



## Vertical and Lateral Carbon Flux in a Larrea/Cardón Ecosystem near La Paz, BCS, Mexico

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Arid ecosystems comprise about 30% of terrestrial cover and are projected to increase by 17-20% in area during this century due to global climate change. Likewise, the dynamics of carbon sequestration under extreme water and temperature stress provides important information about carbon exchange in relation to water use efficiency in the context of rising atmospheric CO<sub>2</sub> levels, global temperature increase, and precipitation shifts. The technique of Eddy Covariance has emerged as an important tool to measure fluxes of carbon dioxide between terrestrial ecosystems and the atmosphere over extended periods of time. Carbon loss through lateral transfer is missed by this method and may play an important role in regional carbon balance.

The objective of this study is to quantify the lateral transport of carbon in aboveground litter fall in comparison to the annual net ecosystem exchange (NEE) measured by the Eddy Covariance tower in the arid Larrea/Cardón ecosystem on the preserve of the Centro de Investigaciones Biológicas del Noroeste (CIBNOR) near La Paz, BCS, Mexico. Using the tower based Eddy Covariance method and litter fall and transport measurements, an accurate measure of lateral carbon transport can be made along with its importance to the overall ecosystem carbon cycle.

By analyzing the Eddy Covariance data from 2004-2008, along with previously published data from 2001-2003, an 8-year data set of seasonal and annual carbon flux can be produced. These data show decreasing carbon sinks in the years 2001-2003, to increasing carbon sources to year 2006, after which the annual carbon source begins to decrease. Seasonally, fall and winter show general carbon sinks following large late summer hurricane events, switching to monthly carbon sources in early spring and increasing through summer. There is a strong control of annual NEE by the previous year's precipitation event strength. The lack of a large precipitation pulse prevents an annual carbon sink in future years.

Lateral carbon transport experiments show lateral transport of leaf litter in quantities that exceed local production. The distance traveled of litter transported by wind is greater than an area of 2500 m<sup>2</sup>. Carbon stored in litter fall is transported over large distances throughout the year and may be subject to respiration or storage outside of the measured footprint of the Eddy Covariance tower. Depending on the geographic and meteorological conditions of the ecosystem, this lateral transport of carbon may distort the annual NEE of the measured ecosystem.