

Quasi-16 day planetary wave oscillations observed in mesospheric ozone and temperature data from Antarctica

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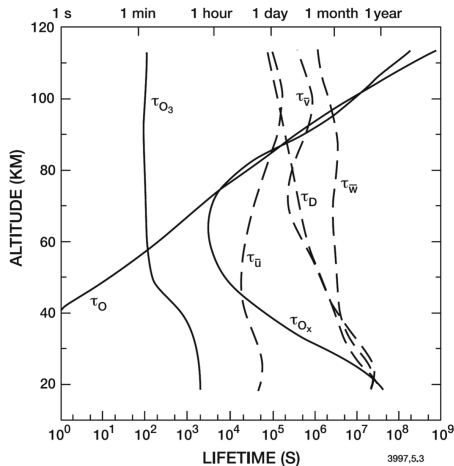
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Goal of the study and instruments used

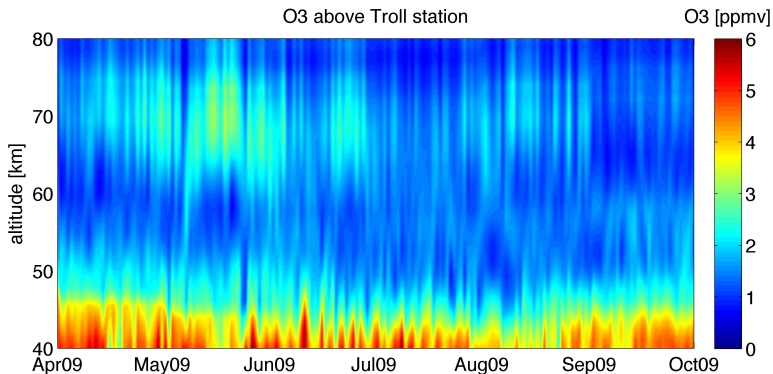
- Investigate presence and profile of 16 day planetary wave in Antarctic stratosphere and mesosphere during winter 2009.
- O₃ measurements from BAS radiometer at Troll.
- Mesospheric temperatures (87 km) from an (hydroxyl) airglow spectrometer at Rothera.

Anti-correlation between O_3 and T variations in the upper stratosphere and mesosphere



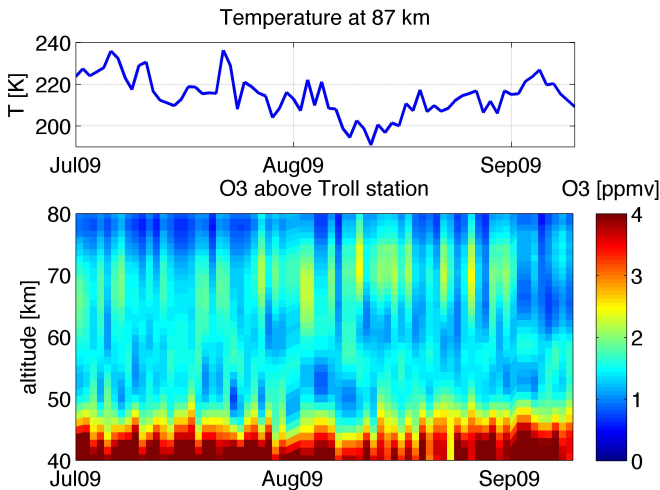
- Chemical reaction rate depends on temperature leads to negative correlation between ozone and temperature perturbations.
- Since $\tau_{chemical} < \tau_{dynamical}$ O_3 density changes are driven by wave-driven density/temperature changes.

Ozone above Troll winter 2009

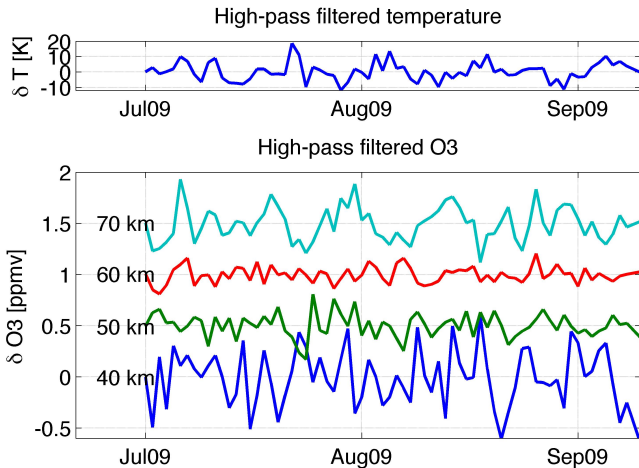


Tertiary maximum (approx. 70 km) and upper part of primary maximum of O_3 .

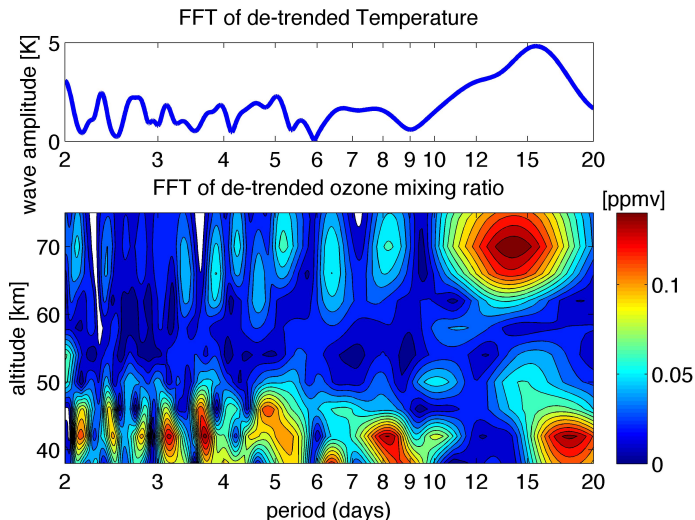
Ozone above Troll winter 2009



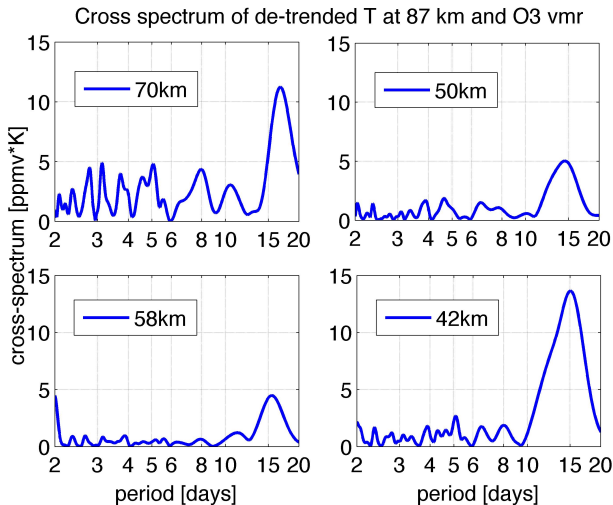
Temperature at 87 km and mesospheric O₃ de-trended using high pass filter (cut-off 20 days)



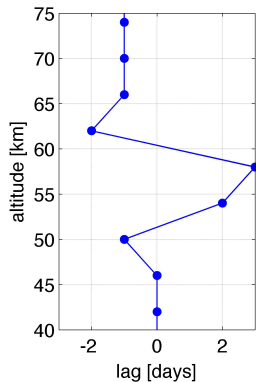
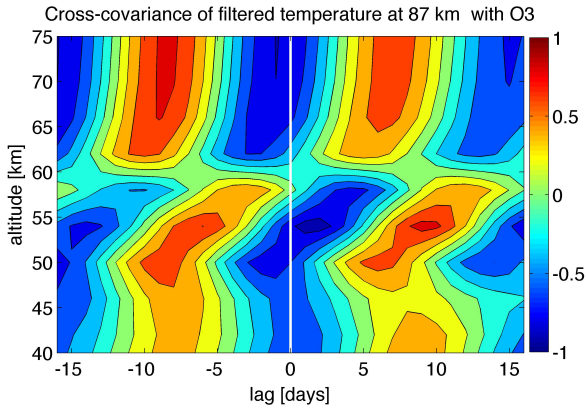
Periodic variations - strong mesospheric peak at 16 days



Phase coherent 16-day oscillation at all levels



Time-laged cross-covariance of oscillations between 12 and 20 days



Conclusions

- 16-day wave activity over the whole altitude range with minimum at stratopause.
- Wave activity seems to be shifted to larger periods in mesosphere than stratosphere.
- Anti correlation between T and O₃ vmr at 0 phase lag.
- No clear tilt of phase lag observed - could indicate normal mode.