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Positron Emission Imaging Studies of Carbon Partitioning in Plants M.R. KISER, C.R. HOWELL, A.S. CROWELL, Duke University Physics Department and TUNL, C.D. REID, R.P. PHILLIPS, Duke University Biology Department — Over the past two centuries the atmospheric CO_2 concentration has increased dramatically, and climate experts predict that CO_2 levels will double by the end of this century. To understand plant responses to these global change conditions, we use short-lived radioisotope labeling techniques to trace the distribution of carbon in plants grown at ambient (350 PPM) and elevated (700 PPM) CO_2 concentrations. The plants are grown and labeled in environmental growth chambers at the Duke University Phytotron, and carbon-11 dioxide is produced at TUNL using the $^{14}N(p,\alpha)^{11}C$ reaction. The close proximity of TUNL and the Duke University Phytotron creates a unique opportunity for these global change studies. Recent experiments seek to quantify the fraction of carbon that is released from the roots either as soluble carbon in the root nutrient solution or as respired CO_2 dissolved in the nutrient solution. Preliminary results from this experiment will be presented, as well as results from single detectors collimated to restrict the field of each detector to a specific region of the plant and development of a high spatial resolution planar positron emission imager.

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