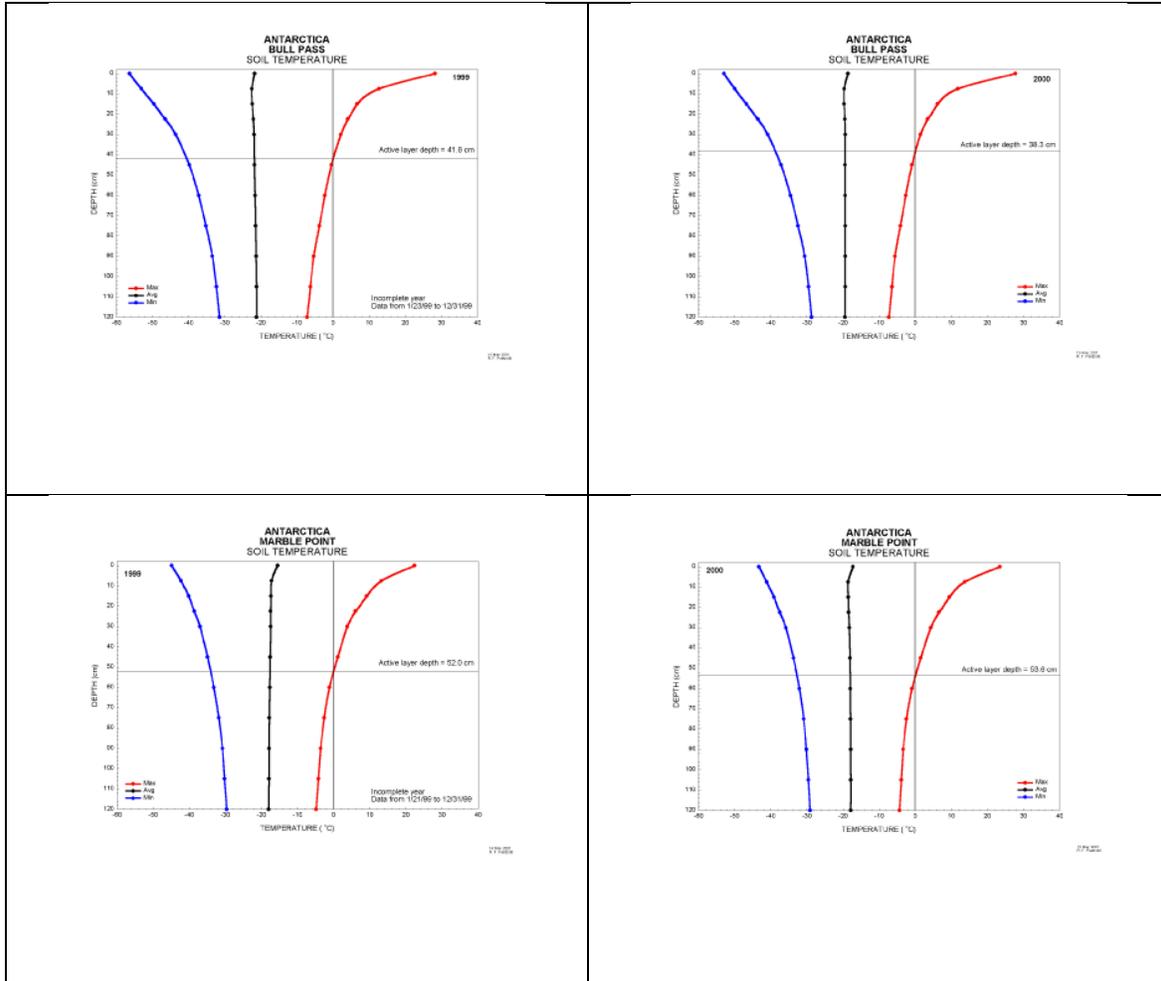
Scott Base: 26 January 1999 through 31 December 2001

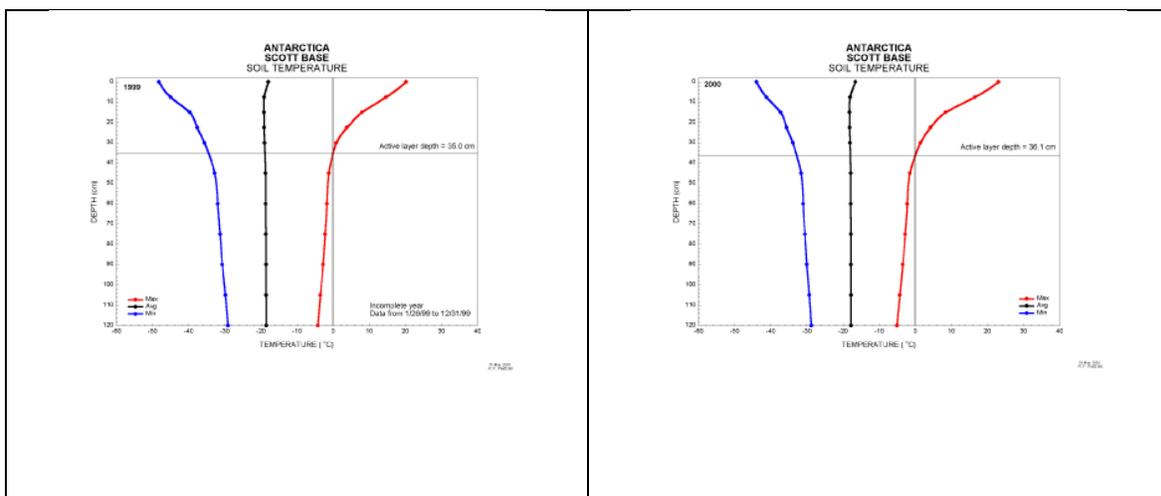
Scott Base Oil: 03 December 1999 through 31 December 2000

### 1.3.2 Active Layer Depths

Year	Active-layer depths (cm)		
	Scott Base	Bull Pass	Marble Point
1999	35.0	41.8	52.0
2000	36.1	38.3	53.6

### 1.3.3 Soil Temperatures





## 2 CONTACTS AND ACKNOWLEDGMENTS

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## 3 REFERENCES

Balks, M.R., R.F. Paetzold, J.M. Kimble, J. Aislabie, and I.B. Campbell. 2002. Effects of hydrocarbon spills on the temperature and moisture regimes of cryosols in the Ross Sea region. *Antarctic Science* 14(4): 319-326.

## 4 DOCUMENT INFORMATION

### 4.1 Publication Date

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April 2003

### 4.2 Date Last Updated

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20 January 2021