



**Western Region Technical Attachment
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LIGHTNING DETECTION: A STATUS REPORT

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Over the past few years, a handful of organizations and companies have been the primary sources for real-time lightning detection and location information. Atmospheric Research Systems, Inc. (ARSI) had been the company using the time of arrival (TOA) detection and location system (Western Region Technical Attachment No. 92-22), and was supplying the data for the AFOS LDS graphic under contract with the National Weather Service (NWS). A competing company, Dynatech and its subsidiaries GeoMet Data Services (GDS) and Lightning Location and Protection, Inc. (LLP), provided lightning detection and location information using the direction finding (DF) technology. For the western United States, the Bureau of Land Management (BLM) has provided lightning information to the NWS and the United States Forest Service (USFS) based on the direction finding technology developed by LLP.

Late last year (1993), Dynatech acquired ARSI, leaving only one private company in the lightning detection and location business. This acquisition has had and will continue to have an impact on the national lightning detection and location system. As of January 6, 1994, the data that had been appearing on the AFOS LDS graphic using TOA technology was entirely replaced by data using the DF technology.

After acquiring ARSI, Dynatech made plans for extensive side-by-side testing of the two technologies to identify each system's strengths and weaknesses. Results from test networks in Florida indicated that the TOA sensors were considerably more sensitive than the DF sensors as well as more accurate in location. The TOA could identify both cloud-to-ground and cloud-to-cloud lightning. However, many cloud-to-ground strikes were misidentified as cloud-to-cloud strikes since the sensor detected the dart leader before it actually reached the ground. The DF technology had fast waveform analysis circuits which prevented this misidentification. Also, it was determined that significant amounts of data were being lost due to saturated communications on both systems.

As a result of these tests and new user requirements by the Electric Power Research Institute (EPRI), Dynatech is beginning to merge the two existing systems, TOA and DF, to attain at least 1 km strike accuracy and detection efficiencies exceeding 90%. Currently, the DF accuracy is on the order of 8 km and the detection efficiencies near 70%. This merging of the two technologies is expected to be completed nationwide by late fall (1994) and will be accomplished by redeploying new sensors, incorporating the best of both technologies. The upgrade will not create any holes in coverage, as new sensors will only replace existing sensors after a checkout period. The merged technology is crucial to improving location accuracies, sensitivity, and detection efficiency. The combination of the two technologies will allow

detection of both cloud-to-ground and some cloud-to-cloud strikes, although the amount of cloud-to-cloud strikes reported will be dependent on the communications bandwidth, since cloud-to-ground strikes are of primary concern.

In Western Region, the future accessibility of lightning data from the BLM is uncertain. BLM is currently evaluating the feasibility of keeping their lightning detection network versus obtaining the data via Dynatech. This decision will most likely be made prior to the next convective season.

References

LLP and LPATS: Two different lightning mapping technologies. Western Region Technical Attachment No. 92-22.