Is mining soil nitrogen good or bad?

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Misunderstanding of the intricacies of nitrogen (N) cycling in agricultural soils has led to improper fertilizer N use in important global agroecosystems, ranging from excessive use to unsustainable exploitation (mining) of soil organic matter reserves. This must be addressed to avoid excessive N accumulation and to ensure adequate N reserve. Here we develop a framework for answering the question "Should soil organic N be mined, and if so, for how long?" to maintain sustainable agricultural production in major agroecosystems worldwide. Agricultural systems where external N input exceeds the capacity of the soil to form soil organic matter are prone to leak reactive N to the environment. Excessive additions need to be halted, and where excess reactive N remains in these systems it needs to be mined, at least for some time. In other agroecosystems, external N input is low and current use of the land mines N acquired through the mineralization of soil organic matter. Thus the paradox of mining soil organic N, where on the one hand it can be desirable for agroecosystem health and on the other threatens agroecosystem function. Untangling the paradox of mining soil organic N and revealing the residual effect of fertilizer N will answer the question of whether N use efficiency is as low as perceived. This has major implications for food security and environmental quality.