

## ***Interactive comment on “A refinement of coccolith separation methods: Measuring the sinking characters of coccoliths” by Hongrui Zhang et al.***

### **Anonymous Referee #1**

Received and published: 18 March 2018

Dear Editor,

I have reviewed the Technical Note entitled 'A refinement of coccolith separation methods: Measuring the sinking characters of coccoliths' submitted by Zhang et al. to Biogeosciences.

In this study, the Authors have measured the settling velocity of a selection of sedimentary coccoliths and claim that their new dataset – and the various parameters linking size/shape and the speed of decanting by gravity in aqueous solution– will be of use for the microseparation protocol of these calcareous nanofossils. Indeed, these micron-sized calcite particles are impossible to isolate under the binocular microscope, as done in routine for the foraminifera. Yet, recent works highlight the potential of the biominerals produced by the coccolithophores in palaeoceanographic research. I am

generally supportive of publication of this work in Biogeosciences – but I have a number of comments / questions that should be addressed in a future version of the draft, would the Authors decide to follow my points. I am not really familiar with the decanting technique for concentrating coccoliths, but my overall impression is that final users will find hard to use the data of this paper to facilitate/enhance the processing of their own samples.

- In my opinion, the lack of the integration of the coccoliths with coincident particles (quartz, clays, other calcite particles, including other coccoliths) represents a major caveat of the refinement of the decanting protocol. The Authors treat their assemblages as monospecific coccolith assemblages. For the large assemblages, which yielded 50% relative abundance of the target species, what is the effect of other calcite particles? If their composition change, would that change the settling velocity? More importantly, it is well known that clays are charged particles that are able to form aggregates ('flaks') in suspension and as such, these particles are prone to substantially influence the setting velocity. This issue is only briefly acknowledged by the 'hindered settling'. This is crucial for the application of the parameters in natural assemblages containing various concentrations (?nature) of clay minerals. Therefore I am of the opinion that this points need to be further discussed. Adding synthetic clay minerals in the assemblages would have been a sensitive means to address this criticism, although I am not advocating that the Authors should perform more experiments.

- It is not clear to me how many particles (coccoliths) were actually counted, nor if replicated measurements have been conducted? Also, it would be good to explain the 'drop technique' used in this study.

- It is not clear from reading the text why *Helicosphaera carteri* escapes the settling velocity equation derived for other taxa (L203-205).

- Why is the potential of centrifuging not discussed at all - except a brief mention L47?

- Figure 1 should include the array of sizes of the various coccoliths presented.

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- Figure 2 is not really convincing given the number of coccoliths in the field of view.

Minor comments:

L87: That *Pseudoemiliana lacunosa* and *Umbilicosphaera sibogae* are impossible to differentiate is premature here, and should be discussed later in the manuscript.

L143 "in ammonia at 20°C" – I guess you mean in deionized water neutralized by addition of ammonia? L348 : Publication date is 2009. L415 *Pseudoemiliana lacunosa* is misspelt. L420 *Calcidiscus leptoporus* is misspelt. (Many other taxa are misspelt throughout the text and captions).

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