COMPARISON OF TIDAL RESULTS OBTAINED WITH METEOR RADARS WITH NON-INTERFEROMETRIC AND INTERFEROMETRIC CAPABILITIES

Lau, E.M.[1], Iimura, H.[2], Avery, S.K.[1]
, Avery, J.P.[3], Palo, S.E.[2], Makarov, N.A.[4]
[1]University of Colorado, Cooperative Institute for Research in Environmental Sciences (CIRES), U.S.A.
[2]University of Colorado, Department of Aerospace Engineering, U.S.A.
[3]University of Colorado, Department of Electrical and Computer Engineering, U.S.A.
[4]Institute for Experimental Meteorology, Scientific Production Association TYPHOON, Russia

Until recently the remoteness and harsh environment of the polar regions limited our understanding of the dynamics of the upper atmosphere over these regions. Over the last decade some instruments have been installed at the Amundsen-Scott station at the South Pole. Optical instrument measurements first revealed the existence of a faint nonmigrating semidiurnal tide in the mesosphere-lower thermosphere (MLT) over the South Pole. This nonmigrating semidiurnal tide was found to propagate in the westward direction with a zonal wavenumber one. Surprisingly at that point the migrating semidiurnal tide was not discerned from the measurements as it had been at lower latitudes; this behavior has since been explained by physical principles. A meteor radar installed in the mid 1990's that operated for over one year revealed that the nonmigrating semidiurnal tide was stronger during the austral summer and almost disappeared during the winter. The nonmigrating semidiurnal tide was measured to have an amplitude of $\sim$20 m/s during the summer. A similar behavior was observed for the migrating diurnal tide but with significantly smaller amplitudes. One limitation of that meteor radar was the lack of vertical resolution so all returns were assumed to come from a height of 95 km.

A new meteor radar started operating in 2001 at the South Pole station with the goal of helping in the understanding of the horizontal wind field dynamics over the Antarctic continent. This new meteor radar includes a system similar to the one installed in the mid 1990's (COBRA system) and another one that has interferometric capabilities and thus can resolve the altitude of the wind measurements associated with each meteor trail (MEDAC system). The tidal results of the COBRA and MEDAC systems are compared. It is found that the nonmigrating semidiurnal tide results obtained with the COBRA system could be underestimated by about 20% due to the lack of altitude resolution.

Abstract Submission Form

2006 National Radio Science Meeting

Abstract: lau14448

Date Received: September 18, 2005

1. (a)
Elías Lau
University of Colorado
CIRES
216 UCB
Boulder, CO
80309-0216 U.S.A.
Elias.Lau@Colorado.EDU
(b) 303-492-4625
(c) 303-492-1149

2. G - Ionospheric Radio and Propagation

3. (a)

4. C - Contributed Paper

5. No special instructions