Reply

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We thank Dr. Mossop for providing additional information on the study reported by Mossop *et al.* (1968), which we alluded to in our paper (Rangno and Hobbs, 1983). In the absence of detailed information on flight paths, it is impossible to establish whether or not the cloud described by Mossop *et al.* was affected by aircraft produced ice particles (APIPs). However, we stand by our original statement that: "This is a case where APIPs *might well have* been responsible for the observed concentrations of ice particles" (italics added). In view of the new fact, now provided by Mossop, that ice particles were detected on the first aircraft penetration, we would now insert the word "highest" before "observed" in the above quoted sentence. We believe that APIPs might have produced ice particles in the cloud studied by Mossop *et al.* because, although some ice particles (0.1 L^{-1}) were observed on the first aircraft penetration, the really high concentrations (10–100 L^{-1}) were not detected until subsequent aircraft penetrations.

We do not question the reality of natural ice crystal multiplication in certain clouds. Indeed, we suggested that natural ice "splinter" production could have been responsible for the high ice particle concentrations (100 L^{-1}) measured on the *first aircraft pass* through the clouds listed as the 7th and 8th cases in Table 1 of our paper (see pages 220 and 229 in Rangno and Hobbs, 1983). Also, we did not reject ice "splinter" production during icing of the aircraft as a possible mechanism for APIPs, even though the Hallett and Mossop (1974) criteria for such production were not satisfied. In fact, we stated "there is no reason to expect that all of the criteria for ice splinter production during riming given by Hallett and Mossop will be applicable to APIPs." However, as discussed in our paper, other mechanisms could also be responsible for APIPs.

It is surprising that while the Hallet and Mossop mechanism (which is based on observations that high concentrations of ice particles can be produced in the laboratory when a metal rod is whirled through a cloud of supercooled drops) has been widely used to explain high concentrations of ice particles in natural clouds (where graupel is assumed to serve in lieu of the metal rod), it was not *predicted* that the passage of a (metal) aircraft through a natural supercooled cloud might likewise produce high concentrations of ice. But this is just another instance of observation preceding theoretical prediction!

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