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OPENING REMARKS

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It is our custom to review the year's accomplishments at the onset of the yearly NAPEX meetings. Therefore, I will present the last year's accomplishments and the plans for the next year. The studies supported by the Propagation Program during the last year are listed below:

- OLYMPUS data collection and analysis
- The ACTS Propagation Program
- Low elevation angle 11-GHz measurements
- Satellite Broadcast and Mobile Studies
- Radiometric Techniques
- Propagation Models Database
- NASA Reference Publication 1274
- CCIR activities
- Fade Detection and Compensation
- Rain Rate Measurements
- Information Dissemination

OLYMPUS Data Collection and Analysis

During the last year, we witnessed the dramatic recovery of the Olympus satellite. After a 4-month interruption, we started data collection last fall. To this day, we have collected about two years of propagation data. Our preprocessing and analysis software have been completed and most of the data collected so far have been processed. Some results have also been published. Good agreement between beacon and radiometer measurements have been consistently observed. Using Olympus measurements, models have been investigated and/or developed. To disseminate study findings, compare results with other Olympus experimenters, and also learn about other experimenters' work, a session is devoted to Olympus studies during this NAPEX meeting.

ESA has informed the Olympus experimenter community that, due to a shortage of fuel, north south station keeping will not be practiced any longer. This is expected to result in the satellite gradually moving to an inclined orbit which will create a potential problem for large stations with no tracking capability. Considering the size of our terminals at Blacksburg, we expect to be able to continue the measurements for a few more months. During the next year we will conclude our Olympus measurements and concentrate on publishing our findings. Our interaction and cooperation with OPEX will continue throughout the next year.

The ACTS Propagation Program

The ACTS Propagation Program experienced a very active year. The 3rd ACTS Propagation Studies Workshop was held last January, where the requirements of the ACTS propagation terminal were finalized. During the last year, the propagation terminal prototype design was completed, and currently the prototype construction is near completion. The ACTS mobile propagation terminal, which is under development by UOT and APL, is also near completion. A NASA Research Announcement (NRA) was published and about 20 organizations responded to the NRA, resulting in the selection of 10 experimenters.

During the next year, we will witness the delivery of the experiment terminals to the selected sites. Field measurements are expected to start in early to mid-spring 1993.

Low Elevation Angle 11-GHz Measurements

The third year of low elevation angle 11-GHz measurements was completed by UOT, and the fourth year began. The first three years of this effort were supported by INTELSTAT. This effort will continue in the coming year.

Satellite Broadcast and Mobile Studies

A report was published on satellite signal reception inside buildings for UHF and L-band frequencies by UOT. This was just in time for providing propagation data to CCIR and WARC'92. Mobile measurements were made at L-band using INMARSAT signals. We hope to expand this work to conduct S-band measurements and data analysis.

Radiometric Techniques

Propagation studies using ground based radiometers continued during the last year. NOAA investigators completed the analysis of the 4-station Colorado network. And 90 GHz data were collected in Kansas. We will continue to employ ground-based radiometers as a cost-effective means of atmospheric propagation measurement.

Propagation Models Database

We started an effort to develop a data base of propagation models which are relevant to microwave communication systems. Prediction methods found in the NASA Propagation Handbooks, CCIR Study Group 5 recommendations, etc., will be included in the software. A limited amount of propagation data will also be available. The software will run on IBM-compatible and Macintosh personal computer systems. A talk on this software and a demo will be given later today. In the next year we expect to distribute the first release of the data base.

NASA Reference Publication 1274

One of our major achievements in the last year was the production and distribution of the NASA Reference Publication 1274 entitled "Propagation Effects for LMSS." This publication is a compendium of relevant propagation models and data for mobile satellite communication systems.

We have in the past updated the two NASA Propagation handbooks on intervals of about 4 years. It is now time to revise these handbooks. Therefore, we will try to revise and update them in the next year.

CCIR Activities

Last year was a busy one for CCIR Study Group 5 members. Working Parties 5 A, B, and C met in Geneva, December 1991, with Robert Crane and myself attending. The conversion of Study Group 5 reports to recommendations kept us all busy. CCIR is under pressure by ITU to do away with its reports and replace them with recommendations which provide clear and authoritative means of modeling. During the meeting, Robert Crane became *data base keeper* for rain rate statistics, and I became *data base keeper* for LMSS propagation data. Robert Crane was also asked to develop a new map-based rain rate climatology.

In the December meeting, we were successful in converting all reports on slant path propagation to recommendations, except Report 1009 which is on LMSS propagation. Currently I am preparing an input document to add prediction models to Report 1009 to prepare it for conversion to recommendations. Models from NASA Reference Publication 1274 will be included in the input document. Robert Crane will develop a map-based rain rate climate model.

Fade Detection and Compensation

Our fade detection/compensation studies continued mainly at the University of San Diego and VPI. A report was published by VPI. Next year we will try to conclude this effort and present a comparative analysis of the existing models.

Rain Rate Measurements

The 5th year of rain rate measurements at a mid-Atlantic region was completed, a model was developed, and the 6th year of data collection began. A network of 10 rain gages was used for this study. This work will continue during the coming year.

Information Dissemination

We continued the timely dissemination of our research results. The University of Colorado published 4 quarterly newsletters, informing the community of the propagation news of the NASA Propagation Program and elsewhere. Our cooperation with the OPEX group continued and Tim Pratt and I participated in OPEX 15 last October in Portugal. I participated in an AGARD meeting last October in Turkey. A session on propagation was organized for the AIAA International Satellite Communications Conference last March in Washington, DC. A session on Olympus propagation is organized for ICC'92 in Chicago.

To serve the industry, we continued our interaction with the commercial satellite communications manufacturers and service providers. We like to be informed of the industry's plans so that our studies could effectively support their propagation

NAPEX XVI

Session 1

**SLANT PATH PROPAGATION STUDIES AND
MEASUREMENTS**

Chairman:

John Kiebler

NASA Headquarters

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REMARKS FROM NASA HEADQUARTERS

John Kiebler

An overview of the Office of Commercial Programs was given.
(See Figure 1)

