FILE NAME: StationRecordScottBase.doc

LAST UPDATED: 3/16/2023

STATION RECORD

## SCOTT BASE

**ANTARCTICA**

**STATION:** SCOTT BASE (ANT001)

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| **STATION MANAGER:**  Phone:  FAX:  E-mail: | Cathy Seybold  USDA NRCS  Federal Bldg., Rm. 152  Lincoln, NE 68508  USA  (402) 437-4132  (402) 437-5336  cathy.seybold@usda.gov | Deb Harms  USDA NRCS  Federal Bldg., Rm. 152  Lincoln, NE 68508  USA  (402) 437-5336  deb.harms@usda.gov |  |
|  |  |  |  |
| **PROJECT PERSONNEL:**  Phone:  FAX:  E-mail: | Tanya O’Neill  University of Waikato  Private Bag 3105  Hamilton, 3240 NZ  tanya.oneill@waikato.ac.nz | Megan Balks  Dept. of Earth Sciences  University of Waikato  Private Bag 3102  Hamilton, NZ  +647 8562 889  +647 8560 115  m.balks@waikato.ac.nz |  |
|  |  |  |  |
| Phone:  FAX:  E-mail: | Iain Campbell  23 View Mount  Stoke 7001  Nelson, NZ  64 3 547 3329  64 3 547 3329  campbell.lsc@xtra.co.nz | Malcolm McLeod  Landcare Research  Private Bag 3127  Hamilton, NZ  +647 858 4926  mcleodm@landcare.cri.nz | David Saul  School of Biological Sciences  University of Auckland  Private Bag 92019  Auckland, NZ  64 9 373 7599 x 87712  d.saul@auckland.ac.nz |
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**LOCATION:** Scott Base, Antarctica.

GPS (01/16/99): 77° 50’ 53.9” S

166° 45’ 40.7” E

m elevation

GPS (11/30/99): 77° 50’ 53.5” S

166° 45’ 38.6” E

200 ft elevation

GPS (12/08/99): 77° 50’ 53.4894” S

166° 45’ 38.6359” E

37.659 m (123.55 ft) elevation

NOTE: Differential GPS at the MRC probe by Erol Balks

GPS (12/09/00): 77° 50’ 53.7” S

166° 45’ 38.8” E

153 ft elevation

GPS (12/31/01): 77° 50’ 53.5” S

166° 45’ 38.5” E

157 ft elevation

GPS (01/16/03): 77° 50’ 53.6” S

166° 45’ 38.5” E

145 ft elevation

GPS (01/05/04): 77° 50’ 53.5” S

166° 45’ 38.1” E

118 ft elevation

GPS (01/17/05): 77° 50’ 53.6” S

166° 45’ 38.7” E

GPS (01/18/09): 77° 50’ 53.6” S

166° 45’ 38.6” E

109 ft elevation

GPS (01/21/12): 77° 50’ 53.9” S

166° 45’ 38.1” E

143 ft elevation

**INSTRUMENTATION:**

Summary

|  |  |  |
| --- | --- | --- |
| Quantity | Description | Comments |
| (1) | Campbell CR-10X-2M datalogger S/N: X14674. Wiring panel S/N: 6325. | Installed 1999. Replaced 12/00 because of factory recall. |
| (1) | Campbell CR-10X-2M-XT datalogger S/N: X24395. Wiring panel S/N: 6325. | Installed 12/00; Replaced 01/04 |
| (1) | Campbell CR-10X-2M-XT datalogger S/N:  X28503. Wiring panel S/N: 6325 | Installed 01/04; Replaced wiring panel 01/08; Removed 01/15/09 |
| (1) | Campbell AM416 multiplexer S/N: 11642. | Installed 1999; Replaced 01/08; Removed 01/15/09 |
| 1 | Campbell CR1000 datalogger S/N:12046 | Installed 01/15/09 |
| 1 | Campbell NL115 flash card storage module | Installed 01/15/09 |
| 1 | Campbell SC932 modem interface S/N: 6302 | Installed 2003. |
| 1 | Campbell NL100 network link interface S/N: 1384 | Installed 2003 in Scott Base Hatherton Lab. |
| 3 | Campbell BP24 24-amp-hr YUASA battery | Installed 2007, 2008, 2009 |
| (1) | Power-Sonic 30AH battery | Installed 1999. Provided by Ron Sletten (Replaced in 2005) |
| 1 | Campbell CH12R charger/regulator S/N: 1806. | Installed 1999. |
| 1 | Campbell MSX-20 Solar panel. | Installed 1999. |
| 1 | Campbell ENC 16/18 enclosure. | Installed 1999. |
| 1 | Campbell CM10 3-m tower | Installed 1999. Added guy wires in 01/09 |
| (12) | Vitel dielectric constant soil moisture/temperature sensors. | Installed 1999. Stack 1 (4 sensors) replaced 1/06. Stack 1 (#3 sensor) replaced 1/07. All were removed 01/09 |
| 12 | Steven’s Hydra-probe SDI-12 (soil moisture/temperature sensors) | Installed 01/09 |
| 4 | Campbell 107B soil temperature sensors | Installed 1999. Added 4th 107 in 01/09 |
| 1 | MRC soil temperature probe | Installed 1999. |
| 1 | Vaisala HMP45C temp/relative humidity sensors. | Installed 2005. Replaced 01/09 |
| (1) | Vaisala HMP35C temp/relative humidity sensors. | Installed 12/00. Replaced with HMP45C 2005 |
| 1 | Campbell solar radiation shields for HMP35C or HMP45C temperature/humidity sensors. | Installed 1999. |
| 1 | Licor LI200X pyranometer solar radiation sensors. | Installed 1999. |
| 1 | Licor pyranometer solar radiation sensor leveling fixtures. | Installed 1999. |
| 1 | Pyranometer mounting arms. | Installed 1999. |
| 1 | REBS Q\*7.1 net radiometer (S/N: Q98047)  Correction factors top: 9.44, bot: 11.76 | Installed 12/00 |
| (1) | Met One wind speed & direction sensors (S/N: C3295) | Installed 1999. Replaced 2005. Removed 01/09 |
| 1 | R.M. Young wind speed & direction sensor | Installed 01/09 |
| 1 | Wind sensor mounting arms | Installed 1999. |
| 1 each | Solar panel, regulator, and 24 Ahr battery (own power system for hydra-probes) | Installed Jan 2010 |

**HISTORY:**  January 17, 1999: Station initiated. Three stacks of four Vitel Hydra probes were installed and attached to a Campbell Scientific CR10X-2M datalogger. Three Campbell 107 temperature sensors were installed and attached to the datalogger. A MRC soil temperature probe was installed and connected to the datalogger. Above ground sensors are one Licor pyranometer, one Met One wind speed and direction sensor, and one Vaisala HMP45C air temperature and relative humidity sensor. The above ground sensors were mounted on the tower using appropriate brackets. The air temperature/relative humidity sensor was mounted in a solar radiation shield. The wind and solar radiation sensors were mounted three meters above the ground surface. The air temperature/relative humidity sensor was mounted approximately 1.6 meters above the ground surface. The datalogger, a Campbell AM416 multiplexer, and a Campbell BP24 power supply, were located inside of a Campbell ENC16/18 enclosure. The enclosure was mounted on a Campbell CM10 3-m tower. Power is supplied by a Campbell (SolarX) MSX20 solar panel, mounted on the tower. The solar panel faces true north and is perpendicular to the surface of the earth. An additional Power-Sonic 30AH battery was connected in parallel to battery in the enclosure. The additional battery was placed in a wooden box. Datalogger was set to New Zealand Standard Time. Midnight is 2400. The datalogger program, *Ant1*, was downloaded to the datalogger. Measurements are made at 20-minute intervals and averaged and recorded every hour. Measurements of solar radiation and wind are made at 10-second intervals and averaged and recorded every hour.

November 30, 1999: Downloaded new program, *Ant1*, to correct solar radiation calculation (changed multiplier from 400 to 200). Added new desiccant. Downloaded data. Everything OK.

December 8, 1999: Discovered that the green and white wires for V3 and V4 for the Vitel sensor connected to AM416 position 10 were reversed. Re-wired these wires to correct positions. Downloaded data. Everything OK.

December 9, 2000: Downloaded data to Ant1.dat Recorded serial numbers. Datalogger is one that was recalled by Campbell. Everything seems to be working OK.

December 10, 2000: Replaced datalogger with CR10X2M-XT (S/N: X24395). Replaced HMP45C air temperature/relative humidity probe with HMP35C because the HMP45C couldn’t measure air temperatures lower than –40ºC. Added REBS Q\*7.1 net radiometer (S/N: Q98047). Clamped the net radiometer to the north tripod leg because the clamps were too small for the main tripod mast. Downloaded *Ant1 v.2.00* to accommodate the new instruments. Everything seems to be working OK. Added desiccant.

December 31, 2001: Downloaded data to Ant1.dat. Everything seems to be working OK. Net radiometer bulbs look frosted. Wiped them off with glove. Probably should replace them next year.

January 1, 2002: Removed HMP35C air temperature/relative humidity sensor radiation shield for use at Mt. Fleming. Wedged sensor between enclosure and solar panel so it will be in shade most of time.

January 14, 2002: Replaced HMP35C air temperature/relative humidity sensor radiation shield. Downloaded data to Ant1.dat. Everything seems to be working OK. MRC probe has been raised about two inches (due to frost heave?) so that the 0-in depth sensor is now 2 inches into the air, the 3-inch sensor is now at one inch, etc.

January 5-6, 2003: Don Huffman connected the datalogger with the Scott Base server and downloaded a modified datalogger program, *Ant1* v. 3.00, so that the data are output in groups so that the WCC computers can use it. He downloaded the data to Ant1\_03.dat. Don Huffman will provide notes as to what he did and what equipment was installed, along with a wiring diagram showing the installation of the equipment connecting the datalogger to the server.

January 16, 2003: Net radiation sensor is completely frosted and needs to be replaced. MRC probe top sensor is 2.5 inches above the soil surface. It was probably installed this way. Check original notebook. Top of probe is 3.25 inches above the soil surface. The probe is firm in the ground. Solar radiation data reads 0 since installation of new program. Investigation shows that the datalogger is reading the wrong channel. This is corrected. Added desiccant. Everything seems to be working OK.

February 1, 2003: Downloaded *Ant1* v. 3.01. Changed security code and added hourly max 10-s wind speed and daily average air temperature.

May 2, 2003: Cleared datalogger. Corrected time. Downloaded *Ant1* v. 3.01 at 05/03/03 0038 NZ standard time. There were problems with the datalogger recording the data. The measurements were OK, but garbage was being recorded. Also, the time went bad. Wrong year, month, day, & hour. Seems to be working OK now. Li battery is low.

January 5, 2004: Transferred the data to a Campbell SM4M storage module. Replaced the datalogger with CR-10X-2M-XT (S/N: X28503). Replaced the desiccant.

January 8, 2004: Replaced the net radiometer globe.

January 14, 2005: Swapped out the single battery that was in the wooden box on the ground. Added a third battery. It is also on the ground behind the boxed one. Dated both new batteries. Used crimp type butt splices to connect the wiring. Changed both the upper and lower lenses on the net radiometer. Downloaded the data from the logger to a Campbell SM4M storage module. Voltages: station batteries-13.3 vdc, Li battery-3.1 vdc. Swapped desiccant packs. Checked wiring of RAD modem, SC932 interface, and full length of twisted pair cable. Found no problems. Did continuity testing of the twisted pair cable. Checked good after problem was found with an intermittent jumper wire. Operation and programming of the NL-100 checked okay. From current data on the PDA, it appears that the RH side of the HMP-35 has failed. Weather conditions: high thin clouds, -5C, wind 7-10 mph.

January 15, 2005: Pulled RAD modem and SC-932 from station. Did loopback tests on all 4 RAD modems and checked DCE on both SC-932s. Replaced modem and 932 in station. Did loopback on station modem and twisted pair cable. Reinstalled modem in Hatherton Lab rack. Found comms cable attached to CS-I/O port rather than RS-232 port on NL-100. Also, PC208W in the lab had the wrong security code for the datalogger (1101,0000,0000). Changed security code to match that set by R. Paetzold, May 8, 2003 (7101,1111,0000). Communications were restored and link operates normally. Notes: IP address for NL-100 (192.133.31.155), Sub-net mask (255.255.255.128), DNS Primary (192.133.31.146), DNS Secondary (131.203.248.1). Peter deJoux, SB summer science tech assisted with the diagnostics.

January 17, 2005: Replaced the Met One anemometer as a precaution. Bearings were getting noisy. Used existing cable. Replaced the HMP-35 with a HMP-45. Data still shows as bad. Both RH and temp. Need to work with Ron P. to see if both need corrections in programming or if we need to send Peter deJoux a different one. Could have Peter install a CSI-107 and re-program to get temps if that is all that we can do. Station time 7:47 PM, actual 8:22 PM, NZST. Station was reset. Taped down loose outside wiring. Took station pictures looking N,E,S,W. Weather conditions: clear, -4C, light breeze.

March 9, 2005: Over the weekend of March 5-6, D. Huffman modified the datalogger program to work with the HMP-45 that was installed in January, and uploaded it today. Air temp now works, but still do not have RH (original problem). Security codes were changed on the logger from 7101,1111,0000 to 1991,0000,0000. Later it was learned that Don also removed the maximum hourly wind speed and average daily air temperature.

January 8, 2006: Added two new battery containment boxes that are located on the ground. Replaced one 24 amp-hr battery (battery was installed in 2005). Replaced both the upper and lower lenses on the net radiometer (the lenses were scratched on one side due to sand blasting). After trial and error, it was discovered that the SE 8 channel on the wiring panel was not working properly, causing the RH not to work. Rewired the RH (blue wire), of the HMP45C, to the SE 10 channel. The logger program was retrieved and modified for the new wiring, and then uploaded. Relative humidity now works. Station clock (7:54 PM) was 19 min behind actual time (8:13 PM). Station clock was reset (NZ standard time). Taped down some loose outside wiring. The depth from the top of the MRC probe to the soil surface was 9.5 cm (3.63 inches). Added three packets of desiccant. There was no storage module installed.

January 11, 2006: There were 7 vitels (stack 1 and the 1st three in stack 2) that were not working properly. Stack one vitels (1st four sensors) were removed and four new ones were installed. We only had enough vitels to replace four of them. They were installed at the same depths of 2, 15, 25, and 40 cm in same location. The original fourth vital depth was actually at 37 cm (measured from middle of sensor). Everything appeared to be working okay. Weather conditions: clear, -9°C, 10 mph wind.

February 16, 2006: Don Huffman modified the datalogger program to reinstall maximum hourly wind speed. The program was downloaded between 10 and 11 am.

March 22, 2006: It was discovered that RH was not working since Feb. 16, 2006. The wrong program was modified on Feb 16, which did not contain the RH correction that was made on Jan. 8, 2006. The data was downloaded between 7 and 8 am. Don Huffman modified the logger program to correct the RH (RH input from SE8 to SE10).

January 12, 2007: Vitel #3 (25 cm depth) was reading -6999 for all four voltages. The Vitel was replaced and put in a different location so as not to disturb the original stack. Lithium battery voltage was 3.06. Station clock was 30 min behind—reset clock at 8:30 pm and at 10:30 pm. The enclosure inside was wet; the desiccant was all soaked. Fixed the two cable openings (in the bottom of the enclosure) so nothing could blow in. The globes were sand blasted on one side. Replaced both globes and gaskets on the net radiometer. Extra globes, gaskets, and screws were placed in the enclosure (in zip-lock bag). Replaced one battery (24Ah), which was located in the enclosure. Added a storage module and data download to it. Replaced the storage module. Added four desiccant packs. Everything appeared to be working.

January 12, 2008: Swapped the storage modules. Lithium battery was reading 3.07 volts. The battery was reading 14.1 volts. MRC probe was 7.5 cm out of the ground. Replaced net radiometer globes. Station clock was the same as the computer clock. Replaced one 24 Ah battery. Everything seemed to be working okay except for the vitels. Vitel #1, 2, and 4 had all four voltages not reading correctly (< 0.1 volts). On all the other vitels, the fourth voltage (temperature) was not reading correctly (< 0.1 volts, negative voltages).

January 19, 2008: Replaced Vitels #1, 2, and 4 and placed them at 2 cm, 15 cm, and 25 cm depths, respectively.

January 20, 2008: Checked the 12 V and the 5V on the wiring panel—only reading 2 V on the 5 V port and 4.6 V on the 12 V port. Measured the vital sensor individually with a volt meter and the four voltages were negative; even on the newly installed ones. For an instant, the fourth voltage on the newly installed first sensor was reading correctly (> 2.0 volts). The CR10X wiring panel was replaced. The 12 V and 5 V ports were reading correctly. Checked the vital sensors and fourth voltage on all the vitels were still reading incorrectly (< 0.1 volts; or negative voltages). Replaced the multiplexer. Check the vital sensor and the fourth voltage on all the vitels were still reading incorrectly (< 0.1 volts; or negative voltages). Checked the SE ports from the multiplexer to the datalogger (used a jumper wire). Check the vital sensor and the fourth voltage on all the vitels were still reading incorrectly (< 0.1 volts; or negative voltages). Removed all the red (power) wires of the vital sensors and connected each, one a time, looking for a bad sensor. All continued to read incorrect fourth voltages (< 0.1, or negative voltages). Check all the grounds (G). Decided for next time to replace all the vitel sensors with SDI12s and eliminate the multiplexer.

January 15-16, 2009: 11:00 AM Downloaded data from CR10X and removed the storage module. Lithium battery was reading 3.05 volts. Station clock was 1.5 min behind. Removed 12 hydra-probe sensors and installed 12 new SDI-12 moisture sensors. Added a 4th 107 soil temperature sensor at 40 cm. The soil temperature sensors were installed with SDI-12 sensors in the second group (rep). Removed the CR10X datalogger and multiplexer. Added a CR1000 datalogger and NL115 flash card storage module (with flash card). Replaced the MetOne wind sensor with an R.M. Young. Replaced the HMP45C with a new one. Added a 109 air temp sensor and radiation shield. Replaced one 24 Ahr battery. Changed globes on the net radiometer. Started the CR1000 at 3:50 PM on the 16th. The clock was set to NZ standard time. The battery was reading 13.9 volts. MRC probe was 6.5 cm out of the ground. Everything seemed to be working okay.

January 18, 2009: Updated firmware on existing NL100 inside the Hatherton Lab at Scott Base. Baud rate needed to be set at 9600 for communication with CR1000. Communication with CR1000 was established. Used loggernet version 3.2. Added guy wires to the climate station. The mast was showing stress cracks at the base—could easily wiggle the mast.

January 17, 2010: Swapped flash cards. Replaced one 24 Ahr battery. Replaced the globes on the net radiometer. Did some restoration of the ground surface were the soil moisture sensors were installed. Tightened the guy wiree—two turns each. Everything seemed to be working OK.

January 18, 2010: After looking at the data, the station went down in June and came back up in September when there was some sunlight light. Hydra-probes #5 and 6 were bad. They may have drained the batteries, and were disconnected from the datalogger. The reason why the station went down is unknown. Therefore, the hydra-probes were put on a separate power supply (own solar panel, battery, and regulator). If the hydra-probes are causing the power drain--only they will go down, and not the entire station. The station was communicating with the Hatherton lab.—it was left connected.

January 19, 2010: Swapped the flash card one last time. Everything was working okay.

January 22, 2011: Swapped flash cards. Replaced one 24 Ahr battery. Replaced the globes on the net radiometer (one set of globes is stored in the enclosure). Station clock was dead on. Lithium battery was 3.4 volts. Replaced the nose of the wind sensor; was close to breaking. MRC was 6 cm out of the ground. Added two desiccant packs. Everything seemed to be working OK. Hydra-probes #5 and 6 are disconnected.

January 11, 2012: Swapped flash cards. Replaced one 24 Ahr battery. Replaced the globes on the net radiometer (extra globes were put in the enclosure). Station clock was 20 seconds behind. Lithium battery was 3.43 volts. Battery voltage was 13.9. Wind sensor was good. MRC was 6 cm out of the ground. Added two desiccant packs. Everything seemed to be working OK. Hydra-probes #5 and #6 are disconnected. A forth battery was added to the station, so there are three batteries to run the station and one battery that runs the hydra-probes. Air temp was 0ºC with 4 mph winds; it was partly cloudy. Need to bring a battery Nema box for next time.

December 14, 2012: Swapped flash cards. Replaced one 24 Ahr battery. Replaced the globes on the net radiometer (there are extra globes in the enclosure). Station clock was 1 minute behind. Lithium battery was 3.4 volts. Battery voltage was 13.9. Wind sensor was good. MRC was 6 cm out of the ground. It appears the program was corrupted. Installed the forth battery in a NEMA box.

December 15, 2012: Uploaded the datalogger program with the laptop and swapped flash cards. Everything seemed to be running okay.

December 17, 2012: Swapped flash cards and received an error (orange light) on insertion of the new card in the NL115. Replaced the NL115 and put another new flash card in. Everything seemed to be working okay. Data on the flash card that was swapped out was good. Could be bad flash card or NL115.

December 20, 2012: Downloaded data with the laptop. Everything seemed to be running okay.

January 11, 2014: Swapped memory cards. Replaced one 24 Ahr battery. Lithium battery was 3.47 volts. Battery voltage was 13.97 volts. Weather conditions: 5 mph winds, -0.7°C Temp.

January 9, 2015: 1027 NZDT. Downloaded datalogger and swapped flash cards. Lithium battery was 3.4 V. Difference between station and PC time was 1 min 19 sec. MRC probe height was 9 cm out of ground (including 5 cm of probe head). Replaced the battery that was in the main data-logger box. Removed screw-on battery cover and put new battery on base of box. Extended wiring to reach lower battery location. Tower is not vertically level, photos taken to illustrate. Pyranometer was re-levelled. Wind sensor needs re-levelling but need bigger ladder. Weather measured on hand-held kestrel 3500; Measurement time1077 NZDT; Wind max 5 Knots, Temp 0.9 Degrees F, RH: 89.9 %, Dewpoint 2.1 Degrees C, Wetbulb -0.3 Degrees C, Air pressure 984.4 hPa. [Spare radiation globes (1 spare set or 2 globes) in enclosure. Two sets of new bolts for mounting REBS in enclosure. Bolts have Phillips head. Next time use new bolts when replacing globes (current ones are stripped a little). Several spare gaskets.]

January 10, 2016: Swapped CF cards. A complete dataset was collected in 2016. However, the data still problematic, specifically there are a few data values that are corrupt presumably due to the connection to the Heatherton Lab. This connection was removed. Station clock was one hour behind; reset clock back to NZST. The data was corrected to NZST. Lithium battery was 3.4 V and battery voltage was 13.3. MRC was 9.2 cm out of the ground. The site has 4 x 12V 12Ah batteries. One battery powers only the Hydra-probes – this battery will be replaced with old batteries that are tested using Scott Base battery tester. Box powering only Hydra-probes was labelled. REBS globes all used, i.e. no spare for replacement in 2016-2017 season. Station status summary pdf printed and then all errors were reset.

December 31, 2016: Swapped CF cards. Downloaded data. Changed output of water contents to soil temperature calculated from hydra-probes.

January 19, 2018: Swapped CF cards. Downloaded data. MRC Height 91 mm.

January 21, 2018: Downloaded data, including several months of data missing from the first download. Very strange because no errors or comms problems occurred during the first visit that I noticed, or this visit either. The CF card held a complete data set for the entire year. So there appears to be some downloading issues at this site. Replaced oldest battery. Site photographed. Rebs globes replaced.

January 10, 2019: Downloaded data.

December 21, 2019: Downloaded data.

February 1, 2021: Downloaded data.

December 6, 2021: Program was not running, could not reset. There was no data. Loaded program from laptop. Set clock to NZST. Updated OS to 32.05.

December 8, 2022: Downloaded data. MRC probe height above ground is 10 cm. Site has been removed. The end.

| MULTIPLEXER  POSITION | STACK | VITEL PROBE  # | DEPTH  (cm) | COMMENTS |
| --- | --- | --- | --- | --- |
| 1 | 1 | 1-2 | 2 | CR1000 #1 control port 1 |
| 2 | 1 | 1-15 | 15 | CR1000 #2 control port 1 |
| 3 | 1 | 1-25 | 25 | CR1000 #3 control port 1 |
| 4 | 1 | 1-40 | 40 | CR1000 #4 control port 1 |
| 5 | 2 | 2-2 | 2 | CR1000 #5 control port 3 |
| 6 | 2 | 2-15 | 15 | CR1000 #6 control port 3 |
| 7 | 2 | 2-25 | 25 | CR1000 #7 control port 3 |
| 8 | 2 | 2-40 | 40 | CR1000 #8 control port 3 |
| 9 | 3 | 3-2 | 2 | CR1000 #9 control port 7 |
| 10 | 3 | 3-15 | 15 | CR1000 #10 control port 7 |
| 11 | 3 | 3-25 | 25 | CR1000 #11 control port 7 |
| 12 | 3 | 3-40 | 40 | CR1000 #12 control port 7 |

| MULTIPLEXER  POSITION | STACK | 107 TEMP  PROBE # | DEPTH  (cm) | COMMENTS |
| --- | --- | --- | --- | --- |
| 13H1 | 4 | 4-2 | 2 |  |
| 13L1 | 4 | 4-15 | 15 |  |
| 13H2 | 4 | 4-25 | 25 |  |
|  |  |  | 40 |  |

**DATA:**

DATALOGGER OUTPUT:

| COL | OUTPUT | UNITS | LOCATION | SENSOR | COMMENTS |
| --- | --- | --- | --- | --- | --- |
| 1 | Station ID | N/A | N/A | Campbell CR10 | 001 |
| 2 | Year | N/A | N/A | Campbell CR10 |  |
| 3 | Day | N/A | N/A | Campbell CR10 |  |
| 4 | Time | N/A | N/A | Campbell CR10 | NZ standard time |
| 5 | Battery | Volts | Enclosure | Campbell CR10 |  |
| 6 | Int Temp | °C | Datalogger | Campbell CR10 | Datalogger Temp |
| 7 | Air Temp | °C | Air 1.6 m | Vaisala HMP35C | HMP45C after 1/05 |
| 8 | RH | % | Air 1.6 m | Vaisala HMP35C | HMP45C after 1/05 |
| 9 | Solar Rad | W/m2 | Air 3 m | LiCor |  |
| 10 | Net Radiation | W/m2 | Air 1 m | Q-7.1 Net Radiometer | Beginning 12/10/00 |
| 11 | Wind Spd | mph | Air 3 m | Met One |  |
| 12 | Wind Dir | azimuth | Air 3 m | Met One | True North |
| 13 | 1V1 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 14 | 1V2 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 15 | 1V3 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 16 | 1V4 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 17 | 2V1 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 18 | 2V2 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 19 | 2V3 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 20 | 2V4 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 21 | 3V1 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 22 | 3V2 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 23 | 3V3 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 24 | 3V4 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 25 | 4V1 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 26 | 4V2 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 27 | 4V3 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 29 | 4V4 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 29 | 5V1 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 30 | 5V2 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 31 | 5V3 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 32 | 5V4 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 33 | 6V1 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 34 | 6V2 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 35 | 6V3 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 36 | 6V4 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 37 | 7V1 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 38 | 7V2 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 39 | 7V3 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 40 | 7V4 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 41 | 8V1 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 42 | 8V2 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 43 | 8V3 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 44 | 8V4 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 45 | 9V1 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 46 | 9V2 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 47 | 9V3 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 48 | 9V4 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 49 | 10V1 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 50 | 10V2 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 51 | 10V3 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 52 | 10V4 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 53 | 11V1 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 54 | 11V2 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 55 | 11V3 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 56 | 11V4 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 57 | 12V1 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 58 | 12V2 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 59 | 12V3 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 60 | 12V4 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 61 | Soil Temp | °C | Soil 2 cm | Campbell 107 |  |
| 62 | Soil Temp | °C | Soil 15 cm | Campbell 107 |  |
| 63 | Soil Temp | °C | Soil 25 cm | Campbell 107 |  |
| 64 | Soil Temp | °C | Air 2.5 in | MRC Temperature Probe | \*0 in |
| 65 | Soil Temp | °C | Soil 0.5 in | MRC Temperature Probe | \*3 in |
| 66 | Soil Temp | °C | Soil 3.5 in | MRC Temperature Probe | \*6 in |
| 67 | Soil Temp | °C | Soil 6.5 in | MRC Temperature Probe | \*9 in |
| 68 | Soil Temp | °C | Soil 9.5 in | MRC Temperature Probe | \*12 in |
| 69 | Soil Temp | °C | Soil 15.5 in | MRC Temperature Probe | \*18 in |
| 70 | Soil Temp | °C | Soil 21.5 in | MRC Temperature Probe | \*24 in |
| 71 | Soil Temp | °C | Soil 27.5 in | MRC Temperature Probe | \*30 in |
| 72 | Soil Temp | °C | Soil 33.5 in | MRC Temperature Probe | \*36 in |
| 73 | Soil Temp | °C | Soil 39.5 in | MRC Temperature Probe | \*42 in |
| 74 | Soil Temp | °C | Soil 45.5 in | MRC Temperature Probe | \*48 in |
| 75 | Resistance |  |  | MRC Temperature Probe | Reference value |

\* First MRC probe sensor is 2.5 inches above the soil surface. Depths of sensors adjusted accordingly. These values represent the distance from the top sensor to the other sensors in the probe.

DATALOGGER OUTPUT after January 2003:

| COL | OUTPUT | UNITS | LOCATION | SENSOR | COMMENTS |
| --- | --- | --- | --- | --- | --- |
| 1 | Array | N/A | N/A | Campbell CR10 | 1 |
| 2 | Year | N/A | N/A | Campbell CR10 |  |
| 3 | Day | N/A | N/A | Campbell CR10 |  |
| 4 | Time | N/A | N/A | Campbell CR10 | NZ standard time |
| 5 | Datalogger ID | N/A | N/A | Campbell CR10 | 70 |
| 6 | Battery | Volts | Enclosure | Campbell CR10 |  |
| 7 | Int Temp | °C | Datalogger | Campbell CR10 | Datalogger Temp |
| 8 | Air Temp | °C | Air 1.6 m | Vaisala HMP35C | HMP45C after 1/05 |
| 9 | RH | % | Air 1.6 m | Vaisala HMP35C | HMP45C after 1/05 |
| 10 | Solar Rad | W/m2 | Air 3 m | LiCor |  |
| 11 | Net Radiation | W/m2 | Air 1 m | Q-7.1 Net Radiometer | Beginning 12/10/00 |
| 12 | Wind Speed | mph | Air 3 m | Met One |  |
| 13 | Wind Dir | azimuth | Air 3 m | Met One | True North |
| 14 | Max Wind Speed | mph | Air 3 m | Met One | Max of 10-s avg. beginning 02/01/03 |
| 15 | Array | N/A | N/A | Campbell CR10 | 2 |
| 16 | Year | N/A | N/A | Campbell CR10 |  |
| 17 | Day | N/A | N/A | Campbell CR10 |  |
| 18 | Time | N/A | N/A | Campbell CR10 | NZ standard time |
| 19 | 1V1 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 20 | 1V2 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 21 | 1V3 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 22 | 1V4 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 23 | 2V1 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 24 | 2V2 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 25 | 2V3 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 26 | 2V4 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 27 | 3V1 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 29 | 3V2 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 29 | 3V3 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 30 | 3V4 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 31 | 4V1 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 32 | 4V2 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 33 | 4V3 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 34 | 4V4 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 35 | Array | N/A | N/A | Campbell CR10 | 3 |
| 36 | Year | N/A | N/A | Campbell CR10 |  |
| 37 | Day | N/A | N/A | Campbell CR10 |  |
| 38 | Time | N/A | N/A | Campbell CR10 | NZ standard time |
| 39 | 5V1 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 40 | 5V2 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 41 | 5V3 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 42 | 5V4 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 43 | 6V1 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 44 | 6V2 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 45 | 6V3 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 46 | 6V4 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 47 | 7V1 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 48 | 7V2 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 49 | 7V3 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 50 | 7V4 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 51 | 8V1 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 52 | 8V2 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 53 | 8V3 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 54 | 8V4 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 55 | Array | N/A | N/A | Campbell CR10 | 4 |
| 56 | Year | N/A | N/A | Campbell CR10 |  |
| 57 | Day | N/A | N/A | Campbell CR10 |  |
| 58 | Time | N/A | N/A | Campbell CR10 | NZ standard time |
| 59 | 9V1 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 60 | 9V2 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 61 | 9V3 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 62 | 9V4 | Volts | Soil 2 cm | Vitel Soil Moisture/Temp |  |
| 63 | 10V1 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 64 | 10V2 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 65 | 10V3 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 66 | 10V4 | Volts | Soil 15 cm | Vitel Soil Moisture/Temp |  |
| 67 | 11V1 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 68 | 11V2 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 69 | 11V3 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 70 | 11V4 | Volts | Soil 25 cm | Vitel Soil Moisture/Temp |  |
| 71 | 12V1 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 72 | 12V2 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 73 | 12V3 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 74 | 12V4 | Volts | Soil 40 cm | Vitel Soil Moisture/Temp |  |
| 75 | Array | N/A | N/A | Campbell CR10 | 5 |
| 76 | Year | N/A | N/A | Campbell CR10 |  |
| 77 | Day | N/A | N/A | Campbell CR10 |  |
| 78 | Time | N/A | N/A | Campbell CR10 | NZ standard time |
| 79 | Soil Temp | °C | Soil 2 cm | Campbell 107 |  |
| 80 | Soil Temp | °C | Soil 15 cm | Campbell 107 |  |
| 81 | Soil Temp | °C | Soil 25 cm | Campbell 107 |  |
| 82 | Soil Temp | °C | Air 6.4 cm (2.5 in) | MRC Temperature Probe | \*0 cm (0 in) |
| 83 | Soil Temp | °C | Soil 1.3 cm (0.5 in) | MRC Temperature Probe | \*7.62 cm (3 in) |
| 84 | Soil Temp | °C | Soil 8.9 cm (3.5 in) | MRC Temperature Probe | \*15.24 cm (6 in) |
| 85 | Soil Temp | °C | Soil 16.5 cm (6.5 in) | MRC Temperature Probe | \*22.86 cm (9 in) |
| 86 | Soil Temp | °C | Soil 24.1 cm (9.5 in) | MRC Temperature Probe | \*30.48 cm (12 in) |
| 87 | Soil Temp | °C | Soil 39.4 cm (15.5 in) | MRC Temperature Probe | \*45.72 cm (18 in) |
| 88 | Soil Temp | °C | Soil 54.6 cm (21.5 in) | MRC Temperature Probe | \*60.96 cm (24 in) |
| 89 | Soil Temp | °C | Soil 69.8 cm (27.5 in) | MRC Temperature Probe | \*76.20 cm (30 in) |
| 90 | Soil Temp | °C | Soil 85.1 cm (33.5 in) | MRC Temperature Probe | \*91.44 cm (36 in) |
| 91 | Soil Temp | °C | Soil 100.3 cm (39.5 in) | MRC Temperature Probe | \*106.68 cm (42 in) |
| 92 | Soil Temp | °C | Soil 115.6 cm (45.5 in) | MRC Temperature Probe | \*121.92 cm (48 in) |
| 93 | Resistance |  |  | MRC Temperature Probe | Reference value |
| 94 | Array | N/A | N/A | Campbell CR10 | 6 |
| 95 | Year | N/A | N/A | Campbell CR10 |  |
| 96 | Day | N/A | N/A | Campbell CR10 |  |
| 97 | Time | N/A | N/A | Campbell CR10 | NZ standard time |
| 98 | Daily Avg Air Temp | °C | Air 1.6 m | Vaisala HMP45C | HMP35C 12/00 beginning 02/01/03 |
| 99 | Daily Max Air Temp | °C | Air 1.6 m | Vaisala HMP45C | HMP35C 12/00 HMP45C 1/05 |
| 100 | Daily Min Air Temp | °C | Air 1.6 m | Vaisala HMP45C | HMP35C 12/00. HMP45C 1/05 |
| 101 | Daily Max Wind Speed | mph | Air 3 m | Met One | Max of 10-s avg |

\* First MRC probe sensor is 6.4 cm (2.5 inches) above the soil surface. Depths of sensors adjusted accordingly. These values represent the distance from the top sensor to the other sensors in the probe.

DATALOGGER OUTPUT after January 15 2009:

| COL | OUTPUT | UNITS | LOCATION | SENSOR | COMMENTS |
| --- | --- | --- | --- | --- | --- |
| 1 | TimeStamp | N/A | N/A | Campbell CR1000 | Scotbase Table |
| 2 | Record No. | N/A | N/A | Campbell CR1000 |  |
| 3 | Year | N/A | N/A | Campbell CR1000 |  |
| 4 | Julian Day | N/A | N/A | Campbell CR1000 |  |
| 5 | Hour | N/A | N/A | Campbell CR1000 | NZ standard time |
| 6 | Battery | Volts | Enclosure |  |  |
| 7 | Lith Battery | °C | Datalogger | Campbell CR1000 |  |
| 8 | Int Temp | °C | Datalogger | Campbell CR1000 | Datalogger Temp |
| 9 | Air Temp | °C | Air 1.6 m | Campbell 109 |  |
| 10 | Air Temp Max | °C | Air 1.6 m | Campbell 109 |  |
| 11 | Air Temp Min | °C | Air 1.6 m | Campbell 109 |  |
| 12 | Air Temp RH | °C | Air 1.6 m | Vaisala HMP45C |  |
| 13 | RH | % | Air 1.6 m | Vaisala HMP45C | HMP35C before 1/05 |
| 14 | Solar Rad | W/m2 | Air 3 m | pyranometer |  |
| 15 | Net Radiation | W/m2 | Air 1 m | Q-7.1 Net Radiometer | Beginning 12/10/00 |
| 16 | Corrected Net Radiation | W/m2 | Air 1 m | Q-7.1 Net Radiometer | Corrected for wind |
| 17 | Net Rad volts | volts | Air 1 m | Q-7.1 Net Radiometer |  |
| 18 | Wind Speed | mph | Air 3 m | R.M. Young | Met One before 1/09 |
| 19 | Wind Dir | azimuth | Air 3 m | R.M. Young | True North |
| 20 | Max Wind Speed | mph | Air 3 m | R.M. Young | Max of 10-s avg. beginning 02/01/03 |
| 21 | Wind Speed m/s | m/s | Air 3 m | R.M. Young |  |
| 22 | Soil Temp | °C | Soil 2 cm | Campbell 107 |  |
| 23 | Soil Temp | °C | Soil 15 cm | Campbell 107 |  |
| 24 | Soil Temp | °C | Soil 25 cm | Campbell 107 |  |
| 25 | Soil Temp | °C | Soil 40 cm | Campbell 107 | Added 01/09 |
| 26 | Soil Temp | °C | Air 6.4 cm (2.5 in) | MRC Temperature Probe | \*0 cm (0 in) |
| 27 | Soil Temp | °C | Soil 1.3 cm (0.5 in) | MRC Temperature Probe | \*7.62 cm (3 in) |
| 29 | Soil Temp | °C | Soil 8.9 cm (3.5 in) | MRC Temperature Probe | \*15.24 cm (6 in) |
| 29 | Soil Temp | °C | Soil 16.5 cm (6.5 in) | MRC Temperature Probe | \*22.86 cm (9 in) |
| 30 | Soil Temp | °C | Soil 24.1 cm (9.5 in) | MRC Temperature Probe | \*30.48 cm (12 in) |
| 31 | Soil Temp | °C | Soil 39.4 cm (15.5 in) | MRC Temperature Probe | \*45.72 cm (18 in) |
| 32 | Soil Temp | °C | Soil 54.6 cm (21.5 in) | MRC Temperature Probe | \*60.96 cm (24 in) |
| 33 | Soil Temp | °C | Soil 69.8 cm (27.5 in) | MRC Temperature Probe | \*76.20 cm (30 in) |
| 34 | Soil Temp | °C | Soil 85.1 cm (33.5 in) | MRC Temperature Probe | \*91.44 cm (36 in) |
| 35 | Soil Temp | °C | Soil 100.3 cm (39.5 in) | MRC Temperature Probe | \*106.68 cm (42 in) |
| 36 | Soil Temp | °C | Soil 115.6 cm (45.5 in) | MRC Temperature Probe | \*121.92 cm (48 in) |
| 37 | Resistance |  |  | MRC Temperature Probe | Reference value |
| 38 | Soil Temp | °C | 2 cm | SDI-12 Hydra-probe |  |
| 39 | Soil Temp | °C | 15 cm | SDI-12 Hydra-probe |  |
| 40 | Soil Temp | °C | 25 cm | SDI-12 Hydra-probe |  |
| 41 | Soil Temp | °C | 40 cm | SDI-12 Hydra-probe |  |
| 42 | Soil Temp | °C | 2 cm | SDI-12 Hydra-probe |  |
| 43 | Soil Temp | °C | 15 cm | SDI-12 Hydra-probe |  |
| 44 | Soil Temp | °C | 25 cm | SDI-12 Hydra-probe |  |
| 45 | Soil Temp | °C | 40 cm | SDI-12 Hydra-probe |  |
| 46 | Soil Temp | °C | 2 cm | SDI-12 Hydra-probe |  |
| 47 | Soil Temp | °C | 15 cm | SDI-12 Hydra-probe |  |
| 48 | Soil Temp | °C | 25 cm | SDI-12 Hydra-probe |  |
| 49 | Soil Temp | °C | 40 cm | SDI-12 Hydra-probe |  |
| 50 | water content | Vol % | 2 cm | SDI-12 Hydra-probe |  |
| 51 | water content | Vol % | 15 cm | SDI-12 Hydra-probe |  |
| 52 | water content | Vol % | 25 cm | SDI-12 Hydra-probe |  |
| 53 | water content | Vol % | 40 cm | SDI-12 Hydra-probe |  |
| 54 | water content | Vol % | 2 cm | SDI-12 Hydra-probe |  |
| 55 | water content | Vol % | 15 cm | SDI-12 Hydra-probe |  |
| 56 | water content | Vol % | 25 cm | SDI-12 Hydra-probe |  |
| 57 | water content | Vol % | 40 cm | SDI-12 Hydra-probe |  |
| 58 | water content | Vol % | 2 cm | SDI-12 Hydra-probe |  |
| 59 | water content | Vol % | 15 cm | SDI-12 Hydra-probe |  |
| 60 | water content | Vol % | 25 cm | SDI-12 Hydra-probe |  |
| 61 | water content | Vol % | 40 cm | SDI-12 Hydra-probe |  |
| 62 | 1V2 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 63 | 1V2 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 64 | 1V3 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 65 | 1V4 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 66 | 2V1 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 67 | 2V2 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 68 | 2V3 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 69 | 2V4 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 70 | 3V1 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 71 | 3V2 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 72 | 3V3 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 73 | 3V4 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 74 | 4V1 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 75 | 4V2 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 76 | 4V3 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 77 | 4V4 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 78 | 5V1 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 79 | 5V2 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 80 | 5V3 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 81 | 5V4 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 82 | 6V1 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 83 | 6V2 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 84 | 6V3 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 85 | 6V4 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 86 | 7V1 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 87 | 7V2 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 88 | 7V3 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 89 | 7V4 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 90 | 8V1 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 91 | 8V2 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 92 | 8V3 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 93 | 8V4 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 94 | 9V1 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 95 | 9V2 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 96 | 9V3 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 97 | 9V4 | Volts | Soil 2 cm | SDI-12 Hydra-probe |  |
| 98 | 10V1 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 99 | 10V2 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 100 | 10V3 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 101 | 10V4 | Volts | Soil 15 cm | SDI-12 Hydra-probe |  |
| 102 | 11V1 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 103 | 11V2 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 104 | 11V3 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 105 | 11V4 | Volts | Soil 25 cm | SDI-12 Hydra-probe |  |
| 106 | 12V1 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 107 | 12V2 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 108 | 12V3 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 109 | 12V4 | Volts | Soil 40 cm | SDI-12 Hydra-probe |  |
| 110 | 1V5 | Volts | 2 cm | SDI-12 Hydra-probe |  |
| 111 | 2V5 | Volts | 15 cm | SDI-12 Hydra-probe |  |
| 112 | 3V5 | Volts | 25 cm | SDI-12 Hydra-probe |  |
| 113 | 4V5 | Volts | 40 cm | SDI-12 Hydra-probe |  |
| 114 | 5V5 | Volts | 2 cm | SDI-12 Hydra-probe |  |
| 115 | 6V5 | Volts | 15 cm | SDI-12 Hydra-probe |  |
| 116 | 7V5 | Volts | 25 cm | SDI-12 Hydra-probe |  |
| 117 | 8V5 | Volts | 40 cm | SDI-12 Hydra-probe |  |
| 118 | 9V5 | Volts | 2 cm | SDI-12 Hydra-probe |  |
| 119 | 10V5 | Volts | 15 cm | SDI-12 Hydra-probe |  |
| 120 | 11V5 | Volts | 25 cm | SDI-12 Hydra-probe |  |
| 121 | 12V5 | Volts | 40 cm | SDI-12 Hydra-probe |  |

\* First MRC probe sensor is 6.4 cm (2.5 inches) above the soil surface. Depths of sensors adjusted accordingly. These values represent the distance from the top sensor to the other sensors in the probe.

DATA PROCESSING ALGORITHMS:

Vitel Hydra Probe soil moisture, temperature, complex dielectric constant, electrical conductivity, and salinity are determined from the raw data (four voltages), and a calibration option depending on the soil texture, with a program supplied by Stevens, Inc. Option 1 (sand) is used here for the Type A probes. Note that with this program negative values of soil water are converted to zero.

The temperature sensor went out for vitels at 2 cm depth (rep 1 and 2), 15 cm (rep 1 and 2), and 25 cm (rep 1 and 2). The 107 soil temperatures at those respective depths were converted to a voltage and used in place of the bad temperature in the vitels. The four voltages were then processed (run through the hydra-probe program). These are the sensors and years that were corrected:

2 cm depth, rep 1, 2004 -2006

2 cm depth, rep 2, 2002-2007

15 cm depth, rep 1, 2000-2006

15 cm depth, rep 2, 2002-2007

25 cm depth, rep 1, 2004-2006

25 cm depth, rep 2, 1999-2007

All of 2008

DATA STORAGE AND ACCESS:

Contact Cathy Seybold or Deb Harms. Data can be downloaded from the NSSC website at <http://soils.usda.gov/survey/scan/>. Data are in Excel files organized by calendar year. Each file consists of a page containing all downloaded data for that year and 12 pages of processed Vitel sensor data (one page for each sensor) with the following column headings: SENSOR, SOIL (calibration option), ER (real part of the soil dielectric constant), EI (imaginary part of the soil dielectric constant), TEMP (soil temperature ºC), ER-COR (temperature corrected ER), EI\_COR (temperature corrected EI), WATER (volume fraction soil water content), SALINITY (soil salinity in g/l NaCl), SOIL\_COND (soil electrical conductivity in S/m or mhos/m), SOIL\_COND\_COR (temperature corrected SOIL\_COND in S/m or mhos/m), WATER\_CON\_COR (temperature corrected soil water electrical conductivity in S/m or mhos/m). The column headings for the annual data are: ID (site), YEAR, DAY OF YEAR, HOUR, TIME, DATE, BATT VOLT (battery voltage), INT TEMP ºC (datalogger temperature), AIR TEMP (ºC), RH (%), SOLAR RADIATION (w m-2), NET RADIATION (w m-2), WIND SPEED (mph), WIND DIR (deg from true north), 1V1 (2-cm depth, Vitel stack 1), 1V2 (2-cm depth, Vitel stack 1), 1V3 (2-cm depth, Vitel stack 1), 1V4 (2-cm depth, Vitel stack 1), 2V1 (15-cm depth Vitel, stack 1), 2V2 (15-cm depth Vitel, stack 1), 2V3 (15-cm depth Vitel, stack 1), 2V4 (15-cm depth Vitel, stack 1), 3V1 (25-cm depth Vitel, stack 1), 3V2 (25-cm depth Vitel, stack 1), 3V3 (25-cm depth Vitel, stack 1), 3V4 (25-cm depth Vitel, stack 1), 4V1 (40-cm depth Vitel, stack 1), 4V2 (40-cm depth Vitel, stack 1), 4V3 (40-cm depth Vitel, stack 1), 4V4 (40-cm depth Vitel, stack 1), 5V1 (2-cm depth, Vitel stack 2), 5V2 (2-cm depth, Vitel stack 2), 5V3 (2-cm depth, Vitel stack 2), 5V4 (2-cm depth, Vitel stack 2), 6V1 (15-cm depth, Vitel stack 2), 6V2 (15-cm depth Vitel, stack 2), 6V3 (15-cm depth Vitel, stack 2), 6V4 (15-cm depth Vitel, stack 2), 7V1 (25-cm depth, Vitel stack 2), 7V2 (25-cm depth, Vitel stack 2), 7V3 (25-cm depth, Vitel stack 2), 7V4 (25-cm depth, Vitel stack 2), 8V1 (40-cm depth, Vitel stack 2), 8V2 (40-cm depth Vitel, stack 2), 8V3 (40-cm depth Vitel, stack 2), 8V4 (40-cm depth Vitel, stack 2), 9V1 (2-cm depth, Vitel stack 3), 9V2 (2-cm depth Vitel, stack 3), 9V3 (2-cm depth Vitel, stack 3), 9V4 (2-cm depth Vitel, stack 3), 10V1 (15-cm depth, Vitel stack 3), 10V2 (15-cm depth Vitel, stack 3), 10V3 (15-cm depth Vitel, stack 3), 10V4 (15-cm depth Vitel, stack 3), 11V1 (25-cm depth, Vitel stack 3), 11V2 (25-cm depth Vitel, stack 3), 11V3 (25-cm depth Vitel, stack 3), 11V4 (25-cm depth Vitel, stack 3), 12V1 (40-cm depth, Vitel stack 3), 12V2 (40-cm depth Vitel, stack 3), 12V3 (40-cm depth Vitel, stack 3), 12V4 (40-cm depth Vitel, stack 3), SOIL T 2 cm ºC, SOIL T 15 cm ºC, SOIL T 25 cm ºC, MRC1 –2.5-in ºC, MRC2 0.5-in ºC, MRC3 3.5-in ºC, MRC4 6.5-in ºC, MRC5 9.5-in ºC, MRC6 15.5-in ºC, MRC7 21.5-in ºC, MRC8 27.5-in ºC, MRC9 363.5-in ºC, MRC10 39.5-in ºC, MRC11 45.5-in ºC, MRC12 reference resistor, WIND SPEED (m s-1).

**SOILS:**  Soil described by John Kimble and Iain Campbell. Soil samples collected for characterization.

CLASSIFICATION: Loamy-skeletal, mixed, superactive, hypergelic Typic Anhyorthel

LAB PEDON NUMBER: 99P0328

SITE IDENTIFICATION NUMBER: 99FN143004

**LANDSCAPE:**

SLOPE: 6 %

ASPECT: SE (135º)

ELEVATION: 38 m

**VEGETATION:**

GROUND COVER: None

CANOPY COVER: None

**COMMENTS:** Sensors in rep 2 installed in the pit, used for soil description and sampling. Rep 1 is about one meter southwest of the pit and rep 3 is about one meter northeast of the pit.

Note: NZ standard time is used here because Scott Base uses NZ time. Actually, NZ and Scott Base use daylight savings time during the summer.

DATA NOTES: December 8, 1999. Solar radiation data from 1/16/99 1800 to 11/30/99 0700 in the processed database has been divided by two to correct for incorrect multiplier in datalogger program (400 instead of 200). All solar radiation data in the processed database are correct. Also, this date V3 and V4 columns for Vitel sensor #10 were switched to correct for incorrect wiring. All Vitel data in the processed database are correct. The datalogger program and hard wiring of the multiplexer are now correct and all future data collected are correct.

**NOTES FOR NEXT STATION VISIT:**