

**SPACE COMMUNICATIONS TECHNOLOGY CENTER
(SCTC)**

**SATELLITE Ka-BAND PROPAGATION
MEASUREMENTS IN FLORIDA**

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&

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FLORIDA PROGRAM GOALS

- * Generate CDF's for Sub-tropical Region**
- * Sub-tropical Fading Statistics**
- * Diversity Gain**
- * Radiometer Development**
- * Sub-tropical Rain Models**

20 GHz Brightness Temperature

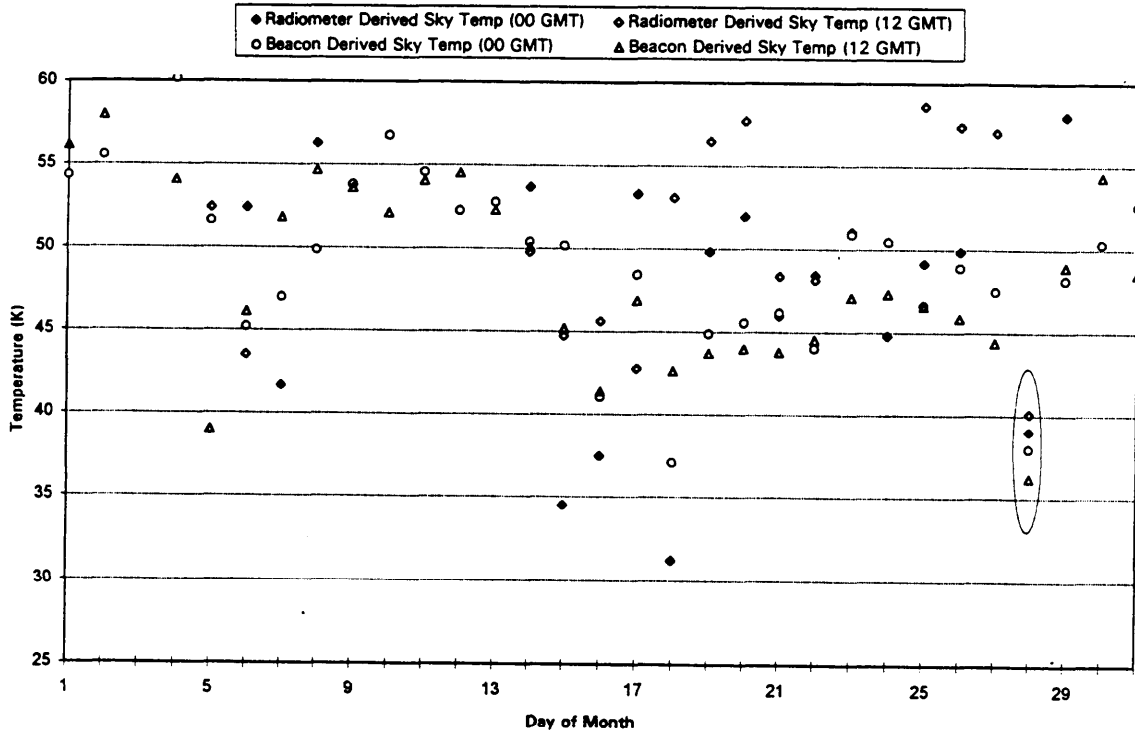


Figure 2. 20 GHz Brightness Temperature - 10/28 used for calibration
Antenna Efficiency: 68%, Antenna Spillover 87°

6/22/95 | 10:02 AM

27 GHz Brightness Temperature

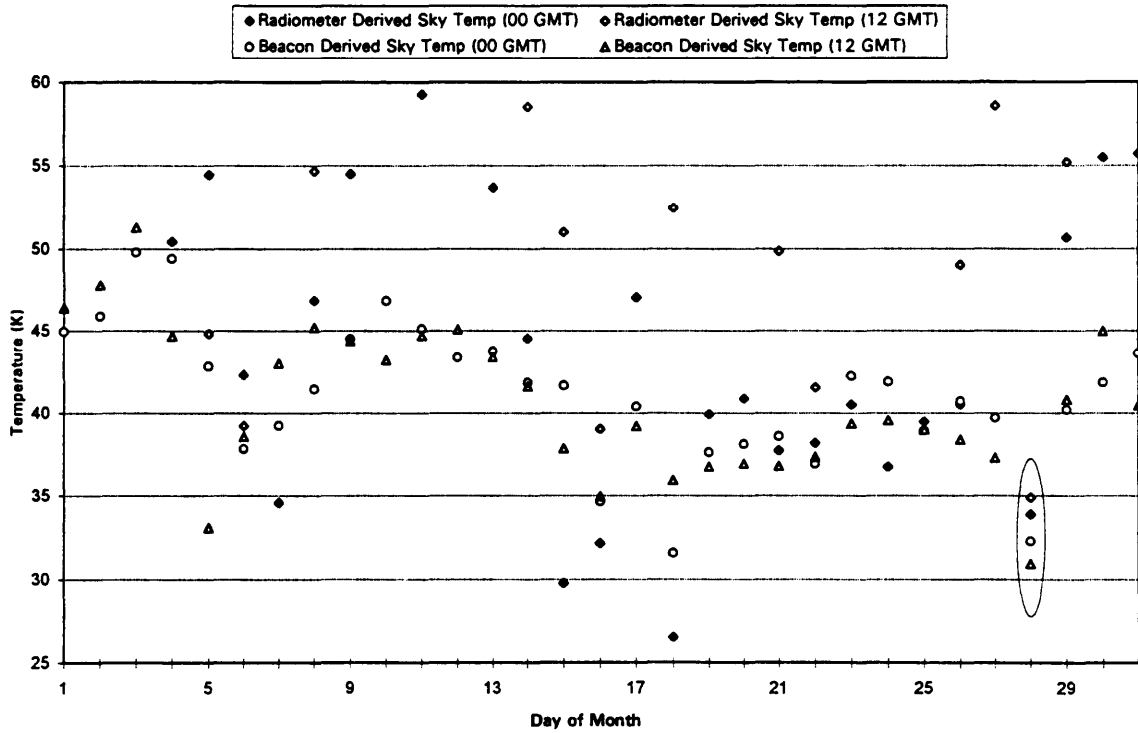


Figure 3. 27 GHz Brightness Temperature - 10/28 used for calibration
Antenna Efficiency: 58%, Antenna Spillover 84°

6/22/95 | 10:02 AM

Florida Winter Storm
January 14, 1995 - 27 GHz "Pre-Processed" Data

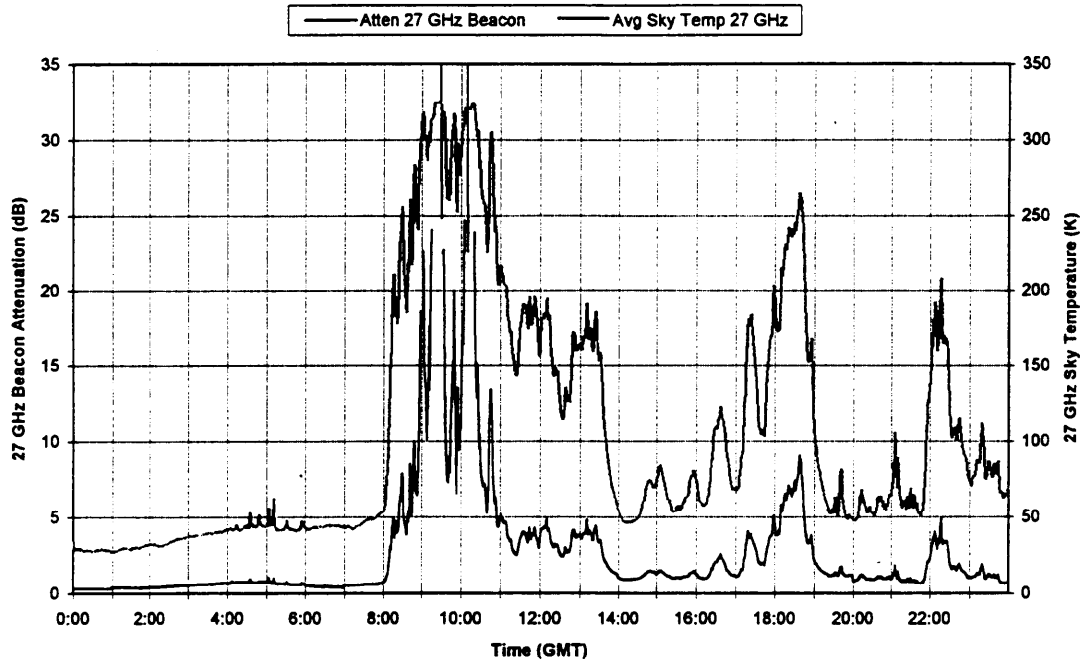


Figure 4. Typical Florida Winter Storm - Pre-processed data - 27GHz

Florida Summer Shower
July 20, 1994 - 27 GHz "Pre-Processed" Data

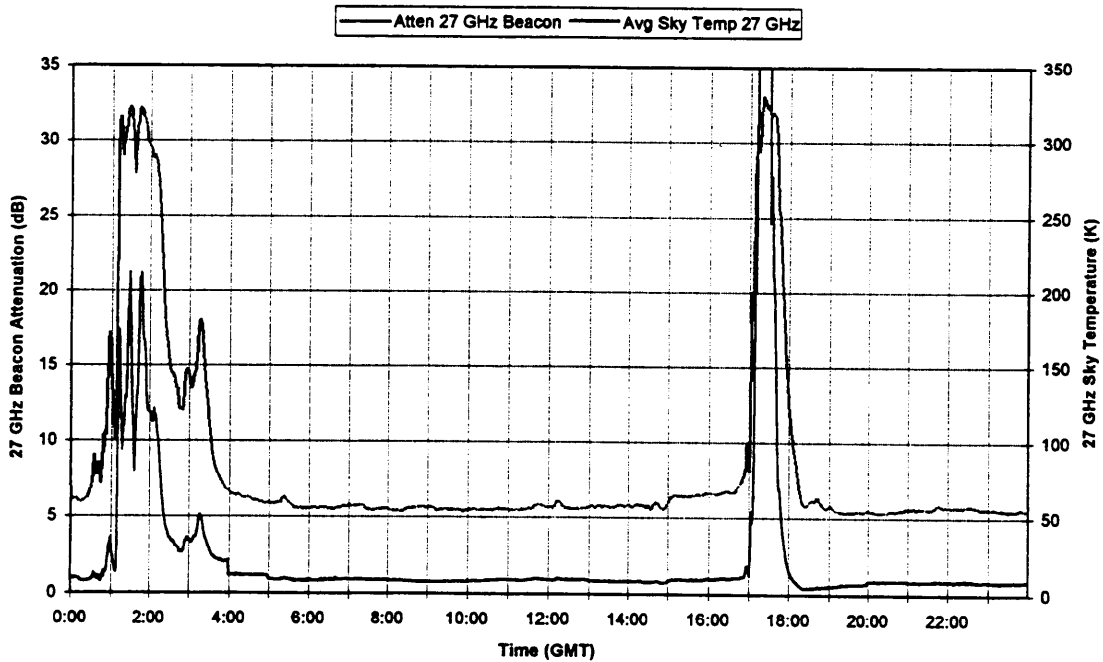


Figure 5. Typical Florida Summer Shower - Pre-processed data - 27GHz

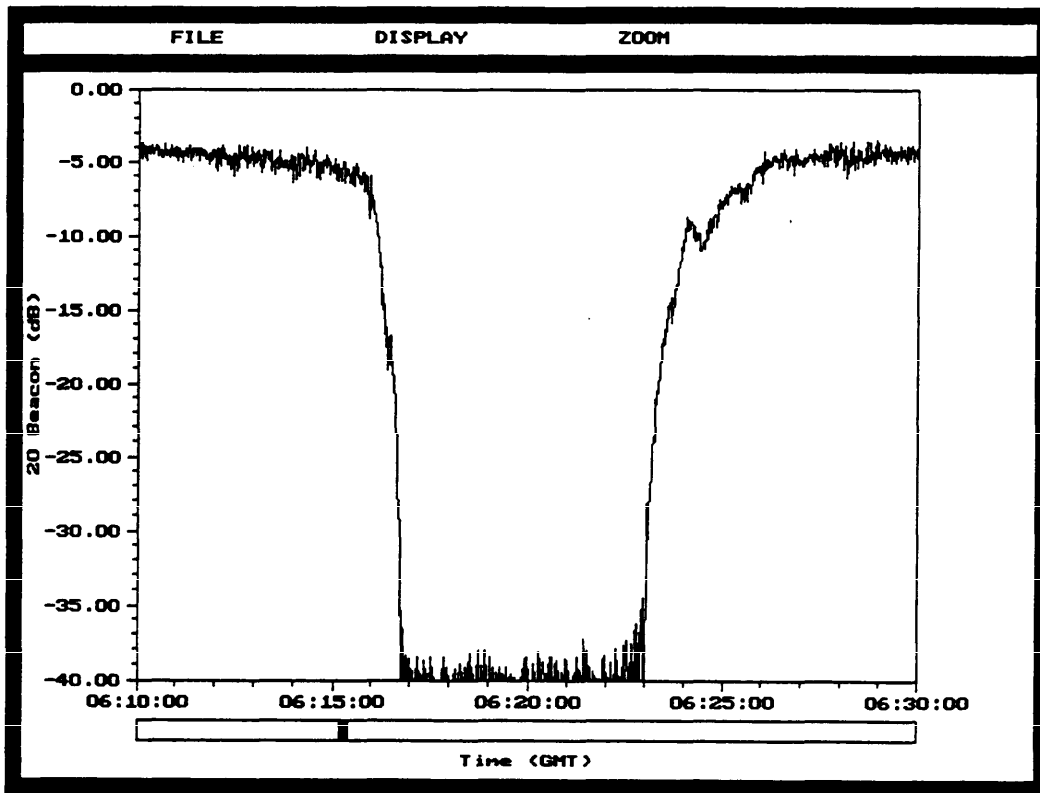


Figure 6. Ran Event - 20 GHz Beacon
May 20, 1995

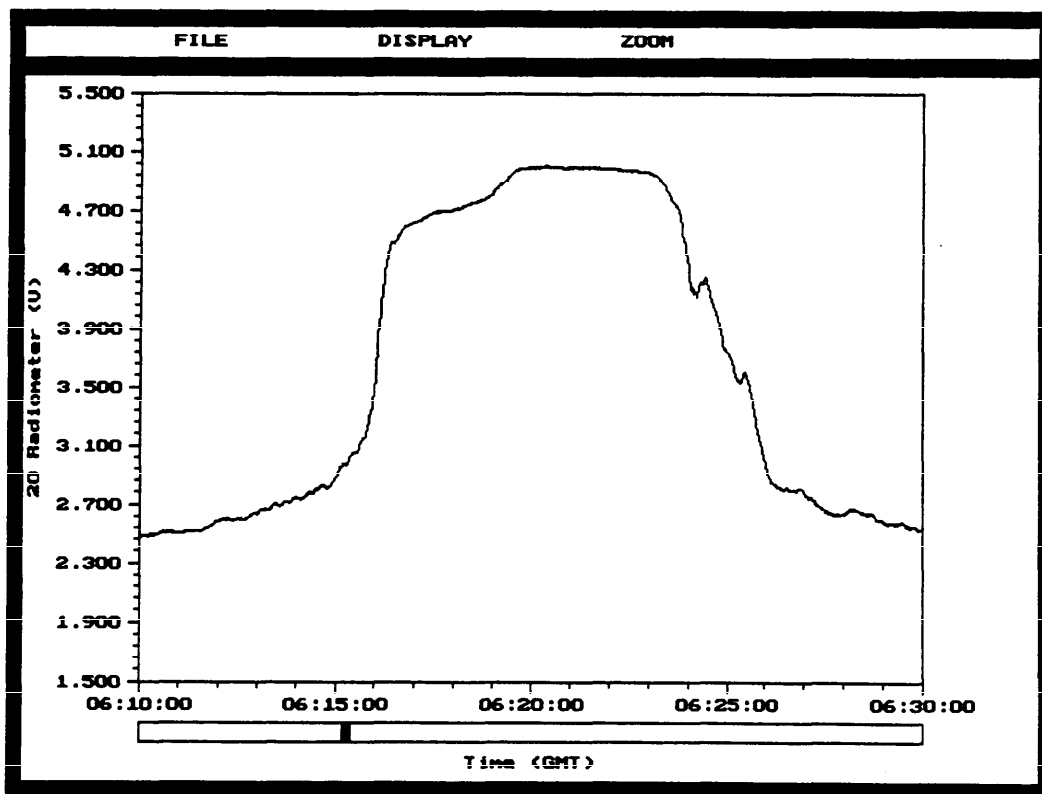


Figure 7. Ran Event - 20 GHz Radiometer - overlaps storm
May 20, 1995

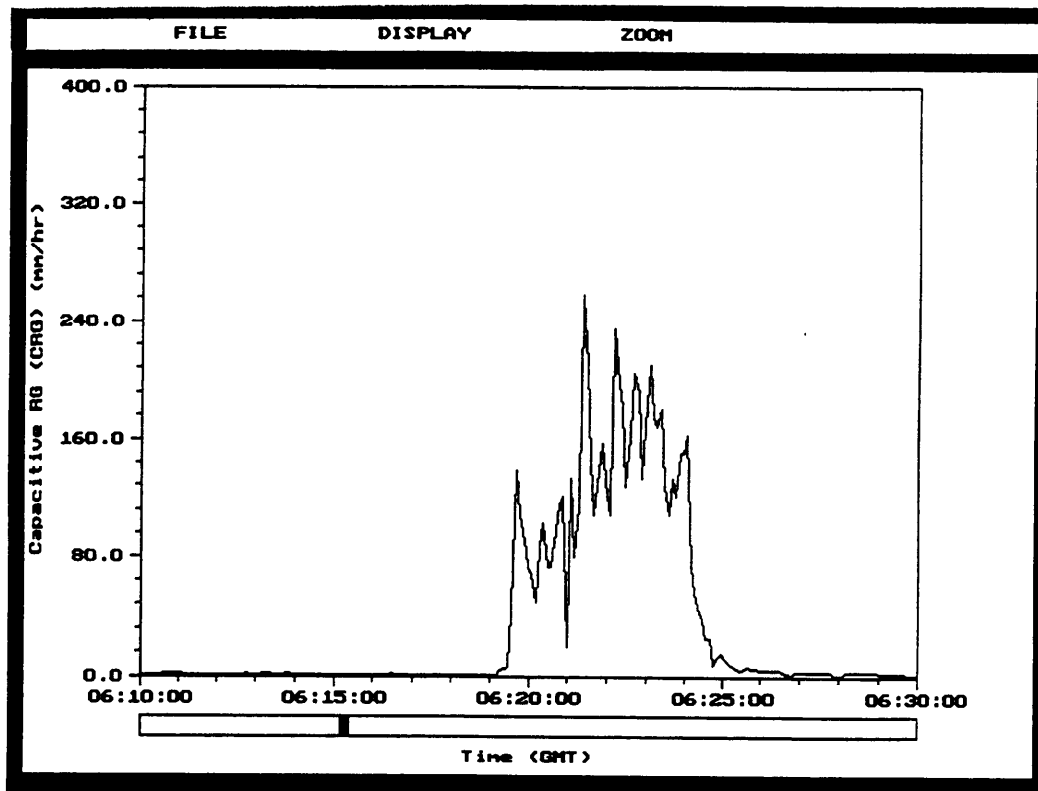


Figure 8. Rain Event - Rain rate - Delayed 2 minutes from fade onset.
May 20, 1995

20/27 GHz CDF June - August 1994

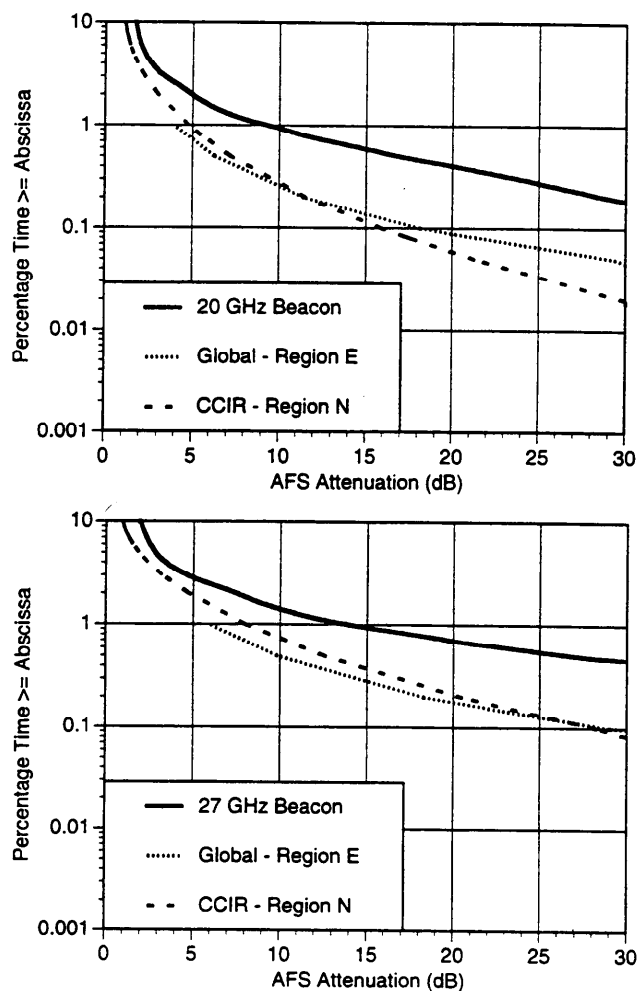


Figure 9. Comparison of pv0 Summer 1994 data with CCIR and Global Rain Models.

FADE ANALYSIS

Step 1 - Generate Binary pv1 file via Version 5.1

Step 2 - Generate Binary pv1a file
Mark Bad Artifact Intervals in Appropriate Channels
Power Outages
Antenna Testing and Other Log Book entries

Step 3 - Data Averaging
Extrapolate Over Calibration Periods
Select Running Average (1 - 30 seconds)
Median Averaging

Step 4 - Fade Analysis
Discard data with values ≤ 0
Generate CDF with 0.1 dB bins
Fade Duration Matrix
Level: < 1 Db, < 2 dB, < 30 dB, >30 dB.
Durations: < 1 Sec, < 2 Sec < 120 Sec.
Slope Matrix
Level: < 1 dB, < 2 dB, < 30 dB, >30 dB.
Slopes: -1.25 dB/sec, -1.20 dB/sec ... 1.25 dB/sec.

Figure 10. Proposed Fade Analysis Procedure.

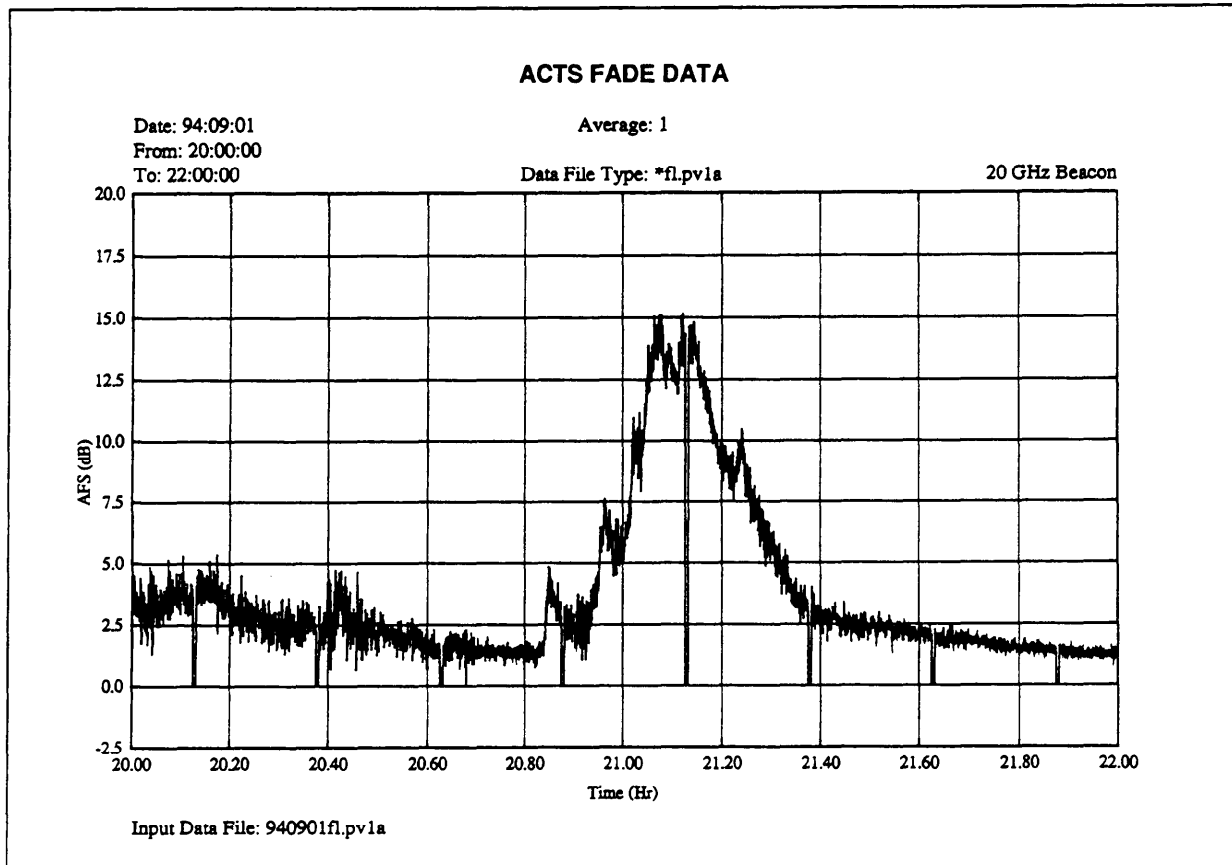


Figure 11. pv1 data: Typical Fade including calibration periods.

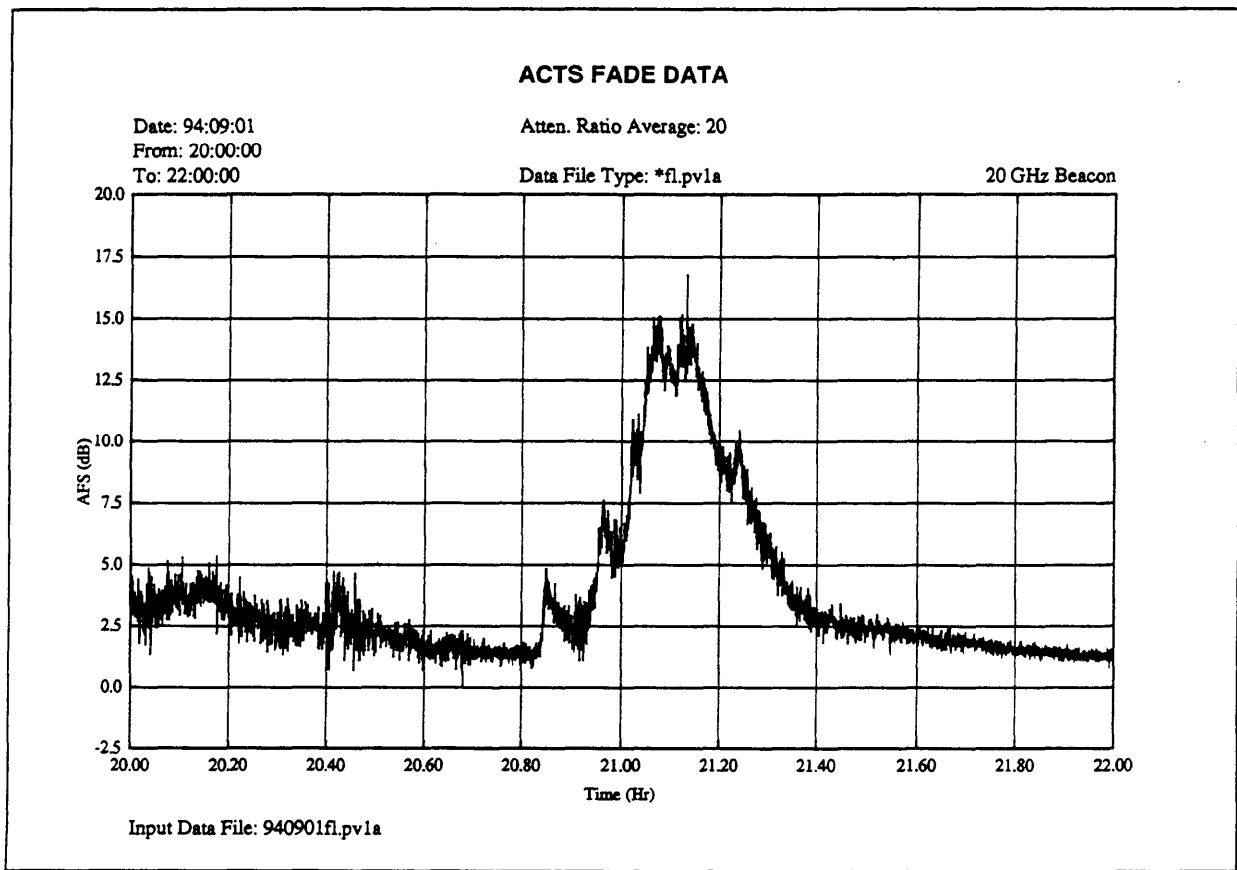


Figure 12. pvl data: Interpolate calibration data periods with 27 GHz data and attenuation ratio.

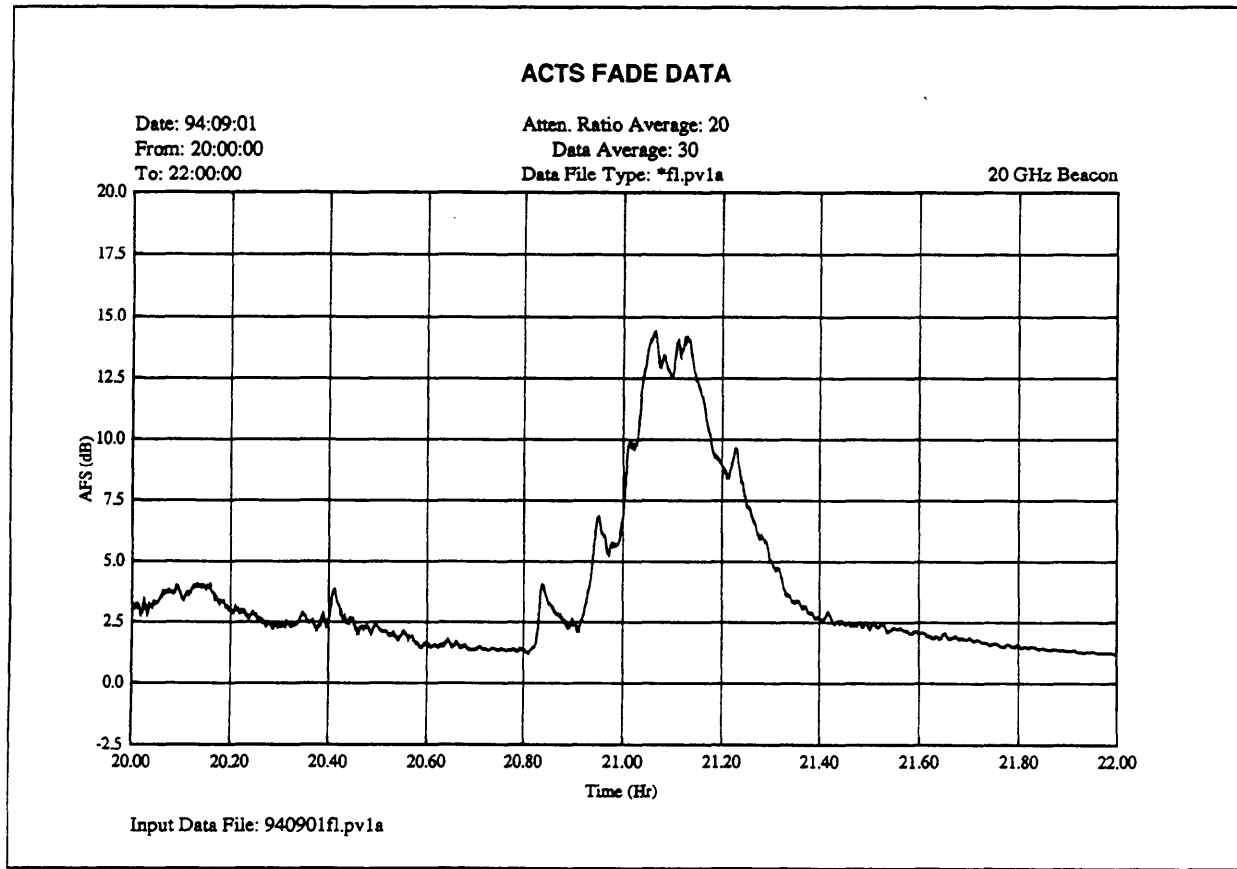


Figure 13. pvl data: 30 sample running average - episode illustration.

27 GHz Fade Duration - 20 Sample Average

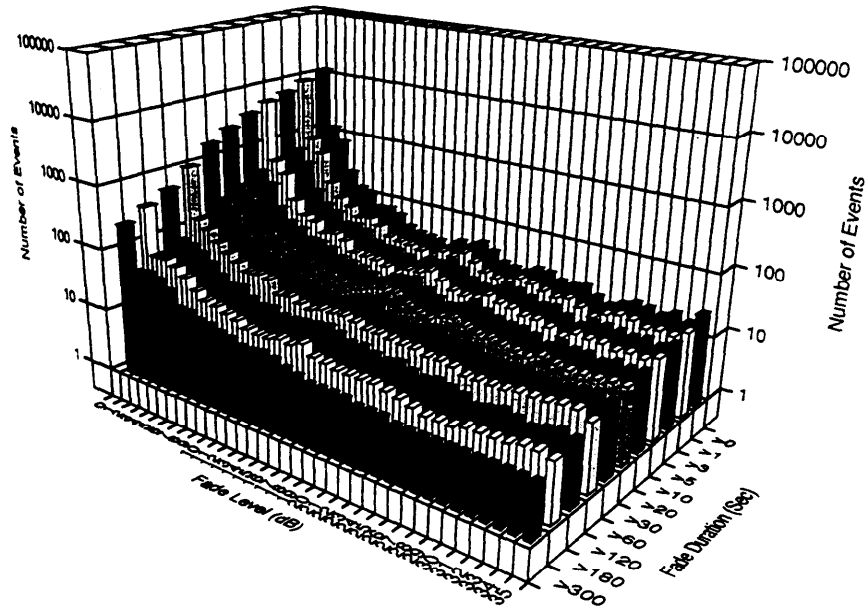


Figure 14. Fade matrix plot number of events vs fade duration and fade level.

SUMMARY

- * ACTS Florida Terminal On-Line Since November, 1993
Two Weather Periods: Winter/Dry and Summer/Moist
Archived Data Available in Texas

- * Pre-processing Software Operational
Fine Tuning Post-processing Software

- * Fading Above New CCIR Model Predictions
Need Better Sub-Tropical Rain Models

- * Diversity Measurements in Sub-Tropical Areas
COMSTAR-GTE Measurements
New Diversity Measurements to Begin 1995

- * Radiometer Measurements
Provides Simpler Fade Measurement Alternative

Figure 15. Summary.