

## Reply

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As we understand, Dr. Parungo's primary criticism of our paper (Hindman *et al.*, 1982) deals with the results of the ice nucleus (IN) measurements using the Nuclepore filters. She states that our filters should have detected IN in the clouds from the Titan III launch, shortly after launch, in accordance with her IN measurements reported from an earlier Titan III launch (Parungo and Allee, 1978). One reason for the differences between our results is in the different approaches to collecting, analyzing and interpreting the samples as previously discussed by Hindman and Lala (1980) and Parungo and Allee (1980). In fact, we reanalyzed our 3 L samples, following the suggestion in her comments (Parungo, 1983). The results were not sufficiently different to those reported by Hindman *et al.* (1982) to warrant revising the conclusions. Further, the lack of IN detected with our filters early in the life of the launch clouds is probably due to HCl adsorbed by the particles on the filters. The HCl probably changed the particles composition and reduced their IN activity. The later samples were collected with little HCl present and hence the IN activity apparently was not reduced.

With regards to our laboratory experiment where we used a vapor-diffusion neutralizer, perhaps a few words of clarification would be helpful. The neutralizer consisted of two coaxial cylinders; the inner cylinder wall was porous and NaOH pellets were sandwiched between the inner wall and the non-porous outer wall. The aerosol sample passed through the inner cylinder. The molecular diffusivity of the HCl, being much larger than that for the exhaust particles, caused the HCl to contact the NaOH pellets and be removed while the particles emerged unchanged. The system cannot introduce new particles nor can it affect existing particles except by greatly reducing the partial pressure of HCl. The experiment showed that the portable IN counter was not rendered insensitive by the HCl in the laboratory exhaust aerosol.

Clearly, further research is required with both the filters and the portable IN counter to achieve reproducible and, hence, reliable IN measurements from solid-rocket-booster (SRB) launch clouds.

The significant finding from the research accomplished to date by Parungo and Allee (1978), Hindman *et al.* (1980, 1982) and by Turco *et al.* (1982) is that IN are produced by firings and launches of SRB's. The critical data which have not been obtained from SRB launch clouds are the numbers of IN as a function of activation temperature, their activity over periods of days, and their interaction with supercooled clouds. These are the data required to determine the inadvertent weather modification potential of space shuttle launch clouds. Hopefully, the IN measurements made in the Shuttle launch clouds in March 1982 by Lala and Langer (personal communication, 1982) will provide these data.

## REFERENCES

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