Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02617, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02617
EGU General Assembly 2008

Monitoring soil and vegetation dynamics in large-scale experiments

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Ek and Cuenca (1994), Cuenca et al (1996), as well as many others, have demonstrated the significant impact of soil parameterization on simulation of the diurnal atmospheric boundary layer and related atmospheric processes. Soil moisture monitoring, at the very least, and determination of soil hydraulic and thermal properties in more complete experiments, have been incorporated in large-scale field experiments dealing with the soil-plant-atmosphere continuum (SPAC) since the HAPEX-MOBILHY experiment in France in 1985-86. Through the HAPEX-Sahel experiment in Niger in 1992, the BOREAS experiment in Canada in 1994 and 1996, the IHOP 2002 experiment in Kansas, Oklahoma and Texas, and the Wood River experiment in Oregon in 2003-2007, to name just a few, new sensor systems, instrumentation and techniques have been applied to monitor soil hydraulic and thermal conditions. Oftentimes, this monitoring was performed at one or a few locations felt to be representative of the radiation balance and atmospheric flux measurements made at a site for a particular vegetative cover, but not distributed in a manner to capture the same source area as the atmospheric sensor systems. The technology of the soil sensor systems and soil hydraulic property instrumentation has evolved over the past 20 years, but proven field-tested methodology has been limited to point measurements. A review of the sensor systems applied to determine *in situ* soil moisture content, soil water retention function, soil thermal properties and soil hydraulic properties with coupled vegetative response from the above mentioned experiments will be presented. Proposed application and preliminary data from a fiber optic cable system with emphasis on widely distributed soil thermal properties and related soil moisture and soil hydraulic proper-

ties will be indicated.