Atmospheric
Chemistry
and Physics
Discussions

Open Access

ACPD

Interactive
comment

Interactive comment on "Additional Global Climate Cooling by Clouds due to Ice Crystal Complexity" *by* Emma Järvinen et al.

Anonymous Referee #3

Received and published: 17 July 2018

Review of E. Järvinen et al., 2018

This paper describes the submicron scale complexity of individual ice crystals derived from airborne measurements and cloud chamber experiments. The authors assess that a new radiation parameterization for global climate models considering the higher roughness of ice crystals reveals a lower SWCRE. I find the paper very well written, logically organized, and the figures and tables are appropriate. I recommend the paper to be published with minor revision.

Special comments:

1. Page 2, Line 30/31: "In two cases the crystal complexity measurements and the angular light scattering measurements were conducted on the same ice particle pop-

ulation." I did not get where you use this coupled information later. Or is there any advantage at all having the measurements on the same ice particle population?

2. Page 3, Line 22/23: Why is there more shattering in mixed-phase clouds?

3. Page 8, Line 20: Why is the size distribution from the ACRIDICON-CHUVA campaign representive?

4. Page 10, Line 8: Why are these regional differences in the change of SWCRE? Why is the signal mainly in the tropics?

5. Page 11, Line 4: Before you could investigate the role in a warmer climate, you need to know if there are changes of the submicron scale complexity in a warmer climate. Do you expect them?

Technical corrections:

1. Page 3, Line 3; Page 5, Line 2; Page 7, Line 8: "sub-micron". Mostly you write "submicron", hyphenless.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-491, 2018.