Annotated Bibliography: Belowground Carbon Allocation

Nadelhoffer, Raich, Aber (1998)

**Keywords: total root carbon allocation, fine-root production, litterfall, Raich-Nadelhoffer model, carbon budgets, carbon fluxes**

*Title:* A global trend in belowground carbon allocation: comment

*Introduction (Nadelhoffer, 1998):* There has been criticism of the Raich-Nadelhoffer model, a global-scale relation between litterfall and belowground carbon allocation. This article is a re-evaluation of the carbon allocation model.

*Methods (Nadelhoffer, 1998):* The model was created where soil respiration is carbon lost via CO2 by respiration, litterfall is input of carbon, export of C is loss by erosion or leaching, delta C root is the change in root carbon, and delta C soil is the change in the soil carbon (forest floor plus mineral soil). Requirements for the model:

* Reliable annual litterfall and soil respiration rate
* Only applicable to relatively mature forests (>30 years old)

*Criticisms by Grower et. al. of the model (Nadelhoffer, 1998):*

1. No positive correlation between measured and predicted
2. No positive relation between estimated root production and predicted belowground C allocation
3. Misuse of the approach

*Rebuttal (Nadelhoffer, 1998):* Grower et. al. didn’t use the model in a way that follows the requirements of the model. Only 3 of the 17 forests used were older than 30 years old and carbon content is not at a steady rate at this point in forest development. The failure to publish the methods and data for other plots leaves two more stands unverifiable. Therefore, respiration and litterfall for 16 of the 17 stands cannot be accurately determined for the Grower et. al. study. As for the second criticism, there is not correlation between fine-root production and litterfall at the global scale. Since the model was applied to situations that didn’t meet the underlying assumptions required for the model, the third criticism is invalid.

*Conclusion (Nadelhoffer, 1998):* Grower et. al. did not contribute to the validity of the global-scale Raich-Nadelhoffer model but tis tactic should be tested and used in smaller scale. C budgeting should determine below-ground C fluxes at all scales. Grower et. al. did not present data with an appropriate method.