Higuera, P.E. and P.V. Dunnette. 2014. Data, code, and figures from Dunnette et al. 2014, Biogeochemical impacts of wildfires over four millennia in a Rocky Mountain subalpine watershed. *New Phytologist* In Press (doi: 10.1111/nph.12828). figShare: http://dx.doi.org/10.6084/m9.figshare.988687

Overview

This archive includes data and scripts needed to reproduce the analyses in Dunnette et al. 2014; it includes 49 files and is 23 MB when downloaded as a .zip archive. After extracting the .zip archive, sort by file type. Most data files are in .csv format, while some are in .xls format. Scripts and functions are written for MATLAB software (*.m file type; www.mathworks.com), and each is file fully commented, including dependencies. For some scripts or functions, the MATLAB statistics or curve fitting toolbox is required; all other functions required are provided in this archive.

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Citation Information

Original Reference - *please cite if you use data, code, or figures in your own work*

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*The definitive version of this paper is available at http://www.newphytologist.com

Online Resources

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Also available from:

- github: https://github.com/HigueraLab/Dunnette_et_al_2014_NewPhytologist/
- University of Idaho PaleoEcology and Fire Ecology Lab: http://www.uidaho.edu/cnr/paleoecologylab

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1. Chickaree Lake Biogeochemical Data

File: `CH10_biogeochemData.csv`

Includes the following raw data (by column):

1. core_ID: Sediment core identifier
2. drive_ID: Drive identifier
3. top_sam #: Top sample number
4. bot_sam #: Bottom sample number
5. top_cm: Top depth of sample (cm)
6. bot_cm: Bottom depth of sample (cm)
7. top_age: Top age of sample (cal. yr before CE 1950)
8. bot_age: Bottom age of sample (cal. yr before CE 1950)
9. d15N: Nitrogen isotopic composition (delta 15N; per mil)
10. %N: Percent Nitrogen (by weight)
11. d13C: Carbon isotopic composition (delta 13C; per mil)
12. %C: Percent Carbon (by weight)
13. C:N_atomic_ratio: Ratio of %C to %N (atomic)
14. bulk_density: Bulk density (dry g wet cm-3)
15. C_acc: Carbon accumulation rate (g cm-2 yr-1)

16. MS_SI : Magnetic susceptibility (SI units)

Missing Values: NaN

Checksum values:

- 635 rows (with headers), 16 columns
- Column 3 (top_sam #): 58551
- Column 5 (top_cm): 201836
- Column 10 (%N): 626.83
- Column 15 (C_acc): 341.58

2. Chickaree Lake Biogenic Silica Data

File: `CH10_BSiData.csv`

Includes the following raw data (by column):

1. top_cm: top depth of sample (cm)
2. bot_cm: bottom depth of sample (cm)
3. top_age: top age of sample (cal. yr before CE 1950)
4. bot_age: bottom age of sample (cal. yr before CE 1950)
5. %BSi: Percent biogenic silica (by weight)
6. d15NAIR: Nitrogen isotopic composition (delta 15N; per mil)
7. %N: Percent Nitrogen (by weight)
8. d13CVPDB_17O_corrected: Carbon isotopic composition delta 13C; per mil)
9. %C: Percent Carbon (by weight)
10. C:N_atomic_ratio: Ratio of %C to %N (atomic)
11. bulk_density: Bulk density (dry g / wet cm3)

Missing Values: None

Checksum values:

- 41 rows (with headers), 11 columns
- Column 3 (top_cm): 69935
- Column 5 (%BSi): 1042.45
- Column 10 (C:N): 591.52

3. Chickaree Lake Loss-on-ignition Data

File: `CH10_LOI_Data.csv`

Includes the following raw data (by column):

1. core_ID: Sediment core identification number
2. drive_ID: Drive identifier
3. top_sam #: Top sample number
4. bot_sam #: Bottom sample number
5. top_cm: top depth of sample (cm)
6. bot_cm: bottom depth of sample (cm)
7. top_age: top age of sample (cal. yr before CE 1950)
8. bot_age: bottom age of sample (cal. yr before CE 1950)
9. d15N: Nitrogen isotopic composition (delta 15N; per mil)
10. %N: Percent nitrogen (by weight)
11. d13C: Carbon isotopic composition (delta 13C; per mil)
12. %C: Percent carbon (by weight)
13. C:N_atomic_ratio: Ratio of %C to %N (atomic)
14. bulk_density: Bulk density (dry g wet cm-3)
15. LOI_550: Loss on ignition at 550 C (% organic matter; multiply by 100)
16. LOI_1000: Loss on ignition at 1000 C (% organic matter; multiply by 100)

Missing Values: None

Checksum values:

- 124 rows (with headers), 16 columns
- Column 3 (top_samp #): 12010
- Column 5 (top_cm): 31833.7
- Column 10 (%N): 161.05
- Column 15 (LOI_550): 38.63

4. Chickaree Lake Charcoal Data

Files: `CH10_charData.csv`, `CH10_charParams.csv`,
`CH10_charResults.csv`

Three files provide the raw input data, the parameters used, and the output data for charcoal analysis via the program *CharAnalysis* (see *Materials and Methods* in main text, and web site https://sites.google.com/site/charanalysis/).

4.1 `CH10_charData.csv`

Includes the following raw data (by column):

1. cmTop: top depth (cm) of the sample
2. cmBot: bottom depth (cm) of the sample
3. ageTop: estimated age at top of sample (cal. yr before CE 1950)
4. ageBot: estimated age at bottom of sample (cal. yr before CE 1950)
5. charVol: volume of sediment subsample from which charcoal was prepared (cm3)
6. charCount: pieces of charcoal counted in the sample (#)

Missing values: None

Checksum values:

- 1202 rows (with headers), 6 columns
- Column 3 (ageTop): 2446519
- Column 6 (charCount): 38218

4.2 `CH10_charParams.csv`

See CharAnalysis User's Guide for description of parameters file, available at the web site linked to above.

Missing values: -9999 (column 3) or blank cell (all others)

Checksum values:

- 26 rows (with headers), 5 columns
- Column 3 (Parameters): -39779

4.3 `CH10_charResults.csv`

Includes the following derived data (reflecting interpolation):

1. cmTop_i: top depth (cm) of interpolated sample
2. ageTop_i: bottom depth (cm) of interpolated sample
3. charCount_i: pieces of charcoal in interpolated sample
4. charVol_i: volume of interpolated sample

5. charCon_i: charcoal concentration in interpolated sample (pieces/cm3)

6. charAcc_i: charcoal accumulation rate, based in interpolated concentration and age (pieces/cm2 yr)

7. charBkg: background charcoal, Cback, smoothed based on methods selected in _charParams.csv file, (pieces/cm2 yr)

8. charPeak: peak charcoal, Cpeak, based on methods selected in _charParams.csv file, (pieces/cm2*yr)

9. thresh1: threshold value (pieces/cm2 yr) based on first threshold entered in _charParams.csv file

10. thresh2: same as thresh1, but for second threshold entered

11. thresh3: same as thresh1, but for third threshold entered

12. threshFinalPos: positive threshold value (pieces/cm2 yr), based on fourth threshold value entered in *charParams.csv file

13. threshFinalNeg: negative threshold value (pieces/cm2 yr), based on fourth threshold value entered in *charParams.csv file

14. SNI: signal-to-noise index values, based on threshdFinalPos values

15. threshGOF: P value from KS goodness-of-fit test between fitted noise distribution and empirical data below the sample-specific threshold

16. peaks1: samples that exceed thresh1 values are identified by "1"; only the first sample is identified

17. peaks2: same as peaks1, but for the second threshold value

18. peaks3: same as peaks1, but for the third threshold value

19. peaksFinal: same as peaks1, but for the final threshold value

20. peaksInsig.: peaks that exceeded threshFinalPos (the final threshold), but did not pass the minimum-count test are identified with a "1"

21. peakMag: peak magnitude is the total pieces of charcoal accumulated in a given peak (pieces/cm2*peak); if a peak is only one sample long, then peak magnitude is simply CHAR minus the positive threshold. If a peak is more than one sample long, then each sample exceeding threshFinal is summed

22. smPeak Frequ: frequency of peaks (from peaksFinal) smoothed over time, as set in *_charParams.csv file

23. smFRIs: fire return intervals (from peaksFinal) smoothed over time, as set in *_charParams.csv file

Missing values: NaN

Checksum values:

- 458 rows (with headers), 23 columns

- Column 2 (age Top_i): 1014540
- Column 6 (char Acc_i): 753.8938
- Column 19 (peaks Final): 36

5. Chickaree Lake Magnetic Susceptibility Data

Files: `CH10_MS_charParams.csv`, `CH10_MS_charData.csv`, `CH10_MS_charResults.csv`

Three files provide the raw input data, the parameters used, and the output data for peak analysis of magnetic susceptibility (MS) data, using the program *CharAnalysis* (see *Materials and Methods* in main text, and web site https://sites.google.com/site/charanalysis/). The column headers for all files are the same as for charcoal analysis (CH10_char* files), but NOTE that the units for MS have been manipulated to be able to be used in CharAnalysis (see 7-9 below).

5.1 `CH10_MC_charData.csv`

Includes the following raw data (by column):

1. cmTop: top depth (cm) of the sample
2. cmBot: bottom depth (cm) of the sample
3. ageTop: estimated age at top of sample (cal. yr before CE 1950)
4. ageBot: estimated age at bottom of sample (cal. yr before CE 1950)
5. dummyVar: dummy variable set to 1, to facilitate use in CharAnalysis program
6. MS_shifted_trans: Shifted MS data (from col. 8), transformed by dividing by the sediment accumulation rate (cm/yr). Thus, when these transformed values are multiplied by the sediment accumulation rate (cm/yr), as done in CharAnalysis, the result is the transformed MS values (column 8).
7. MS_raw_SI: Raw magnetic susceptibility measurements (SI units)
8. MS_shifted: Raw MS values, shifted by adding the minimum values in MS_raw_SI to each value, such that the minimum value becomes 0. CharAnalysis cannot work with negative data.

Missing values: None

Checksum values:

- 1477 rows (with headers), 8 columns
- Column 3 (ageTop): 3970165
- Column 6 (setRate/MS): 0.3626761

6. Chickaree Lake Chronology Data

Files: `CH10_210Pb_data.xls`, `CH10_ageDepthData.xls`,
`CH10_ageDepthData.csv`, `CH10_radiometricSamples.csv`,
`CH10_14Cdates.zip`

These files provide the chronology data presented in Table S1
(CH10*radiometricSamples.csv), the age-depth data presented in Figure 2
(CH10_ageDepthData.csv), and the input files used in the MATLAB functions
_CRSModel* and *MCAgeDepth* (*.xls), publically available at
http://code.google.com/p/crsmodel/ and http://code.google.com/p/mcagedepth/, as
used in Higuera et al. (2009, Ecological Monographs, 79: 201-219). See the user manuals
for each program at these web sites for details on the two .xls files. The .zip archive
includes the .B00` files output from CALIB (see *Materials and Methods* in main text)
and needed to run *MCAgeDepth*. The age-depth data output from *MCAgeDepth* is
described below.

6.1 `CH10_ageDepthData.csv`

Includes the following raw data (by column):

1. Top depth of sample (cm)
2. Calibrated age at sample top (cal yr BP)
3. Upper 95% confidence intervals for data in column two
4. Lower 95% confidence intervals for data in column two
5. Sedimentation rate (cm/yr)
6. Upper 95% confidence intervals for data in column five
7. Lower 95% confidence intervals for data in column five
8. Sample resolution (yr/sample)
9. Upper 95% confidence intervals for data in column eight
10. Lower 95% confidence intervals for data in column eight

Missing values: None

Checksum values:

- 1596 rows (with headers), 10 columns
- Column 1 (sampleCm): 642150.9
- Column 2 (calAge): 4679522
- Column 5 (sedAcc): 211.236
- Column 8 (sampleRes): 6860.85

7. Chickaree Lake Pollen Data

Files: `CH10_PollenCounts.xls`, `CH10_pollenPercentages.csv`

Raw pollen data needed to use in the function pollenDiagram_ROMO.m, to create Fig. S2 (*.xls), and pollen percentages (*.csv*).

7.1 `CH10_PollenCounts.xls`

Includes the following raw data (by column):

1. Sample_ID : Identification of sample, by lake (CH), year (07 or 10), core (1 or 2), and drive (A, B,C,...).

2. Sample_number: Sample number for each drive

3. Top_cm: Top depth of each sample (cm)

4. age_yrBP: Age of each sample, in calibrated years before present (CE 1950)

5. Pinus hap: Haploxilon Pinus pollen grains counted

6. Pinud dip: Diploxilon Pinus pollen grains counted

7. Pinus undiff: Undifferentiated Pinus pollen grains counted

8. Picea: Picea pollen grains counted 9...112: Column heads are the taxonomic identification for each pollen grain counted

9. Charcoal: NOT COUNTED

10. EU: Exotic pollen grains, added as spike.

Missing values: NaN.

Checksum values:

- 46 rows (with headers), 113 columns
- Column 2 (sample_number): 6143
- Column 4 (age_yrBP): 86683
- Column 10 (Pseudotsuga/Larix): 42
- Column 113 (EU): 8793

7.2 `CH10_pollenpercentages.csv`

Includes the following raw data (by column):

1. Sample_ID : Identification of sample, by lake (CH), year (07 or 10), core (1 or 2), and drive (A, B, C,...).

2. Sample_number: Sample number for each drive

3. Top_cm: Top depth of each sample (cm)

4. age_yrBP: Age of each sample, in calibrated years before present (CE 1950)

5. Pinus hap: Haploxilon Pinus pollen grains counted

6. Pinud dip: Diploxilon Pinus pollen grains counted

7. Pinus undiff: Undifferentiated Pinus pollen grains counted

8. Picea: Picea pollen grains counted 9...107: Columns heads are the taxonomic identification for each pollen grain counted

Missing values: None.

Checksum values:

- 46 rows (with headers), 106 columns
- Column 2 (sample_number): 6143
- Column 4 (age_yrBP): 86683
- Column 10 (Pseudotsuga/Larix): 12
- Column 102 (Nuphar): 13.19

8. MATLAB code to generate figures in Dunnette et al. 2014

Files: All are MATLAB files; figure scripts inclues "_scripts" while all other files are functions called upon by the scripts. To run the script files, the function files must be in the working directory. See individual files for readme information, including dependencies.

- auto.m
- corr_p_adj_N.m
- Fig_3_script.m
- Fig_4_5_script.m
- Fig_6_S4_script.m
- Fig_S1_script.m
- Fig_S2_script.m
- pollenDiagram_ROMO.m
- SEA.m
- SEA_CI.m

9. Figure files from Dunnette et al. 2014

Figures come in two formats .tif and .fig. The latter is the MATLAB figure file format. *NOTE:* There is no .fig file for figure 1.

Files:

- Fig_1.jpg
- Fig_2.jpg
- Fig_3.jpg
- Fig_4.jpg
- Fig_5.jpg
- Fig_6.jpg
- Fig_S1.jpg
- Fig_S2.jpg
- Fig_S3.jpg
- Fig_S4.jpg
- Fig_2_800_dpi.fig
- Fig_3_800_dpi.fig
- Fig_4_800_dpi.fig
- Fig_5_800_dpi.fig
- Fig_6_800_dpi.fig
- Fig_S1.fig
- Fig_S2.fig
- Fig_S3.fig
- Fig_S4.fig