

# ASA, CSSA, and SSSA 2010 International Annual Meetings

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## Green Revolution 2.0: Food+Energy and Environmental Security

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45-1 Lysimetric Evaluation of Eddy Covariance Fluxes Over Irrigated Sunflower in the Texas High Plains.

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Monday, November 1, 2010

Long Beach Convention Center, Exhibit Hall BC, Lower Level

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Water use efficiency of different cropping systems is of high interest to the agricultural community in arid and semi-arid regions such as the Texas High Plains. In these regions, irrigation is extensively used to supplement generally limited, erratic growing season rainfall to meet crop water demand. Although large precision weighing lysimeters are considered as standard for crop water use measurements, these systems are expensive to build and maintain. Alternatively, eddy covariance (EC) systems are used to measure crop water use. However, due to numerous explicit and implicit assumptions in the EC method, an energy balance closure problem is widely acknowledged. Therefore, the objectives of our study were to quantify energy balance closure and evaluate flux measurement biases over irrigated sunflower (*Helianthus annuus*) in the Texas High Plains. For this purpose, an EC system was installed near a large weighing lysimeter at the center of a 2.4-ha field in the USDA-ARS Conservation Production Research Laboratory, Bushland, Texas. Continuous heat flux measurements were made at 20 Hz during June-September 2009. Collected raw high frequency data were corrected before determining sensible and latent heat fluxes. The post-processing procedures include smoothing, detrending, coordinate rotation, buoyancy, and density corrections. The corrected EC crop water use measurements were compared with lysimeter energy balance data to quantify the energy balance closure. Efforts were also made to determine relationships between size of the bias and concurrent atmospheric conditions in relation to crop growth stages. In this presentation, we will discuss the preliminary findings of this study.

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