


**The GLOBE Program**


**GLOBE Soil Moisture Measurement Campaign:**  
Easier protocols, more fun!



Martha P.L. Whitaker, Bart Nijssen, Jim Washburne and Ty P.A. Ferré  
The University of Arizona  
Department of Hydrology & Water Resources  
Tucson, AZ 85721-0011

**The Soil Moisture Campaign (SMC)**


- ❖ **SMC is now the preferred protocol**  
(Although data will still be accepted from all soil protocols)
- ❖ **Collect near-surface samples (0-5 cm and 8-12 cm)**
- ❖ **Collect duplicate samples**
- ❖ **Record a GPS location or find lat/lon from USGS topo map**



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**The SMC is consistent with previous protocols**

- ❖ **SMC is identical to the near-surface gravimetric protocol EXCEPT:**
  - ❖ **Frequency**
    - ❖ October 11-19, 2003 (World Space & Earth Science week)
    - ❖ April 17-25, 2004 (Earth Day week)
  - ❖ **Location (roving/regional vs. fixed/school site)**
    - ❖ Ideally, collect as many samples as feasible within an hour's drive of a school




Example of a driving loop in the Tucson, Arizona vicinity

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**What factors affect Soil Moisture variability?**

- Precipitation
- Soils
- Exposure
- Concentration
- Landcover
- Weather
- Climate




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**Soil Moisture and Teacher Curricula – good timing**

**SMC data collection dates coincide with Earth Day (4<sup>th</sup> week in April) and World Space /Earth Science week (mid-October)**

- ❖ Teachers may already plan to discuss environmental science, and soil moisture is an ideal topic!
- ❖ Collection of samples is hands-on science for your students.
- ❖ Soil sample collection protocol builds on several skills (e.g. GPS use, map reading, observations, scientific record-keeping, Internet skills for data reporting, etc.)




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**Soil Moisture and Teacher Curricula – Great Ideas**

**But why we should care about soil moisture?**

- ❖ **Soil moisture affects entire ecosystems**
  - ❖ soil water provides nutrients to plants
  - ❖ soils can “rinse” water as water flows through it
  - ❖ water helps form soils
  - ❖ water promotes decay of plants that become part of the soil
- ❖ **Soil moisture plays a major role in watersheds**
  - ❖ soil acts like an enormous sponge across the land surface – it slows rainwater runoff and helps control flooding!
- ❖ **Soil moisture affects the entire water cycle**
  - ❖ water from soil evaporates back to the atmosphere; this cools the soil and increases the relative humidity of the air.
  - ❖ changes in relative humidity can affect the weather




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### Soil Moisture and Real Scientists


**Real scientists will use student-collected data to:**

- ❖ Compare with satellite-collected soil moisture data
  - ❖ Ground-truth data is very important to interpreting satellite imagery
- ❖ Compare with computer models of soil moisture distribution across local and regional areas
  - ❖ Computer models of global climate change rely on accurate soil moisture data



*Meet a scientist who runs global climate models*

**Bart Nijssen**



*Meet a scientist who studies soil moisture in ecosystems*


**Martha Whitaker**

**\*\*\* Students are *inspired* by real-world use of their data \*\*\***

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### Challenges associated with the SMC


- ❖ Getting a Latitude /Longitude for each sample location
  - ❖ BUT...GPS can be done before, during or after sample collection OR interpolate your location from a USGS topographic map
- ❖ Drying large numbers of samples, especially if you don't have an oven
  - ❖ BUT... We can help locate local scientists with lab ovens to help you dry the samples
  - ❖ AND... We provide you with instructions to build your own low-tech, low cost oven



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### Opportunities associated with the SMC

- ❖ Focused effort, once per semester – *easier to schedule*
- ❖ Great way to develop regional *collaborations*
  - ❖ with other schools
  - ❖ with soil moisture professionals/agencies
- ❖ Our *active research* provides timely motivation
- ❖ *Low-cost* options available
- ❖ Students will have *fun!*



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### Basic Equipment you will need








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### Low-cost option #1: Foil pouches

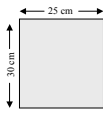
**Don't have soil cans?  
Use foil pouches!**




- ❖ Did we mention low cost?
- ❖ Materials easily available virtually everywhere!
- ❖ Easy, fun task for most ages of students to make.
- ❖ No soil cans to clean!
- ❖ Foil packets should not be reused, but the aluminum is recyclable.

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
### How to make a foil pouch in 5 easy steps



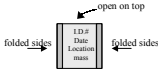
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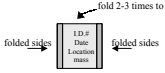
(b)



(c)



(d)



(e)

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## Low-cost option #2: Light-bulb powered oven

*Don't have a lab oven?*

*Make your own low-tech oven!*



❖ Did we mention low cost?

**TOTAL COST OF LIGHT BULB OVEN: \$100** or as little as **\$75**  
if two groups split the cost of a 55-gal drum (only ½ drum is needed)  
This is a 66% savings over a traditional, low-end lab oven model

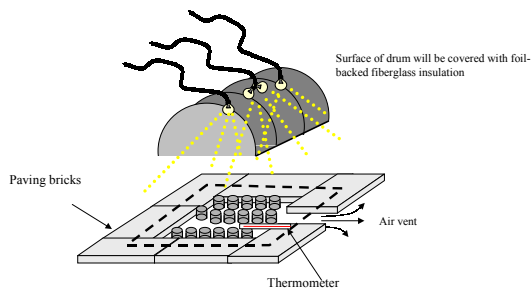
❖ Most materials available at hardware stores!

❖ Interesting, fun project for a handyman/woman to supervise



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## Schematic of Light-Bulb Powered Oven



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## Contact information

*If you have any questions about the  
GLOBE Soil Moisture Campaign, please contact:*

*Martha P.L. Whitaker*  
*GLOBE Soil Moisture Research Scientist*  
**[mplw@hwr.arizona.edu](mailto:mplw@hwr.arizona.edu)**  
**(520) 621-3041 or 621-9715**

<http://www.hwr.arizona.edu/globe/sci/SM/SMC/>



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