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Interactive comment on "Phanerozoic black shales and the Wilson Cycle" *by* J. Trabucho-Alexandre et al.

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Review of the manuscript "Phanerozoic black shales and the Wilson Cycle" by Trabucho-Alexandre et al.

This manuscript, by Trabucho-Alexandre and collaborators, discusses the main factors governing the deposition of Phanerozoic organic-rich, black shales. Deposition of black shales is a long-standing issue in sedimentology that, as clearly stated by the authors, has long been explained mainly using three different oversimplified, uniformitarian models (the restricted circulation model, the open ocean oxygen minimum zone model and the continental shelf model). In this manuscript, however, the authors emphasize the relationship between black shale deposition and the different stages that occur during the evolution of a basin (i.e., during the Wilson Cycle). Indeed, the au-

thors' main conclusion is that the development of sedimentary environments in which black shales may accumulate ultimately controls the spatial distribution of black shales, their stratigraphic position in a basin, and their nature (e.g., type of organic matter). That is, according to the authors, basin evolution controls organic-rich, black shale deposition. In my opinion, the synthesis presented here is of interesting value for the topic. Also, the manuscript reads well and shows high quality figures. Thus, I recommend its publication, but only if the point explained below is revised.

One would not disagree that the existence of the appropriate sedimentary environments is required for the deposition of black shales and that the development of these environments is intimately related to the Wilson Cycle. Yet, while the required sedimentary environments may occur at any given stage of the Wilson Cycle (as stated by the authors), black shales may not be deposited. This, in my opinion, indicates that other factors are at least as important as basin evolution. The authors mention that the spatial distribution of black shales is also controlled by climate and oceanography. As the manuscript is right now, however, one has the impression that basin evolution is the most important control. Thus, I suggest the authors clearly highlight in the manuscript that, although basin evolution is important, climate and oceanography are as equally so. At least an example of this co-dependence should be given in the manuscript, which would be appreciated by readers.

An example that climate and/or oceanography could have been as equally important as basin evolution is presented in Jiménez Berrocoso et al. (2008, 2010), MacLeod et al. (in press) and Martin et al. (in review). The Cenomanian-Santonian organic-rich, black shales of Demerara Rise were deposited on the side of a gently sloping topographic high, extending off the broadly convex northeastern margin of South America facing the North Atlantic (i.e., expanding ocean basin-mature ocean basin stages shown in Fig. 2C, D). The Late Cretaceous greenhouse climate was a key factor here, producing high nutrient inputs from continental regions under the influence of intense tropical weathering. Similarly, ocean circulation was fundamental to keep a nutrient trap work-

ing in the area for 15 Myr. The ocean basin stage did not change, but black shales were then never deposited from the Campanian-Paleocene, a situation that is interpreted as due to ocean circulation changes.

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MacLeod, K.G., Isaza-Londoño, C., Martin, E.E., Jiménez Berrocoso, Á., and Basak, C. Changes in North Atlantic circulation at the end of the Cretaceous greenhouse interval. Nature Geoscience, in press.

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Manchester, 30 September 2011. Álvaro Jiménez Berrocoso

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