

## ***Interactive comment on “Microbiotic crusts on soil, rock and plants: neglected major players in the global cycles of carbon and nitrogen?” by W. Elbert et al.***

**Anonymous Referee #3**

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I found the manuscript very interesting and important and with additional clarification it could be published. The paper presents scientific questions that fall within the scope of *Biogeosciences*. The authors collected data from various publications on exchange rates and extrapolated them globally.

Some issues that need to be address by the authors:

In most of the regions of the world the BSC's (biological soil crusts) are presented by mixed compositions of organisms. The composition varies along the rainfall gradient. In low rainfall regimes (less than 70 mm rainfall) the BSC is a thin (1-2 mm), presented by cyanobacterial crust (mainly filamentous that is the first and main colonizers of the

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soil surface in undisturbed soils of semiarid and arid lands, and do not fix nitrogen). In semiarid areas (up to 450 mm rainfall) the BSCs are thick (10-20 mm) with heavy moss and lichen crusts.

It is very rare that the BSC covers one hundred percent of the soil surface. The BSC is one component composing patchiness in dry landscapes of the world. The percent cover change with the rainfall. The BSC cover can change from about 80% in the dry areas to zero in wet semiarid areas (450 mm rainfall) (see Belnap and Lange, 2001, and the literature in [www.soilcrust.org](http://www.soilcrust.org)).

The authors made general assumptions, which are not obvious and should be discussed in more detail, especially why and how they made them.

The growth and the percent cover of the BSC is affected by soil surface moisture quantity and duration related to rainfall and dew regimes, temperature and light intensity. Therefore, it is very hard and complicated to generalize about the duration of the BSC activity. For these reasons I have some doubt on the assumptions and conclusions reached which need additional clarifications. My main concern is with the lack of explanation for the calculations. The authors should reveal some reported values and the recalculation formula used, with assumptions made (e.g. area coverage). The estimations that they provide are not obvious, and the appendices do not help. For example, the scale-up of the  $4 \text{ kg ha}^{-1}\text{y}^{-1}$  to all semi/ and arid environments. I think that if the authors make a clearer statement of the scale-up methods (suggestion- they may use satellite data for world BSC coverage) and address the above issues, it would improve the paper.

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