EDITORIAL

This special issue of the *Journal of Applied Meteorology* (*JAM*) contains articles based on papers that were prepared for the Sixth World Meteorological Organization Scientific Conference on Weather Modification held in Paestum, Italy, in May–June 1994. The long time between the conference and publication attests to the fact that the gathering and review of a group of international papers is a slow process. We wanted this issue of *JAM* to show the international character of the work being pursued in weather modification and to represent the spectrum of the papers at the meeting. Consequently, more time than usual was taken in review and editing. There were over 175 participants from 30 countries at the conference. Nine nations are represented by papers in this special issue. Even at this late date, there are a few manuscripts under revision and review that will be published in a later journal issue.

Some of the advancements of the technology of weather modification are evidenced by many of the papers. The tracing of seeding materials throughout clouds and the linking of the formation of ice to the seeding material is demonstrated in the first two papers. Tracking of chaff, sulfur hexaflouride, and silver iodide from the cloud base to the ice formation regions of the cloud is demonstrated. Circular-polarization radar is shown to be able to track chaff, which can be identified in precipitation echo regions. The measurements are coupled with results from a cloud model that show good agreement and add to the understanding of the results.

The technology of computers and cloud models in one paper indicates that realistic convective cloud seeding scenarios with both ice nuclei and hygroscopic particles can result in significant increases in precipitation in susceptible clouds, with no success or even slight decreases in naturally efficient clouds.

Cloud seeding in mountainous regions continues to offer good prospects for the increase of precipitation, as detailed in two papers. Lee waves have an important effect on the transport of crystals produced by liquid propane, a developing technology for cloud seeding. Work in Australia indicates that measurements of supercooled liquid water advecting over the mountains is a useful index for determining precipitation potential.

Dry ice was used in South Africa in a three-year experimental program to increase rainfall in the Nelspruit area. Results are encouraging, with a better response coming from clouds with an active coalescence process, but the discovery of the effectiveness of hygroscopic flares has diverted attention to that technology in recent years.

Mountain valley clouds have been treated with liquid carbon dioxide dispersed from generators atop automobiles in the Salt Lake area. Clearing of the fog and additional sunshine into the city were observed on several occasions. The spread of ice crystals depended somewhat on the extra heating due to the glaciation of the supercooled fog.

Three papers are presented relating to the Israeli cloud seeding projects and address the effects of desert dust on precipitation. Measurements reveal that much of the dust sampled in the area is coated with sulfates, making the particles effective cloud condensation nuclei. The effect may be more pronounced in southern Israel where dust is more common. These results help to explain the apparent negative results of cloud seeding in that region.

Papers follow from scientists in Cuba, Spain, Russia, and South Africa. The results in Cuba were obtained by Cuban and Russian scientists in field projects during the 1980s. Much good cloud physics data was collected, as was information on the results of cloud seeding. The results indicate that moderate-sized clouds (in the cloud-top range of $-10°$ to $-20°C$) give the strongest seeding signal and are in agreement with some convective cloud studies in western Texas, Florida, and Thailand. Hail-related papers comes from Spain and Russia. A very finescale hailpad network (spacings of approximately 4 km) is used to relate hail characteristics to crop damage near Leon, Spain. The initial reports of hail size give a useful prediction of the losses to barley and wheat crops, taking into account the crop maturity. The Russian scientists indicate environmental pollution due to heavy seeding over the years during which lead iodide was used for hail suppression. Replacement of the lead iodide with silver iodide has eliminated the problem.

Statistical papers were contributed from South Africa and the United States. The papers involve permutation tests and the simulation of the influence of type II errors on cloud seeding results.

Finally, a few papers were appropriate for notes. Papers from the United States, Bulgaria, China, and Argentina are included here. New chemical tracing methods are described that help to detect the effect of silver iodide seeding on snowfall. Physical and statistical evaluation of hail suppression operations in Bulgaria show reductions in hail damage during several heavy hail damage years. Studies in China demonstrate the efficacy of using liquid nitrogen for the reduction of supercooled fog. Scientists from Argentina illustrate the importance of ice formation for convective cloud development. The final paper on the modification of a marine stratus-layer cloud by a ship's plume lead us on to inadvertent modification and reminds us of the breadth of the topic in which we are involved.

Harold D. Orville
Guest Editor