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## The two-day wave in the Antarctic and Arctic mesosphere and lower thermosphere

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**Abstract.** There have been comparatively few studies reported of the 2-day planetary wave in the middle atmosphere at polar latitudes. Here we report on a study made using high-latitude meteor radars at Rothera in the Antarctic (68° S, 68° W) and Esrange in Arctic Sweden (68° N, 21° E). Observations from 2005–2008 are used for Rothera and from 1999–2008 for Esrange. Measurements were made of horizontal winds at heights of 80–100 km. The radar data revealed distinct summertime and wintertime 2-day waves. The Antarctic summertime wave occurs with significant amplitudes in January – February at heights between about 88–100 km. Horizontal wind monthly variances associated with the wave exceed 160 m<sup>2</sup> s<sup>-2</sup> and the zonal component has larger amplitudes than the meridional. In contrast, the Arctic summertime wave occurs for a longer duration, June–August and has meridional amplitudes larger than the zonal amplitudes. The Arctic summertime wave is weaker than that in the Antarctic and maximum monthly variances are typically 60 m<sup>2</sup> s<sup>-2</sup>. In both hemispheres the summertime wave reaches largest amplitudes in the strongly sheared eastward zonal flow above the zero-wind line and is largely absent in the westward flow below. The observed differences in the summertime wave are probably due to the differences in the background zonal winds in the two hemispheres. The Antarctic and Arctic wintertime 2-day waves have very similar behaviour. The Antarctic wave has significant amplitudes in May–August and the Arctic wave in November–February. Both are evident across the full height range observed.

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