

Interactive comment on “A linear theory of physical properties in inhomogeneous sediments and its application to relative paleointensity determination” by K. Fabian

Anonymous Referee #1

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In this paper, the author presents mathematical consideration on effects of environmentally induced variations in sediment components to relative paleointensity estimation. The problem of a proper normalization has been an important issue on relative paleointensity, and this paper contributes from theoretical consideration.

The conclusion of this paper derived from the theory is a matter of course. If there is a perfect normalizer, we do not need to care about homogeneity of sediments in relative paleointensity. If all components of sediment phases change in parallel, the role of a normalizer is just to compensate concentration variations, and hence a crude normalizer will work. In nature, such conditions can not be expected. In this respect,

this paper adds little to our present knowledge on relative paleointensity.

The value of this paper would be greatly enhanced if the author presents some results of the numerical modeling on the effect of non-zero bias in Eq. (12). This effect of the bias was not recognized before the theoretical study of this paper. As mentioned by the author, we have experienced that even in relative paleointensity records from sediments with significantly large changes in magnetic properties, a succession of first-order paleointensity peaks and troughs often (but of course not always) agrees with those from reasonably homogeneous sediments. Quantitative estimations how inhomogeneity of sediments affect relative paleointensity would be quite useful for our community.

The model of this paper assumes that a single (environmental) master signal linearly controls concentration changes of all components. In nature, there would be leads and lags (phase shifts) depending on the components even if a single master signal (e.g. insolation) controls the system. I suggest the author to discuss on this point.

I could not understand the meaning of the following two sentences in the later part of the abstract before reading the whole text; “Common magnetic cleaning — to the normalizer”, “the proposed linear — environmental signals”. Abstract should be informative by itself.

Interactive comment on eEarth Discuss., 1, 51, 2006.

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