

Lake Sediment Core Magnetic Susceptibility (MS) Measurement Procedures

1. Set up fixed ruler: tape stuck to the edge of the table and marked off in 0.5cm increments works well. Leave space at the left side of the table for the top of the core barrel and the measuring jig.
2. Remove core from refrigerator and allow to sit for at least one, preferably two or more hours. This allows the core to warm up and eliminates any variation in MS due to temperature changes during the measuring process (Figure 1).

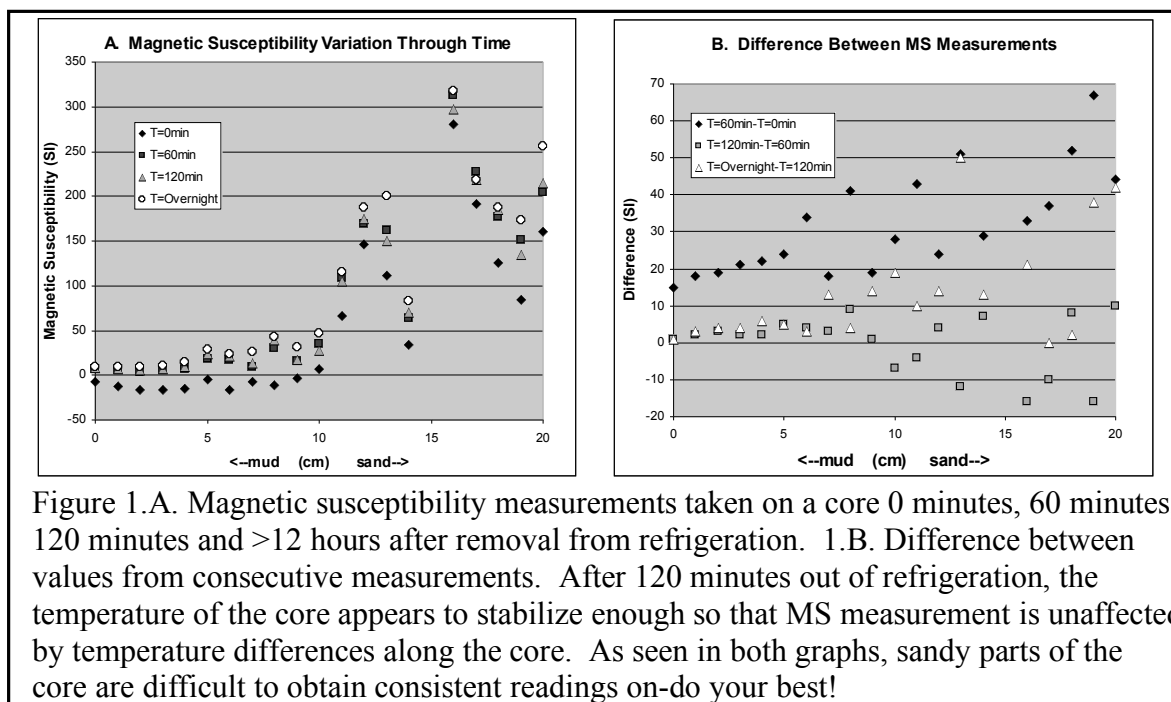


Figure 1.A. Magnetic susceptibility measurements taken on a core 0 minutes, 60 minutes, 120 minutes and >12 hours after removal from refrigeration. 1.B. Difference between values from consecutive measurements. After 120 minutes out of refrigeration, the temperature of the core appears to stabilize enough so that MS measurement is unaffected by temperature differences along the core. As seen in both graphs, sandy parts of the core are difficult to obtain consistent readings on-do your best!

3. Line the top of the core barrel up with the zero point on the fixed ruler. The measurements will begin wherever the sediment begins, even if the sediment is several centimeters down the barrel. The top of the barrel can thus be used as a constant reference point (zero) for comparison to other data.
4. Before you take any measurements...
 - Turn meter on and allow it to adjust for 10 minutes (may not have to be this long, but it definitely takes a few minutes to stabilize when you first turn it on)
 - Take off all metal jewelry (especially on hands and wrists)
 - Check the settings (CGS units, 0.1 measuring interval, toggle switch to "M")
 - Zero the sensor by pressing the Z button or putting the toggle switch to "Z" while holding the sensor away from the core, the table and any other objects
 - Check the sensor with the calibration disk at the same point on the table each time (put a piece of tape on the table to mark your testing point)
 - If you are using the computer with Multisus software to record the data, connect the computer to the MS2 and open Multisus after the MS2 has been turned on. The computer must be within arm's reach, but try to put it as far from the core

surface as possible, to eliminate any magnetic field that may affect the measurements.

- Leave a layer of saran wrap over the core so that the sensor stays clean (it can read MS through the thin plastic).
 - Use Jason S.'s fancy cardboard jig to position the MS2E sensor over the core.
5. To take measurements...
 - Position the sensor so that its long axis is oriented perpendicular to the long axis of the core and its center line is lined up with the depth of the core that you are trying to record. The cardboard jig will help guide this.
 - Push the round sensor tip gently into the sediment so that there is no air space between the sensor and the sediment. A small indent may be left in the sediment when you're finished with each measurement-that's okay, just don't push the sensor TOO far in.
 - On the computer go to File-New Data-MS2E1 surface scanning sensor.
 - The computer will prompt you to connect the MS2 and will then give you a box to enter the core name, measurement interval, alignment of the sensor (black tick marks on the sensor indicate the alignment, generally placed along the strata), meter units (CGS) and meter range (0.1).
 - Follow the instructions to zero the sensor, and then begin measuring. If you're not starting at zero, type the starting position in the "Position" box. Before you tell the computer to "Measure", be sure that the value displayed on the MS2 screen has stabilized (this may take a few seconds).
 - Every 10-20 measurements, you should "Apply Corrections" to correct for drift. The computer will prompt you to remove the sensor from the core surface, will take an air reading and will automatically correct the measurements for drift.
 - If you need to redo a reading, just type the position of that reading in the "Position" box and the computer will allow you to overwrite your previous data.
 6. When you're done with the length of the core, save the data (under "File" on the main menu).
 7. This data can be opened in Excel, but you must tell the program that it's comma-delimited data (if you choose the file that you want to open from within Excel, you will be prompted on how to change the data from comma-delimited to columns).
 8. If you aren't using a computer to record the data, position the sensor as described at the beginning of step 5 and wait for the value on the meter to stabilize before you record each value manually. Re-zero the sensor every 5-10 measurements.