Biogeosciences Discuss., 10, C1874–C1875, 2013
www.biogeosciences-discuss.net/10/C1874/2013/

Biogeosciences Discussions
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Interactive comment on "Modeling microbial exchanges between forms of soil nitrogen in contrasting ecosystems" *by* M. Pansu et al.

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Received and published: 15 May 2013

Response to Nicolardot, Biogeoscience discuss., 10, C1476-1477, 2013

Thank to Pr. Nicolardot for its interactive comment on "Modeling microbial exchanges between forms of soil nitrogen in contrasting ecosystems" which he considers as "a significant piece of work to understand N behavior in such systems". Pr. Nicolardot ask a question concerning high values found for C:N ratios of microbial biomass (MB). Indeed, these values optimized by the MOMOS system on our data, giving 14C/15N ratio in range 12-22 for a 14C/15N substrate of 32, can appear high comparatively to generally used values. The microbial cultures of Nicolardot et al., (1986, SBB 18, 263-273) had C:N ratios in range 5.2-12.7, depending on substrate C:N ratios used in their laboratory conditions. In a literature review, Manzoni and Porporato (2009,

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SBB, 41, 1355-1379, op cit) indicated a more extended range 5-15 generally admitted for MB C:N ratio. Other works like that of Wallander et al. (2003 SBB 35, 997–999) found MB C-N ratios between 18.5 (for a soil C:N ratio of 16.9) and 21.9 $\pm$ 1.3 (for a soil C:N ratio of 30.4). Bottner et al. (2006, SBB 38, 2162–2177, op. cit) measured MB 14C:15N ratios from 7.9$\pm$1.3 for a substrate 14C:15N ratio of 26.8 to 33.9$\pm$7.5 for a substrate 14C:15N ratio of 130. Though MB is often considered for simplification as homeostatic in a C:N range 5-15, this paper, and the above cited ones, show that quality of MB depends on that of the available substrate, it is probably dominated by fungal MB for N poor substrate and enriches in bacterial materials when N:C of substrate increases. In this way McGill et al. (1981, in Terrestrial Nitrogen Cycles, Ecological Bulletin, Stockholm, pp. 49–115) used different C:N ratios for structural (30) and metabolic (3) biomass components when modeling N mineralization. Another way to explain high MB-14C:15N ratios of this work, was to consider fixation of 14N to compensate poor N availability of substrate. Though this hypothesis was in contradiction with that of perfect mixtures for the exponential decrease of the model compartments, it was also explored and did not change significantly the adjusted values of MB-14C:15N ratios. Also this study enables to model the climatic role in C and N storage: cold and wet climates induce accumulation of C with high C:N values, in accordance to Wallander et al. (see above) for Nordic area. The model adjustment shows a similarity between MB- and total-C:N ratios, in accordance with the MOMOS diagram describing the 1st step of humification by microbial mortality. We propose to precise these points and complete the bibliographic list with the above citations in the final version of the paper for Biogeosciences.

Interactive comment on Biogeosciences Discuss., 10, 5749, 2013.