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Climatology of the semidiurnal tide at 52–56°N from ground-based radar wind measurements 1985–1995

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Abstract

Long-term wind measurements carried out at 6 northern midlatitude sites (Saskatoon, Sheffield, Juliusruh, Collm, Obninsk, Kazan) are investigated to establish a climatology of the semidiurnal tide in the mesopause region for the narrow latitudinal range between 52°N and 56°N. Comparison of zonal and meridional components shows that in general the horizontal components are circularly polarized. Intercomparison of amplitudes and phases generally shows good agreement between the results from the different measuring systems. The results are compared with an empirical model of the semidiurnal tide. The longitudinal variation of the semidiurnal tide is small in summer, but the tidal amplitudes in winter are larger at Saskatoon and Kazan, compared with the results from the other sites. The possible influence of wave–tidal interaction in the stratosphere on the interannual variability of this difference is discussed. © 1999 Elsevier Science Ltd. All rights reserved.

1. Introduction

The semidiurnal tide in the upper mesosphere/lower thermosphere region has been measured for several decades, making it possible to study its long-term interannual variability. Such studies have been undertaken with respect to long-term trends (Bremer et al.,

1997; Jacobi et al., 1997a; Portnyagin et al., 1993), while both the seasonal and latitudinal variation of the semidiurnal tide have been investigated empirically with long-term studies (Lysenko et al., 1992; Manson et al., 1989) as well as with the aid of model calculations (Forbes, 1982a,b; Forbes and Vial, 1989; Hagan, 1996; Hagan et al., 1992, 1995; Vial and Forbes, 1989). Satellite observations from the Upper Atmosphere Research Satellite have also been investigated with respect to the global distribution of the semidiurnal tide (Burrage et al., 1995; McLandress et al., 1996).

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