SHORT- AND LONG-TERM STUDIES OF ECOSYSTEM-ATMOSPHERE CO₂ EXCHANGE IN SOUTH DAKOTA

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ABSTRACT

Human emissions of carbon dioxide into the atmosphere affect the radiative balance of the earth as well as the photosynthetic functioning of natural and agroecosystems. At the global level, best estimates of the carbon budget suggest that not all of the anthropogenic CO₂ emissions can be accounted for by increased storage in the atmosphere, ocean, and terrestrial biosphere. At the local level, forest, cropland, and other land use management practices can influence diurnal to annual fluxes of CO₂. In order to assist in narrowing uncertainties relating to the global C budget, as well as to determine local carbon storage within managed systems in South Dakota, we have recently initiated short- and long-term measurements of ecosystem-atmosphere CO₂ exchange within the state. The two sites include a Moody County soybean field and a thinned Ponderosa Pine forest located in the Black Hills.

Measurements at the Black Hills were established during October of 2000 and are planned to operate continuously for at least 7 years as a part of a global network of micrometeorological flux towers. In contrast, measurements at the Moody County soybean site were performed for a period of three weeks during July and August of 2000. Both sites show a strong diurnal drawdown of CO₂ during the growing season, which extended into November of 2000 at the Black Hills Ponderosa Pine site. Representative fluxes and diurnal trends of the data along with their implications for assessing carbon storage with relation to land management in South Dakota will be discussed.