Reply

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Woodley's views on the microstructure of clouds in general, and of the clouds of Israel in particular, are similar to our own. We agree that 1) young, rising, cumulus cloud turrets, especially those that are only moderately supercooled, contain less ice than older clouds with similar cloud-top temperatures (e.g., Hobbs et al. 1980; Hobbs and Rangno 1985, 1990; Rangno and Hobbs 1988, 1991, 1994); and that 2) young, building, cumulus turrets in Israel exhibit this aging phenomenon (see Fig. 9 in Rangno and Hobbs 1995). We have discussed the effects of aging on the glaciating behavior of clouds on numerous occasions (see references). In Rangno and Hobbs (1995), we suggested reasons why high ice particle concentrations were not observed in Israel by the Hebrew University of Jerusalem (HUJ) researchers when, in fact, this is a common phenomenon.

Woodley believes that the HUJ researchers who carried out the Israeli cloud seeding experiments were well aware of the effects of time on the glaciation properties of clouds. We have examined more than 500 published pages by HUJ researchers on various aspects of the Israeli experiments, and we have yet to find a ''life cycle'' qualification with respect to their numerous discussions of low ice particle concentrations in Israeli clouds. Further, the HUJ researchers attempted to explain on numerous occasions why Israeli clouds did not exhibit high ice particle concentrations. Specifically, they claimed that because of the supposed ''continentality'' of the clouds (i.e., high droplet concentrations, small droplets, and lack of precipitation-sized drops), ice enhancement does not occur in Israel (Gagin 1975, 1981, 1986). If the HUJ researchers were aware of the time evolution of ice in clouds, they did not discuss this phenomenon in connection with the clouds they seeded.

Woodley speculates on whether polar continental cumuliform clouds have a positive seeding potential, which might be realized in young turrets containing little or no ice. We do not know, although we suspect that they do not in Israel because of their low equivalent potential temperatures (θ_e) and, therefore, low ''dynamic'' seeding potential. Woodley's discussion of a possible seeding potential in summertime tropical air masses (high θ_e) in Texas, Thailand, and elsewhere are not relevant to Israel [see, for example, Gagin (1986), who contrasts the concepts and results of dynamic seeding in Florida with those of ''static seeding'' in Israel].

Woodley comments on Fig. 12 in Rangno and Hobbs (1995) (updated from Rangno and Hobbs 1988). A careful reading of Rangno and Hobbs (1988) should alleviate Woodley's concerns about the influence of cloud life cycles on the data shown in this figure. In compiling these data, we assembled microstructural measurements on primarily *aging* clouds. However, a few of the data points were known (or surmised) to be for younger clouds. For example, as explained in Rangno and Hobbs (1988), the data point from Heymsfield et al. (1979) represents ice particle measurements made largely in updrafts. Thus, we agree with Woodley that the results shown in Fig. 12 of Rangno and Hobbs (1995) indicate the strong tendencies for ice to appear in high concentrations in *aging* clouds with high cloud-base temperatures.

Woodley's summary of recent measurements in Texas is interesting, but, for the reasons given above, they have little relevance to the clouds of Israel.

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