Five Years of SCAN Soil Climate Monitoring in Vermont

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The Soil Climate Analysis Network (SCAN) of the Natural Resources Conservation Service (NRCS) is a cooperative nationwide data collection system designed to support natural resource assessments and conservation activities. It collects soil moisture, soil temperature, and local climate information on a real-time basis. Two SCAN stations were installed in Vermont in September 2000. This article highlights the soils and installation of equipment at the sites and presents a summary of data collected from October 2000 through September 2005.

In 1999, the Vermont Monitoring Cooperative (VMC), a partnership among the State of Vermont, the University of Vermont, the USDA Forest Service, and private organizations, joined with NRCS to develop a Long-Term Soil Monitoring Program in Vermont. As part of this program, SCAN stations were installed at two VMC research sites (Fig. 1) near Lye Brook Wilderness (Fig. 2) in the Green Mountain National Forest in southern Vermont and on state-owned forestland on the west flank of Mount Mansfield in the northwestern part of the state (Fig. 3).

The VMC granted $10,000 to NRCS to facilitate the installation. The NRCS National Water and Climate Center (NWCC) provided the necessary equipment and staffing support. NRCS provides administrative and technical oversight for the two sites, with assistance from the State of Vermont and the Forest Service.

Site criteria for locating the two VMC SCAN stations included: slope less than 5–10% in an approximately 1/4-acre clearing within a forested area. During the time of installation, the soil at each site was described (Tables 1 and 2).

Data is located on the National Water and Climate Center website: http://www.wcc.nrcs.usda.gov. The website contains current and historic data for each SCAN site. In addition to data, each site will eventually contain the soil pedon information and site characterization (chemical, physical, and mineralogical) information provided by the National Soil Survey Center.

Data Summaries

Soil Temperature

The soils at the two Vermont SCAN sites have similar temperature characteristics (Fig. 4). There are several features worth noting.

- Spring and Fall Turnover. Like lakes and other water bodies, the soils have a spring and fall turnover. In summer, the upper layers of soil are the warmest, but in winter, the deeper layers are warmest. At some date in the month of April, the soil has virtually the same temperature throughout the 40-in profile as the upper layers begin to warm up. In September, the same temperature equalization happens as the upper layers begin to cool down. Tracking the exact dates of these turnovers could be useful in monitoring climate change, relating soil temperature to biological activities in soil, and for other purposes.

- Winter Hibernation. There is very little change in soil temperature between the months of December and April, with the soils appearing to hibernate through the winter months. They gradually drop in temperature to near 0°C, with deeper layers being...