The effect of topography on fuel moisture

J. Best[1] A. Tepley[2]

[1]Ecoinformatics Summer Institute, Clarkson University
[2]Department of Geography Oregon State University

Ecoinformatics Summer Institute Final Presentation

Outline

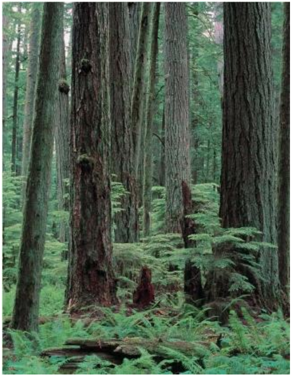
Why are fires important?

- Large scale disturbance
- Community composition
  - Resets successional pathway
- Management issues
  - Conflicts with people
  - Timber harvesting

What about fuel moisture?

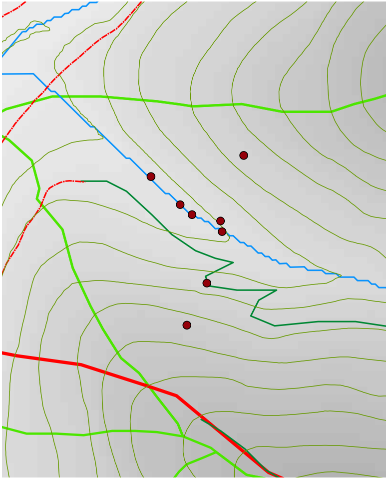
$$\text{Fuel Moisture} = \frac{\text{Wet mass} - \text{Dry Mass}}{\text{Dry Mass}}$$

- Local intensity
- Local rate of spread



Collection Methods

- Transects in WS01
  - Extensive met. data
- Collected for 24 hr.
  - $\frac{1}{8}$in.: Hourly
  - $\frac{5}{8}$in.: Every 6 hr.

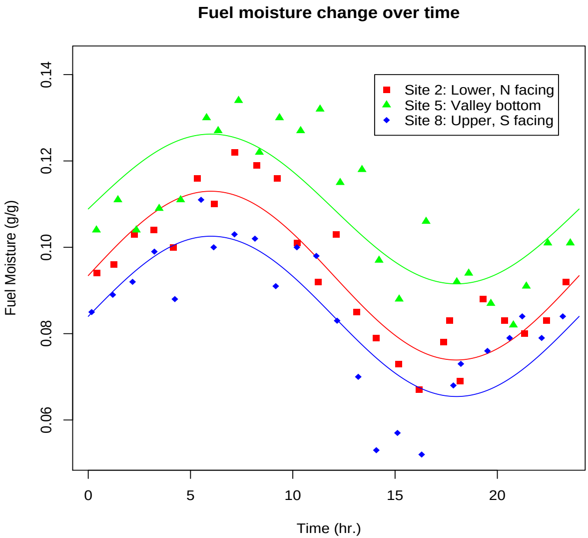


Measurement Methods

Each sample:

- Massed wet
- Dried 36 hr. at 60°C
- Massed dry

Fuel Moisture



Statistical Model


```
Moisture ~ SlopePosn + Aspect + Slope + AT1 + AT2

Coefficients:
                          Pr(>|t|)
(Intercept)   0.1581867    < 2e-16 ***
SlopePosn    -0.0214542   1.19e-08 ***
Aspect       -0.0025753   0.000888 ***
Slope        -0.0289303   0.033211 *
AT1           0.0146129   9.37e-13 ***
AT2          -0.0165226   5.82e-15 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05

Multiple R-Squared:  0.7863, Adjusted R-squared:
0.7746
p-value:  < 2.2e-16
```

Statistical Model

- `(Intercept)   0.1581867   < 2e-16 ***`
  A flat area at 0°C results in 16% moisture.
- `SlopePosn    -0.0214542   1.19e-08 ***`
  Upper slopes are drier.
- `Aspect       -0.0025753   0.000888 ***`
  Increasing aspect bearing decreases moisture.
- `Slope        -0.0289303   0.033211 *`
  Steeper areas are drier.
- `AT1           0.0146129   9.37e-13 ***`
  Warmer 15 min. temperature increases moisture.
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  Warmer 30 min. temperature decreases moisture.

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Discussion

- Driest:
  - Southern exposure
  - High on the hillslope
  - Easiest ignition, fastest spread
  - Lightning strikes ridges
- Wettest:
  - Northern exposure
  - Valley bottom
  - Natural firebreak

Discussion

Issues:

- Only half the sites
    - Missing topographic data
    - Missing met. data
- Some topographic data suspect (Site 7)
- Representing aspect

Future work:

- Other watersheds
    - Veg. cover
    - Aspect

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