Comparison of TIDI and Ground-Based Winds, and Tides in the WACCM

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1. We compare TIDI with ground-based MF winds in the Hawaiian Islands, and the Island of Rarotonga in the Cook Islands.

2. Comparisons are for line of sight winds at times when TIMED vehicle overflies at MF radar sites. Both traditional and “broadband” emission TIDI winds are compared with MF winds.

3. We examine 12-hour TIDI wind differences, and compare with SABER 12-hour differences, and diurnal tides in WACCM.
TIDI versus MF LOS winds at Hawaii, March 21 - May 20, 2002

Best agreement is with telescopes 1 and 3 LOS winds.
TIDI “broadband” winds versus MF LOS winds
November 16, 2003
TIDI “broadband” winds versus MF LOS winds
November 17, 2003
Preliminary comparisons between MF and broadband TIDI LOS show promising agreement....

However, agreement is better in some cases than others.

Data are presently being examined to ascertain controlling factors (e.g., beta angle, warm versus cold side, telescope number, etc.)

2. Daily zonal (U) and meridional (V) winds are sorted by local time, and averaged in longitude.

3. 12-hour differences are formed (requires about 10-15 consecutive days to obtain global maps). The resulting maps are proxies for the migrating diurnal tide at a fixed local time.

4. Procedure 1-3 are applied to WACCM winds, and to SABER version 4 (NLTE) temperatures.
These plots are generated by applying steps 1-3 on previous slide to WACCM V and U (output from March 30-day run).

Migrating diurnal tide in WACCM shows dominance of (1,1) Hough mode.

V has a wavy vertical structure, largely asymmetric about the equator.

U has a symmetric component about the equator.
The 0-12 LT diff. is very consistent with the picture of migrating diurnal tides provided by WACCM.

However, the 10-22 LT U and V difference fields are less consistent with tidal predictions.
WACCM 12-hour V and U differences corresponding to TIDI warm side sampling (output from March run).

These plots show the same tidal features seen in previous WACCM slide, referenced to a different local time.
TIDI 12-hour V and U winds differences, warm side.

Compared with the “cold side” data, the 8-20 LT and 10-22 LT difference fields are not as consistent with WACCM tides.
During June 30-July 15 2003, the 12-hour wind difference fields indicate greater symmetry in the migrating diurnal meridional wind.

In Hough mode terms, this would imply that the corresponding temperatures would have greater asymmetry.
SABER 12-hour difference field is stronger in the Northern hemisphere above 15 scale heights. This pattern is consistent with TIDI’s 12-hour V differences.
1. Preliminary comparisons between MF and broadband TIDI LOS are promising.

2. TIDI 12-hour difference fields, formed from profiles viewed on the “cold-side”, yield global “snapshots” of the diurnal tide that are consistent with WACCM predictions, and with SABER 12-hour temperature differences.