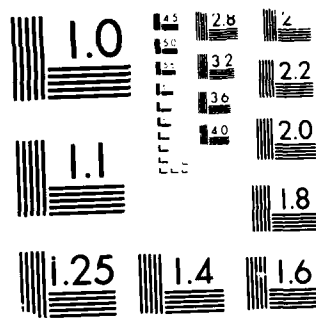


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Atmospheric transmission over a 10.37 km and a 38.9 km path is reported as a function of wavelength in the 3-5 micron region of the spectrum. High relative humidity conditions prevailed and good signal to noise was achieved with a spectral resolution of 2%.

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Final Scientific Report

MEASUREMENT OF ATMOSPHERIC TRANSMISSION OVER LONG PATHS
IN THE INFRARED SPECTRAL REGION

by

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23 October, 1987

Final Scientific Report, April 1985 - 30 November 1986

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INTRODUCTION

The period covered in this report is from 1 April 1985 to 30 September 1986. Originally the Grant period was for one year only ending on 31 March 1986, but later a no-cost extension was made, extending the Grant period to 30 Sept. 1986.

WORK DONE DURING GRANT PERIOD

The work was carried out in two parts. During the first part a re-evaluation of the previous Palmachim experiment was carried out at the request of Dr. R.W. Fenn (Air Force Geophysics Laboratory). The result was a new presentation of the measurements of atmospheric transmittance in the 3-5 and 8-14 micron regions. These results were submitted directly to Dr. Fenn on January 28, 1986.

The second part of the work was a field experiment done in the Northern part of Israel in February, 1986. Two optical paths were measured: one was between Har Odem and Har Avital, and the other was between Har Odem and Har Meron. The first path was 10.37 km long and the second was 38.9 km long. Due to an unfortunate experimental problem the 8-14 micron detector became defective during the experiment and as a result only the 3-5 micron region was measured.

The results were compared with LOWTRAN6 calculations and presented in an easily readable format. Figures showing the results were also produced, an example of which is shown in the accompanying figure. All results were sent directly to Dr. R.W. Fenn at Air Force Geophysics Laboratory on July 13, 1986.

The measurements were made with a spectral resolution of 2% (H.W.H.M.). The air temperature, relative humidity and pressure were measured at the two ends of the optical path and properly averaged to represent the integrated water vapor content of the path, its air temperature and pressure. The visibility was estimated, as accurately as possible, by a trained observer. In all the calculations a rural aerosol model was assumed.

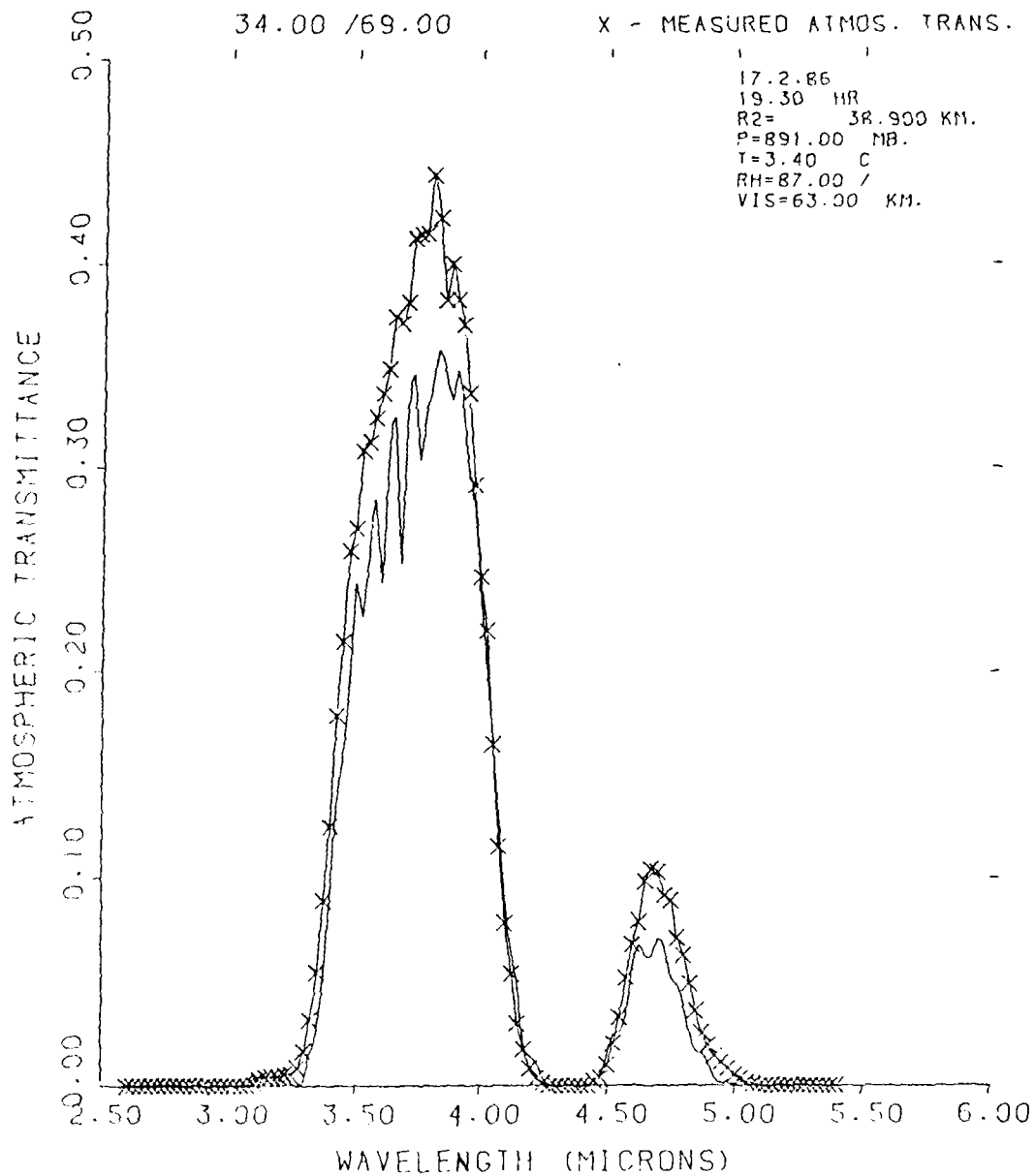
In order to make comparisons between theory and experiment more meaningful the output of the LOWTRAN 6 calculations was convolved with a triangular slit function with a 2% band width (H.W.H.M.).

The accompanying figure will now be described as an example of the results obtained. The top of the figure carries the legend 34.00/69.00. The number 34.00 is the serial number of the spectrum and the number 69.00 is ^a constant which may be disregarded. The figure itself contains two curves: the experimental curve, denoted by crosses, and the theoretical curve, calculated according to LOWTRAN 6. The upper right hand corner carries the following entries:

<u>Entry</u>	<u>Explanation of Entry</u>
17.2.86	Date of the experiment
19.30 HR	Ignore this entry
R2 = 38.900 km	Optical path length in km
P = 891.00 MB	Total atmospheric pressure in millibars
T = 3.40 C	Temperature in degrees C
RH = 87.001	Relative humidity in percent
VIS = 63.00 km	Visual range (human observer)

It is seen that the measured atmospheric transmittance, indicated

by crosses, is higher than the theoretical curve (without crosses) by several percent. This result was observed in almost all of the spectra obtained in this experiment.



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