2001 Fall Meeting
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HR: 1330h
AN: **B12A-0107**
TI: Evaporative Water Loss from Soil Reduced by Elevated Atmospheric CO2
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AB: In the shortgrass steppe, a mixed C3/C4 grassland on the western border of the Great Plains, doubled atmospheric CO2 has led to increased soil water content despite greater biomass growth. We evaluated whether elevated CO2 led to differences in the two main pathways of water loss, evaporation and transpiration, using stable isotopes for partitioning. In our Open-Top Chamber (OTC) experiment, elevated and ambient chambers (EC and AC) were compared with non-chambered control plots (NC) for the period May, 1999-October, 2000. All plots received similar rainfall inputs, but AC plots had significantly lower volumetric water content than EC plots during the entire study period, and than NC plots during 1999. Changes in the soil water balance were apparent in the d18O values of soil CO2. AC plots had significantly higher d18O values than EC plots during the dry summer of 2000, but not during the moister summer of 1999. We established a strong relationship between d18O of soil CO2 and soil water at the same depths in soils adjacent to the OTC plots. We used this relationship, together with soil water content and known values of precipitation inputs, in a simple mass-balance model that allowed us to partition evapotranspiration into its

components. During the period October, 1999, to October, 2000, the relative loss by evaporation averaged 20 percent lower in EC than AC plots. This reduction of evaporation may have resulted from increased biomass transpiring more, drainage of water below the rooting zone, and/or from reduced vapor diffusion across the more densely vegetated soil surface.
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