RESPONSES OF THE ELIASSEN-PALM FLUX TO THE PASSAGE OF SOLAR SECTOR BOUNDARIES (Abstract)

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Responses of planetary waves to the passage of solar sector boundaries (SSB) are studied by use of the Eliassen-Palm (E-P) flux. Reported responses to the passage are as follows: The vorticity area index (VAI) dips on the first day after the passage (J. M. WILCOX *et al.*: J. Atmos. Sci., **31**, 581, 1974), and the polar temperature reaches a minimum on the passage date in the troposphere (Y. MISUMI: J. Meteorol. Soc. Jpn., **61**, 686, 1983) and 2.5 days after that in the stratosphere (Y. MISUMI: Abstract, IAMAP, Hamburg, 1981). The E-P flux is useful to study variations of waves, because its divergence indicates the influence of waves on the zonal mean field and its direction shows that of the wave group velocity on the meridional plane. Results mentioned below were obtained in winters from 1964 to 1972.

It is found that, from 4.5 to 0.5 day before the passage of SSBs, the divergence of the E-P flux occurs between 60 and 70°N in the 200–500 mb layer. The southward residual mean meridional flow due to this divergence is enough to give rise to a residual mean upward flow which decreases temperature in the polar troposphere. The E-P flux divergence is caused by decrease of E-P flux vertical components for zonal wave numbers 2 and 3 in the troposphere, which propagate to the stratosphere. Especially, the decrease of wave number 2 and that of wave number 1 at the 150 mb level reach the middle stratosphere and create a minimum of polar temperature there.

On the passage date E-P flux convergence appears in the 200–500 mb layer. This convergence is diagnosed by the reflective index changed by the divergence mentioned above and brings about the VAI response.

The continuing decrease of the E-P flux is completely expressed by the internal atmospheric dynamics, without external forcings or modulations. However, decreases cannot be diagnosed by the reflective index and are accompanied by small variation of the kinetic and available potential energy.

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STRATOSPHERIC CIRCULATION IN THE SOUTHERN HEMISPHERE (Abstract)

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By the use of stratospheric geopotential height and temperature field data obtained from the TIROS satellite, the dynamical interaction between planetary waves and zonal mean winds in the southern hemisphere stratosphere is investi-

gated during the period from June to November 1981. Eliassen-Palm (E-P) flux diagnostics is used as a powerful and useful tool to deal with the wave-mean flow interaction process.

Characteristics of the seasonal march from winter to summer of the wave activity (measured by the E-P flux) and the zonal mean wind in the southern hemisphere are summarized as follows: From June to July the wave activity is quiet corresponding to small time variations of the maximum westerly speed. In mid-August the core of the stratospheric westerly jet shifts poleward and downward due to a wave number 2 minor warming. After the shifting of the westerly jet the wave activity of wave number 1 is enhanced, with a succession of waves continuing until October. In early November the summer easterlies are established at the 5 mb level.

One of the most interesting characteristics of the seasonal march in the southern hemisphere is shifting of the westerly jet in mid-winter. Regarding the wave-mean flow interaction, the different wave properties of waves 1 and 2 are also interesting: wave 1 activity, to which the quasi-stationary component mainly contributes, begins in association with shifting of the westerly jet while wave 2 activity lies mainly around the shifting. These facts suggest the importance of the wind profile in determining the variability of wave activity.

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A BALLOON OBSERVATION OF STRATOSPHERIC NITROGEN DIOXIDE OVER SYOWA STATION, ANTARCTICA (Abstract)

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Stratospheric nitrogen dioxide was observed by spectroscopic technique on board a 5000 m^3 balloon flown from Syowa Station. The method was based upon atmospheric absorption of solar radiation in the visible region. The solar spectra in the wavelength region 430–450 nm were measured with a resolution of about 2Å, and analyzed to deduce the absorption due to nitrogen dioxide. The spectrometer used was a Jobin-Yvon H20 monochromator, and one spectral scan took about one minute. The balloon's gondola was oriented toward the sun, and the solar radiation was guided to the spectrometer by an automatic sun seeker and follower. An electrochemical ozonesonde was on board the gondola to measure the ozone density *in situ*. The balloon was flown at 1402UT on November 24, 1982, and the observation terminated at 0615UT the next day. 832 spectra were obtained for various solar zenith angles from 60° to 90° at a balloon float altitude of about 25 km. These spectra enabled us to deduce the stratospheric distribution of nitrogen dioxide. The altitude profile was slightly different between those measured at sunset and sunrise. The peak density was found to be about $5\times10^9 cm^{-3}$ at the altitude of 26–28 km, and the column density above the 20 km altitude was $(5-6)\times10^{15} cm^{-2}$.

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