Construction and Use of HOBO Sensor Access Tubes

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HOBO temperature data loggers (Onset Computer Corp., Pocasset, MA) have gained popularity for use in soil survey work. They are reliable, easy to use, and a more efficient way to gather soil and air temperature data than non-recording sensors. When placed in available watertight containers, data loggers can be buried directly in the soil or may be placed on poles to record air temperature data. Photos, GPS location, bearing trees, flagging, metal rods, and wooden stakes are often used to mark the location of data loggers when buried in the soil. The inability to locate a buried HOBO results in wasted time and lost data. We have about 60 HOBOs to be installed in Humboldt County on the northern coast of California. Many of these will be placed in dense forest situations with limited sight or in state parks, where ground disturbance must be kept to a minimum. Although it is a simple task to dig up buried HOBOs and then relaunch and rebury them each year, I wanted to reduce the work of finding and monitoring the 20 data loggers I will install. The objective of this article is to discuss the construction of access tubes I have made for this purpose.

Methods Testing

Access tubes consist of 3-inch PVC pipe filled with insulating material and covered with a plastic cap. HOBO sensors are placed into and retrieved from the tube with a wire. The question to be answered is how well data from a tubed HOBO compares with that of a HOBO buried in direct contact with the soil. I have compared results from tubed HOBOs with different insulating materials with buried “untubed” HOBOs for a 3-mo period in the front yard of my house in McKinleyville, CA. The climate is mesic or iso-mesic with low temperatures near 0°C and daytime temperatures near 20°C. The first insulator I used was made from spray insulation foam. I followed this with a more simple insulator made from 3/16-inch bubble wrap, followed by one made from 1/8-inch polyethylene packing foam. Results after a 3-mo trial showed there was no significant difference among the three insulators, and all insulators mimicked the buried HOBO without the PVC pipe. In fact, temperatures recorded by a HOBO placed in a noninsulated tube were the same as the buried HOBO after 1 mo. My final design uses 1/8-inch foam because of its durability and ease of construction.

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