The Living Levee: assessment of wetland soil on trace organic compound removal

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Objective:
Understand the hydrology of the Living Levee and demonstrate the relationship between wetland soil adsorption capacity and depth

Background:
- The Living Levee performs tertiary waste water treatment at the Oro Loma Sanitary district in San Lorenzo, CA
- Originally built for nitrogen removal and flood management
- Suspected to remove Trace Organic Contaminants (TrOCs)
  - Pharmaceuticals and Personal Care Products
- Preliminary studies have shown >80% removal of TrOCs
- Exact fate of TrOCs is still unknown

Scope:
- Cells E, F, and G were chosen for their better performance
- Focused on four TrOCs: Carbamazepine, Atenolol, Metoprolol, Propranolol
  - Carbamazepine was chosen because it had higher than expected removal rates
  - Atenolol, Metoprolol, and Propranolol are beta-blockers
  - Chosen for their similar structure

Figure 1: Shown above is a close-up of the Living Levee. The Outlined cells were the cells that were studied.
Results:

![Figure 2: Change in adsorption capacity with depth](image)

![Figure 3: Hydraulic Retention Time](image)

Discussion:
- Sorption of Carbamazepine has little or no change throughout the layers (Figure 2)
  - Predominant Mechanism: hydrophobicity
- Sorption of the beta-blockers increased (Figure 3) significantly in layers with high clay content
  - Predominant Mechanism: electrostatic interactions

Conclusion:
- Clay content may enhance adsorption
- However, clay content is not the only factor at work
  - Transport of organic matter
  - Minerology

Future Work:
- Conducting more tests on a specific cell
- Concentrate on soil chemistry
  - Organic Carbon-loss on ignition
  - Cation Exchange Capacity