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**Biogeosciences Discussions**

# *Interactive comment on* "Small scale spatial heterogeneity of soil respiration in an old growth temperate deciduous forest" *by* A. Jordan et al.

**Anonymous Referee #2**

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The following review is limited to some general comments because I agree with the specific comments on the methods by the first reviewer. I would like to draw the attention of the authors and the readers to an issue that has not been addressed in this study and hardly receives any attention in similar work. The geostatistical approaches applied here to measure a "representative" distribution of respiration do not consider, apart from the rather unspecific "old growth temperate deciduous forest", which geoecologic factors determine respiration measurement, let alone their spatial patterns. As a consequence, it remains unclear whether the values measured represent a spatial average or a value resulting from an arbitrary pattern of respiration measurements compared to the actual spatial pattern of respiration. To ensure that a real spatial average is measured, the soil and stand properties influencing respiration on different scales have to be integrated into the network of respiration measurement points and



the measurement technique that is applied. Therefore the soil, tree and stand properties relevant for respiration on different scales have to be considered. Respiration, even in a rather uniform (age and spatial distribution of trees) forest is influenced on four different scales: 1. the soil aggregate level where quality and bioavailibility of organic material for microbial decomposition is determined; 2. the soil structural scale, which determines the diffusion of gases and water as well as temperature in the soil and the fluxes between soil and atmosphere; 3. the root pattern around individual trees, determining the contribution of root respiration per unit area; and 4. the stand level, which varies with the density, pattern and age distribution of trees in a stand. A study aimed at developing a geostatistically sound approach to measuring respiration should take these factors and their spatial patterns into account to assure that the spatial variability of each of those respiration-influencing sets of soil, tree and stand properties is appropriately covered by the measurements. The authors show some understanding of the significance of these scale related issues when mentioning the effects of differently sized respiration measuring devizes. This question of area covered by a probe for respiration measurements would fall into the aggregate and soil structure scale level relevant for respiration. Therefore, the least information that should be given in a study like the one presented by the authors is a detailed documentation of the soil, tree and stand properties relevant for respiration to ensure a qualitative comparison with other studies.

Interactive comment on Biogeosciences Discuss., 6, 9977, 2009.