A simulation of the quasi two-day wave and its effect on variability of summertime mesopause temperatures

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The quasi 2-day wave is studied using a multi-year simulation of the Canadian Middle Atmosphere Model. The general characteristics of the wave are presented, and interannual and inter-hemispheric differences are discussed. The simulated quasi 2-day wave amplifies shortly after solstice in the summer hemisphere. The wave exhibits a variable phase speed over the summer season, which decreases as the mesospheric jet weakens. As such, the period is intially shorter than 2 days, but can lengthen to more than 2 days. A 2-day wave index is defined using empirical orthogonal functions, and is used to describe the behaviour of the quasi 2-day wave. The 2-day index is also used to examine the effect of the 2-day wave on mesospheric temperatures through its impact on the residual circulation. It is determined that up to 10% of the interannual variability in the polar summer mesopause temperatures can be attributed to the simulated quasi 2-day wave. It could, therefore, be a significant source of variability on polar mesospheric clouds.