

Space Communications Technology Center
(SCTC)

FLORIDA PROPAGATION STUDIES

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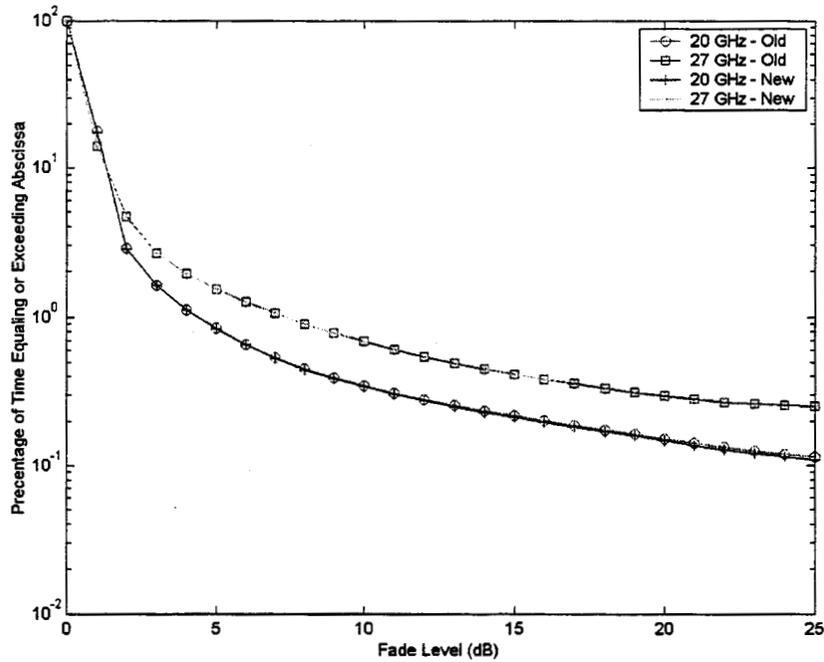
OUTLINE

- Program Goals
- Inclined Orbit Operations
- Five Year Summary
- Current and Proposed Programs
- Conclusions

FLORIDA PROGRAM GOALS

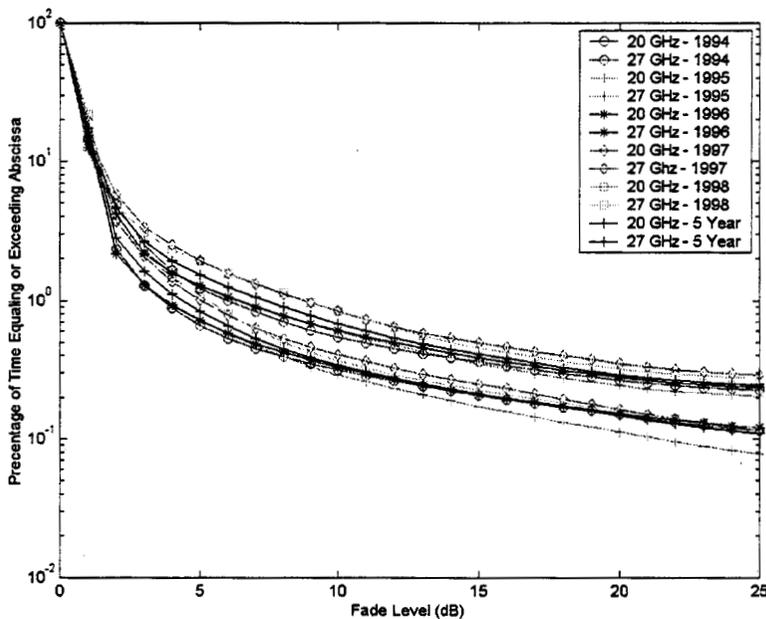
- Six Year Florida Fade Statistics
- Sub-Tropical Fade Duration Statistics
- Seasonal and Diurnal Fade Statistics
- Spatial and Orbital Diversity Gain
- Radiometer Measurements
- Sub-Tropical Propagation Models

5-Year Reprocessing Comparison



A comparison of the older data sets with the recently recalibrated release show no significant change.

Individual and 5-Year CDFs



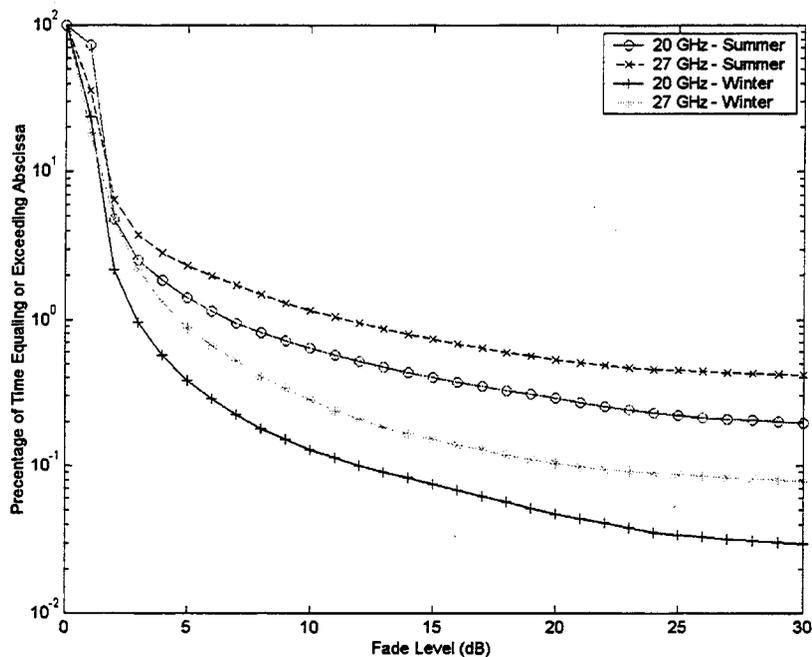
The five yearly averages are clustered tightly around the overall five year average.

SEASONAL AND DIURNAL ANALYSIS

- Seasonal Time Periods
 - Summer: June through September
 - Winter: December through March
- Diurnal Division
 - Day Time: 13 - 24 hr GMT
 - Night Time: 00 - 12 hr GMT
- AFS Fade Depth > 4 dB
 - Significant Summer/Winter CDF Differences
 - Significant Summer Day/Night Differences

Both seasonal and day/night diurnal effect are being studied and quantified.

FLORIDA SUMER/WINTER PROBABILITIES



An example of the significant difference in the cdfs between the summer and winter time periods.

DIVERSITY PROGRAM

- Diversity Improvement in Tropical Regions
 - 2nd ACTS Propagation Terminal
 - Operational May 28, 1999
- Short Baseline Spatial Improvement
 - < 5km Separations
- Orbital Diversity Improvement
 - GBS Satellite 20.7 GHz Beacon
 - 3rd Transportable Terminal

The APT terminal at Oklahoma was moved to Tampa for the purpose of doing 20/27 GHz spatial diversity measurements. It was installed adjacent to the Florida APT terminal for a 1 month checkout. A third, transportable terminal will be used for 20.7 GHz orbital diversity via the GBS satellite at 15W.

Spatial Diversity Schedule

- Nominal 30 Event Duration at each Site
 - Initial 1 Month Checkout Period
- Summer/Fall: 1.2 km Site
- Summer/Fall: 4 - 5 km Site
- Winter/Spring: 1.2 km Site
- Winter/Spring: 4 - 5 km Site

Proposed schedule for spatial diversity measurements using 2 APT units.

INCLINED ORBIT OPERATIONS

- Tracking Mount Requirements
 - VSAT Antenna Experience
- Replacement/Refurbished Antenna
 - Mitigate Wet Antenna Effects
 - Validate Florida APT Data Base
- Faculty and Student Support

Programmed tracking has reduced the error offset to less than 1 dB over a 24 hour period. With faculty and student support from the SCTC, measurements will continue at least through the end of this year.

CONCLUSIONS

- Continuing into Sixth Year of Data Collection
- Successful Inclined Orbit Operations
- 2nd APT Terminal for Diversity Operational
- Two Site Summer and Winter Measurements
- Planning for Orbital Diversity Measurements
- Initiated Additional Radiometer Measurements

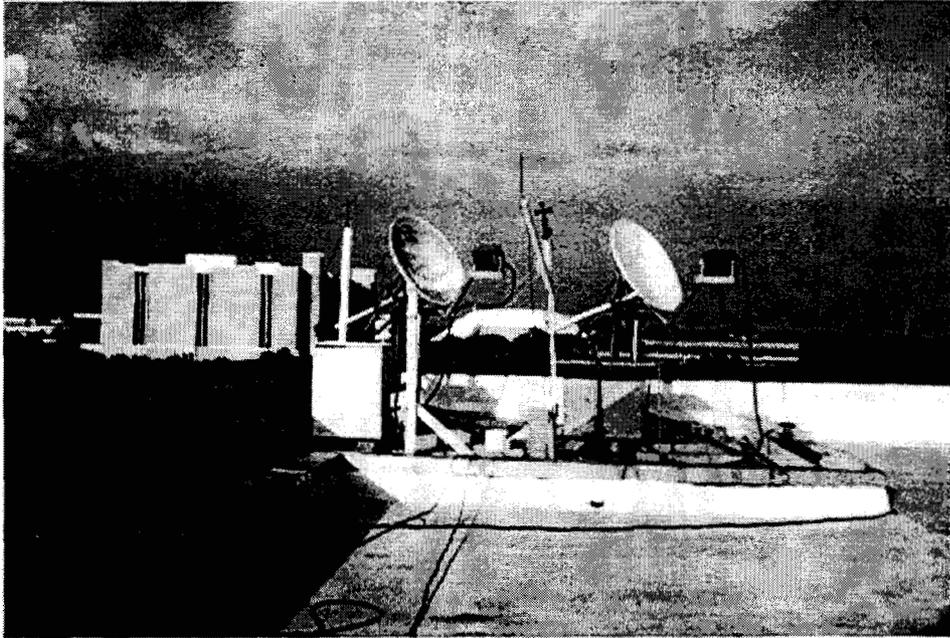


Photo of the two APT Units located on the roof of the Engineering building of the University of South Florida. Tampa. Florida.

Recent Publications:

"ACTS sub-Tropical Seasonal and Diurnal Ka-band Statistics", H. Helmken and R. Henning, Fourth Ka-Band Conference, Venice, Italy, pp97-102, November 1998.

"ACTS Ka-Band Diversity Measurements in Florida", H. Helmken, J. Duvall and R. Henning, National radio Science Meeting, pp 221, January 1999.