Carbon & Nitrogen Cycling

First measurements of coupled fluxes of carbon dioxide, water, and energy in grasslands of Eastern South Dakota using an eddy covariance tower

Tagir Gilmanov, South Dakota State University; Bruce Wylie, EROS Data Center/SAIC; Tilden Meyers, NOAA Atmospheric Turbulence and Diffusion Laboratory; Mark Heuer, NOAA Atmospheric Turbulence and Diffusion Laboratory; Alexander Smart, South Dakota State University; Douglas Malo, South Dakota State University; Ruth Anne Doyle, EROS Data Center/SAIC; Li Zhang, South Dakota State University.

Wednesday, August 11 – 3:00 – 3:20 p.m. International West

ABSTRACT Models of the dynamics of CO2, H2O and energy fluxes form the foundation of understanding of the structure, functioning and biocomplexity of ecosystems. Quantitative information on biogeochemistry, hydrology and energetics of South Dakota grasslands is lacking. Since April, 2004, continuous measurements of CO2, H2O and energy fluxes on a pasture near Brookings, South Dakota, have been conducted using an eddy covariance flux tower in cooperation between South Dakota State University, USGD EROS Data Center, and NOAA Atmospheric Turbulence and Diffusion Laboratory. Instrumental measurements are accompanied by a program of field sampling of aboveground phytomass, phenology, soil moisture, and soil organic matter, as well as collection of remotely sensed spectral vegetation data (MODIS NDVI). During the first three months of the 2004 season, the following parameters of the pasture ecosystem were estimated: maximum gross photosynthesis Pg,max = 42 g CO2 m-2 d-1 (DOY 163), maximum ecosystem respiration Re,max = 26 g CO2 m-2 d-1 (DOY 160), maximum evapotranspiration ETPmax = 6.9 mm d-1 (DOY 177), maximum light use efficiency LUEmax = 44 mmol CO2 mol quanta-1 (DOY 140). These measurements will be used to identify phenomenological and process-based models of carbon, water, and energy fluxes in this pasture ecosystem in relation to meteorological and remotely sensed factors.