Distributed Temperature Sensing System provided by Oregon State University

Author(s):	Regarding data questions contact:
John C. Pace Mailing address: 200 Gilmore Hall Corvallis, OR, USA 97331 Tel./Fax.: 541-737-2286 / , E-mail and web: chad.higgins@oregonstate.edu, http://oregonstate.edu/gradwater/chad-higgins	-

1.0 Data Set Overview

1.1 Time period covered by the data

- October 7, 2012
- October 8, 2012
- October 9, 2012
- October 10, 2012
- October 11, 2012
- October 12, 2012
- October 13, 2012
- October 14, 2012
- October 15, 2012
- October 16, 2012
- October 17, 2012
- October 18, 2012
- October 19, 2012
- October 20, 2012
- October 21, 2012

1.2 Physical location (latitude, longitude, elevation)

See file DTS_location.kmz

1.3 Instrument type

Oryx DTS

1.4 Data provider

Oregon State University

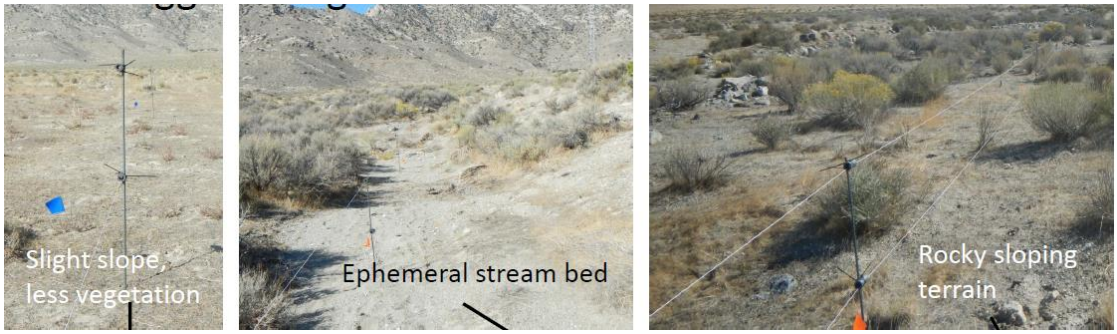
1.5 Web address references

http://www.ctemps.org

https://www.slideshare.net/osuwebcomm/pm6-higgins

2.0 Instrument Description

http://ctemps.org/sites/ctemps.org/files/ctemps/oryx_dts_data_sheet.pdf



http://www3.nd.edu/~dynamics/materhorn/PDF/MATERHORN_AGU_121212.pdf (slide 13) Fernando et al. 2012

2.1 Instrument website

2.2 Table of specifications

Accuracy	Range	Frequency	Resolution
0.1C	-40 to 65C	30s	m

3.0 Data Collection and Processing

3.1 Description of data collection

The Oryx DTS instrument was stationed nust north of Tower 1. From there, fiber-optic cable was installed in a transect the extended 2k, up the slope from Tower 1 past tower 5 and returned back for a total of 4km of installed fiber. The ascending portion cable was installed 0.5m above ground level, and

the decending portion of the fiber was installed 1m above ground level. Two calibration baths with temperature reference measurements were placed adjacent to the ORYS instrument, and ~20-30m sections both the ascending and descending portions of the fiber optic cable were coiled placed in both baths. Each end of the cable were plugged-in to separate challens of the ORYX instrument: ascending to channel 1 and descending to channel 2. The ORYX was configured to alternate between channel 1 and channel 2 in 30s incriments. Thus the cable was interrogated in both directions. This is a so-called, 'double ended configuration. Data files contain 2 temperature files each with a 1 minute resolution (channels 1 and 2 respectively). The first attempt at cable installation resulted in a broken cable which provided partial data. Wild horses then damaged the installation (a total loss) in early october. The cable was reinstalled on October 7 with no breaks and provided complete data until October 21 when again wild horses damaged the installation for a total loss of optical fiber.

3.2 Description of derived parameters and processing techniques used

Original data files are provided.

3.3 Description of quality assurance and control procedures

Temperature data for every 30 second interval are verified against the controlled temperature baths. The double ended calibration matlab scripts can be found at ctemps.org

3.4 Data intercomparisons

4.0 Data Format

4.1 Data file structure

4.2 File naming convention

dataProvider_instrument[_identifier]_rate_instrumentType_startDateAndTime.extension

4.3 Data format

tab delimited ASCII

4.4 Data layout

4.5 List of parameters with units, sampling intervals, frequency, range

length (m) temperature (°C) Stokes anti-Stokes

4.6 Data version number and date

raw, v1.0, June 2017

4.7 Description of flags, codes used in the data, and definitions

4.8 Data sample

```
DTS Sentinel unit serial number: SN409022
Multiplexer serial number:  ORYX
Hardware model number:      OX4-SR
Software version number:    ORYX F/W v3.00 Oryx Data Collector v3.7.2.0
data status      ok
installation     MATTERHORN
differential loss correction     single-ended
forward channel  loe to high
reverse channel  N/A
date  2012/09/22
time  03:26:40
forward acquisition time    15.00
reverse acquisition time    0.00
gamma 499.2812
k internal 0.2559
k external 0.2559
temperature offset calibration    1.0000
default loss term (dB/km)   0.3710
temperature slope calibration     1.0000
multiplexer offset coefficient    1.0000
multiplexer slope coefficient     1.0000
fibre end  0.00
T internal ref (°C)    34.53
T ext. ref 1 (°C)      -0.11
T ext. ref 2 (°C)      25.11
length (m) temperature (°C) Stokes     anti-Stokes
-747.200   85.554      0.387 -0.386
-746.185   -200.000    0.004 -0.590
-745.171   -51.398     0.411 0.174
-744.156   66.102      -0.315     0.291
-743.142   -11.611     0.326 -0.194
```

5.0 Data Remarks

5.1 PI's assessment of the data

The data from October 8 and beyond are quite good, Prior to October 7 the broken nature of the cable meant we had to go to a single ended verification scheme which leads to less certainty in the data.

5.2 Missing data periods

5.3 Software compatibility

6.0 References

[1] Fernando, H. J. S., E. R. Pardyjak, S. Di Sabatino, F. K. Chow, S. F. J. DeWekker, S. W. Hoch, J. Hacker, J. C. Pace, T. Pratt, Z. Pu, J. W. Steenburgh, C. D. Whiteman, Y. Wang, D. Zajic, B. Balsley, R. Dimitrova, G. D. Emmitt, C. W. Higgins, J. C. R. Hunt, J. G. Knievel, D. Lawrence, Y.

Liu, D. F. Nadeau, E. Kit, B. W. Blomquist, P. Conry, R. S. Coppersmith, E. Creegan, M. Felton, A. Grachev, N. Gunawardena, C. Hang, C. M. Hocut, G. Huynh, M. E. Jeglum, D. Jensen, V. Kulandaivelu , M. Lehner, L. S. Leo, D. Liberzon, J. D. Massey, K. McEnerney, S. Pal, T. Price, M. Sghiatti, Z. Silver, M. Thompson, H. Zhang, T. Zsedrovits, 2015: The MATERHORN – Unraveling the Intricacies of Mountain Weather, BAMS, doi: http://dx.doi.org/10.1175/BAMS-D-13-00131.1.

[2] Fernando, H., E. Pardyjak, D. Zajic, S. De Wekker, and J. Pace. "The mountain terrain atmospheric modeling and observations (materhorn) program: The first field experiment (MATERHORN-X1)." In *AGU Fall Meeting Abstracts*, vol. 1, p. 01. 2012.