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Properties and Processes of Ice and Mixed-Phase Clouds: Linking in  
Situ, Remote Sensing Observations and Multiscale Models

**Particle Shattering of Tube-type Cloud Microphysical Probes**

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**Abstract (#1146709):**

It is important to understand sampling artifacts that exist within data obtained by in-situ cloud probes and to identify periods when significant biases exist in observations before utilizing the measurements in research projects. Shattering of ice particles in tube-type cloud microphysical probes is apparent in the in-situ measurements obtained during the Investigation of Microphysics and Precipitation for Coast-Threatening Snowstorms (IMPACTS) field campaign. The Fast Cloud Droplet Probe (FCDP) and Two-dimensional Stereo (2D-S) instruments within the Hawkeye probe that use a sampling tube have much higher particle concentrations than similar cloud probes that utilize probe tips without an enclosing sampling tube, especially in the presence of large hydrometeors. Particle size distributions from probes within the Hawkeye are compared against those from comparable stand-alone probes during aircraft flight legs where all probes functioned. A number of cloud conditions with different aircraft pitch orientations are analyzed to determine the impact of tube orientation on particle shattering amount. Parameters such as mean mass diameter, total liquid and ice mass, and particle habit are investigated to determine their impact on the amount of particle shattering. Several processing methods are compared to determine if, and under what conditions, shattering effects can be mitigated to obtain particle size distributions with useful uncertainties that would allow scientific analysis to be conducted.