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Biogeosciences Discussions

Interactive comment on "Three-dimensional Magnetic Resonance Imaging of fossils across taxa" *by* D. Mietchen et al.

Anonymous Referee #3

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This is a valuable review paper on recent progress in MR imaging of fossils. While X-ray computed tomography (CT) has become a standard in non-invasive fossil analysis, MR imaging of fossilized organisms is still in its infancy. This paper provides a timely contribution, as it explores the potential of this method in various areas of paleontology. It summarizes the work done so far in this field, and embeds it into various review sections. The reader is informed about how different animal and plant taxa change their structure and chemical composition during diagenesis. A key section of the paper is dedicated to understanding how diagenetically altered animal and plant structures can generate an MRI signal, which is in itself surprising, given the small amount of mobile water compared to living organisms. The paper is also highly imaginative in pointing toward interesting future research directions, for example MR imaging and spectroscopic

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analysis of structures/materials from the same specimen. Another fascinating perspective is that MRI can be used to visualize differences in chemical composition between different regions of a fossil, something that cannot be achieved with CT imaging. Such information might become a key to understanding complex processes of taphonomy and fossilization. I will recommend this paper to all my students involved in biomedical imaging, even if it is only to show them that the field of biomedical imaging still permits discovery of unknown territories.

Interactive comment on Biogeosciences Discuss., 4, 2959, 2007.