Spatial Distribution in Everglades
Nutrient Budgets and Their Effects on
Biogeochemical Processes

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- 119 sites across Greater Everglades Ecosystem (GEE)
- Sampled most ecosystem compartments including Soil (0-10 cm), flocculent detrital organic matter (Floc), Water, Periphyton, Vegetation, and Fish.
- Subset (65) sites also estimates of Cladium above ground biomass.
- Further subset (25) sites semi-randomly selected for respiration assay.
Soil dynamics, storage, and change in the Everglades has been well-studied and has been a major focus of the R-EMAP program.

• Importance of soils to overall chemical cycling in wetlands.
• Importance of peat and soil C storage in the global carbon cycle
• Past loss of Everglades soil
• Potential effects of restored hydrology on soil dynamics, including preservation and accretion.
Circa 1988

• Approximately 30 cm Soil loss
• Almost 30 years later

…and about 40+ lbs
<table>
<thead>
<tr>
<th>REGION</th>
<th>TOTAL SOIL C mg g$^{-1}$ dw, Mean ± SE</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEE</td>
<td>358 ± 13</td>
<td>118</td>
</tr>
<tr>
<td>LOX</td>
<td>495 ± 32 a</td>
<td>13</td>
</tr>
<tr>
<td>WCA2</td>
<td>405 ± 108 ab</td>
<td>12</td>
</tr>
<tr>
<td>WCA3</td>
<td>406 ± 96 b</td>
<td>54</td>
</tr>
<tr>
<td>ENP</td>
<td>340 ± 105 b</td>
<td>14</td>
</tr>
<tr>
<td>ENPM</td>
<td>171 ± 70 c</td>
<td>25</td>
</tr>
<tr>
<td>REGION</td>
<td>TOTAL SOIL P $\mu$g g$^{-1}$ dw, Mean ± SE</td>
<td>N</td>
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</tr>
<tr>
<td>GEE</td>
<td>416 ± 19</td>
<td>118</td>
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<tr>
<td>LOX</td>
<td>382 ± 54 ab</td>
<td>13</td>
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<tr>
<td>WCA2</td>
<td>465 ± 56 a</td>
<td>12</td>
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<tr>
<td>WCA3</td>
<td>489 ± 27 a</td>
<td>54</td>
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<tr>
<td>ENP</td>
<td>381 ± 52 ab</td>
<td>14</td>
</tr>
<tr>
<td>ENPW</td>
<td>275 ± 39 b</td>
<td>25</td>
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</tbody>
</table>
Soil Organic Matter Respiration Assay

Soil OM respiration can be dependent on several factors including hydrology, nutrient availability, and the lability of OM.

- Soil from 25 semi-randomly selected sites (distributed to sample each of the 5 regions).
- Determine the influence of P-limitation by amending with 0.4 mmole P (KH$_2$PO$_4$) g$^{-1}$ dw soil.
- Determine lack of labile substrate by amending with 1.2 mmole C (glucose) g$^{-1}$ dw soil.
- Combination of the two.
- Nominal 96 h incubation in dark at room temperature.
- Headspace analyzed for CO$_2$ (µmol CO$_2$ g$^{-1}$ dw h$^{-1}$) by GC with FID and methanizer.
Significantly different at $p < 0.05$. Shapiro-Wilk and Kolmogorov-Smirnov tests of normality. Either Tukey’s or log transform then Tukey’s. SPSS 23.0
Conclusions

Despite spatial differences in C and P across the GEE there was not a significant affect on nutrient mechanisms controlling respiration.

- Phosphorus amendments only significantly effected respiration of soil from LOX.
- All soils responded to “priming” by the combination of amendments.
- WCA2 soils responded to Glucose only amendments despite having high soil C.
- The “low P” ENPM soils did not respond to added P.