Generalized soil sampling protocol

Author: Cassi Wattenburger 6/24/19

Notes

- Contamination should be avoided to the best of your ability
- Work efficiently, there are usually a lot of samples to get through in a single day
- Don't leave any garbage at the sampling site, clean up after yourself
- Always bring extra supplies, such as extra spray bottles, in case something breaks or is lost
- Tick avoidance:
    - wear long-sleeved and light-colored clothes
    - pull your socks over your pant legs and tuck your shirt in (you'll look like a dork but it's worth it)
    - treat clothing with permethrin and/or wear bug spray
    - check for ticks on your clothes while you work, and do a full-body tick check when you get home
    - if you find a tick embedded, remove it with tweezers by pulling straight until the tick lets go (do not twist, do not smoosh the tick) and store it in a plastic bag or tube with ethanol in case you get sick
- Bring drinking water and snacks, take breaks if needed
- Sample with a helper, especially if you'll have limited cell service, tell someone wear you will be and for how long

Materials

- soil corer(s)
- broad metal spatulas (marked at desired sampling depth)
- tube-cleaning brushes
- paper towels
- OPTIONAL: sterile paper towels (wrapped in foil and autoclaved 25 min)
- 70% ethanol in spray bottle(s)
- DI water in spray bottle(s)
- extra 70% ethanol and DI water in jugs
- gloves
- pre-labelled bags for samples (sterile and non-sterile bags)
- cooler with dry ice and/or cooler with ice
- garbage bags
- GPS (if want exact sampling locations)
- pen and paper
- OPTIONAL: soil sieve(s), 2 or 4 mm

Method

1. Wear gloves
2. Clean soil corer and spatula with a wire brush, then DI water and paper towels to completely remove soil. Spray the soil corer and spatula with ethanol and allow to air dry (this disinfects your tools to minimize cross-contamination between samples)
    a. You can also use sterilized paper towels to wipe excess ethanol if air-drying takes too long, but at least let the ethanol "act" for a minute or two before wiping it away
    b. Having multiple corers and spatulas helps, because you can switch between them as you work
3. OPTIONAL: Take a "dummy" soil core near the place wear you will take your next sample, and discard
    a. This may help remove any lingering contaminants from previous samples
    b. You can also stick your spatula into the soil near the site for the same reason
4. Record GPS coordinates of sampling spot, if desired
5. Take your soil cores at the sampling spot
    a. Clear the soil surface of plant litter and debris (unless the O horizon is of interest)
    b. Press the corer down perpendicular to the earth with slow, even pressure, twisting as you push to prevent compaction

    c. If you hit an impenetrable barrier or compact the core, discard and start over
6. Use your spatula as a ruler to measure the sampled core to the desired depth from the surface, remove excess using the spatula
7. Place the sampled core into an appropriate sample bag (sterile if for DNA extraction, non-sterile is fine if for soil biogeochemistry)
    a. you may want to place multiple cores into the same bag, homogenize by mixing, then subsample
8. Immediately place the sample on dry ice or ice (if for DNA extraction) or ice/ambient temperature if for other applications
9. Repeat from step 1 at next sampling site until sampling is complete
10. Upon return to lab, move your frozen samples into a -20 or -80°C freezer ASAP, you can store soil for geochemical measurements at room temperature or at 4°C until you can process them

Optional changes to protocol:

- You may want to sieve your soil samples to homogenize multiple cores, to remove rocks and other debris, or for certain biogeochemical analyses. This can be done in the field (clean and sterilize sieve as you would the corer) but takes a long time, OR samples can be stored on ice/in a fridge until they are sieved in lab but the downside is that the samples are not frozen immediately for DNA extraction which may alter the community. It is up to you and the goals of your experiment.
- Use liquid nitrogen to freeze samples instead of dry ice (a pain to transport, but this will help if you're interested in RNA because freezing is instantaneous).