Evaluation of The TIDI O2 (0-0) P Branch Broadband Filter Data


TIMED SWG Meeting
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APL
Overview

- Broadband Filter and spectral information
- Forward model fitting
- Comparison with P9 filter
- Wind vector results
- Non-migrating diurnal tides
- Comparison with ground-based measurements
- Summary
Filter Transmittance Curve and O2 (0-0) Band Emission lines

P Branch

R Branch

wavenumber 1/cm

$1.300 \times 10^4$  $1.305 \times 10^4$  $1.310 \times 10^4$  $1.315 \times 10^4$  $1.320 \times 10^4$
Daytime O2 Broadband Data

Channels

e/s/channel
P9 Daytime Data

Channels

e/s/channel

Cal  Tel 1  Tel 2  Tel 3  Tel 4

5x10^4
4x10^4
3x10^4
2x10^4
1x10^4
0  50  100  150  200  250  300

Channels
Nighttime O2 Broadband Data
Forward Model and TIDI Spectrum

Total 27 emission lines are used
Rotational Temp and Speed Fitting Map

- tele 1
- tele 2
- tele 3
- tele 4
Broadband Filter Winds

Inverted Winds Meridional (coldside)

Inverted Winds Zonal (coldside)

Inverted Winds Meridional (warmside)

Inverted Winds Zonal (warmside)
P9 Filter Winds

Inverted Winds Meridional (coldside)

Inverted Winds Zonal (coldside)

Inverted Winds Meridional (warmside)

Inverted Winds Zonal (warmside)

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Broadband Wind Vectors
Wind Vectors During Yaw Day

2004015

TIDI Coldside Winds at 96 km DAY 2004015
Wind Vectors During Yaw Day
2004015

TIDI Warmside Winds at 95 km DAY 2004015
Broadband Non-migrating Diurnal Tides

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Non-Migrating Diurnal Tide
HRDI and Model Results

Fig. 2. Zonal wavenumber power spectra as a function of latitude for annual-mean diurnal nonmigrating tidal winds at 95 km. Top: northward wind component. Bottom: Eastward wind component. Left: UARS data analyses (Forbes et al., 2002). Middle: Middle Atmosphere Circulation Model at Kyushu University (MACMKU; Miyahara et al., 1993, 1999; Miyahara and Miyoshi, 1997). Right: Global Scale Wave Model (Hagan and Forbes, 2002). Positive wavenumbers correspond to westward propagation. Contours in m²s⁻².
Rarotonga MF Radar Comparison

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Rarotonga MF Radar Comparison
Summary

• The broadband filter data have better s/n ratio and apparently better wind accuracy.
• The broadband filter data processing is more complex and the rotational temperature effect needs to be investigated.
• Comparison with P9 filter data show similar results.
• Non-migrating diurnal tide results are reasonable.
• Early comparisons with ground-based measurements show promising agreement.