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### **Affirmation of the Existence of Humic Substances and Humin and their Importance in the Interfacial Reactions of Soil Organic Matter**

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The validity of the term and the very existence Humic Substances has been questioned and a ‘Soil Continuum Model’ (SCM) proposed to describe the decomposition of soil organic matter (SOM)<sup>a</sup>. We fundamentally disagree with these concepts. The SCM focuses on the ability of decomposer organisms to access organic debris and SOM, and on the protection against decomposition afforded by soil minerals. In effect the SCM regards SOM as a continuum spanning the full range from intact plant material to highly oxidized carbon in ‘carboxylic acids’. The authors also state that there are no components of SOM that are inherently resistant or acquire resistance to decomposition. We demonstrate that nothing could be further from the truth.

It is inappropriate to refer to SOM components and their transformations as a ‘continuum’ because it is a heterogeneous mixture of a wide range of discrete materials with different compositions with different pathways and rates of decomposition. We will present a number of reasons why the SCM is a flawed concept and cannot be used to describe the known behaviour and composition of SOM.

Compelling evidence regarding the existence of components of SOM (including humic substances), obtained using a variety of extraction and fractionation procedures, which exhibit widely different chemical properties and decomposition behaviour. Evidence from Spectroscopy and modelling will be presented to illustrate these major compositional difference and the impossibility of considering them to be part of a ‘continuum’ concept which fails to identify the different components of SOM and recognise their importance in many interfacial reactions in soil.

<sup>a</sup> Lehmann, J. & Kleber, M. The contentious nature of soil organic matter. *Nature* **528** 60-68 (2015)

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