Intra-Annual Variability of the Mesosphere Wind Field as Observed by TIDI


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Outline

• Improvements to TIDI data (V10)
  – Zero wind correction
  – Background removal
  – Exception handling
• UARS/HRDI and TIDI comparison
• One quick view of the TIDI wind data
Filter wheel configuration 3 (P9 line)

Rolls

IRU off

High beta conditions
Illumination pattern

Spectral line

Fiber structure

Resultant

Position on detector

Response
Fiber shift and baseplate temperature
Orbital variation of instrument temperature

**Baseplate temperature vs spacecraft track angle Backward flight**

**Baseplate temperature vs spacecraft track angle Forward flight**
- Date: 14 Jan 2005 (2005-014)  Beta angle: 0.54°
Zero Wind Correction

- Earth rotation speed along line of sight

\[ v_{\text{earth}} = -\frac{2\pi R_e \cos \lambda_{\text{poi}} \sin \Phi}{P} = -\frac{2\pi R_e (\cos i \cos \alpha + \sin i \sin \alpha \cos \theta)}{P} \]

- Tangent pt
- Angle from north
- Inclination
- Telescope azimuth
- S/C track angle

- The empirical correction fits all winds from 85 to 105 km for each telescope to

\[ u_{\text{zero}} (d,T,\theta) = a_{0,d,T} + a_{1,d,T} \cos \theta + a_{2,d,T} \sin \theta \]
TIDI Correction coefficients
V9 (left) and V10 (right) telescope 1 (45 degrees)
TIDI common volume line of sight winds
HRDI and TIDI coverage
Magnitude of the Hough (1,1) Diurnal Tide
\textit{maximum @ latitude = 19 deg, altitude = 100 km}
HRDI and TIDI meridional wind
90 km 12-14 hr local time

12 December 2007
Fall AGU SA31A-06
Fit to TIDI data and difference
Summary

- Significant progress has been made in resolving the TIDI zero wind offset
- Comparison with the HRDI data is very encouraging
- The HRDI and TIDI data sets now extend more than 16 years
  - 2 solar maxima, 2 solar minima
  - 7 QBO cycles
Calibration image – white light (732 nm)
Average NORCALs for 135 degree telescope

NORCAL fits  Telescope azimuth: 135, EW config: 03

Relative response

Channel

Number of spectra rejected: 23 out of 170
Green—Average signal, Blue—Average fit
TIDI data morning and afternoon