

Review of: Acoustic levitation of pollen and visualisation of hygroscopic behaviour

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Pollen may act as atmospheric cloud condensation nuclei (CCN) as they are able to take up significant amounts of water vapor. The goal of the described experiments was to study hygroscopic swelling of pollen grains. The paper presents results from measurements with two types of pollen which were compared to results from other authors employing other techniques. Here, a common acoustic levitator was used where single pollen grains could be freely levitated and observed as well as recorded by a microscope. It was combined with a humidity-controlled airflow. In contrast to previous measurements where the mass changes of the pollen were studied, the authors determined changes of area and diameter. This technique is new for such types of measurements and the application for large primary biological particles such as pollen. The paper is very well written and easy to follow.

The advantage of this method is the possibility to directly observe the development of pollen sizes and shapes under varying conditions. However, the authors themselves claimed that their method is less accurate than methods involving mass changes and requires modifications for further use.

Nevertheless, I think that the paper is worth publication after revision.

Major issues:

Figure 2: Better show only cutouts of these pictures with the pollen grains.

Table 2: The quality of the front-lit images seems much better. What is the reason and why did you use mainly back-lit?

The quality of the photos is rather low (Figure 2 and Table 2). I am wondering whether you do not have any images with better resolution.

Section 2.4 and Figures 3 to 6: Could you explain what exactly is meant by area ratio, as it was done for the diameter ratio?

To demonstrate the changes of pollen shapes during growth, I suggest to show images at different relative humidities. The introduction of a parameter describing the shape variation would be helpful.

The authors stated that the pollen grains become more spherical when they take up water vapor, the aspect ratio would be a good parameter to describe this.

Could you estimate the error (standard deviation) of their results so that the reader could better value them?

In line 293, the authors state that "These results suggest that the measurement accuracy is hindered by the fact that the grains are being levitated freely." What are the arguments that the advantages of freely levitated pollen prevail the low accuracy of the measurements?

Minor issues:

Line 223: This must be Figure 2 instead of Figure 3.

Line 144: remove "below"

Line 159: ... accordingly, therefore, it is consistent only ...

Line 195: remove the comma

Lines 223 – 225: the mentioned blue and orange lines are hardly visible

Lines 108,176,233,240,241,279,314, 338, 349, 357: comma before respectively

Line 344: nearly spherical

Lines 241/242: Is this sentence correct with the use of “yet”?

Line 245: Put “too” at the end of the sentence with a comma.