

## ABSTRACT

Emily Aldrich

### **A Comparative Investigation of Preparation Methods for Stable Carbon Isotope Analysis of Tree Rings**

The most widely used method for preparing tree ring samples prior to isotopic analysis is the Brendel et al. (2000) method in which whole wood is digested to  $\alpha$ -cellulose in a multi-step process using many harsh chemicals. This is an important step for sample preparation in the analysis of both stable oxygen and hydrogen isotopes. Hydrogen and oxygen in wood exchange readily with their surroundings, an undesirable trait when measuring isotope ratios. To avoid this, tree samples are transformed into cellulose, a molecule where the oxygen and hydrogen atoms are fixed directly to the molecule. Even though the Brendel et al. (2000) method is also used in sample preparations for carbon isotope analysis, it is widely recognized that carbon does not exchange readily with its surroundings. Three preparation methods will be compared for four different tree species in five year increments. Results may have different  $\delta^{13}\text{C}$  values, but this would be inconsequential if temporal trends follow results from samples prepared through the Brendel et al. (2000) method. Analysis of tree ring samples were performed using whole (unaltered) wood, the Brendel et al. (2000) preparation method, and a modified Brendel method. After preparation, all samples are processed using gas extraction tubes, VG SIRA series II stable isotope ratio mass spectrometer located in the Environmental Stable Isotope Laboratory at The University of Vermont. Results will show whether the use of whole wood samples for isotope analysis yield temporally similar trends as compared to samples analyzed using  $\alpha$ -cellulose. Eliminating the digestion step would save dendroclimatologists time, money and exposure to harsh chemicals.