COMMENTS BY REVIEWER #1

Reviewer #1 makes numerous critical comments which, for the purpose of discussion, will be structured around the following concerns.

The structure is poor, not having the conventional introduction, methodology, discussion and conclusions. The paper is organized as a lecture, and not as a paper.

The paper has an introduction. Sections 2 and 3 describe the theoretical and experimental parts of the methodology. The discussion is organised as sections 4 to 6 (comparison of models, typical model parameters and examples of application). Section 7 is a conclusion. It is not clear how this could be altered.

The conclusions are biased, as the paper has no null hypothesis.

The project started with no clear expectation of how much improvement, if any, would be gained by the more flexible Ceronio model. When the results showed the clear improvement in fit offered by the Ceronio model, it was deemed to be potentially valuable to other users of particle count data and reported as such. Whether or not a null hypothesis was stated, the numerical evidence presented in the paper provides overwhelming evidence that the Ceronio model does provide a better fit. Should the paper otherwise be deemed fit for publication, the authors would welcome an opportunity to discuss this problem with the editor.

The methodology is poor. Data screening is done for mathematical reasons without water quality justification. Treatment plant performance not provided, exact location of particle counters not provided.

The particle counts were performed with a single particle counter in the laboratory. Samples were taken on site from the standard sampling taps and transported to the laboratory. This and some more notes on the exact location of the particle counters will be added to the paper. The treatment plant performance was deliberately not covered in great detail, as the emphasis is on the suitability of the Ceronio model (see note in the paper, lines 7-10 on page 158). The reviewer correctly points out that the data screening was done on thebasis on goodness-of-fit only. Mathematical models should only be used after the user is satisfied that the model structure agrees with the data being modelled. If the goodness-of-fit is not good enough, it indicates either that there are larger experimental errors in the data, or that the nature of the particle of the particle suspension is such that the model structure is not appropriate – in both cases, it would be prudent to discard the data set as not being suitable for modelling. The authors therefore believe that the data screening philosophy is sound. Furthermore, which water quality parameters in a raw water sample would "justify" its rejection as a modelling candidate, if it had to be done in this way?

The discussion is poor, insufficient, uses too many graphs, and the graphs show cumulative distributions rather than absolute numbers.

The discussion will be revised and the number of graphs will be reduced. The choice of cumulative distributions for graphing purposes was motivated by the very large data set, as it offers the most economical method for data compression.

The conclusions of the paper are poor.

The conclusions will be amplified.

The references are too limited.

There are very few papers in the water treatment field that deal primarily with the modelling aspects of particle counts. A search will be conducted to find papers in other areas which utilise particle counting (such as oceanography), although their relevance may be questionable.

COMMENTS OF REVIEWER #2

Ceronio model has no physical basis, but only a curve-fitting model. Should be emphasized more strongly.

Will do.

Model cannot be extrapolated without validation, as attempted.

Mathematically speaking, the reviewer is correct. But there is an overwhelming logic supporting the thesis that there has to be a particle size below which the concentration starts to drop – the original reason for the postulation of the variable-beta model. Whereas this size was arbitrarily fixed as one micron in the variable-beta model, the Ceronio model allows it to be an extra degree of freedom. But the authors agree that the prediction of this size by theCeronio model cannot be readily accepted without direct experimental support – such a comment has been included in lines 2-4 on page 258.The point, however is taken, and this point (mentioned at a few places in the paper) will be qualified more carefully.

Discrepancy between 1-10 (figure 11) and 2-10 micrometres (in text).

This is a mistake – to be corrected.

Figure 12, dealing with particle volume, not discussed.

A short discussion will be added.

Model allows the comparison of counters with different settings – should be mentioned.

Will be added as part of the introduction.