Title: Seasonal relationships between soil respiration and water-extractable carbon as influenced by soil temperature and moisture in forest soils of the Andrews Experimental Forest, 1992-1993

Abstract:

The overall objective of this study is to model trace gas emissions from forest soils of the H. J. Andrews Experimental Forest. This is to be accomplished by studying trace gas emissions and related variable at a set of 20 permanent plots at the HJA.

Keywords: Carbon; Carbon storage; Long-Term Ecological Research (LTER); Microclimate; Micrometeorology; Soil chemistry; Soil respiration; Inorganic nutrients; Inorganic nutrients; Organic matter; Long-Term Ecological Research (LTER); Meteorology; Soil chemistry; Microclimate; Soil respiration; Respiration; Carbon cycling; Inorganic nutrients; Carbon;

Date data commenced: 1992-07-12
Date data terminated: 1993-07-07

Principal Investigator: Robert P. Griffiths

List of Entities:
1. Soil Characteristics and Microbial Variables - Full set
2. Soil Characteristics and Microbial Variables - Routine set
3. Field Respiration
4. Air and Soil Temperature
5. Site Location and Description

<table>
<thead>
<tr>
<th>Attribute List:</th>
<th>STCODE</th>
<th>N</th>
<th>N</th>
<th>char(10)</th>
<th>enum</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORMAT</td>
<td>N</td>
<td>N</td>
<td>numeric(1,0)</td>
<td>range</td>
<td>1.0000 1.0000</td>
</tr>
<tr>
<td>SITE</td>
<td>Y</td>
<td>N</td>
<td>char(5)</td>
<td>enum</td>
<td></td>
</tr>
<tr>
<td>DATE</td>
<td>Y</td>
<td>N</td>
<td>datetime</td>
<td>range</td>
<td>7/13/1992 12:00:00 AM - 7/7/1993 12:00:00 AM</td>
</tr>
<tr>
<td>SAMPLOCA</td>
<td>Y</td>
<td>N</td>
<td>char(2)</td>
<td>freetext</td>
<td></td>
</tr>
<tr>
<td>PH</td>
<td>N</td>
<td>Y</td>
<td>numeric(5,2)</td>
<td>range</td>
<td>3.6000 5.9400</td>
</tr>
<tr>
<td>P_MOIST</td>
<td>N</td>
<td>Y</td>
<td>numeric(5,1)</td>
<td>range</td>
<td>17.6000 200.3000</td>
</tr>
<tr>
<td>F_DRY_WT</td>
<td>N</td>
<td>Y</td>
<td>numeric(5,3)</td>
<td>range</td>
<td>0.3330 0.8500</td>
</tr>
<tr>
<td>SOM</td>
<td>N</td>
<td>Y</td>
<td>numeric(5,1)</td>
<td>range</td>
<td>7.4000 89.3000</td>
</tr>
<tr>
<td>EXTR_AMM</td>
<td>N</td>
<td>Y</td>
<td>numeric(6,3)</td>
<td>range</td>
<td>0.0000 4.9650</td>
</tr>
<tr>
<td>MIN_N</td>
<td>N</td>
<td>Y</td>
<td>numeric(6,2)</td>
<td>range</td>
<td>2.5000 147.8200</td>
</tr>
<tr>
<td>DOC_SOIL</td>
<td>N</td>
<td>Y</td>
<td>numeric(6,1)</td>
<td>range</td>
<td>0.3000 787.2000</td>
</tr>
<tr>
<td>LAB_RESP</td>
<td>N</td>
<td>Y</td>
<td>numeric(6,3)</td>
<td>range</td>
<td>0.0030 1.8530</td>
</tr>
<tr>
<td>N2OCONS</td>
<td>N</td>
<td>Y</td>
<td>numeric(6,3)</td>
<td>range</td>
<td>-0.4380 3.5800</td>
</tr>
<tr>
<td>METHCONS</td>
<td>N</td>
<td>Y</td>
<td>numeric(5,2)</td>
<td>range</td>
<td>-0.0600 7.3600</td>
</tr>
<tr>
<td>DENITPOT</td>
<td>N</td>
<td>Y</td>
<td>numeric(6,3)</td>
<td>range</td>
<td>0.0300 127.2900</td>
</tr>
</tbody>
</table>
### 2: Soil Characteristics and Microbial Variables - Routine set

**Attribute List:**

- **STCODE**: N N char(10) enum
- **FORMAT**: N N numeric(1,0) range 2.0000 2.0000 number
- **SITE**: Y N char(5) enum
- **DATE**: Y N datetime range 7/7/1992 12:00:00 AM - 12/23/1993 12:00:00 AM YYYY-MM-DD
- **SAMPLE**: Y N freetext
- **P_MOIST**: N Y numeric(5,1) range 3.5000 408.8000 %
- **F_DRY_WT**: N Y numeric(5,3) range 0.3150 0.9660 number
- **SOM**: N Y numeric(5,1) range 0.0000 89.4000 %
- **DOC_SOIL**: N Y numeric(6,1) range -3.0000 4053.0000 ug/g
- **LAB_RESP**: N Y numeric(6,3) range -0.2600 4.5660 umol/g*hr
- **AIRTEMP**: N Y numeric(5,1) range -0.7000 31.8000 deg C
- **SOILTEMP**: N Y numeric(5,1) range -0.2000 19.8000 deg C

### 3: Field Respiration

**Attribute List:**

- **STCODE**: N N char(10) enum
- **FORMAT**: N N numeric(1,0) range 3.0000 3.0000 number
- **SITE**: Y N char(5) enum
- **RESPDATETIME**: Y N datetime range 7/13/1992 11:20:00 AM - 12/23/1993 12:00:00 AM YYYY-MM-DD hh:mm:ss
- **SAMPLE**: Y N freetext
- **TREATMNT**: Y Y char(1) enum
- **NET_RESP**: N Y numeric(5,2) range -0.9700 18.4400 g/m2*day

### 4: Air and Soil Temperature

**Attribute List:**
STCODE N N char(10) enum
FORMAT N N numeric(1,0) range 4.0000 4.0000 number
SITE Y N char(5) enum
DATE Y N datetime range 7/7/1992 12:00:00 AM 11/27/1993 12:00:00 AM YYYY-MM-DD
AIRTEMP N Y numeric(5,1) range -0.7000 32.5000 deg c
SOILTEMP N Y numeric(5,1) range -0.2000 26.0000 deg c
AIRMAX N Y numeric(5,1) range 0.6000 36.7000 deg c
AIRMIN N Y numeric(5,1) range -1.1000 17.2000 deg c

5. Site Location and Description

Attribute List:
STCODE N N char(10) enum
FORMAT N N numeric(1,0) range 5.0000 5.0000 number
SITE Y N char(5) enum
CONTROL N Y char(10) freetext
ASPECT N N char(10) freetext
MAP_ELEV N N numeric(4,0) range 473.0000 1433.0000 m
LATITUDE N N numeric(13,6) range 44.2000 44.2800 deg lat-lon
LONGITUDE N N numeric(13,6) range -122.2400-122.1200 deg lat-lon
VEG N N char(10) enum
STANDAGE N Y char(10) enum
COMMENTS N N varchar(60) freetext

Attributes Definitions:
AIRMAX
Maximum air temperature during field respiration
AIRMIN
Minimum air temperature during field respiration
AIRTEMP
Mean of air temperatures taken at the start and end of field respiration
ASPECT
Aspect description
BULKDENS
Bulk density of soil
COMMENTS
Site description and comments
CONTROL
| Control site for given site code - if any |
| DATE |
| Date samples collected (yyyymmdd) |
| DENITPOT |
| Denitrification potential |
| DOC_SOIL |
| Dissolved organic carbon extracted from soils (as C) |
| EXTR_AMM |
| Concentration of ammonium n extracted with 2m KCl |
| F_DRY_WT |
| Wt fraction dry/wet wt soil |
| FLD_RESP |
| Forest floor respiration (g CO2) |
| FORMAT |
| Entity number |
| LAB_RESP |
| CO2 released from soils incubated at 15 deg. C |
| LATITUDE |
| Site latitude decimal degrees |
| LIT_RESP |
| Litter respiration (g CO2) |
| LIT_RESP_P |
| Percent litter respiration |
| LONGITUDE |
| Site longitude decimal degrees |
| MAP_ELEV |
| Site elevation from gis map |
| MASS_LIT |
| Mass of litter on a square meter basis |
| METHCONS |
| Methane consumption rates from soils |
| METHPROD |
| Methane production |
| MIN_N |
| Concentration ammonium n after incubation at 40 deg. C for 7 days |
| N2OCONS |
| Nitrous oxide consumed by soils |
NET_RESP
Net respiration rate (as C)

P_MOIST
Percent moisture (wet-dry/dry)x100

PH
pH

RESPDATETIME
Date and time respiration started

SAMPLE
Sample location number along transect at each site

SAMPLOCA
Location along transect where sample is taken

SITE
Permanent trace gas sites

SOILTEMP
Mean of soil temperatures taken at the start and end of field respiration

SOM
Percent soil organic matter in mineral soil (by combustion at 550 C)

STANDAGE
Standage description, OG=old-growth, CC=clearcut, or age in years

STCODE
Database code

TREATMNT
Treatment code: N=no treatment P=mineral soil respiration eliminated by plastic sheet between mineral soil and litter

VEG
Primary tree vegetation

Enumerated Domains:
Enumerated Domain for Attribute: SITE

10C Mid-elevation (south slope)
11C Riparian area
1C 1v control + high hot dry mc
1V High hot dry microclimate (mc)
2C North facing
2V North facing clear cut (mid-elevation)
2VC Control for 2v and 3v
3C Valley site near stream (no slope)
3V 15 year old doug-fir stand
4C Cool-wet high elevation (north slope) control for 6v.
4V 35 year old doug-fir stand
4VC Control for 4v
5C Site similar to 3c but higher
5V Big-leaf maple site
5VC Control for 5v
6C High-moisture site (north facing)
6V Sitka alder veg. site
7C Moisture mid-elevation (north facing veg. site)
8C High dry hot site (south facing ridge top)
9C Low elevation (north slope) cool moisture

Enumerated Domain for Attribute: STCODE
SP004 FSDB Database Study Code

Enumerated Domain for Attribute: SITE
10C Mid-elevation (south slope)
11C Riparian area
1C 1v control + high hot dry mc
1V High hot dry microclimate (mc)
2C North facing
2V North facing clear cut (mid-elevation)
2VC Control for 2v and 3v
3C Valley site near stream (no slope)
3V 15 year old doug-fir stand
4C Cool-wet high elevation (north slope) control for 6v.
4V 35 year old doug-fir stand
4VC Control for 4v
5C Site similar to 3c but higher
5V Big-leaf maple site
5VC Control for 5v
6C High-moisture site (north facing)
6V Sitka alder veg. site
7C Moisture mid-elevation (north facing veg. site)
8C High dry hot site (south facing ridge top)
9C Low elevation (north slope) cool moisture
Enumerated Domain for Attribute: STCODE
SP004 FSDB Database Study Code

Enumerated Domain for Attribute: SITE
10C Mid-elevation (south slope)
11C Riparian area
1C 1v control + high hot dry mc
1V High hot dry microclimate (mc)
2C North facing
2V North facing clear cut (mid-elevation)
2VC Control for 2v and 3v
3C Valley site near stream (no slope)
3V 15 year old doug-fir stand
4C Cool-wet high elevation (north slope) control for 6v.
4V 35 year old doug-fir stand
4VC Control for 4v
5C Site similar to 3c but higher
5V Big-leaf maple site
5VC Control for 5v
6C High-moisture site (north facing)
6V Sitka alder veg. site
7C Moisture mid-elevation (north facing veg. site)
8C High dry hot site (south facing ridge top)
9C Low elevation (north slope) cool moisture

Enumerated Domain for Attribute: TREATMNT
N Total respiration from soil and litter: no treatment
P Respiration from litter only

Enumerated Domain for Attribute: SITE
10C Mid-elevation (south slope)
11C Riparian area
1C 1v control + high hot dry mc
1V High hot dry microclimate (mc)
2C North facing
2V  North facing clear cut (mid-elevation)
2VC  Control for 2v and 3v
3C  Valley site near stream (no slope)
3V  15 year old doug-fir stand
4C  Cool-wet high elevation (north slope) control for 6v.
4V  35 year old doug-fir stand
4VC  Control for 4v
5C  Site similar to 3c but higher
5V  Big-leaf maple site
5VC  Control for 5v
6C  High-moisture site (north facing)
6V  Sitka alder veg site
7C  Moisture mid-elevation (north facing veg. site)
8C  High dry hot site (south facing ridge top)
9C  Low elevation (north slope) cool moisture

Enumerated Domain for Attribute: STCODE
SP004  FSDB Database Study Code

Enumerated Domain for Attribute: ASPECT
High flat  High flat
North  North
North-flat  North-flat
South  South
South-flat  South-flat

Enumerated Domain for Attribute: SITE
10C  Mid-elevation (south slope)
11C  Riparian area
1C  1v control + high hot dry mc
1V  High hot dry microclimate (mc)
2C  North facing
2V  North facing clear cut (mid-elevation)
2VC  Control for 2v and 3v
3C  Valley site near stream (no slope)
3V  15 year old doug-fir stand
4C  Cool-wet high elevation (north slope) control for 6v.
4V 35 year old doug-fir stand
4VC Control for 4V
5C Site similar to 3c but higher
5V Big-leaf maple site
5VC Control for 5V
6C High-moisture site (north facing)
6V Sitka alder veg. site
7C Moisture mid-elevation (north facing veg. site)
8C High dry hot site (south facing ridge top)
9C Low elevation (north slope) cool moisture

Enumerated Domain for Attribute: STANDAGE
YS young stand
MS mature stand
OG old growth
CC Clearcut

Enumerated Domain for Attribute: STCODE
SP004 FSDB Database Study Code

Enumerated Domain for Attribute: VEG
BL maple Broad-leaf maple
Clearcut Clearcut
Douglas-fir Douglas-fir
Noble fir Noble fir
Sitka alder Sitka alder