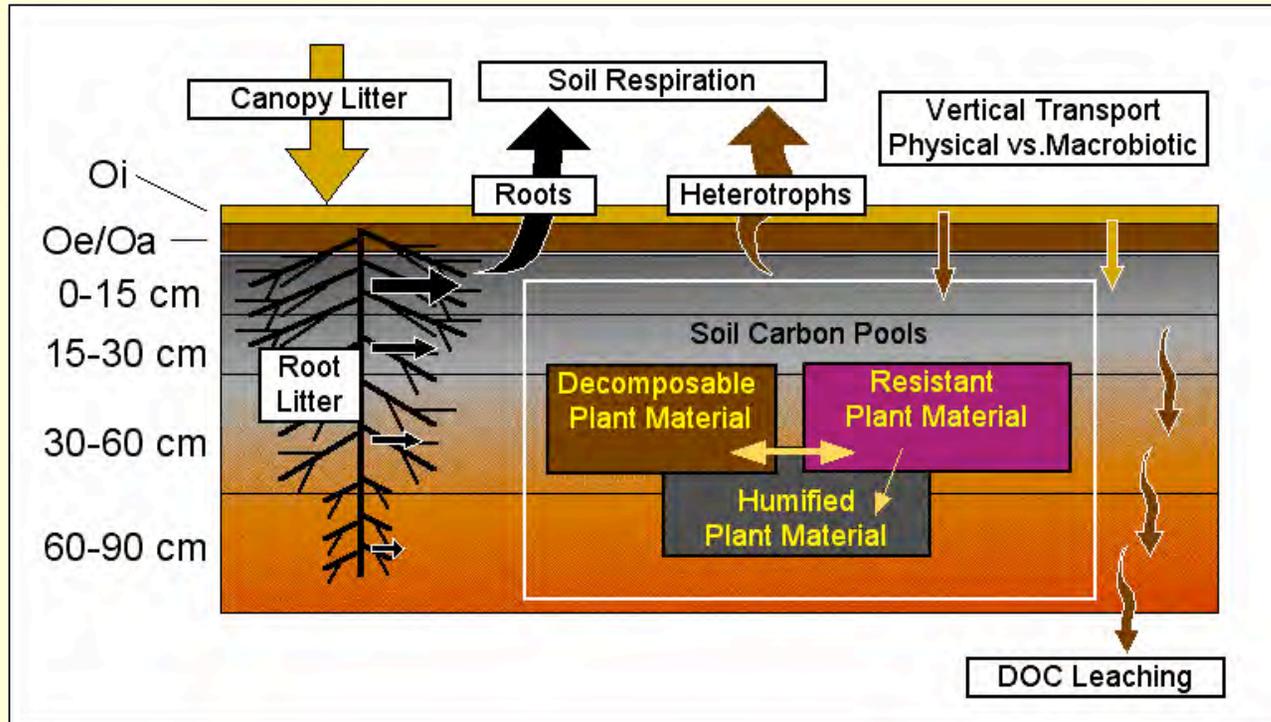


Day 2 Mass Balance

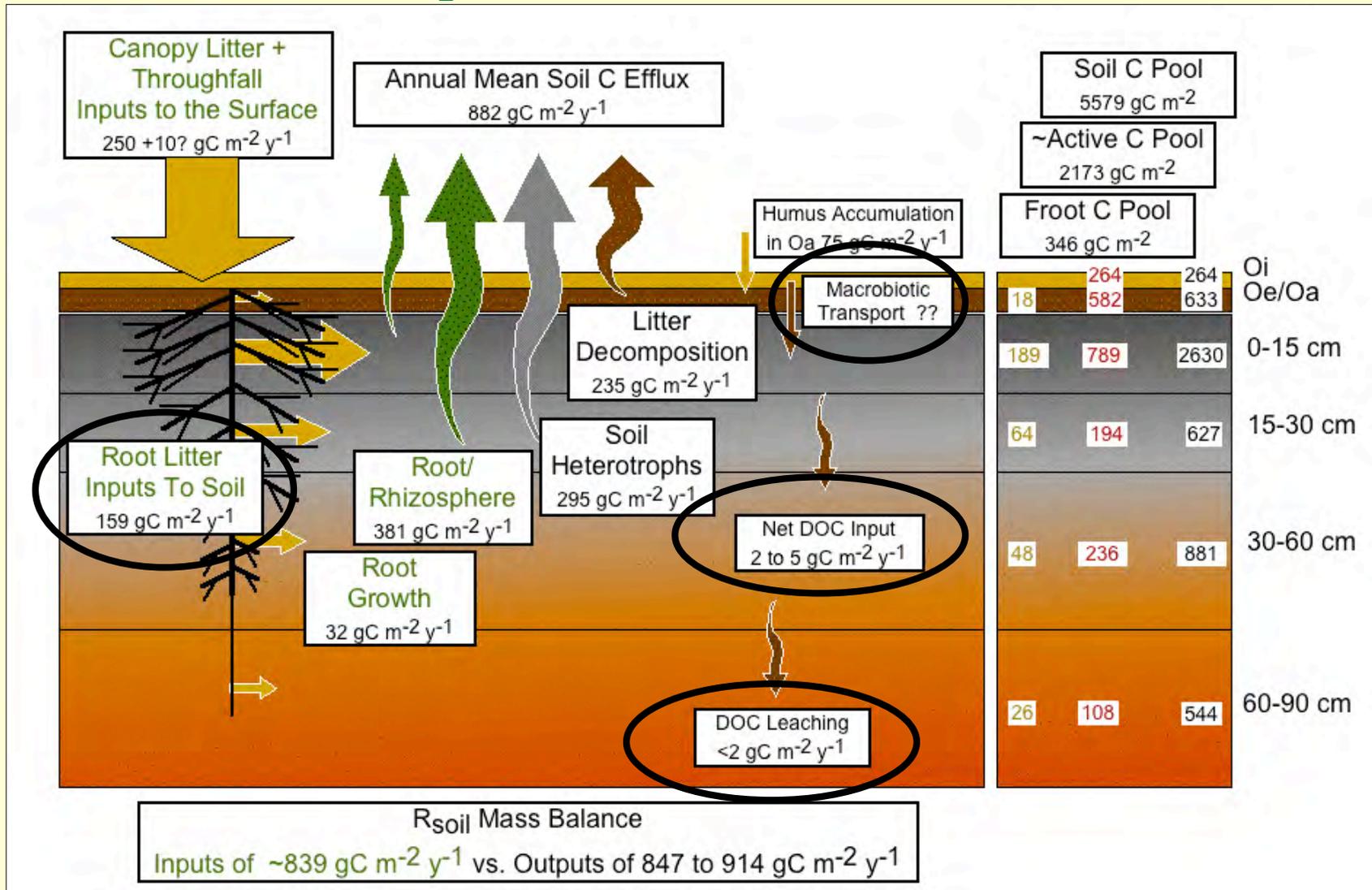
- **C and ^{14}C Mass Balance**
 - **Carbon mass-balance**
 - Flux estimates
 - Modeling tools
 - **^{14}C tools for mass balance**
 - Flux estimates
 - Modeling tools

EBIS Experimental Goals



- Partitioning of soil respiration between autotrophic and heterotrophic sources
- Distinguishing between above- and belowground C sources
- Quantifying pathways and rates of transfer from carbon sources to soil carbon sinks
- Quantifying the role of dissolved organic carbon in vertical transport
- Evaluating the longevity and turnover time of fine roots

Annual Upland C Fluxes C Pools



- Mass balance of C inputs and outputs is approximated.
- We are working on a comprehensive ^{14}C mass balance focused on the active soil C and fine-root pools.

Carbon Balance Issues

- **The mass balance of C inputs and outputs is approximated, but some flux estimates are not yet quantified**
 - We need to propose a refined estimate of
 - Rate of vertical humus? transport from Oe/Oa into the A horizon.
 - Potential rate of macrobiotic transport from O-horizons to mineral soils
 - Rate of turnover of soil fractions (a work in progress)
- **The tools for ^{14}C mass balance should focus on :**
 - Organic layers
 - Active soil C pools
 - Fine root pools
- **Additional details to be considered:**
 - Root litter inputs by root type and soil horizon
 - Net soil-C accumulation into 'active' pools

Renewal Proposal

- **Submit a renewal proposal by March 1, 2005 (realistically Friday, February 18, 2005) for approximately the same total \$\$ that we currently receive.**
 - Progress to date
 - **Research Tasks (Completed, Continuing, New)**
 - Budget
 - CV's

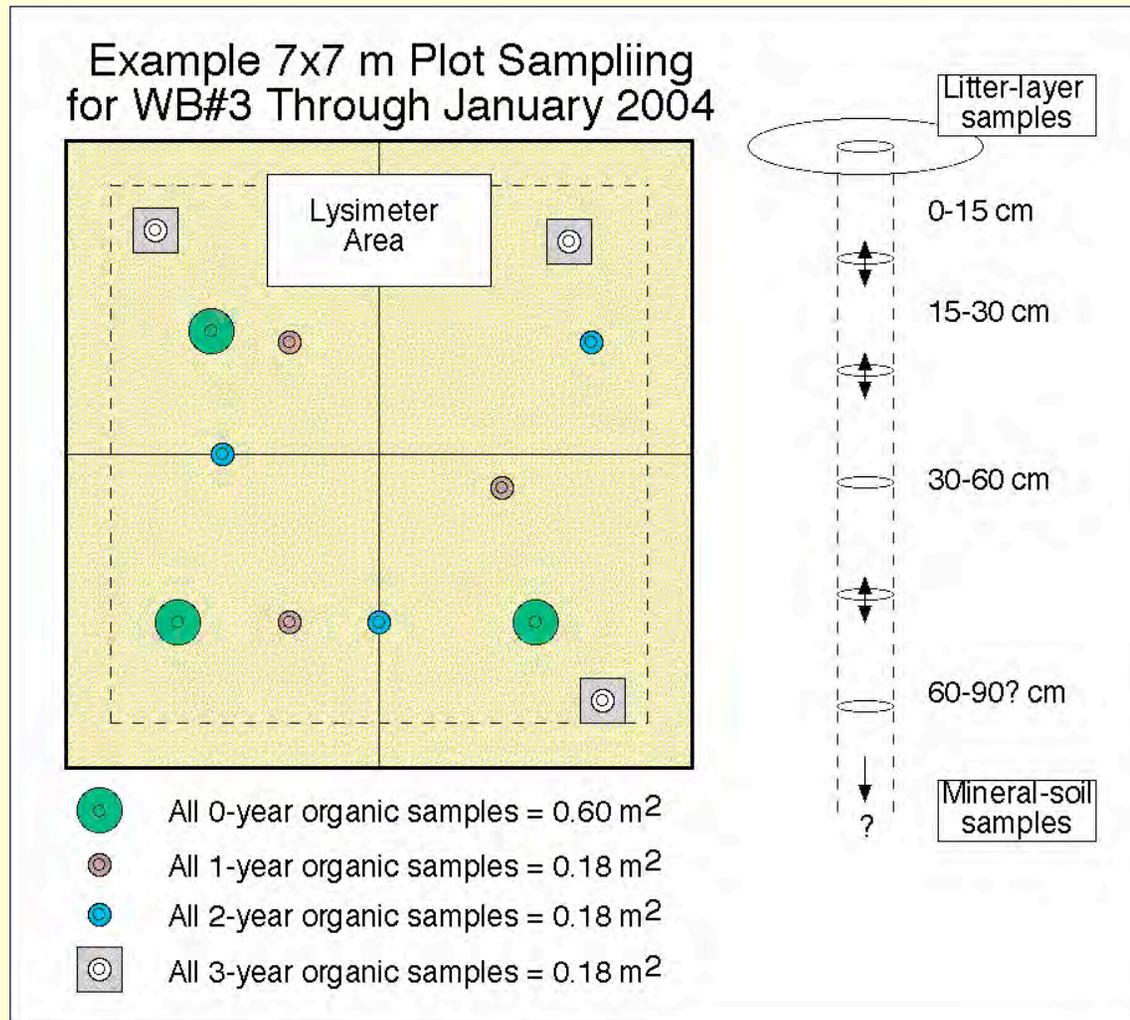
Renewal Proposal - Page 1

- **Section on progress to date**
 - ~1-page summary for all tasks (Word) and a figure(s) to choose from (tif or gif format)
 - **Publications**
 - **Edit the existing list**
 - This is our statement of what we have or will have accomplished with the old \$\$
 - **Add others in preparation**
 - Provide a ppt or pdf format copy of your respective presentation for the web page summary of this workshop (today if possible)
 - **Progress Deadline January 26, 2005**
 - To be returned for group review February 1, 2005

Renewal Proposal - Page 2

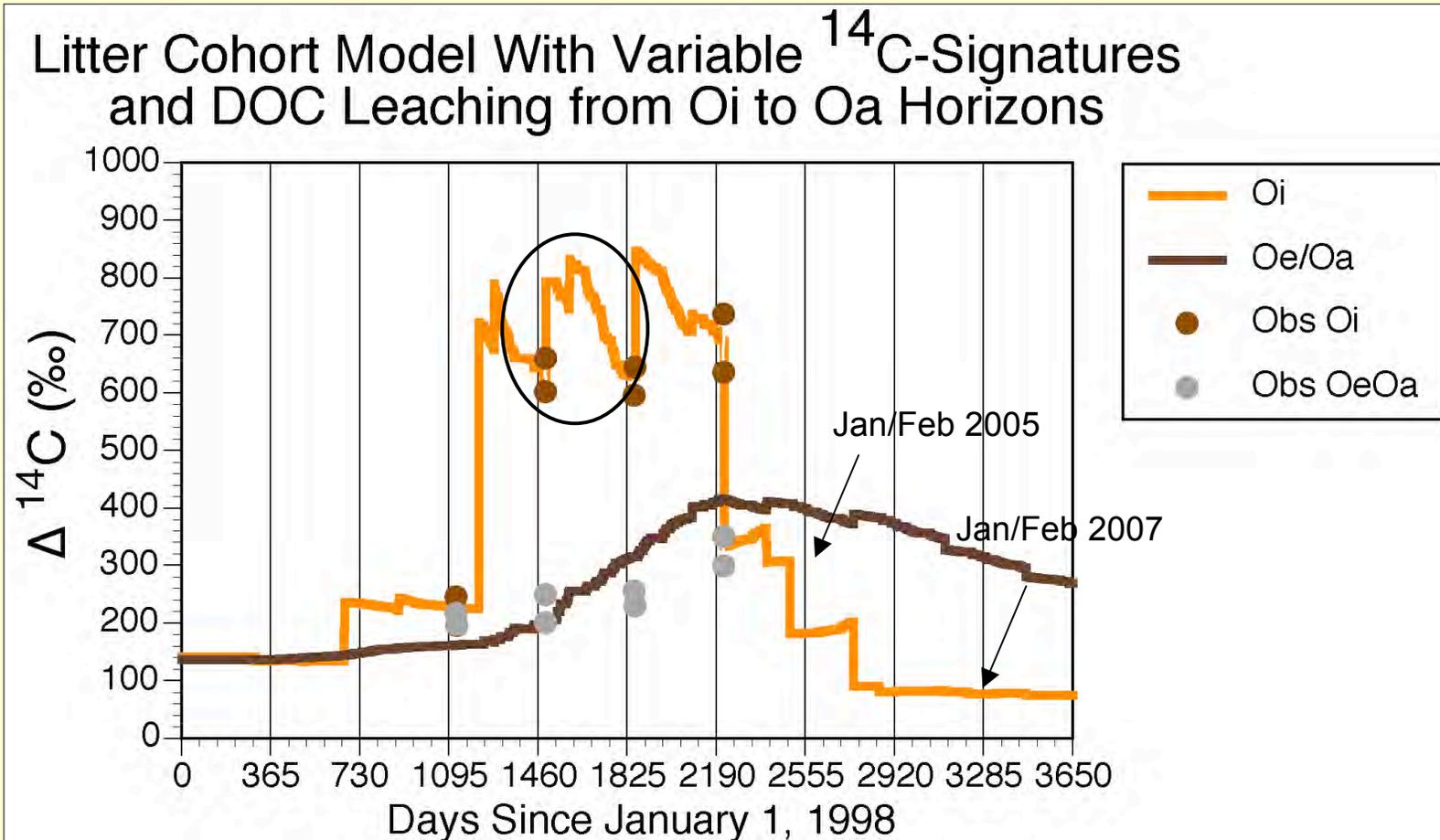
- **Completed vs. Continuing vs. New tasks**
 - What is done?
 - What needs to continue?
 - Recognizing that current tasks have until
 - What new things should we propose?
 - Who is going to do them?
 - **We must have a list of tasks before we leave today.**
- **Constraints**
 - We can't start new things without stopping others (\$\$)
 - We have 40 bags of the enriched 2000 litter material left or ~180 Kg.
- **Deadline draft task input --February 3, 2005**

How much plot sampling is appropriate?



- **<4% of the organic and <0.3% of the mineral ground area have been sampled.**

What temporal patterns do we need/want to capture?



EBIS Experimental Tasks

- **Operation of the experiment - ORNL**
 - Field manipulations and environmental observations
 - Annual sampling for bulk changes - ORNL/LLNL
 - Onsite Litter decomposition?
- **¹⁴C Analyses - CAMS/LLNL**
- **Components of soil respiration - UC-Irvine**
 - Soil respiration and gas well
- **Fine root turnover - UC-Santa Cruz and BGFR**
 - Can we take advantage of the 2004 pulse?
 - 160 to 200 versus 400 to 500 per mil
 - Root screens?
 - Bulk root processing and interpretation?
 - Root decomposition?
- **Vertical transport**
 - Dissolved organic carbon (Completed after 2005)
 - Macrobiodiversity mediated - USFS/UGA
- **Fate of mineral soil C in protected and unprotected forms**
 - Aggregate-based separations - ANL
 - Density-based separations - LBNL/LLNL
- **Chemical Fraction Stuff**

Post Workshop Tasks

- **Write, summarize, think**
- **Project data base**
 - C,N
 - Environmental data
 - Bulk ^{14}C numbers
 - ^{14}C signatures for fractions (litter, root, soil components...)
- **Complete bulk ^{14}C analysis for Year-2 samples (i.e., the mineral soils) and evaluate the need to look at soil fractions at deeper soil horizons.**
- **Complete mass balance (C, N, ^{14}C)**
- **Hypotheses based work.**
- **Extrapolations based on 'mechanisms'**
- **Analyze ^{14}C -signatures for ambient litterfall.****
- **Complete the tree-ring retrospective analysis for all 4 sites.****
- **Analyze 0-15 cm mineral soil C for Y1, Y2, and Y3 (Garten)**
- **Run additional litter leaching studies and/or plan for chemical fraction analyses.****
- **Ditto for root tissues. Do we have older root tissues to serve as a reference.**
- **Fractionation of Oe/Oa material****
- **Change air ^{14}C monitoring to capture canopy-level values****
- **Characterize throughfall C-inputs and ^{14}C -signatures** (not a big deal, but....)**
- **N cycling and mass balance**
- **Get Ameriflux CO_2 diurnal data set from the profile system for future use.**

EBIS Modeling Tasks

- **Integration and modeling**
 - **Organic layer decomposition - ORNL, LLNL,**
 - **Can we transition to a stochastic model run?**
 - **Rothamsted model**
 - **Complete the**
 - **Root turnover - LBNL, UC-Santa Cruz**
 - **Century**

Renewal Proposal Page 3

- **Budget Input**
 - Key Issue: Tracking and paying for ^{14}C -analyses per year by task
 - **Budget deadline --February 14, 2005**
- **Updated one-page CV's**
 - **CV Deadline --- January 26, 2005**
- **Suggested Reviewers**

EBIS: Recap

- **Experimental progress**
 - ^{14}C -Enrichment and ^{14}C -dilution experiments are being conducted at 4 sites on two soils.
 - Three annual cohorts of enriched or background litter have been added to the experimental plots.
- **Conclusions**
 - Black-box models of soil C flux are inadequate
 - Updated models of soil carbon loss and turnover will require additional layers of complexity to capture the fate of leaf and root litter inputs
 - Litter layers
 - Labile vs. recalcitrant mineral soil carbon pools
 - Root turnover
 - Vertical transport
 - Semi-independent organic and mineral soil C cycles might be considered.

