Measurement of Carbon Dioxide Fluxes in Central Asia. (A06-saliendra050256-Oral)

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Abstract:

Recent estimates of global carbon budget indicate the existence of a 'missing sink' for atmospheric carbon dioxide (CO2). We hypothesize that the vast rangeland areas of the world could be a part of this 'missing sink'. We used the Bowen ratio-energy balance technique for continuous measurements of net CO2 exchange between the atmosphere and rangeland ecosystems at three study sites: 1) grassland steppe in Shortandy, Kazakhstan; 2) sagebrush-ephemeroid semidesert in Karnap, Uzbekistan; and 3) shrub sandy desert in Karrykul, Turkmenistan. Cumulative daily net CO2 fluxes during measurement periods (168-237 days) indicated that Central Asian rangelands were sinks for atmospheric CO2 in the order: Shortandy (528 +- 86) > Karnap (344 +- 183) > Karrykul (105 +- 142 g CO2/m2/season). The seasonal peak of aboveground biomass production indicated a similar trend: Shortandy (3231 +- 216) > Karnap (516 +- 26) > Karrykul (387 +- 85 kg/ha). Historical climatic data (1961-93) from weather stations near the study sites had annual precipitation as: Shortandy (308) > Karnap (237) > Karrykul (113 mm/yr). Thus, as expected, precipitation was a key factor in determining the seasonal capacity of Central Asian rangelands as sinks for atmospheric CO2.

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