

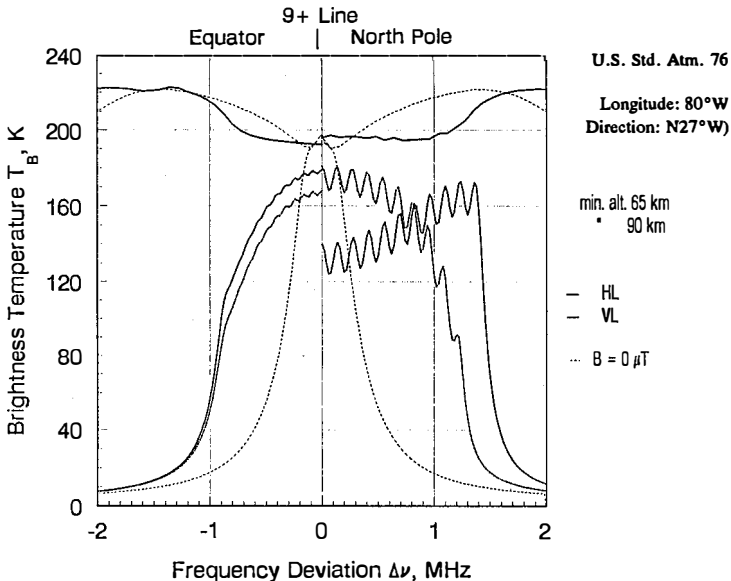
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**POLARIZED TRANSMISSION AND EMISSION IN THE
MIDDLE ATMOSPHERE (25 - 150 km) NEAR THE
ZEEMAN-SPLIT MICROWAVE O₂ LINES**

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Gaseous atmospheric attenuation and delay properties in the 50 to 75-GHz band and near 119 GHz are dominated by the fine structure lines of molecular oxygen. With increasing altitude the complex refractivity displays spectral patterns which change from an unstructured band to the isolated shapes of about 35 lines. The earth's magnetic field (22 - 65 μ Tesla) splits each line into many sublines. The anisotropic nature of these Zeeman components causes polarization discrimination and Faraday rotation.

The "Zeeman-effect" Propagation Model ZPM estimates the path transmission and emission that originates between 25 and 150 km near isolated O₂ lines. Many aspects of how polarized, plane radio waves propagate through a spherically stratified model atmosphere are evaluated (i.e., complex refractivity tensor, path-specific attenuation rates, Faraday rotation, polarization, and optical depth). Related to the absorptive line properties is thermal emission. The example below shows emission near the 61.150-GHz line frequency, as seen by a linearly polarized (HL/VL) pencil-beam antenna looking from outer space into the atmosphere to minimum heights of 65 and 90 km above sea level at either the equator or the north pole. Radiometers of limb-sounding experiments conducted from space platforms (e.g., UARS-MLS and ATLAS-MAS) are able to detect such emissions features, which reveal information on O₂ density, ambient temperature, and pressure.



W. A. Davis
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**National Radio Science Meeting
5-8 January 1993**

**Sponsored by USNC/URSI
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**University of Colorado
Boulder, Colorado
U.S.A.**

**National Radio Science Meeting
5-8 January 1993
Condensed Technical Program**

Monday, 4 January

2000-2400

USNC-URSI Meeting

Broker Inn

Tuesday, 5 January

0835-1200

B-1 ANTENNAS

CR2-28

0855-1200

A-1 MICROWAVE MEASUREMENTS

CR1-46

D-1 MICROWAVE, QUASI-OPTICAL, AND ELECTROOPTICAL DEVICES

CR1-9

G-1 COORDINATED CAMPAIGNS AND ACTIVE EXPERIMENTS

CR0-30

J/H-1 RADIO AND RADAR ASTRONOMY OF THE SOLAR SYSTEM

CR2-26

1335-1700

B-2 SCATTERING

CR2-28

F-1 SENSING OF ATMOSPHERE AND OCEAN

CR2-6

G-2 IONOSPHERIC PROPAGATION CHANNEL

CR0-30

J/H-2 RADIO AND RADAR ASTRONOMY OF THE SOLAR SYSTEM

CR2-26

1355-1700

A-2 EM FIELD MEASUREMENTS

CR1-46

D-2 OPTOELECTRONICS DEVICES AND APPLICATION

CR1-9

1700-1800

Commission A Business Meeting

CR1-46

Commission C Business Meeting

CR1-40

Commission D Business Meeting

CR1-9

Commission G Business Meeting

CR0-30

Wednesday, 6 January

0815-1200

PLENARY SESSION

MATH 100

1335-1700

B-3 EM THEORY

CR2-28

D-3 MICROWAVE AND MILLIMETER AND RELATED DEVICES

CR1-9

F-2 PROPAGATION MODELING AND SCATTERING

CR2-6

H-1 PLASMA WAVES IN THE IONOSPHERE AND THE MAGNETOSPHERE

CR1-42

J-1 FIBER OPTICS IN RADIO ASTRONOMY

CR2-26

1355-1700

E-1 HIGH POWER ELECTROMAGNETICS (HPE) AND
INTERFERENCE PROBLEMS

CR1-40

United States National Committee
INTERNATIONAL UNION OF RADIO SCIENCE
PROGRAM AND ABSTRACTS

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