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DOCUMENTATION FOR THE BOSTON AREA DEPOSITION AND SOIL SOLUTION DATASET

Overview

This document describes the structure and organization of an environmental dataset that details bulk deposition (in the open), throughfall (beneath tree canopy), and soil solution measurements of nitrogen (N), phosphorus (P), and carbon (C) made from May to October of 2015 at nine locations across Metropolitan Boston. This dataset was constructed by Stephen Decina, Pamela Templer, and Lucy Hutyra of Boston University. Its construction was partially funded by the Boston Area Research Initiative's Research Seed Grant program. Details on the preparation of these data and their analysis are available in the research article: Decina, Stephen M., Pamela H. Templar, and Lucy R. Hutyra. 2018. "Atmospheric Inputs of Nitrogen, Carbon, and Phosphorus across an Urban Area: Unaccounted Fluxes and Canopy Influences." *Earth's Future*, 6: 134-148, https://doi.org/10.1002/2017EF000653.

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1. Description of Contents

In 2015, Stephen Decina, Pamela Templer, and Lucy Hutyra of Boston University measured organic and inorganic Nitrogen (N), organic Carbon (C), and organic and inorganic Phosphorus (P) in bulk and throughfall atmospheric inputs at nine sites throughout the greater Boston area, five of which had collocated bulk and throughfall measurements. While eight of these sites were within the City of Boston, one site was within the City of Waltham. These sites are listed as: *Kenmore*, *BU_Bridge*, *Community_Farm*, *Weld_Hill*, *Bussey_Brook*, *Dorchester*, *Roxbury*, *BU_Bay_State*, and *BU_CAS*. All measurements within the data correspond to these nine sites.

The data are structured in accordance with the time interval of collection and the type of measurement. Bulk deposition and throughfall measurements were made across four time periods: T1 (May 12-13 to June 22), T2 (June 22 to August 3), T3 (August 3 to September 14), and T4 (September 14 to October 23-24). Soil solution measurements were made across two time periods T1 (May 12-13 to August 3) and T2 (August 3 to October 23-24). Therefore, the columns are structured to designate the exact time interval an element or compound measured. It should be noted that all "NA" values within the soil data for sites 6-9 are due to the lack of soil at these sites, which prevented measurements of soil solution to be made.

1.1 Description of Variables

1.1.1 Collection Site Indicators and Details

- *Site_name* - The name of the individual site, followed by an underscore of "_B" for bulk deposition measurements and "_TF" for throughfall measurements. For soil solution, the designation of "_B" and "_TF" means that soil solution measurements were taken respectively in close proximity (within 1 meter) of bulk deposition and throughfall collectors. The individual sites are: *Kenmore*, *BU_Bridge*, *Community_Farm*, *Weld_Hill*, *Bussey_Brook*, *Dorchester*, *Roxbury*, *BU_Bay_State*, and *BU_CAS*.

- *Site_number* - Number assigned to the individual sites (1-9). Sites 1-5 with both bulk deposition and throughfall measurements have two site names for each number to represent the two types of measurements made at these sites. Sites 6-9 only had bulk deposition measurements.

- *Type* - The type of measurement made at each site. Bulk indicates that bulk deposition measurements were made, while throughfall indicates that throughfall measurements were made.

- *Latitude* - The latitude of each site in decimal degrees.

- *Longitude* - The longitude of each site in decimal degrees.

- *T1_dep_days_in_field* - The number of days bulk deposition and throughfall resin collectors were in the field for each site for the T1 time period.

- *T2_dep_days_in_field* - The number of days bulk deposition and throughfall resin collectors were in the field for each site for the T2 time period.

- *T3_dep_days_in_field* - The number of days bulk deposition and throughfall resin collectors were in the field for each site for the T3 time period.

- *T4_dep_days_in_field* - The number of days bulk deposition and throughfall resin collectors were in the field for each site for the T4 time period.

- *T1_soil_days_in_field* - The number of days soil solution resin bags were in the field for each site for the T1 time period.

- *T2_soil_days_in_field* - The number of days soil solution resin bags were in the field for each site for the T2 time period.

1.1.2 Site Measurement Details

- *T1_NO3N_dep_kgNha* - The amount of nitrate-N, in kilogram N per hectare, in bulk deposition and throughfall during the T1 time period.

- *T2_NO3N_dep_kgNha* - The amount of nitrate-N, in kilogram N per hectare, in bulk deposition and throughfall during the T2 time period.

- *T3_NO3N_dep_kgNha* - The amount of nitrate-N, in kilogram N per hectare, in bulk deposition and throughfall during the T3 time period.

- *T4_NO3N_dep_kgNha* - The amount of nitrate-N, in kilogram N per hectare, in bulk deposition and throughfall during the T4 time period.

- *T1_NH4N_dep_kgNha* - The amount of ammonium-N, in kilogram N per hectare, in bulk deposition and throughfall during the T1 time period.

- *T2_NH4N_dep_kgNha* - The amount of ammonium-N, in kilogram N per hectare, in bulk deposition and throughfall during the T2 time period.

- *T3_NH4N_dep_kgNha* - The amount of ammonium-N, in kilogram N per hectare, in bulk deposition and throughfall during the T3 time period.

- *T4_NH4N_dep_kgNha* - The amount of ammonium-N, in kilogram N per hectare, in bulk deposition and throughfall during the T4 time period.

- *T1_OrgN_dep_kgNha* - The amount of organic N, in kilogram N per hectare, in bulk deposition and throughfall during the T1 time period.

- *T2_OrgN_dep_kgNha* - The amount of organic N, in kilogram N per hectare, in bulk deposition and throughfall during the T2 time period.

- *T3_OrgN_dep_kgNha* - The amount of organic N, in kilogram N per hectare, in bulk deposition and throughfall during the T3 time period.

- *T4_OrgN_dep_kgNha* - The amount of organic N, in kilogram N per hectare, in bulk deposition and throughfall during the T4 time period.

- *T1_InorgP_dep_kgPha* - The amount of inorganic P, in kilogram P per hectare, in bulk deposition and throughfall during the T1 time period.

- *T2_InorgP_dep_kgPha* - The amount of inorganic P, in kilogram P per hectare, in bulk deposition and throughfall during the T2 time period.

- *T3_InorgP_dep_kgPha* - The amount of inorganic P, in kilogram P per hectare, in bulk deposition and throughfall during the T3 time period.

- *T4_InorgP_dep_kgPha* - The amount of inorganic P, in kilogram P per hectare, in bulk deposition and throughfall during the T4 time period.

- *T1_OrgP_dep_kgPha* - The amount of organic P, in kilogram P per hectare, in bulk deposition and throughfall during the T1 time period.

- *T2_OrgP_dep_kgPha* - The amount of organic P, in kilogram P per hectare, in bulk deposition and throughfall during the T2 time period.

- *T3_OrgP_dep_kgPha* - The amount of organic P, in kilogram P per hectare, in bulk deposition and throughfall during the T3 time period.

- *T4_OrgP_dep_kgPha* - The amount of organic P, in kilogram P per hectare, in bulk deposition and throughfall during the T4 time period.

- *T1_OrgC_dep_kgCha* - The amount of organic C, in kilogram C per hectare, in bulk deposition and throughfall during the T1 time period.

- *T2_OrgC_dep_kgCha* - The amount of organic C, in kilogram C per hectare, in bulk deposition and throughfall during the T2 time period.

- *T3_OrgC_dep_kgCha* - The amount of organic C, in kilogram C per hectare, in bulk deposition and throughfall during the T3 time period.

- *T4_OrgC_dep_kgCha* - The amount of organic C, in kilogram C per hectare, in bulk deposition and throughfall during the T4 time period.

- *T1_NO3N_soil_micgNgres* - The amount of nitrate-N, in micrograms (µg) N per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T1 time period.

- *T2_NO3N_soil_micgNgres* - The amount of nitrate-N, in micrograms (µg) N per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T2 time period.

- *T1_NH4N_soil_micgNgres* - The amount of ammonium-N, in micrograms (µg) N per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T1 time period.

- *T2_NH4N_soil_micgNgres* - The amount of ammonium-N, in micrograms (µg) N per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T2 time period.

- *T1_OrgN_soil_micgNgres* - The amount of organic N, in micrograms (µg) N per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T1 time period.

- *T2_OrgN_soil_micgNgres* - The amount of organic N, in micrograms (µg) N per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T2 time period.

- *T1_InorgP_soil_micgPgres* - The amount of inorganic P, in micrograms (µg) P per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T1 time period.

- *T2_InorgP_soil_micgPgres* - The amount of inorganic P, in micrograms (µg) P per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T2 time period.

- *T1_OrgP_soil_micgPgres* - The amount of organic P, in micrograms (µg) P per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T1 time period.

- *T2_OrgP_soil_micgPgres* - The amount of organic P, in micrograms (µg) P per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T2 time period.

- *T1_OrgC_soil_micgCgres* - The amount of organic C, in micrograms (µg) C per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T1 time period.

- *T2_OrgC_soil_micgCgres* - The amount of organic C, in micrograms (µg) C per gram resin, in soil solution associated with bulk deposition and throughfall collectors during the T2 time period.