Background Information

In the 21st century, global accelerated climate change poses the greatest threat to future generations. The carbon cycle is partially offset by anthropogenic means, including the burning of fossil fuels. Deep soil organic carbon comprises a vast carbon sink that is often neglected. Soil organic carbon makes up 65.6% of total terrestrial ecosystem carbon (Ares, et al. 2007, 39), implying that soil comprises the greatest portion of carbon budgets in forest ecosystems at high latitudes.

The purpose of this investigation is to determine if increased intensity harvests will have an effect, if any, on the retention of deep soil organic carbon of the Boistfort series. Soil samples from BO+VC and TTP+VC plots were placed in an array under incubation conditions set at 22˚C and 33˚C. The set-up of the experiment tested for comparable rates of decomposition between soils.

The concept of ‘carbon neutrality’ in the use of biomass for bio-fuels based energy sources is limited by the exclusion of the below-ground biomass and soil carbon that influence the carbon balance.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ΔC%</th>
<th>Std. Dev.</th>
<th>Mean Pre C%</th>
<th>Std. Dev.</th>
<th>Mean Post C%</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[30-50] (32˚)</td>
<td>0.78</td>
<td>0.48</td>
<td>1.87</td>
<td>0.45</td>
<td>2.65</td>
<td>0.93</td>
</tr>
<tr>
<td>[30-50] (22˚)</td>
<td>0.23</td>
<td>0.51</td>
<td>2.54</td>
<td>1.02</td>
<td>2.77</td>
<td>0.84</td>
</tr>
<tr>
<td>[50-100] (32˚)</td>
<td>-0.04</td>
<td>0.09</td>
<td>1.01</td>
<td>0.32</td>
<td>0.97</td>
<td>0.28</td>
</tr>
<tr>
<td>[50-100] (22˚)</td>
<td>-0.12</td>
<td>0.11</td>
<td>1.01</td>
<td>0.32</td>
<td>0.89</td>
<td>0.26</td>
</tr>
<tr>
<td>[150-200] (32˚)</td>
<td>0.06</td>
<td>0.05</td>
<td>0.39</td>
<td>0.20</td>
<td>0.45</td>
<td>0.22</td>
</tr>
<tr>
<td>[150-200] (22˚)</td>
<td>0.15</td>
<td>0.09</td>
<td>0.39</td>
<td>0.20</td>
<td>0.58</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Descriptive Statistics

Description of Research Methods

- Soil Augur and Core Method (3-meters depth)
- Sieving
- Soil Incubation & Intermittent Water Tending
- Deep Soil Total Carbon Analysis
- Data Review

Summary

Results show that a majority of the samples display an increase in carbon concentration. Of the twelve temperature/depth groups from both treatment classes, only three (25%) showed a decrease in carbon concentration. A simple student’s t-test employed showed no significant difference between pre and post incubation deep soil carbon concentrations after about five weeks, indicating that the soil remained unchanged throughout the experiment (P-value=0.49). This is rather intuitive considering that the carbon concentrations are extremely low at greater depths, the C:N ratios are high (poor food quality), and the amount of microbial activity is low. I believe that the response variable would show greater change with respect to temperature if the experiment was allowed to progress for a longer period of time. Temperature treatments showed no significant difference in carbon content. Thus, it is largely unknown if increased intensity harvests will have an effect, if any, on the retention of deep soil organic carbon of the Boistfort series.

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