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**Humification an obsolete expression or still a relevant process for soil organic matter maturation? –  
What tells us solid-state NMR spectroscopy?**

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Since the first isolation of humic acids via alkaline extraction by Achard in 1786, the perception of humic substances (HS) as an important component of soil organic matter (SOM) has undergone considerable changes. During the last years, the concept of HS and the expression of humification has been questioned in particular with respect to their suitability to explain the formation of biochemically recalcitrant SOM. Most of the recent criticisms are based on limiting the concept of humification to SOM, soluble in alkaline solution. This, on the other hand, is in discrepancy with the definition published by the International Humic Substance Society (IHSS), in which humification comprises all biochemical and chemical reactions occurring during the decay and transformation of plant and microbial remains leading to complex and heterogeneous mixtures of polydispersed materials. However, the nature of the latter and the involved reactions are still matter of present research and discussions. One analytical tool, which already shortly after its introduction into soil science in the 1980's led to results questioning previous paradigm, represents solid-state <sup>13</sup>C – and latter <sup>15</sup>N - NMR spectroscopy. The new findings had major implications on our present understanding of the origin of SOM and the mechanisms by which it is formed. Up to now, the application of established and advanced NMR spectroscopy results in unexpected findings, which are still challenging our scientific view of soil biochemistry. Therefore, the intention of the present contribution is to summarize how established solid-state NMR techniques contributed to our knowledge of SOM stabilization or humification and to demonstrate the potential of advanced one and two dimensional techniques for a better understanding of biochemical processes in soils, sediments and water.

**Keywords:** soil biochemistry, solid-state NMR spectroscopy, C and N cycling

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