Straten) deals with pathways in crop modeling for cultivation and the papers represent a tribute to Donald R. Nielsen and James W. Biggar.

The 17 papers show a tremendous range both in subject and depth of coverage. They range from 10 to 55 pages in length. The topics range from fundamental descriptions of transport processes to empirical studies to philosophical essays. The broad range of topics is reflective of the broad range of interests and research activities of Jim Biggar and Don Nielsen. The list of chapter authors is impressive and only serves to illustrate the considerable influence of these two scientists.

The individual papers cover a wide range of topics: (1) fundamentals of transport equation formulation; (2) incorporation of interfacial areas in models; (3) statistical physics of subsurface solute transport; (4) soil properties and water movement; (5) nonideal transport of reactive solutes; (6) recent advances in vadose zone flow and transport modeling; (7) diffusion-linked microbial metabolism; (8) persistence and interphase mass transfer of liquid organic contaminants; (9) coupling vapor transport and transformation of volatiles; (10) evaporation: use of fast-response turbulence sensors; (11) emerging measurement techniques for vadose zone; (12) microwave observations of soil hydrology; (13) water and solute transport in arid vadose zones; (14) water flow in desert soils; (15) site-specific management of flow and transport; (16) customizing soil-water expertise; and (17) present directions and future research.

The variety of authors results in a wide range of styles and quality of writing. The level of mathematical sophistication also varies. Regardless, there will be something for everyone in this collection. In particular, several of the chapters represent a good starting point for graduate students looking for an introduction to a particular topic.

J. SKOPP
School of Natural Resource Sciences
University of Nebraska
Lincoln, NE 68583-0915
(jskopp1@unl.edu)

Data and Models in Action: Methodological Issues in Production Ecology


In recent years, models have become a critical tool in understanding ecological processes and predicting the future of both natural and anthropogenic systems. Major issues in modeling, nevertheless, remain unresolved. For example, what are the soundest approaches for upscaling and downscaling models? How can we optimize model parameterization? What are the breakthrough technologies in data and models? What are the emerging trends in model building? With respect to hardware, these trends are (i) growing resources, (ii) networks, (iii) multimedia, and (iv) sensor technology. Among future trends in software that will affect model building are (i) object-oriented design in agricultural research. An object, such as a pea plant, is a sophisticated subroutine that has structure and function and interacts with other objects and the environment in a more naturally realistic way. Most people trained in linear thinking using languages such as Fortran and Basic. Exporting these models to other users is always problematic, in part, because of the idiosyncratic nature of philosophies of science that reflects today's realities are increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly commodified, technology increasingly 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