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## Observations of the mesospheric semi-annual oscillation (MSAO) in water vapour by Odin/SMR

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**Abstract.** Mesospheric water vapour measurements taken by the SMR instrument aboard the Odin satellite between 2002 and 2006 have been analysed with focus on the mesospheric semi-annual circulation in the tropical and subtropical region. This analysis provides the first complete picture of mesospheric SAO in water vapour, covering altitudes above 80 km where previous studies were limited. Our analysis shows a clear semi-annual variation in the water vapour distribution in the entire altitude range between 65 km and 100 km in the equatorial area. Maxima occur near the equinoxes below 75 km and around the solstices above 80 km. The phase reversal occurs in the small layer in-between, consistent with the downward propagation of the mesospheric SAO in the zonal wind in this altitude range. The SAO amplitude exhibits a double peak structure in the equatorial region, with maxima at about 75 km and 81 km. The observed amplitudes show higher values than an earlier analysis based on UARS/HALOE data. The upper peak amplitude remains relatively constant with latitude. The lower peak amplitude decreases towards higher latitudes, but recovers in the Southern Hemisphere subtropics. On the other hand, the annual variation is much more prominent in the Northern Hemisphere subtropics. Furthermore, higher volume mixing ratios during summer and lower values during winter are observed in the Northern Hemisphere subtropics, as compared to the corresponding latitude range in the Southern Hemisphere.

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