01:28:01 GMT

Project Objectives

The Southern Plains Experiment in Cloud Seeding of Thunderstorms for Rainfall Augmentation (SPECTRA) Project was designed to study convective clouds in Texas, southeastern New Mexico and Oklahoma where advertent and/or inadvertent weather modification occurs. The objectives of the SPECTRA project were to document microphysical signatures produced by glaciogenic base seeding, document the Cloud Condensation Nuclei (CCN) distribution and their effect on the cloud Drop Size Distribution (DSD), test hygroscopic seeding using milled salt and finally, conduct model simulations of seeded and non-seeded clouds. In order to achieve these objectives, a field program was designed starting initially with Phase 1 (2004) which focused on the collection of CCN number concentrations and CCN size distributions at cloud base and measurement of the DSD spectra of convective clouds at various levels from cloud base to cloud top. Phase 2 resumed in 2005 and focused on hygroscopic seeding using milled salt.

To attain the fundamental purpose of SPECTRA, specific objectives related to field work, and subsequent analysis, were pursued for each phase of the project.

SPECTRA Phase I

1. The identification of types, and frequency of occurrence, of cloud condensation nuclei (CCN) within and in the vicinity of growing convective cloud towers.
2. Observations of cloud-droplet spectrum, liquid water contents and hydrometeor sizes and types, as well as inferences about cloud updrafts, to determine the impact of the CCN particulates on in-cloud processes, most notably coalescence.

SPECTRA Phase II

1. To disperse hygroscopic material (finely milled salts) into the updraft regions of growing convective towers and, then, to observe and document cloud behavior in response to the seeding using ground-based radar and cloud-physics data obtained with the SOAR research aircraft; the treated cloud volumes were identified by the release, and detection, of sulfur hexafluoride (SF6) gas.
2. To study and document seeding signatures in convective towers using glaciogenic materials dispensed from cloud base at one, or more, rain enhancement project areas in south Texas.

Instrumentation during SPECTRA

- The SOAR research aircraft, leased to the TDLR for up to 130 hours of flight time, equipped with cloud-physics instrumentation and aerosol instruments. The cloud physics instruments used were the DMT CIP and DMT CDP. In addition, the DMT CCN counter, the DMT modified PCASP and the Texas A&M University DMA/TDMA were used during this campaign. For phase 2, the aircraft was equipped with the University of Washington SF6 detector.
- An agricultural-type single-engine aircraft for up to 40 hours, with a capability of dispensing seeding material (milled salt) and SF6 gas at cloud base;
- 5-centimeter wavelength radar (known as a WSR 100/2/77) with a volume scan equipped with Thunderstorm Identification, Tracking, Analysis, and Nowcasting (TITAN).
- NEXRAD weather radar data feed (from Lubbock and Midland NWS sites) run through TITAN;
- An Emergency Managers Weather Information Network (EMWIN), a satellite

networking system that retrieves information issued from the National Weather Service (NWS) within a few seconds of time of issuance;

- Radio communication equipment to direct pilots of both seeder and research aircraft in, and among, convective towers. Geostationary Positioning Satellite (GPS) latitude and longitude data from each of the two aircraft will be collected and viewed with the TITAN software.