The lower regolith boundary revisited in unmatched detail with a new global lithological map

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Bedrock is the lower boundary of the regolith column. It represents one control on regolith formation. For this bedrock types and properties are more relevant than its age, which most geological maps focus on. A new high-resolution global lithological map (GLiM) could provide a valuable tool for global analyses of the regolith zone.

GLiM consists now of more than one million polygons that were assembled from more than 65 geological maps; some natively in digital format, some digitized by hand. Most of the maps are at a scale of 1: 2, 500, 000 or finer. The lithology information was gathered from metadata of the maps or from additional literature, totalling more than 220 different sources. The classification was expanded from the system introduced by Dürr *et al*. [1, 2]. The map distinguishes six classes of sediments, six classes of igneous rocks, as well as metamorphic rocks. Additional information levels add further detail (e.g. sediment grain size).

A presented comparison between maps of the uppermost regolith layer (soil) and GLiM shows expected significant spatial correlations between the lithological classes and soil types. This highlights the impact of lithology on regolith generation, which is one possible explaination of the impact of lithology on chemical erosion[3]. Due to its high resolution, the new global lithological map can be applied to numerous global problems that require high levels of detail.

[1] Dürr, H. H. Meybeck, M. & Dürr, S. H. (2005) *Global Biogeochemical Cycles* **19**, GB4S10. [2] Moosdorf, N. Hartmann, J. & Dürr, H. H. (2010) *Geochem. Geophys. Geosyst.* **11**, Q11003. [3] Hartmann, J. Dürr, H. H. Moosdorf, N. Meybeck, M. & Kempe, S. (in press) *International Journal of Earth Science*.

Organic nitrogen cycling during organic matter decomposition

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Proteins represent the dominant input of organic N into soil ecosystems. The breakdown of proteins to amino acids is anticipated to be the critical process determining the underlying mechanisms in litter and soil N dynamics. This includes initiating the N mineralization sequence by providing substrates for ammonification and microbial uptake. However, the release and fate of organic N-containing compounds during decomposition of organic matter is largely unknown.

We developed a new ^{15}N pool dilution assay to quantify gross rates of protein depolymerization (i.e. amino acid production) and amino acid immobilization [1]. The assay is based on the concurrent labeling of the pool of 18 proteinogenic amino acids, which are present in a free form in soil and litter, and the measurement of ^{15}N:^{14}N ratios in the individual amino acids by GC-MS over time.

The results from a litter decomposition experiment showed that gross protein depolymerization exceeded gross N mineralization by >8 fold indicating that only a small fraction of amino acids released by extracellular enzymes was actually mineralized to ammonium. These results point to an important direct role of dissolved organic N (i.e. amino acids) for microbial N nutrition and a negligible contribution of MIT ('mineralization-immobilization turnover'; extracellular deamination of amino acids) to N mineralization in decomposing litter. Furthermore, controls such as litter quality and microbial community structure and the effect of stress (i.e. temperature) on organic and inorganic N cycling processes will be discussed in more detail.

[1] Wanek *et al*. (2011) *Soil Biology & Biochemistry* **43**, 221–221.