About half the CO2 emitted by burning fossil fuels is removed from the atmosphere by sink processes, dramatically reducing the rate of accumulation, but quantifying and predicting future sink behavior (especially on land) has proved difficult. Measurements of small variations in atmospheric CO2 are an important source of information about sinks, requiring an accurate account of the influence of atmospheric transport. These calculations are complicated by the fact that terrestrial ecosystems systematically emit CO2 when vertical transport is weak (night and winter) and take up CO2 when vertical transport is strong (day and summer). The covariance between large-scale ecosystem metabolism and atmospheric transport is analogous to an electronic rectifier, and simulation of the "rectifier effect" has traditionally been one of the largest sources of uncertainty when mapping land sinks in the global carbon budget.

Recent global estimates of the depth of the planetary boundary layer from CALIPSO LIDAR backscatter allow systematic evaluation of variations in the CO2 rectifier effect for the first time. Seven years of PBL retrievals from CALIPSO show strong seasonal rectification over North America and especially Asia, and favor a terrestrial carbon sink in northern middle latitudes that is more likely to saturate in coming decades than a tropical sink driven by CO2 fertilization.

Link to colloquium videos and announcement page: [http://www.atmos.colostate.edu/dept/colloquia.php](http://www.atmos.colostate.edu/dept/colloquia.php)