Seasonal Variation of Vertical Na Flux by Dissipating Gravity Waves in the Mesopause Region at Midlatitudes

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Seasonal variations of Na flux due to dissipating gravity waves in the mesopause region are characterized from measurement made with a Na wind/temperature lidar at Starfire Optical Range (35˚N) for over two years from 1998 to 2000. The vertical Na flux exhibits strong 12-month and 6-month oscillations, especially below 92 km, with maximum downward flux over 2x10^8 m^{-2}s^{-1} in winter and over 1x10^8 m^{-2}s^{-1} in summer. The 12-month oscillations arise in part because of the strong seasonal variations of the Na profiles. The 6-month oscillations are directly related to the strong semiannual variation of gravity wave activities.