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Review of *Standard Soil Methods for Long-Term Ecological Research* Edited by G. Philip Robertson, David E. Coleman, Caroline S. Bledsoe, and Phillip Sollins

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Standard Soil Methods for Long-Term Ecological Research. Edited by G. Philip Robertson, David E. Coleman, Caroline S. Bledsoe, and Phillip Sollins. New York: Oxford University Press, 1999. xvii+462 pp. Tables, figures, notes, references, index. $90.00 cloth (ISBN 0195120833).

Standard Soil Methods for Long-Term Ecological Research is the second in a series of books dedicated to summarizing the research results and methods of ecological studies being conducted at sites around North America and Antarctica under the sponsorship of the National Science Foundation's Long-Term Ecological Research (LTER) program. The twenty-one sites range from arctic tundra to hot desert and from natural tropical rainforest to urban and suburban areas.

The LTER effort is distinctive in its emphasis on uncovering the long-term (greater than one to three year) ecological dynamics of a particular biome and promoting synthesis and comparative research among disparate ecosystems. Thus, volumes that synthesize research results and methods from one site and place them into a broader cross-site context are critical to realizing the LTER network's ultimate goals. Standard methods are particularly important to detect change through time and for synthesis studies that combine data collected by individual investigators at individual sites. It is gratifying to see that soils are the

topic of the first LTER methods book since soil analysis literature tends to be dominated by techniques more suitable for agricultural lands and less so for natural ecosystems.

The chapters range from methods for sampling and storing soils to measuring their physical, biological, and chemical features. Most of the coverage (thirteen of twenty chapters) is devoted to organic matter and organisms, reflecting the fact that soils research at the LTER sites is focused primarily on the role soils play in plant growth, nutrient cycling, and ecosystem functioning. The chapters generally follow a format of first listing the possible methods with their advantages and drawbacks, then making recommendations for the best methods for LTER work, and finally detailing the recommended methods' steps. There is the occasional weak chapter, but for the most part the aggregate wisdom is impressive. For example, the advice and attention given to sampling intensity, sample archiving, and quality control—including such details as the names and addresses of providers of soil reference materials—would not be found in other soil analysis books and seem particularly important for LTER concerns. The chapter on soil water and temperature status also provides web addresses for equipment suppliers. Many of the chapters offer first-hand accounts of the difficulties and necessary modifications of standard methods, giving one the sense that a great deal of valuable, hitherto unrecorded "lab lore" is contained herein.

This volume should come in handy for any ecological researcher, whether affiliated with an LTER site or not, who wants her or his soil results to be comparable to those of other researchers at other sites. I can imagine graduate students relying on it to help them decide what approach to use when measuring any soil characteristic. The book should advance the continuing effort of ecologists to collaborate and identify key long-term and broad scale ecological patterns and processes effectively. **Mary Ann Vinton**, *Department of Biology, Creighton University.*