Archived Soil Incubations Project

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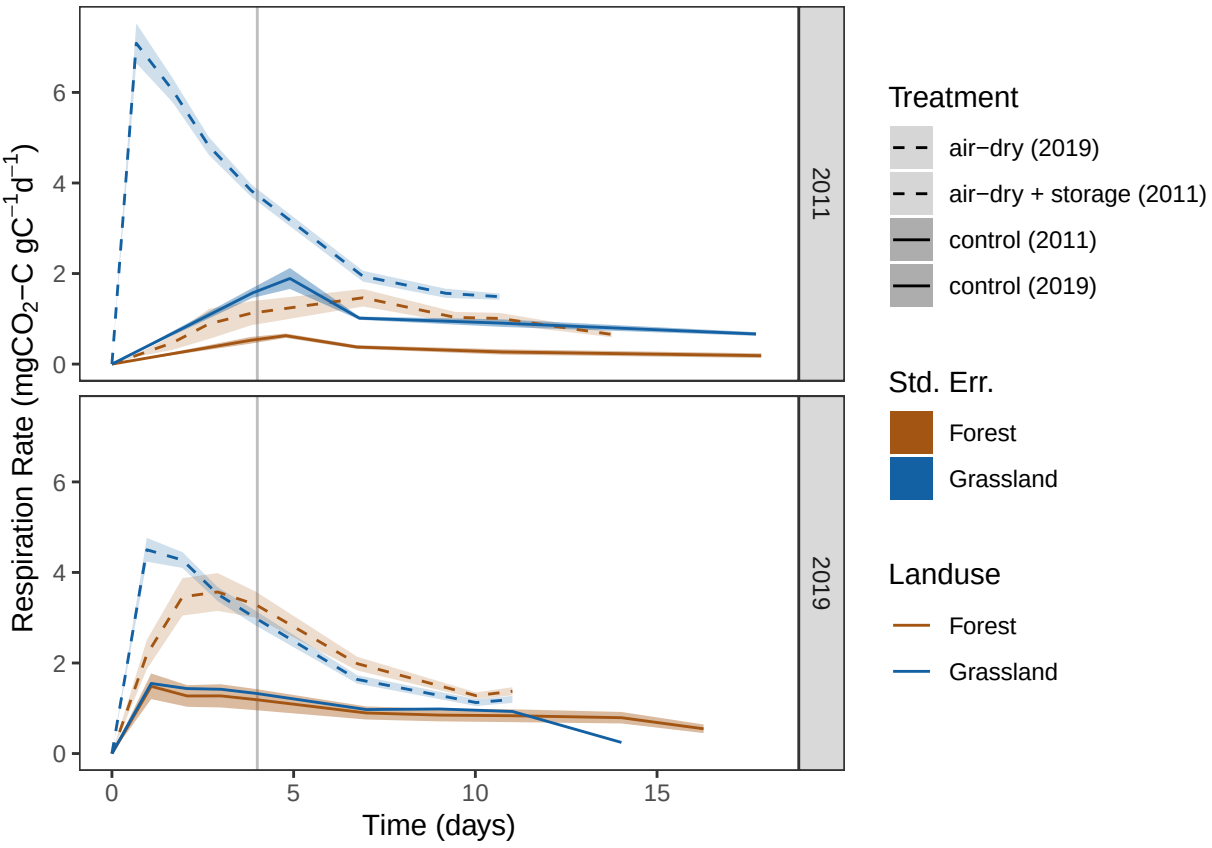
Notes:

- This workbook is intended to load and prepare the key data for analysis for the archive incubation project.
- in general, this is an updated version of script "./src/arc_inc_master.R"
- all code chunk options are set to "echo = FALSE"; see raw .Rmd file for data wrangling code.

CO_2 fluxes and soil data

1. Load flux data from air-dry + storage control samples, and convert from "wide" to "long" format so as to match other data.
2. Load flux data from air-dry + storage samples and from air-dry experiment (ctl & treatment), C & N data for all the Exploratories samples (measured in 2011), and soil mass and moisture data for all experiments.
3. Combine and summarize data in long format to calculate respiration rates and plot over time.
4. Plot of CO_2 fluxes over time. Note that the final measurement points for a few samples which took >18 days to reach CO_2 targets are excluded for display reasons. Respiration rates for those samples remained flat.

```
## Warning: Removed 7 rows containing missing values (geom_path).
```



Isotope data

section in progress

1. Read in isotope data from various sources. First load helper function 'read_jena_ams_results.R"
2. Next read in data from the appropriate directories in 'data/raw'.
3. Create a "tidy" style template for the data, i.e. variables in columns.

- Key variables are as follows:
  - SampleName (incorporates lab rep and treatment, e.g. "HEG10-1_dry")
  - ID (plot IDs, e.g. for "HEG10" for Exploratory samples)
  - Treatment (3 treatments: air-dry, air-dry + storage, storage duration; + controls)
  - Type (2 levels: F = forest, G = grassland)
  - Period (incubation period, 2 levels: pre = preincubation, inc = equilibrium incubation)
  - Experiment (3 levels: arc = air-dry + storage, rewet = air-dry/rewet, time = storage duration)
- Observational columns include:
  - d14c (Δ^{14}C-CO_2)
  - d13c (δ^{13}C-CO_2)
  - C_g_kg (C content)
  - dw_g (dry weight)
  - mgCO2.C_gS (mg CO_2-C respired g^{-1} soil $Period^{-1}$)
  - time_d (days in incubation period prior to measurement)
  - h2o_grav (gravimetric water content, percent)
  - h2o_whc_field (percent of water holding capacity, field-moist)

4. Add observational data from timeseries data.
5. Add ^{14}C data to template. Note that archived sample Δ^{14}C data needs to be corrected for decay. The correction is very small and likely insignificant, but will do this anyway.

- decay correction formula is:

$$1000 \cdot \left((FM \cdot e^{\frac{-year_{obs}+1950}{8267}}) - 1 \right)$$