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Correlations of mesospheric winds with subtle motion of the Arctic polar vortex

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Abstract. This paper investigates the relationship between high latitude upper mesospheric winds and the state of the stratospheric polar vortex in the absence of major sudden stratospheric warmings. A ground based Michelson Interferometer stationed at Resolute Bay (74°43' N, 94°58' W) in the Canadian High Arctic is used to measure mesopause region neutral winds using the hydroxyl (OH) Meinel-band airglow emission (central altitude of ~85 km). These observed winds are compared to analysis winds in the upper stratosphere during November and December of 1995 and 1996; years characterized as cold, stable polar vortex periods. Correlation of mesopause wind speeds with those from the upper stratosphere is found to be significant for the 1996 season when the polar vortex is subtly displaced off its initial location by a strong Aleutian High. These mesopause winds are observed to lead stratospheric winds by approximately two days with increasing (decreasing) mesospheric winds predictive of decreasing (increasing) stratospheric winds. No statistically significant correlations are found for the 1995 season when there is no such displacement of the polar vortex.

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