Reply

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In a preliminary experiment the sphere having a long thin rod (20 cm) was precooled in a cold box and then fixed in an ionized air flow. There was no condensation on the insulator. We obtained similar results for electrification during condensation (Takahashi, 1973a, p. 251). The surface condition of the sphere is a very sensitive to this charging as Griffiths and Vonnegut indicated. The sphere should be heated to a high temperature and annealed. Blowing cigarette smoke to the sphere changes the result. To check the thermoelectric effect of this instrument, the sphere was cooled in an ionized, dry nitrogen atmosphere. Without condensation of water to the sphere, there was no electrification.

The interesting points of that experimental result are the negative charging to drops during condensation and the positive charging during evaporation. The existence of liquid water is necessary to have such charging. In order to show that the electric charging is determined by the surface phenomena of water, not by the contact potential between water and metal, different metal materials were used. When ice was grown on the sphere instead of liquid water, positive charging during condensation and negative charging during evaporation were found as expected from the surface potential of ice (Takahashi, 1970, 1973b).

There might be two approaches to extend this study. One is to study the electrification of floating drops during condensation and evaporation in ionized air. The second is to study the preferrential orientation of water molecules on the surface as a function of the supersaturation to subsaturation ratio.

REFERENCES

Takahashi, T., 1970: Electric surface potential of growing ice crystals. *J. Atmos. Sci.*, **27**, 453–462.

——, 1973a: Electrification of condensing and evaporating liquid drops. *J. Atmos. Sci.*, **30**, 249–255.

——, 1973b: Electrification of growing ice crystals. *J. Atmos. Sci.*, **30**, 1219–1223.