

Appendix A

Gravity wave anisotropy during major warmings

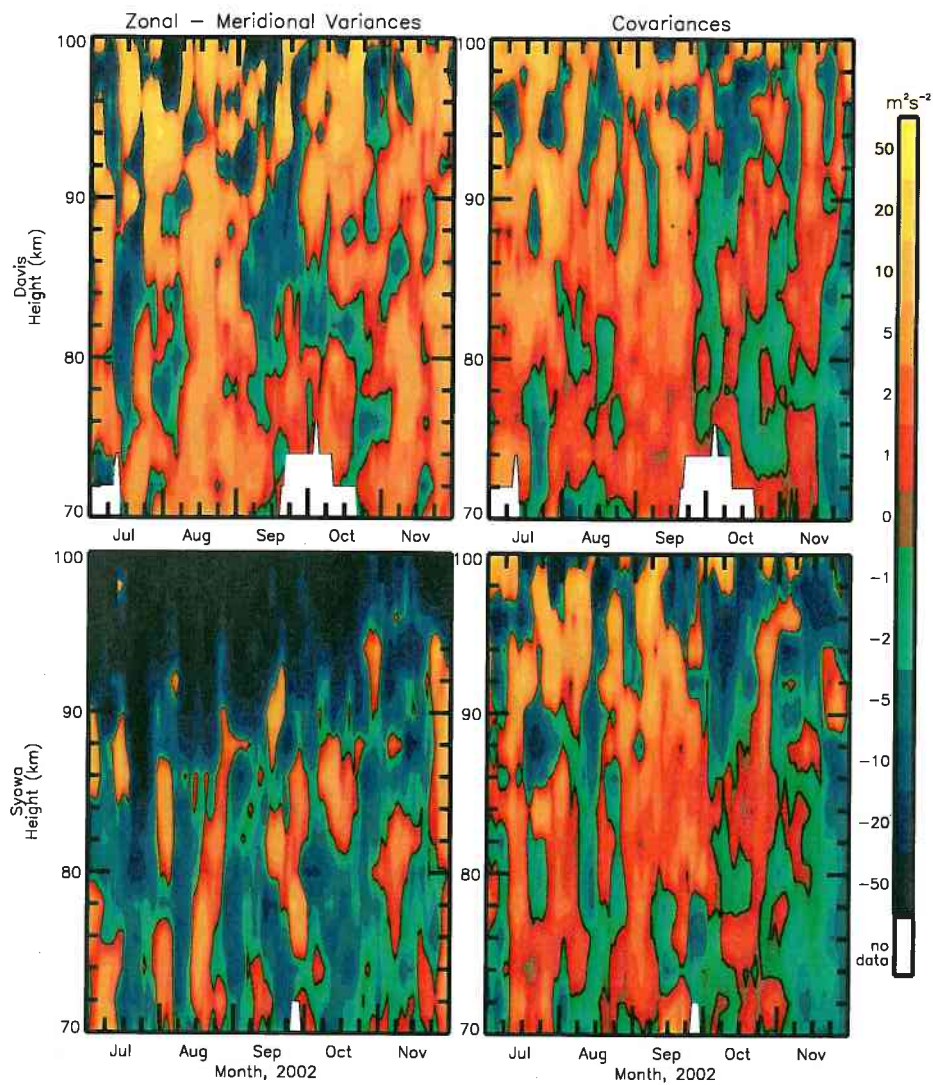


Figure A.1: The quantity $\overline{u'^2} - \overline{v'^2}$, and the covariances at Davis and Syowa around the time of the 2002 southern major warming. Variances and covariances used are in the period range 20-120 minutes. Data are shown as percentage difference from the mean at a particular height during the time period shown.

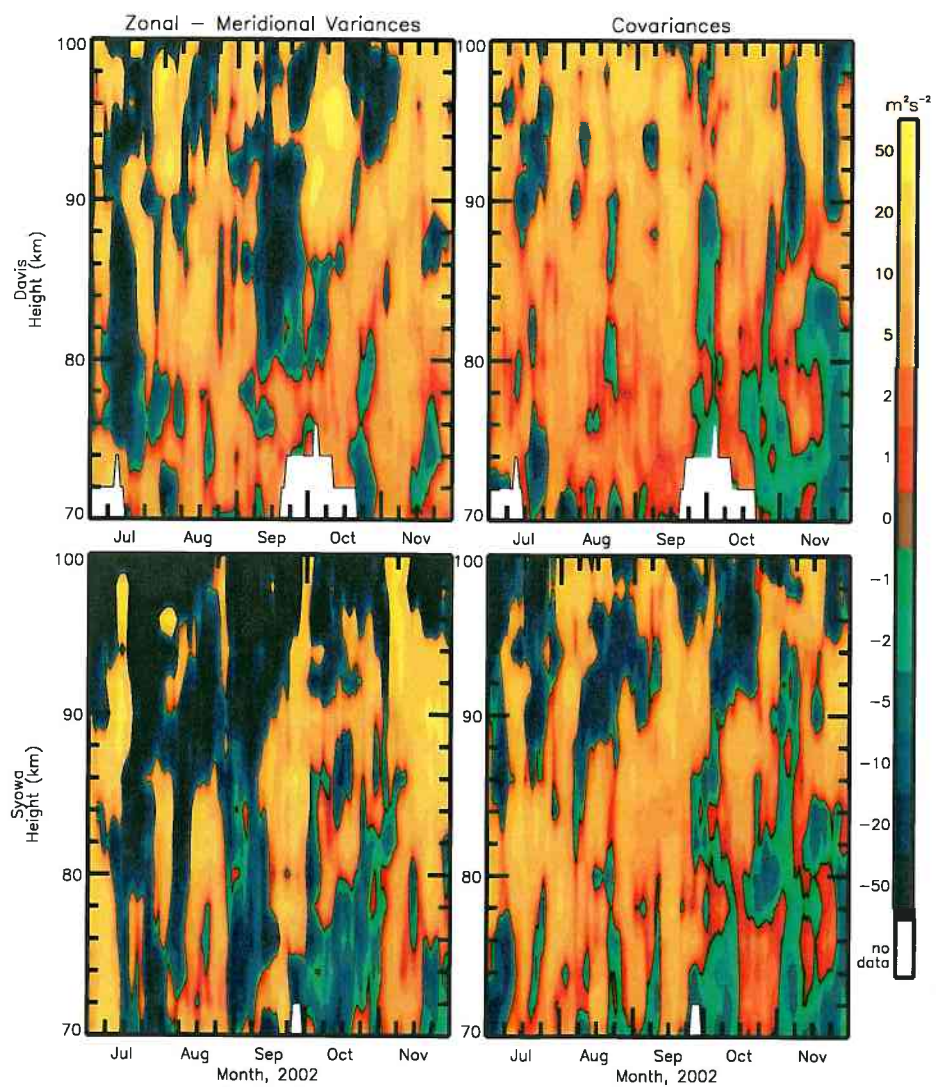


Figure A.2: As for Figure 7.7, but for the period range 120-480 minutes.

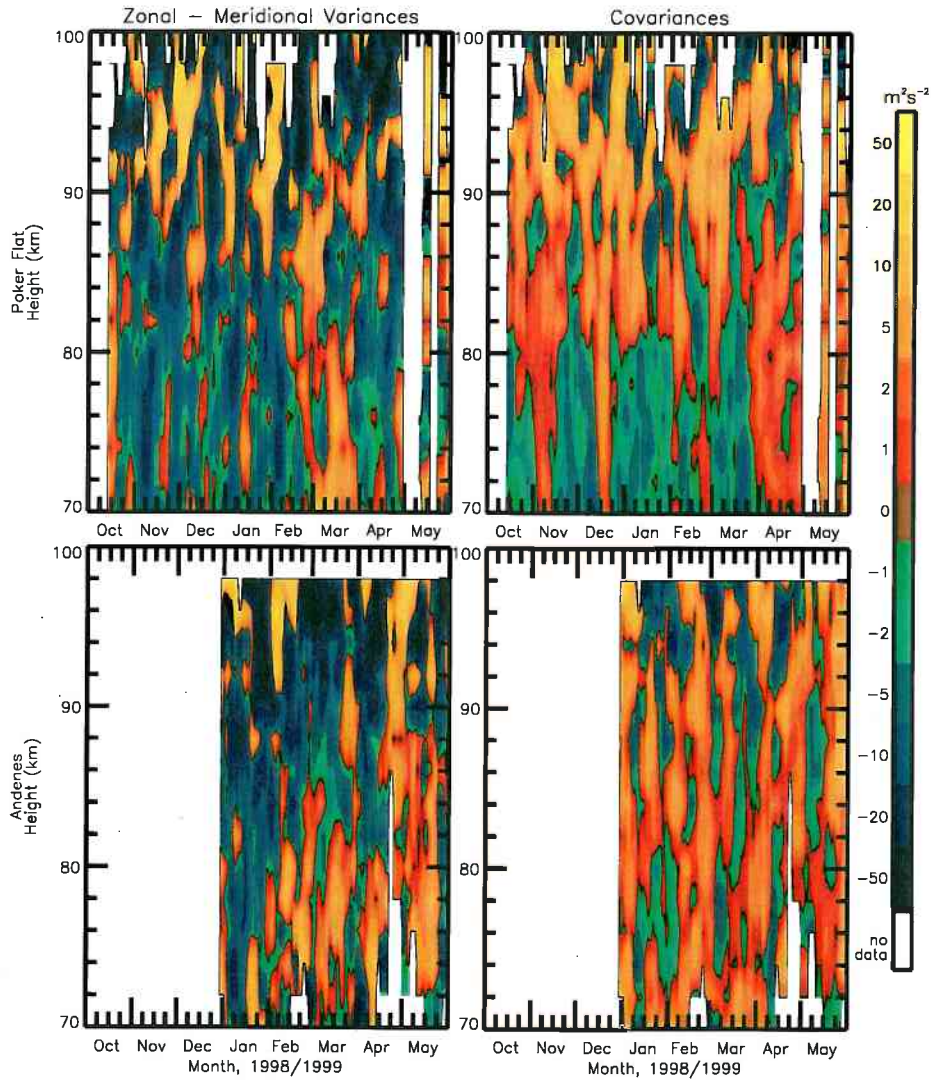


Figure A.3: $\overline{u'^2} - \overline{v'^2}$ and the covariance at Poker Flat and Andenes during the 1998/1999 northern winter. Variances and covariances used are in the period range 20-120 minutes. Data are shown as percentage difference from the mean at a particular height during the time period shown.

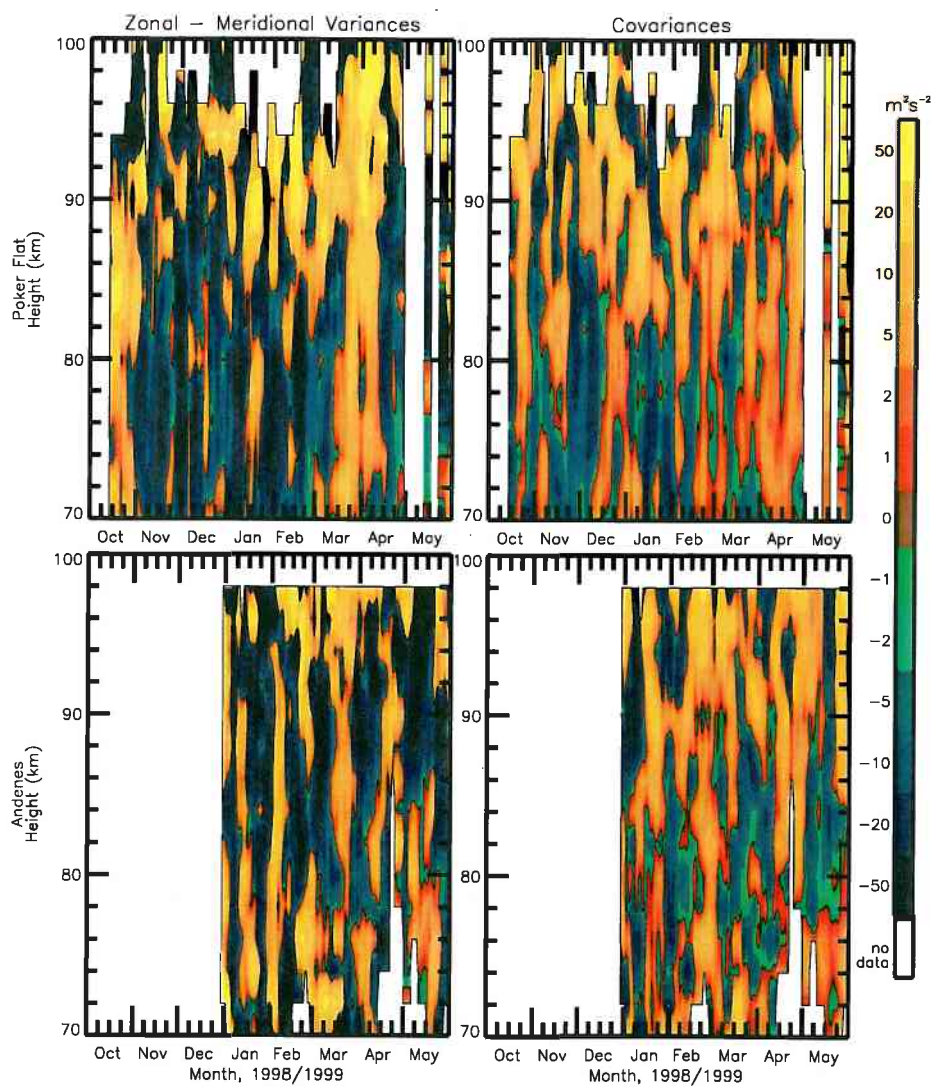


Figure A.4: As for Figure A.3, but for the period range 120-480 minutes.

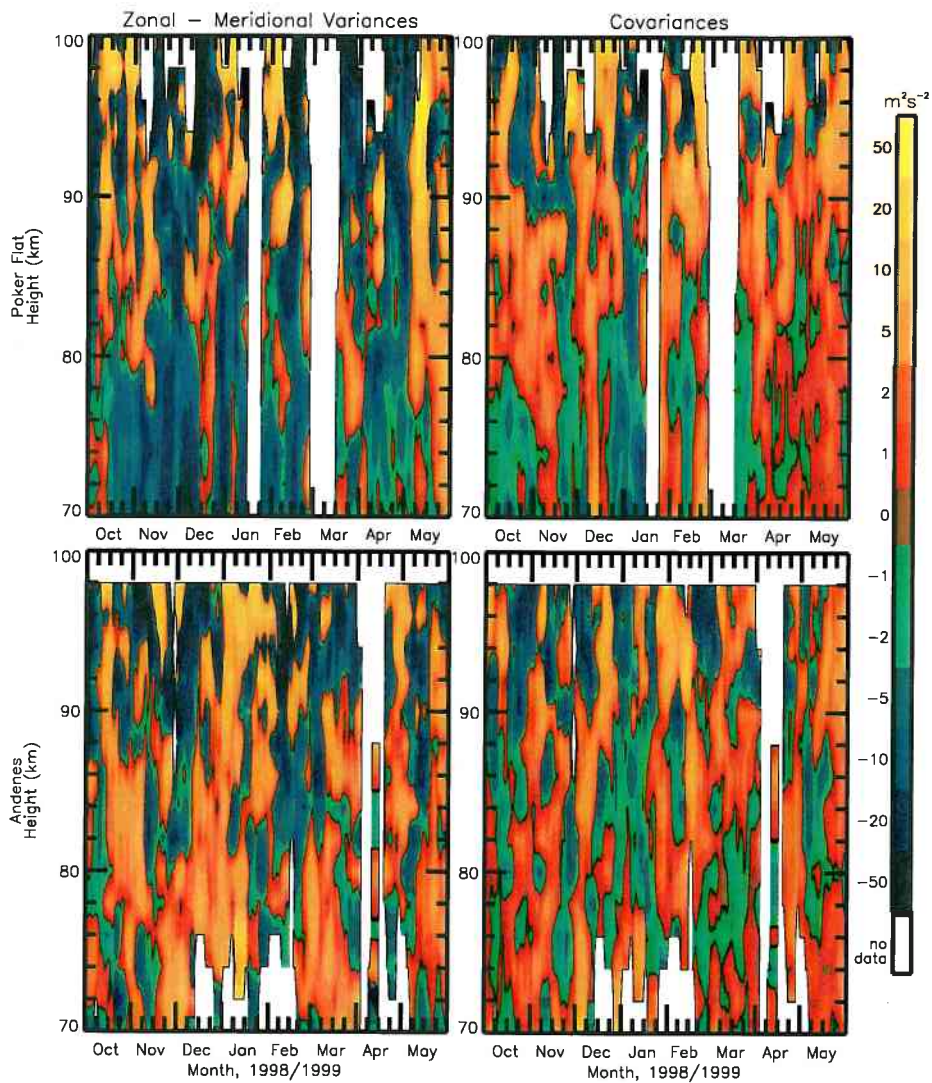


Figure A.5: $\overline{u'^2} - \overline{v'^2}$ and the covariance at Poker Flat and Andenes during the 1998/1999 northern winter. Variances and covariances used are in the period range 20-120 minutes. Data are shown as percentage difference from the mean at a particular height during the time period shown.

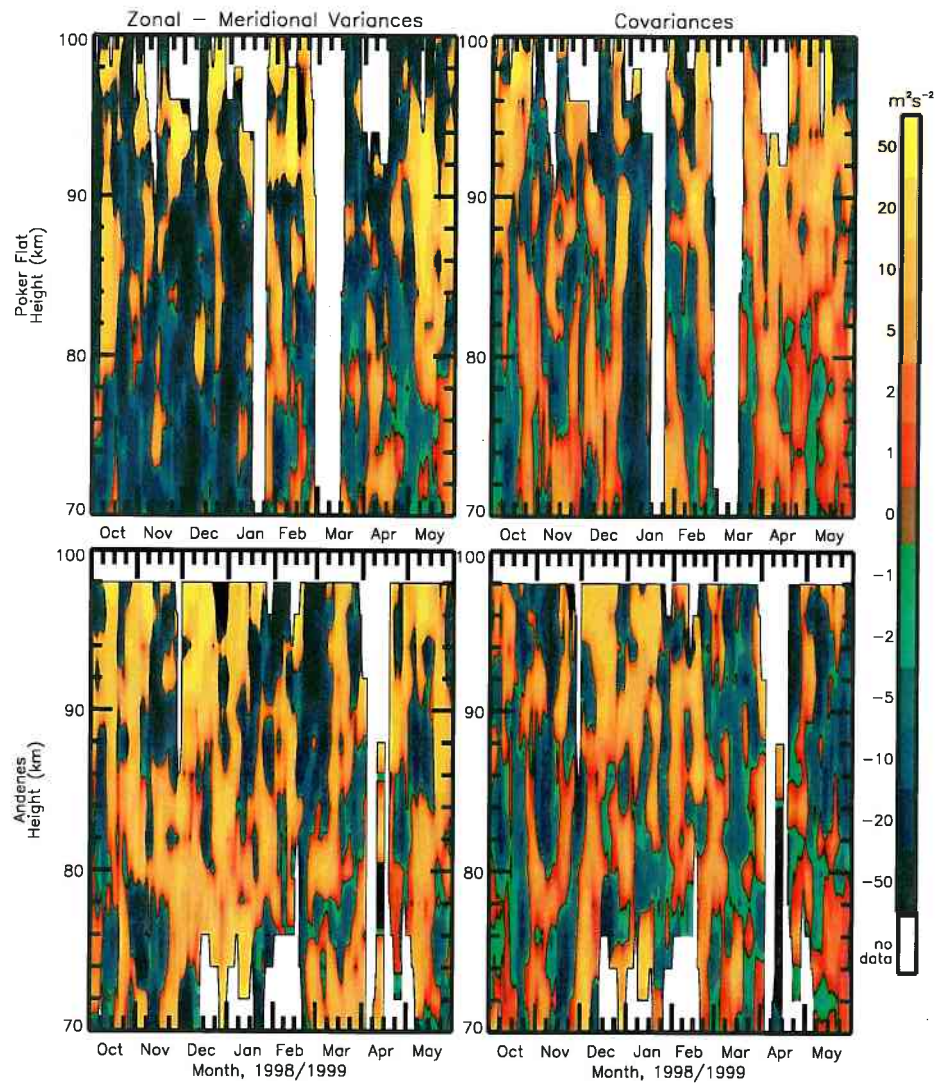


Figure A.6: As for Figure A.5, but for the period range 120-480 minutes.

Appendix B

Gravity wave polarisation during northern major warmings

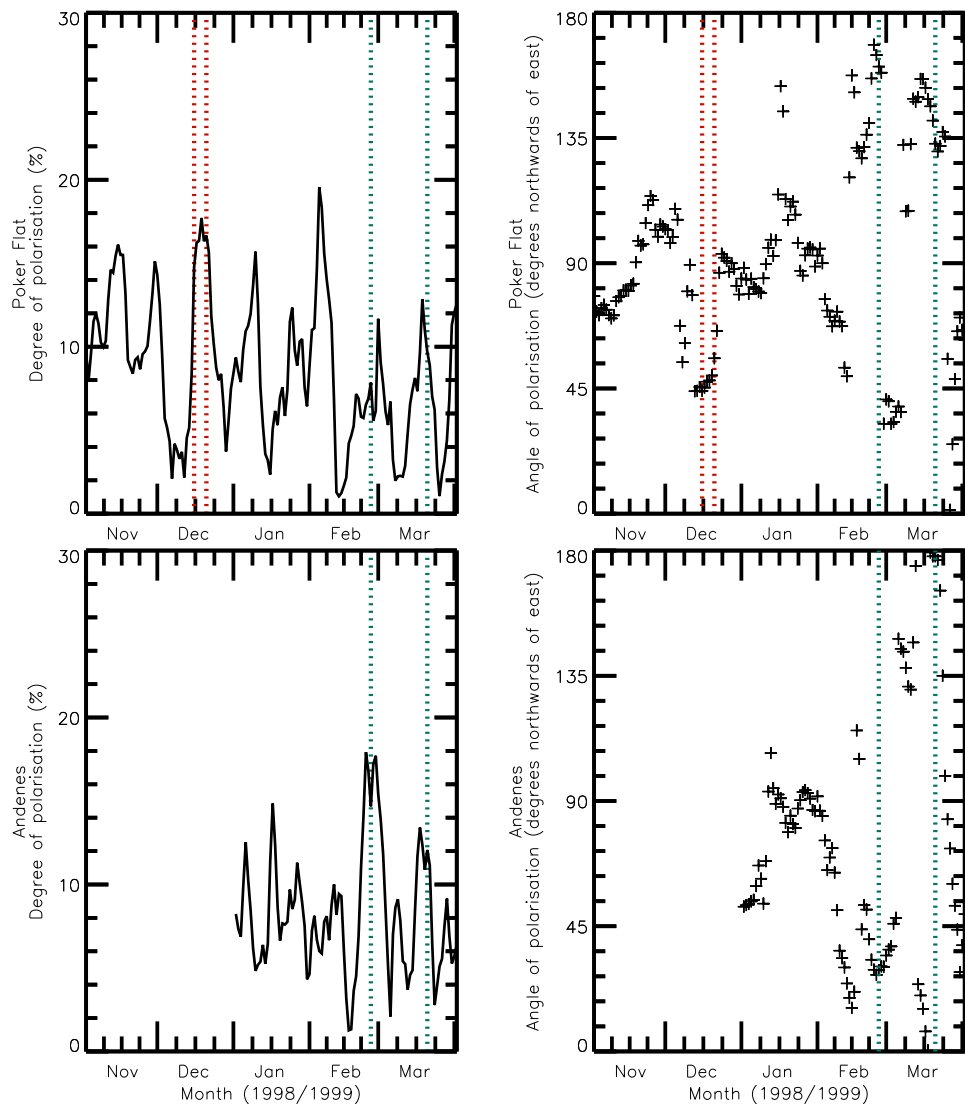


Figure B.1: The degree and angle of wave polarisation at Poker Flat and Andenes during the 1998/1999 northern winter. Variances and covariances used are in the period range 20-120 minutes, with a 7-day running mean applied and averaged from 76-84 km.

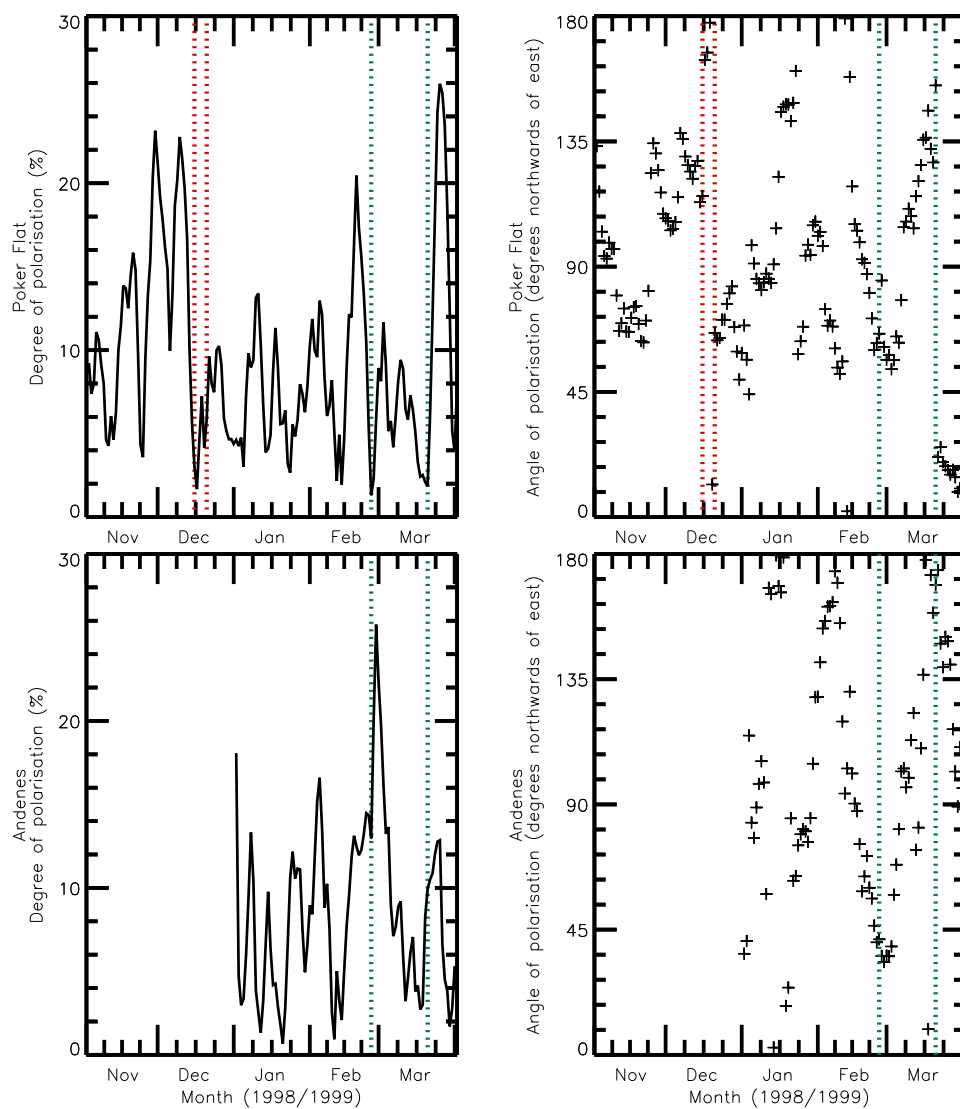


Figure B.2: As for Figure B.1, but for the period range 120-480 minutes.

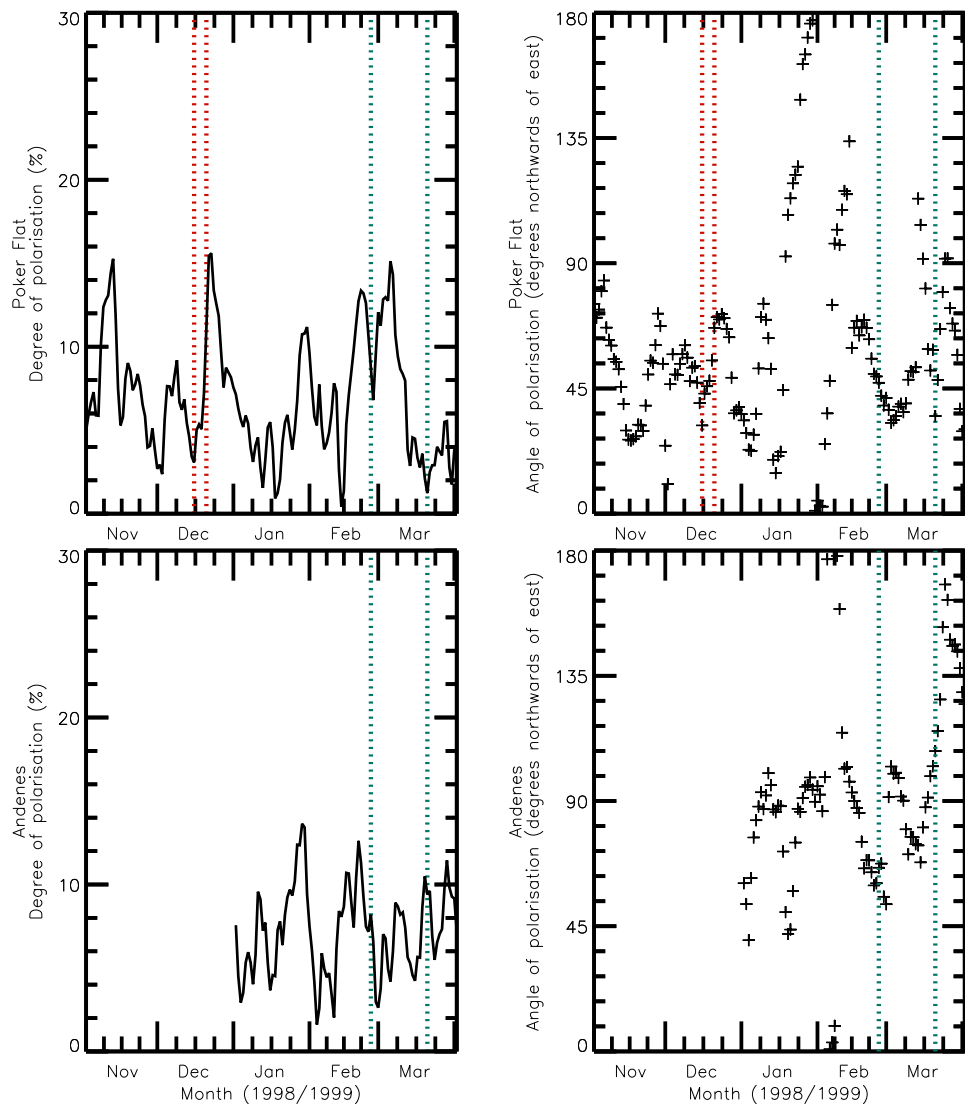


Figure B.3: The degree and angle of wave polarisation at Poker Flat and Andenes during the 1998/1999 northern winter. Variances and covariances used are in the period range 20-120 minutes, with a 7-day running mean applied and averaged from 86-94 km.

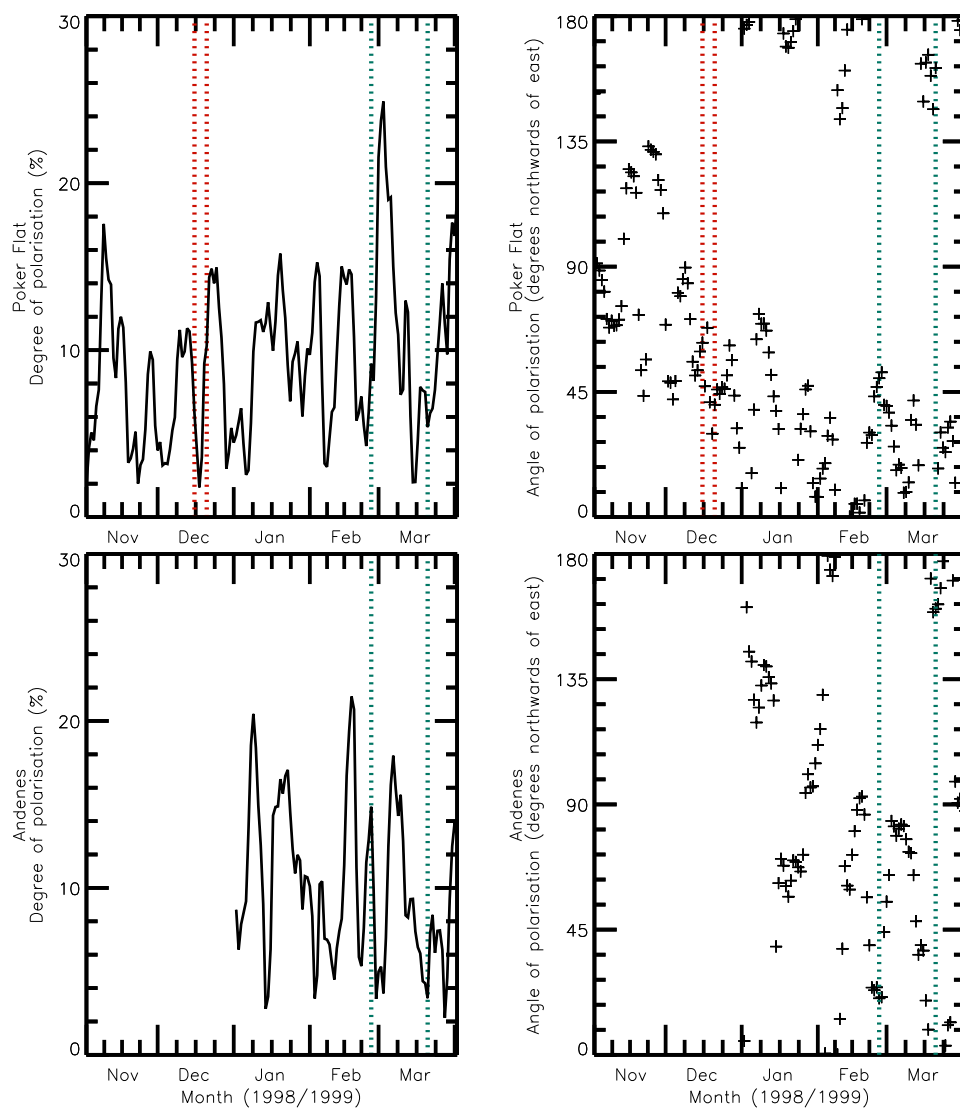


Figure B.4: As for Figure B.3, but for the period range 120-480 minutes.

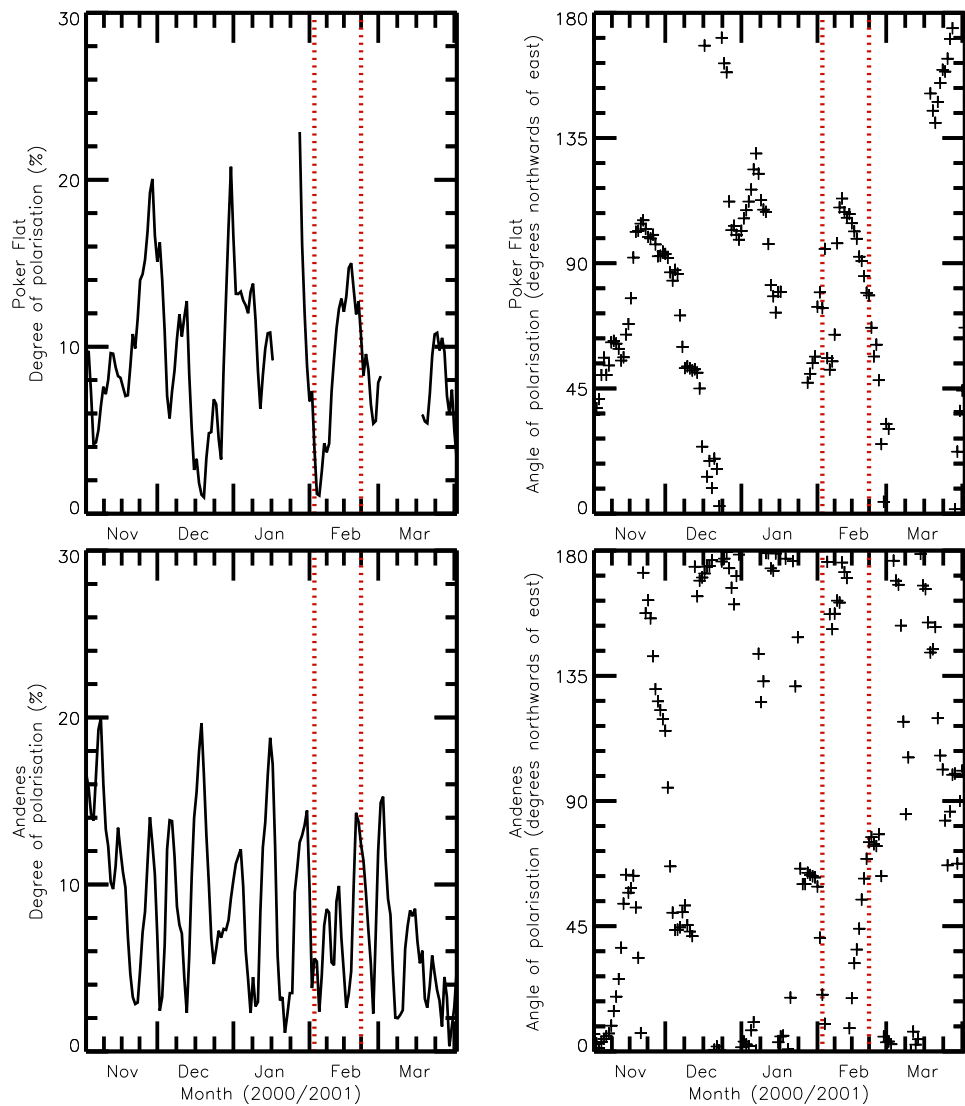


Figure B.5: The degree and angle of wave polarisation at Poker Flat and Andenes during the 2000/2001 northern winter. Variances and covariances used are in the period range 20-120 minutes, with a 7-day running mean applied and averaged from 76-84 km.

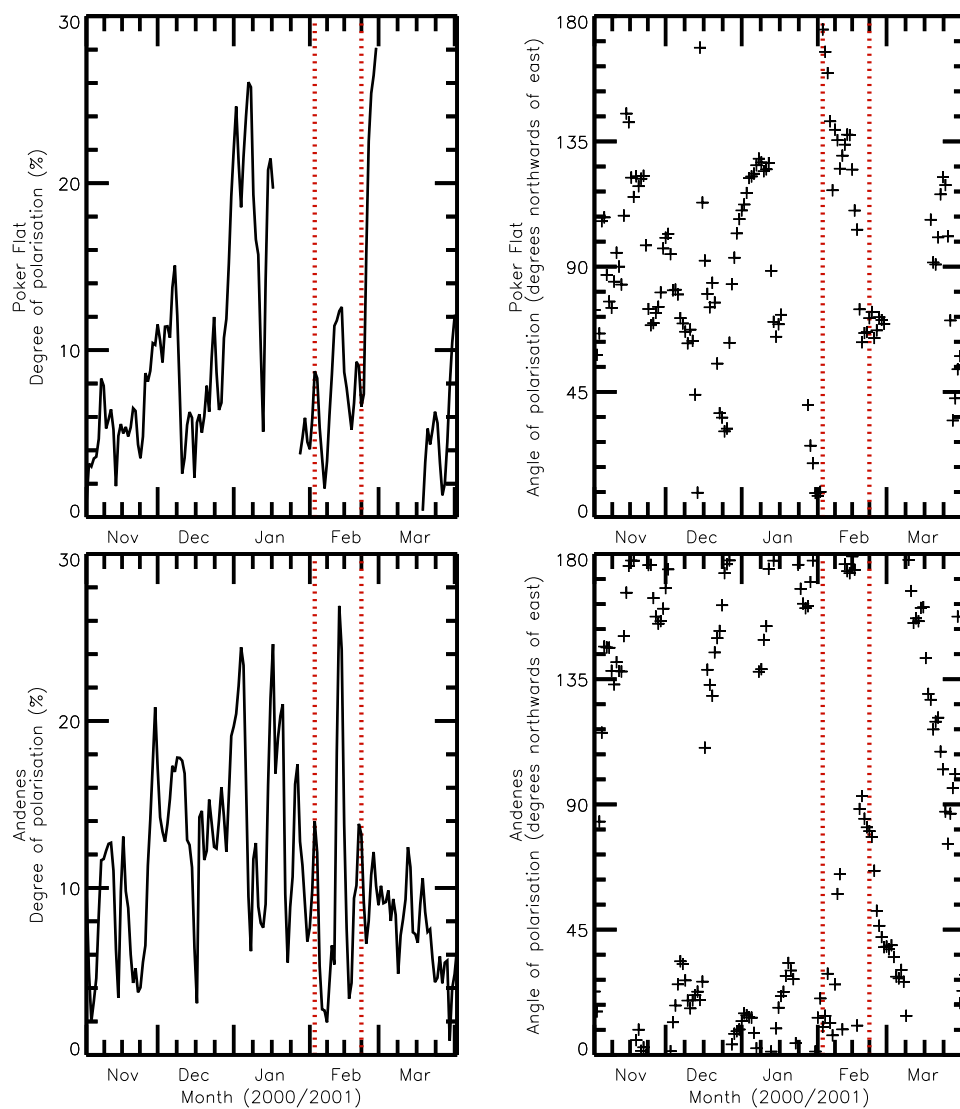


Figure B.6: As for Figure B.5, but for the period range 120-480 minutes.

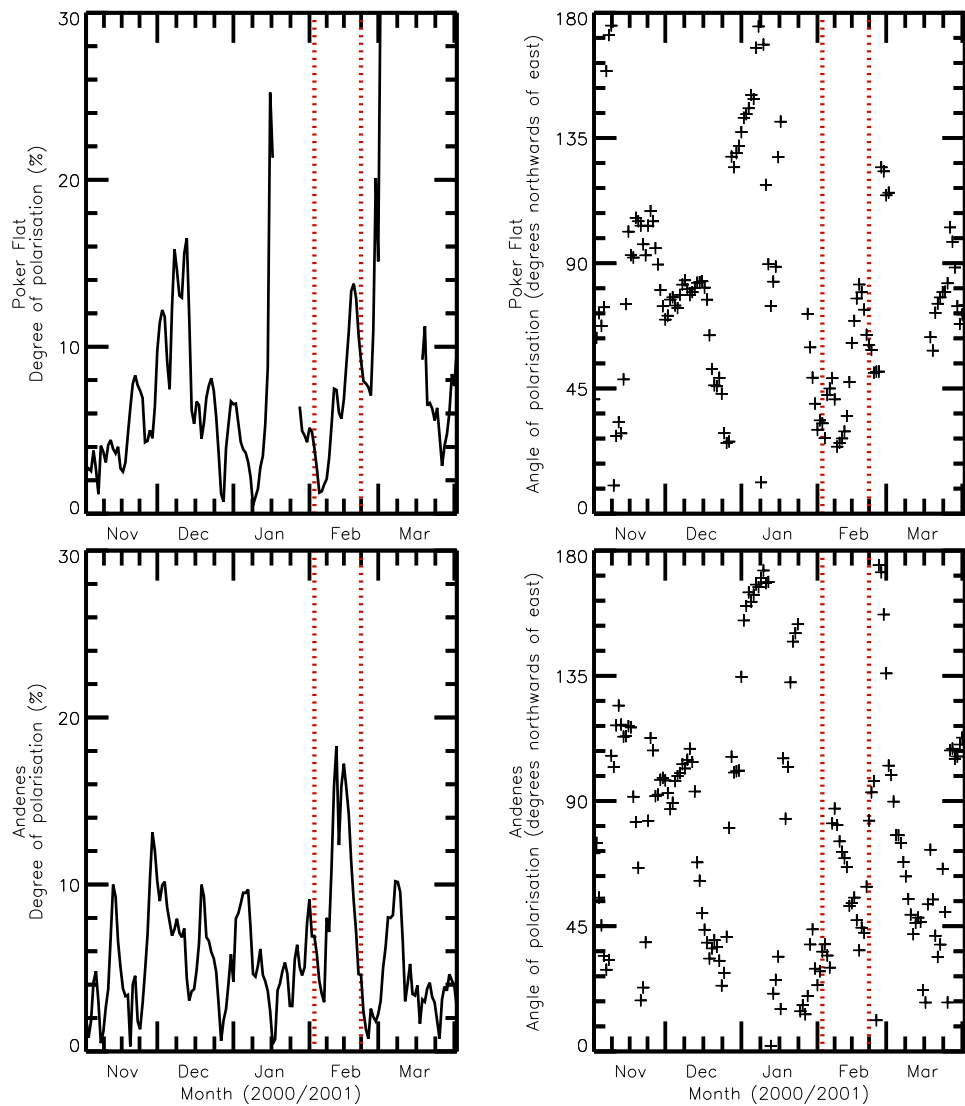


Figure B.7: The degree and angle of wave polarisation at Poker Flat and Andenes during the 2000/2001 northern winter. Variances and covariances used are in the period range 20-120 minutes, with a 7-day running mean applied and averaged from 86-94 km.

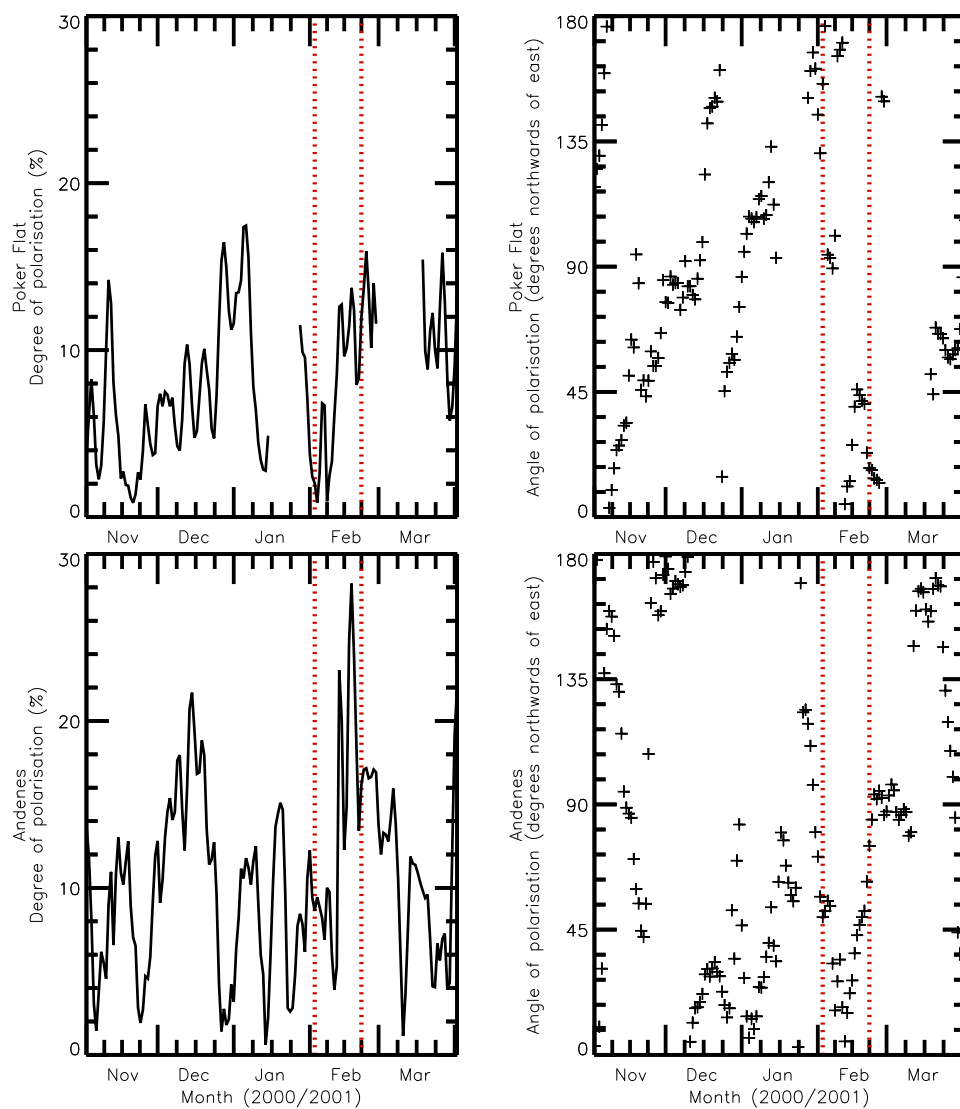


Figure B.8: As for Figure B.7, but for the period range 120-480 minutes.

Appendix C

MLT gravity waves and
stratospheric winds: Antarctica,
2002.

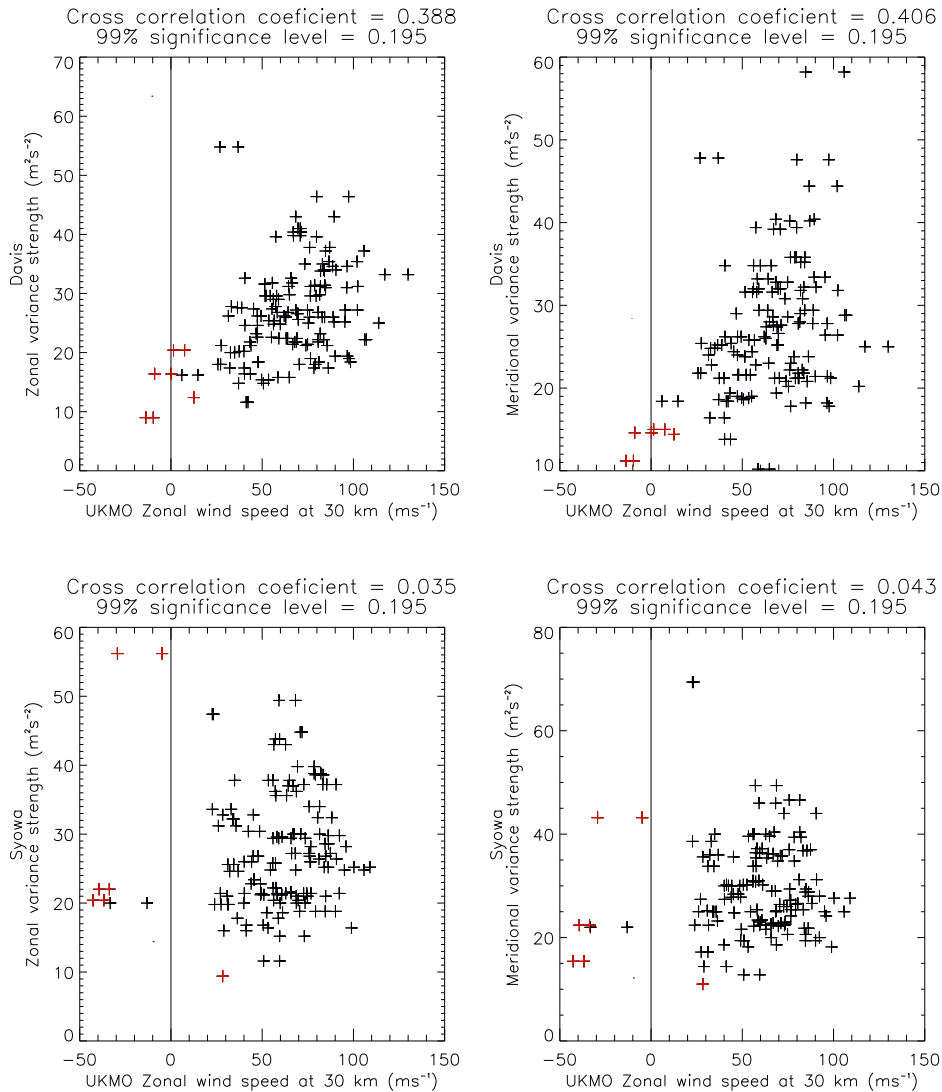


Figure C.1: Scatter plot of mesospheric zonal and meridional variance strength averaged from 76-84 km and stratospheric zonal wind speed at 10 hPa (~ 30 km) during 2002. Variances are daily averages in the period range 20-120 minutes. The stratospheric wind data are obtained from the UKMO assimilated data set. Data are shown in red during the major stratospheric warming and in black for the rest of winter (from May to September inclusively).

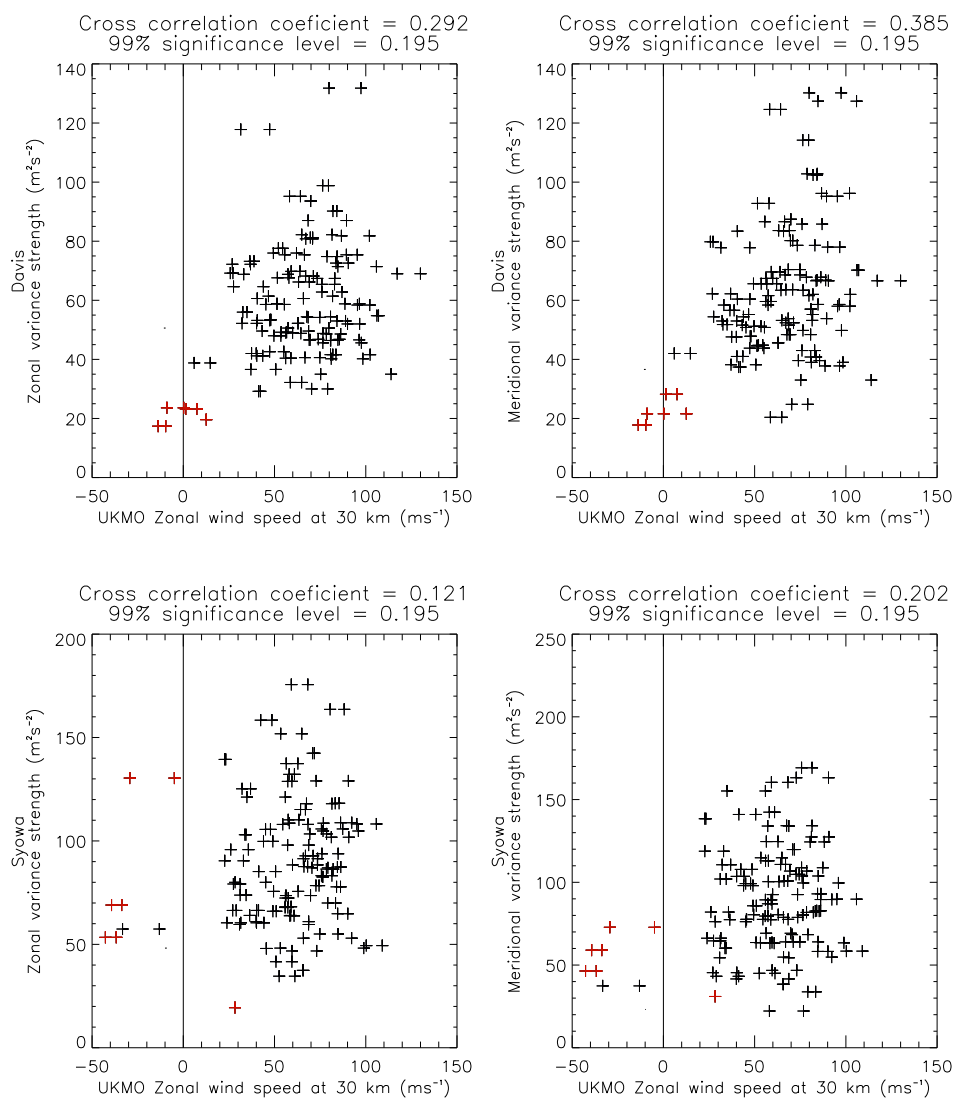


Figure C.2: As for Figure C.1, but for variances of period 120-480 minutes averaged in the height range 76-84 km.

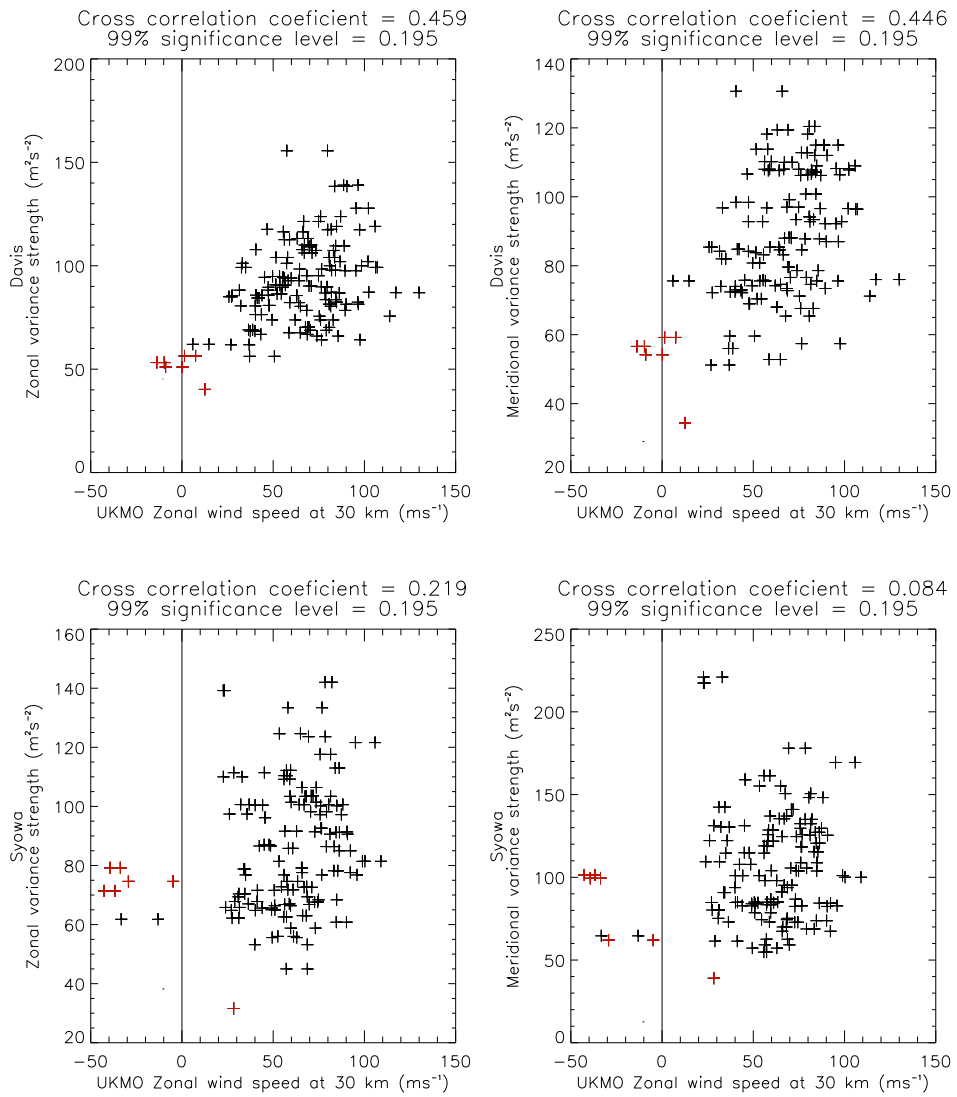


Figure C.3: As for Figure C.1, but for variances of period 20-120 minutes averaged in the height range 86-94 km.

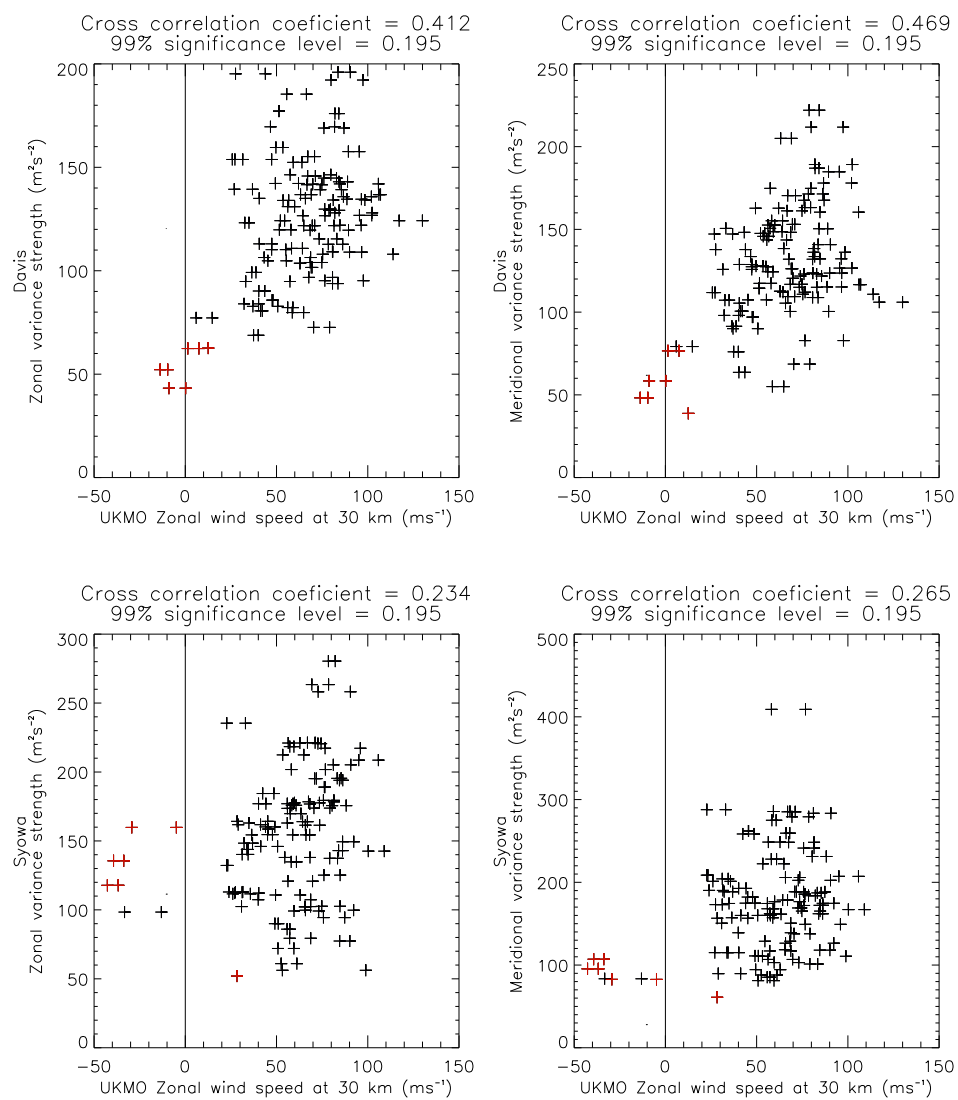


Figure C.4: As for Figure C.1, but for variances of period 120-480 minutes averaged in the height range 86-94 km.

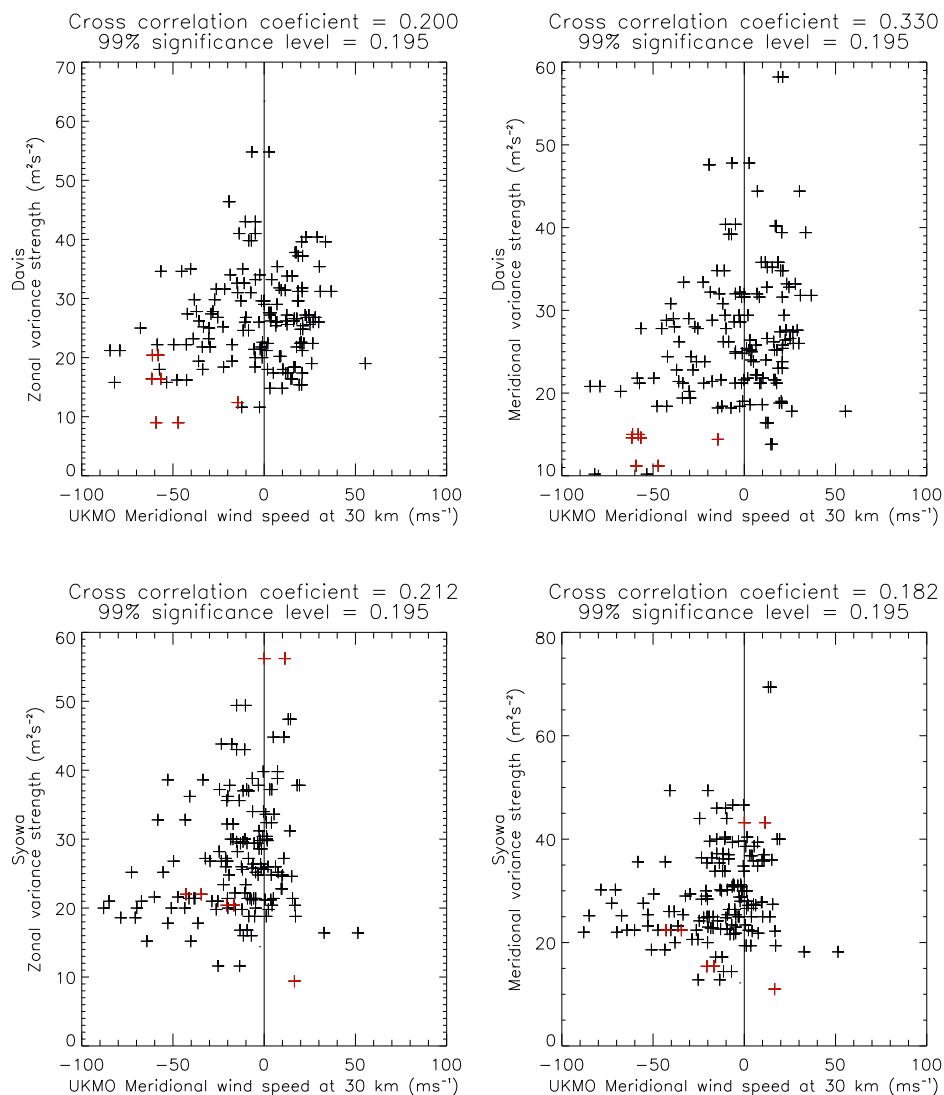


Figure C.5: Scatter plot of mesospheric zonal and meridional variance strength averaged from 76–84 km and stratospheric meridional wind speed at 10 hPa (~ 30 km) during 2002. Variances are daily averages in the period range 20–120 minutes. The stratospheric wind data are obtained from the UKMO assimilated data set. Data are shown in red during the major stratospheric warming and in black for the rest of winter (from May to September inclusively).

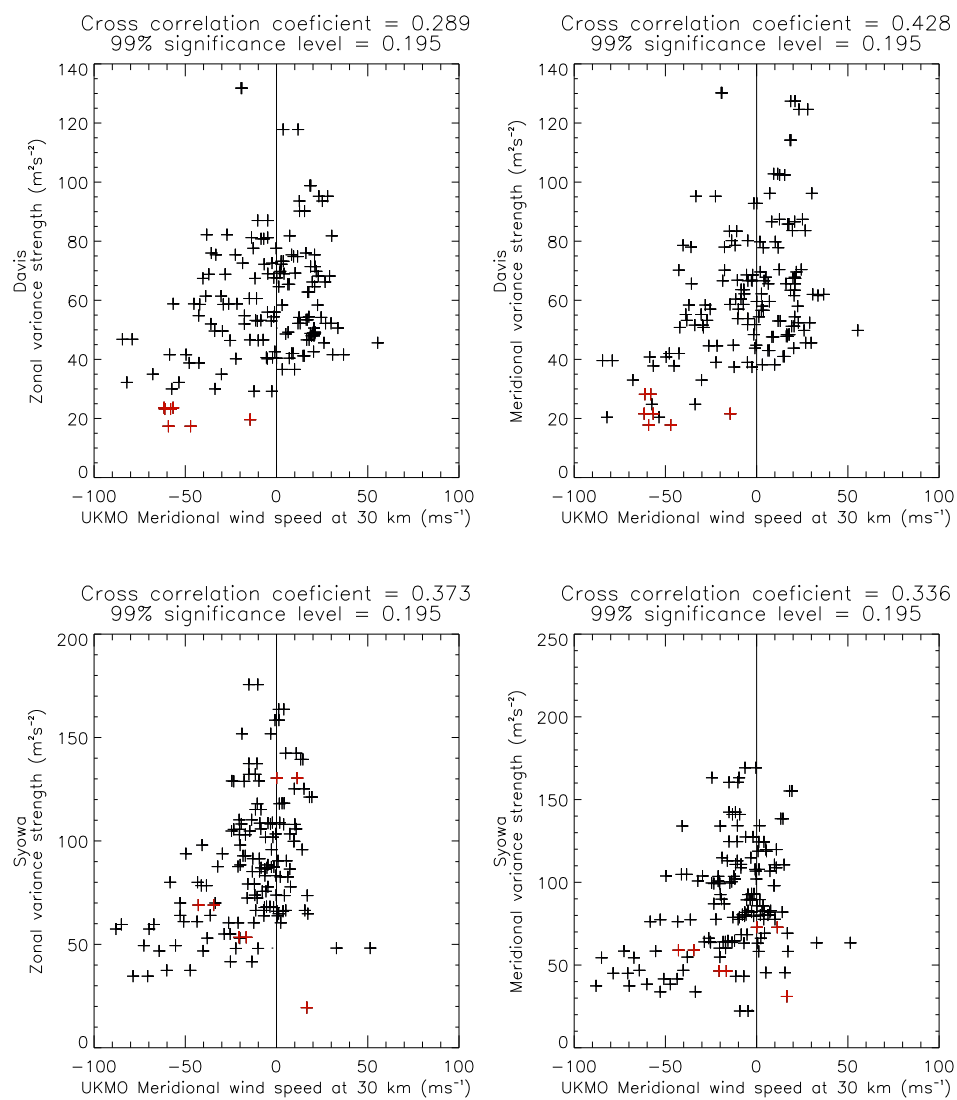


Figure C.6: As for Figure C.5, but for variances of period 120-480 minutes averaged in the height range 76-84 km.

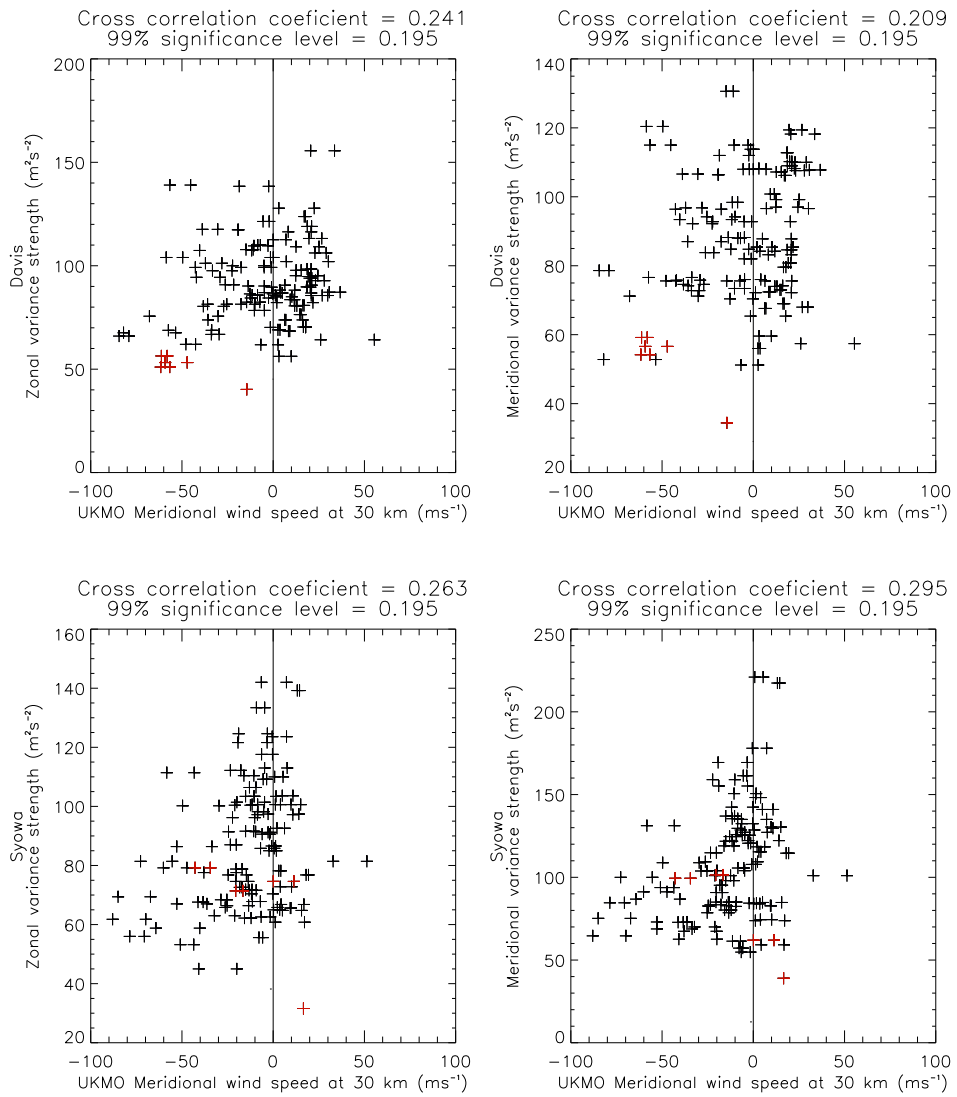


Figure C.7: As for Figure C.5, but for variances of period 20-120 minutes averaged in the height range 86-94 km.

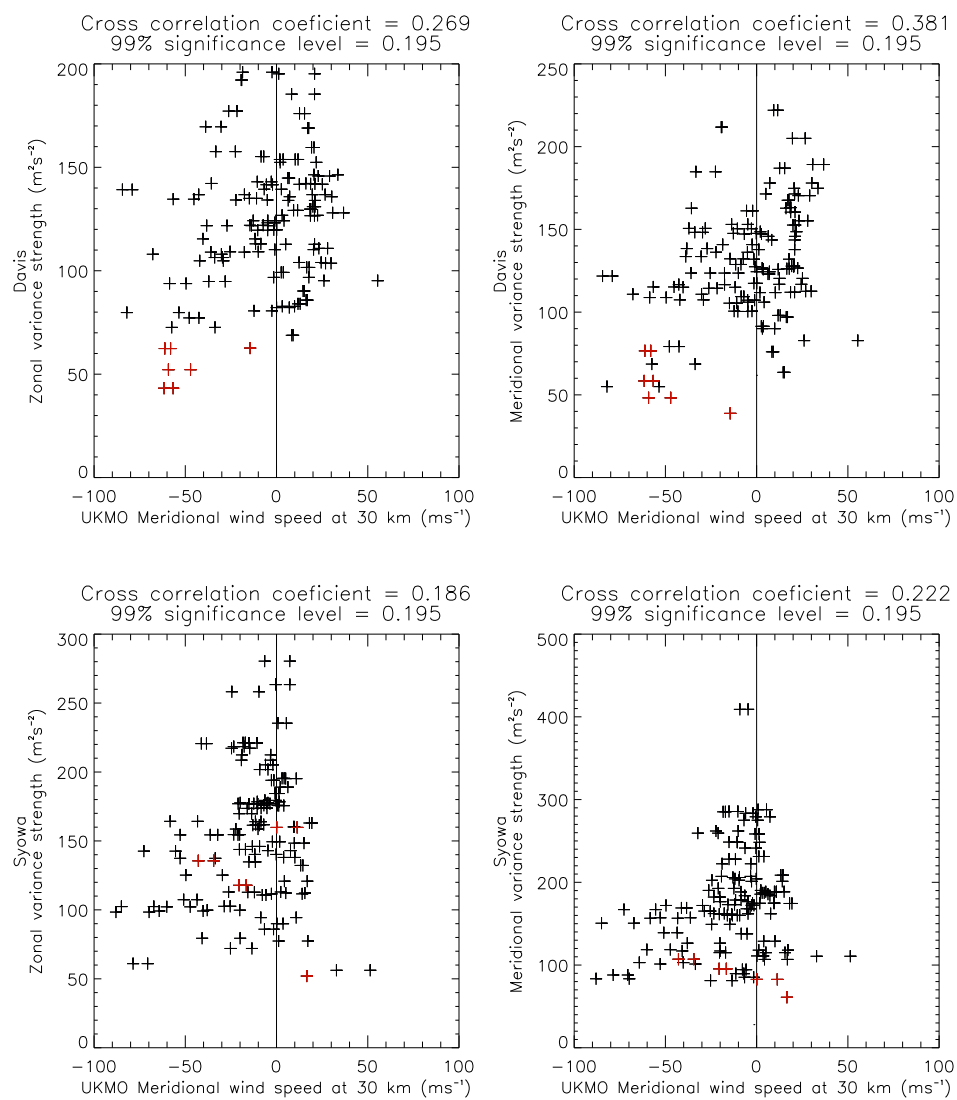


Figure C.8: As for Figure C.5, but for variances of period 120-480 minutes averaged in the height range 86-94 km.

Appendix D

MLT gravity waves and
stratospheric winds: Arctic, 1999.

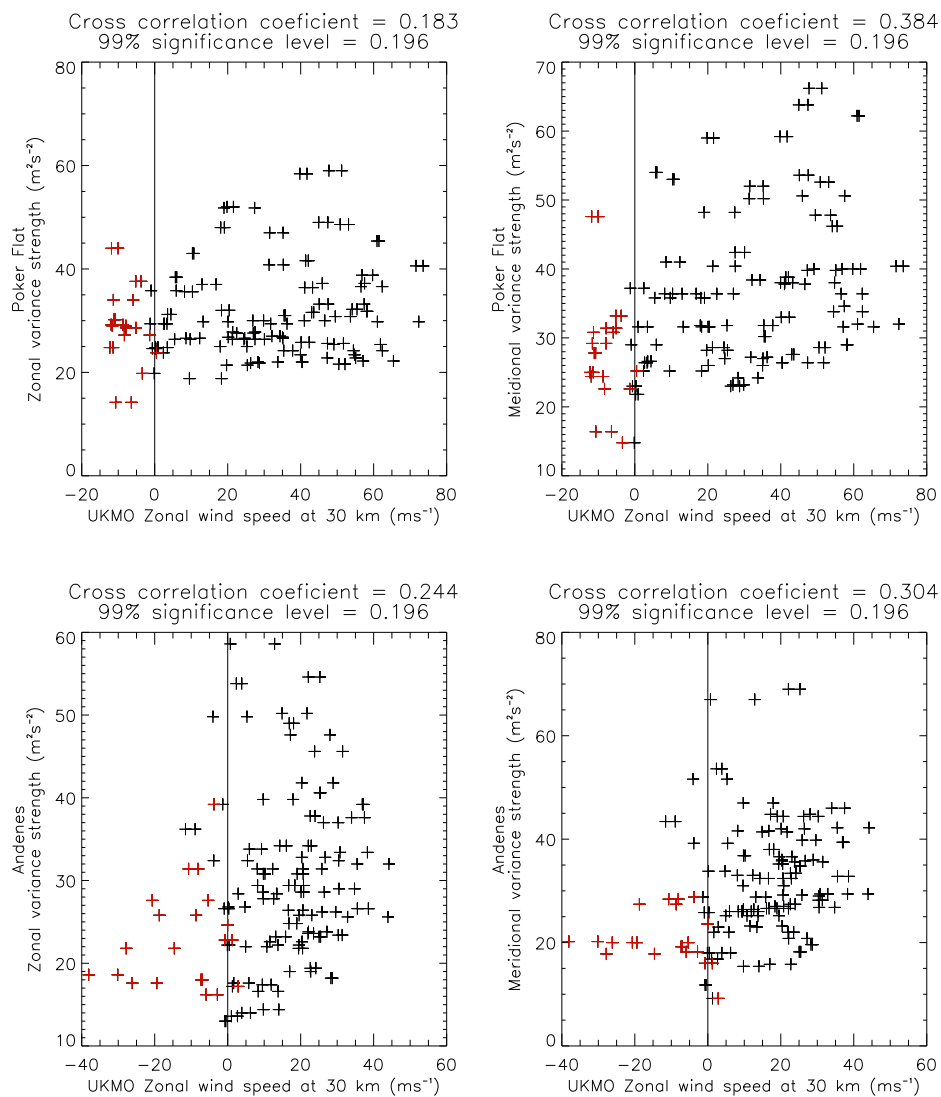


Figure D.1: Scatter plot of mesospheric zonal and meridional variance strength averaged from 76–84 km and stratospheric zonal wind speed at 10 hPa (~ 30 km) at Poker Flat and Andenes. Variances are daily averages in the period range 20–120 minutes. The stratospheric wind data are obtained from the UKMO assimilated data set. Data are shown in red during the major stratospheric warming and in black for the rest of the winter months (November, December, January, February and March).

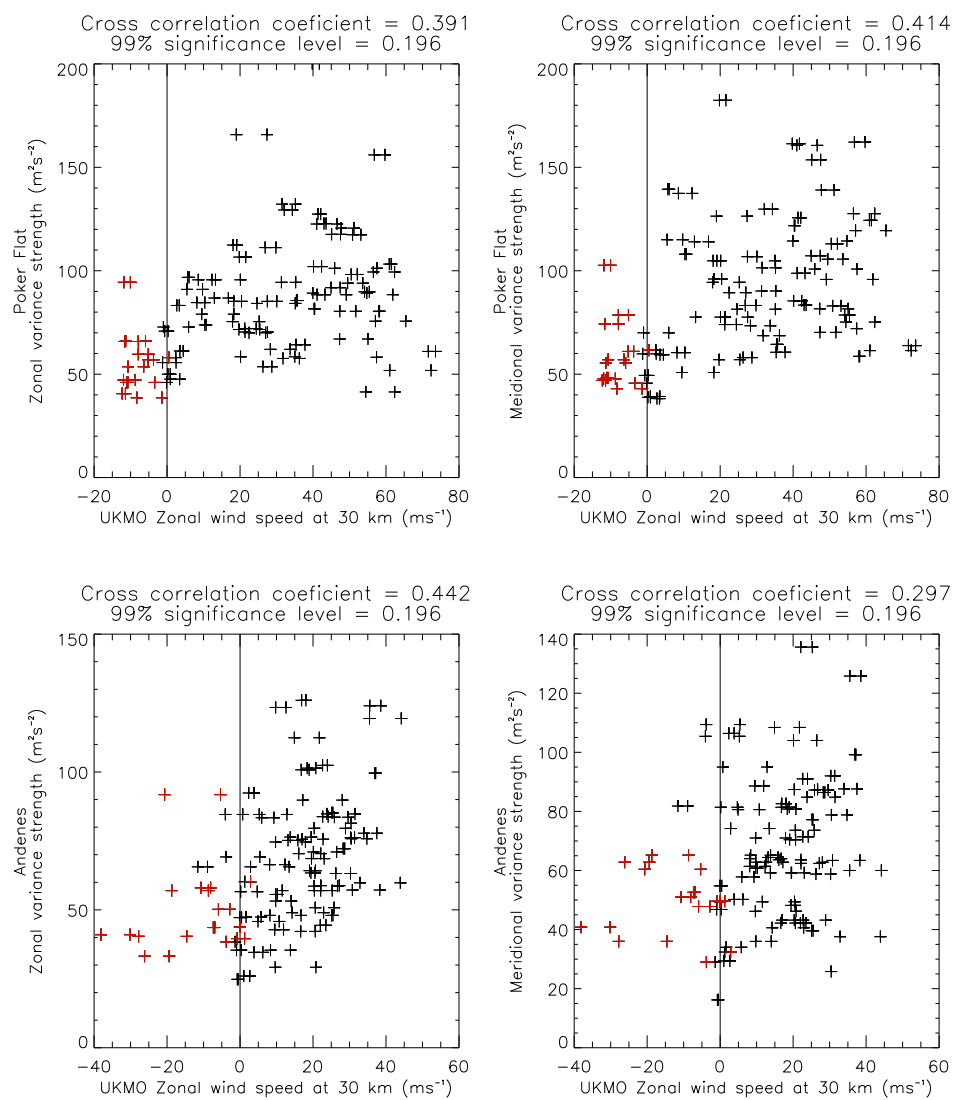


Figure D.2: As for Figure D.1, but for variances of period 120-480 minutes averaged in the height range 76-84 km.

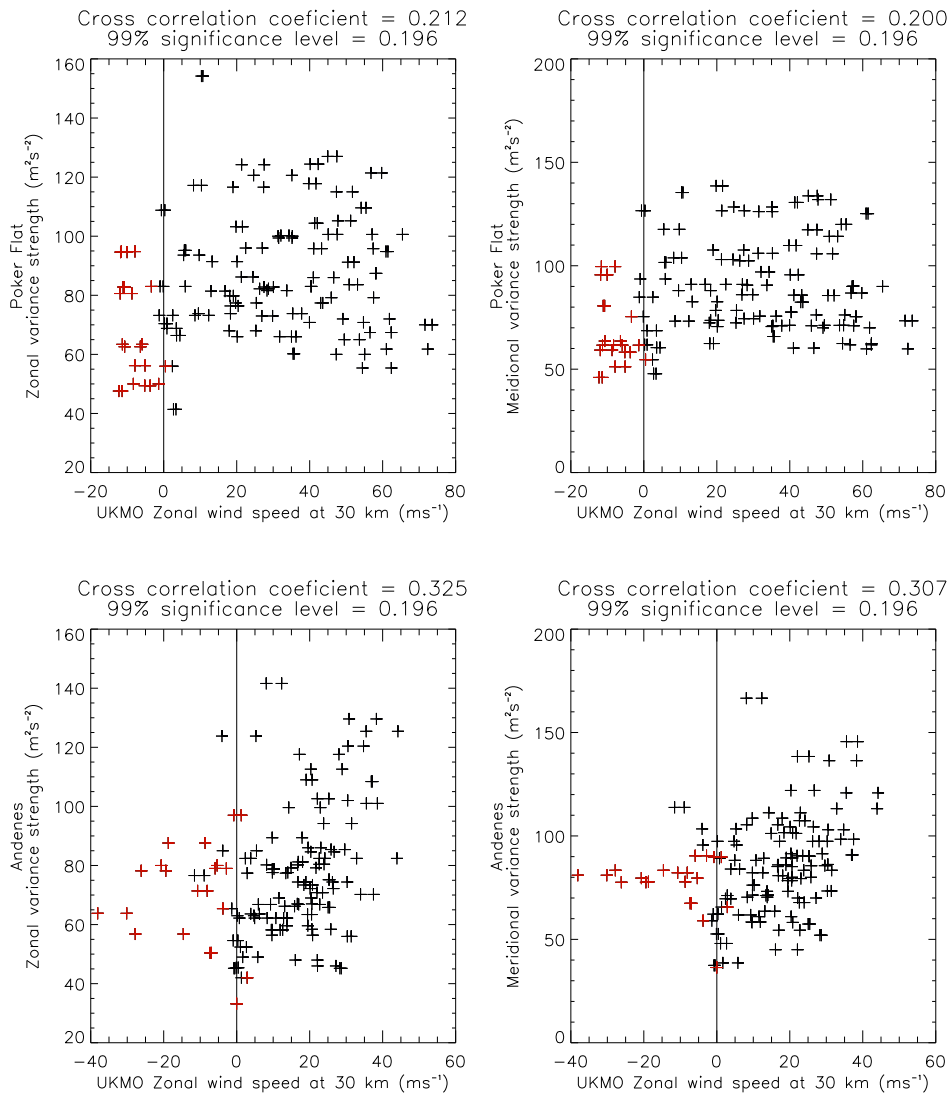


Figure D.3: As for Figure D.1, but for variances of period 20-120 minutes averaged in the height range 86-94 km.

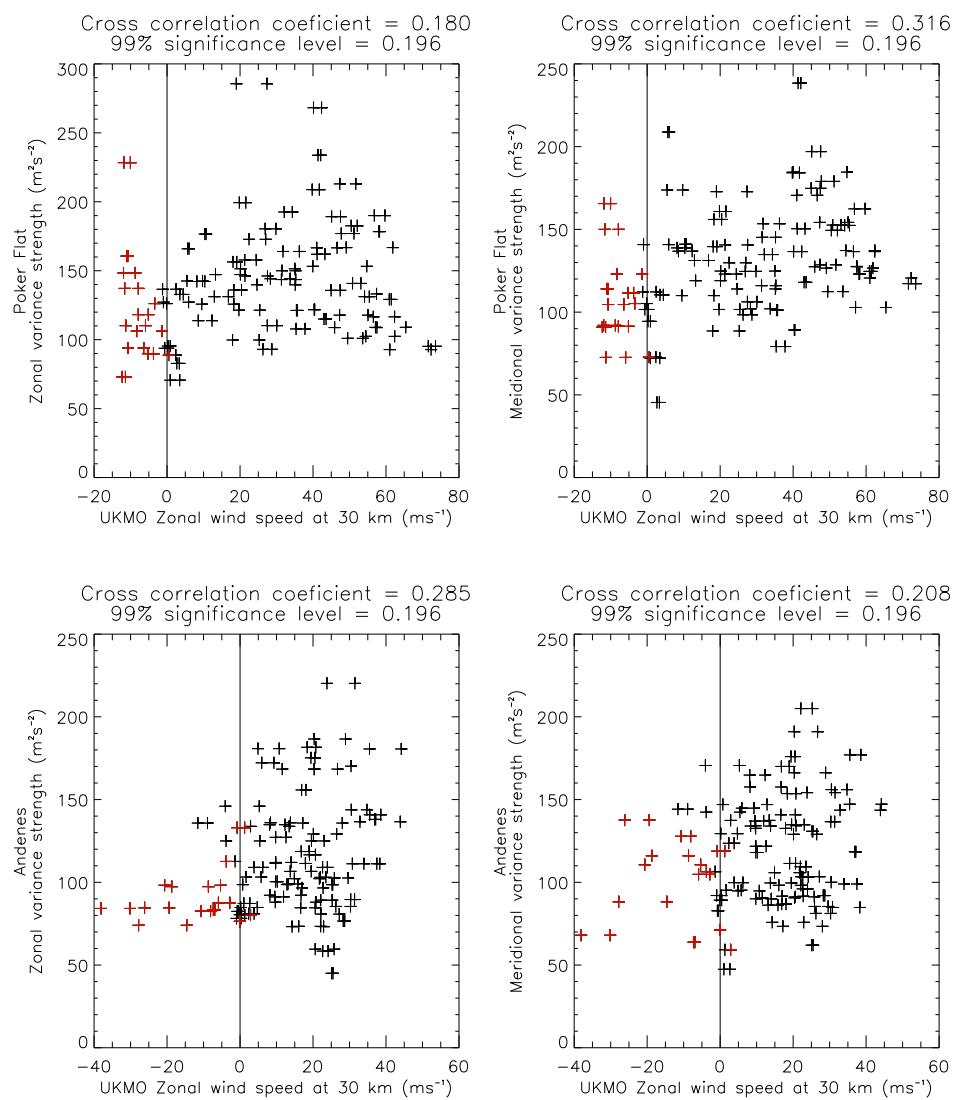


Figure D.4: As for Figure D.1, but for variances of period 120-480 minutes averaged in the height range 86-94 km.

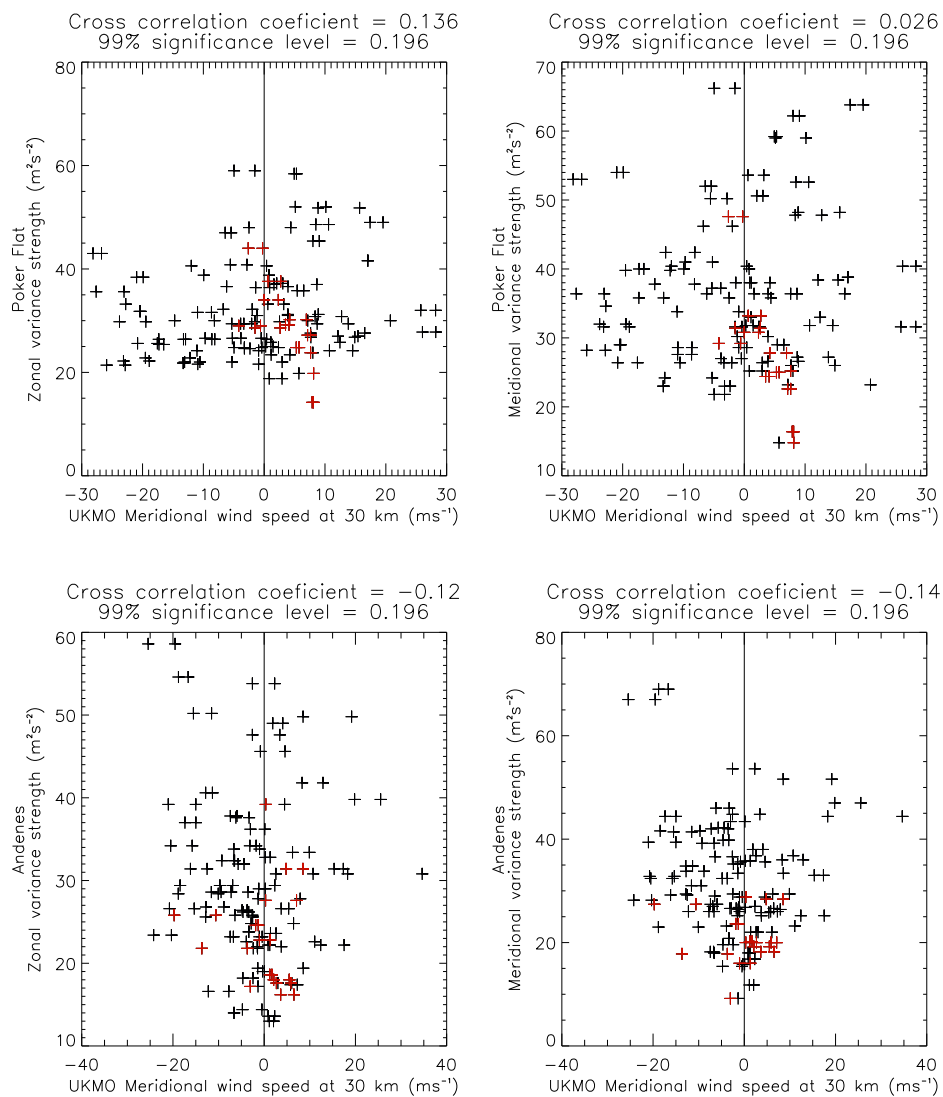


Figure D.5: Scatter plot of mesospheric zonal and meridional variance strength averaged from 76–84 km and stratospheric meridional wind speed at 10 hPa (~ 30 km) at Poker Flat and Andenes. Variances are daily averages in the period range 20–120 minutes. The stratospheric wind data are obtained from the UKMO assimilated data set. Data are shown in red during the major stratospheric warming and in black for the rest of the winter months (November, December, January, February and March).

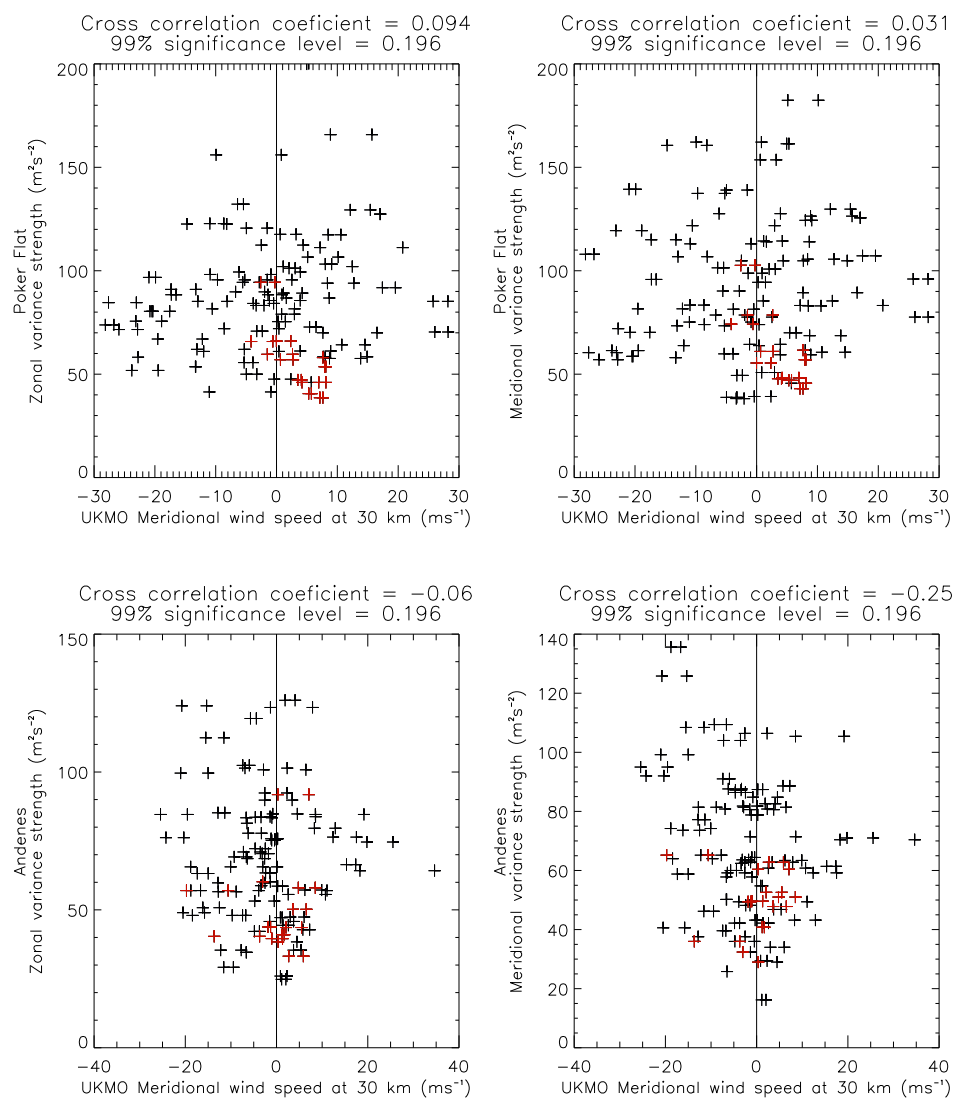


Figure D.6: As for Figure D.5, but for variances of period 120-480 minutes averaged in the height range 76-84 km.

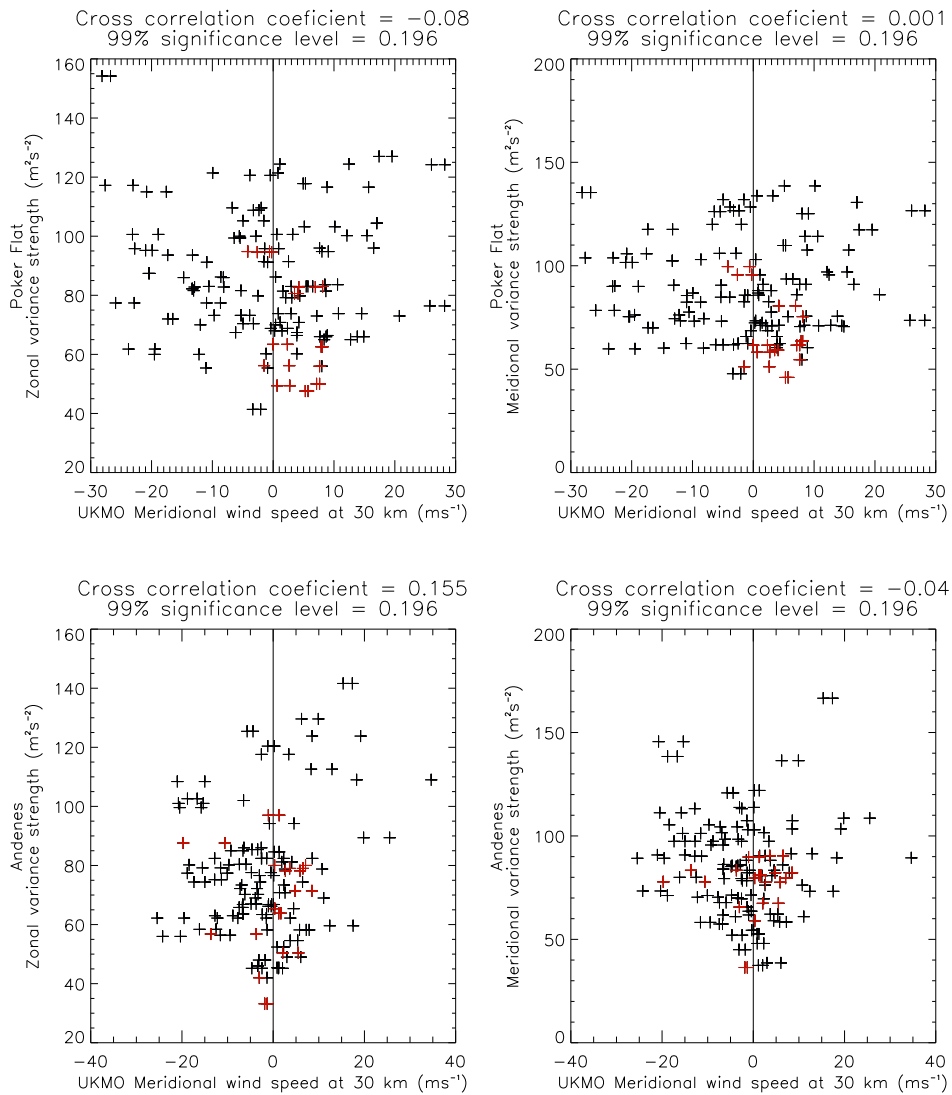


Figure D.7: As for Figure D.5, but for variances of period 20-120 minutes averaged in the height range 86-94 km.

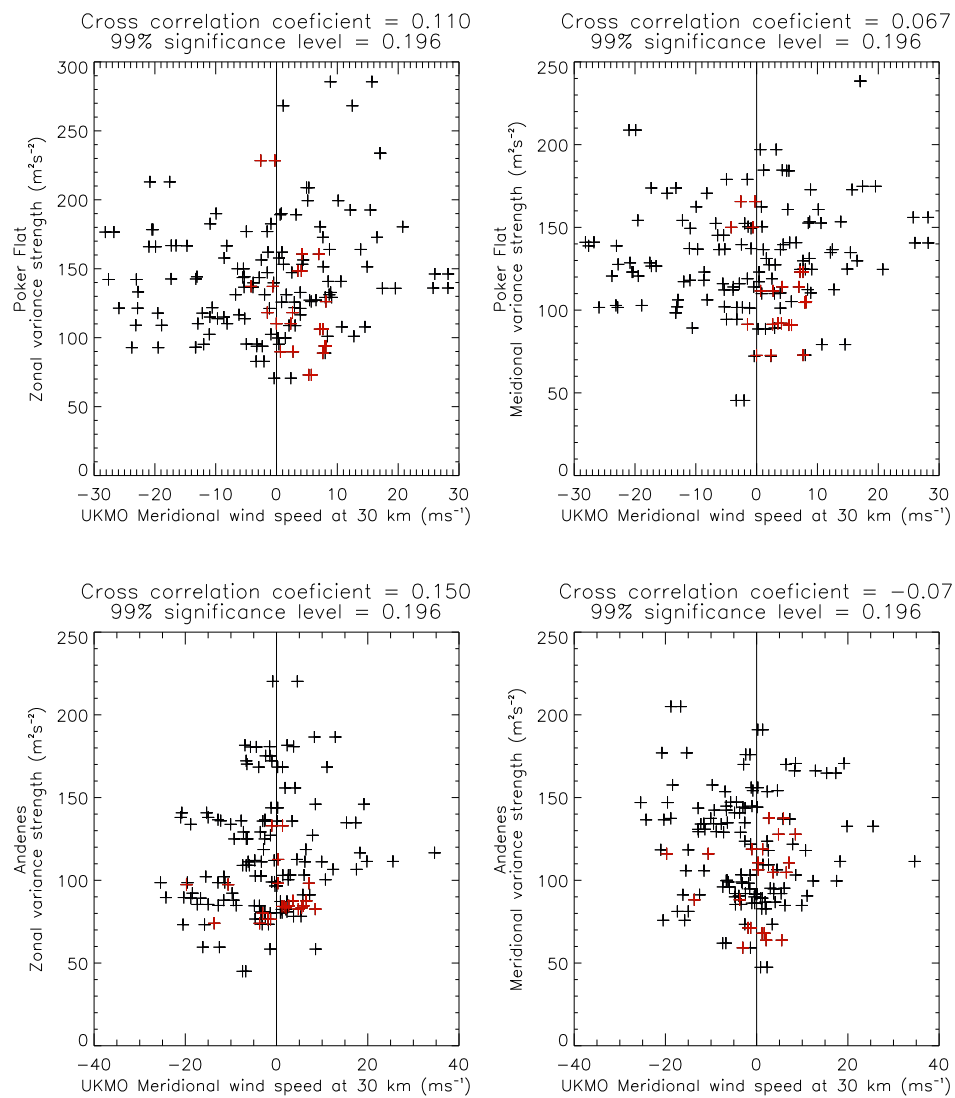


Figure D.8: As for Figure D.5, but for variances of period 120-480 minutes averaged in the height range 86-94 km.

Appendix E

MLT gravity waves and
stratospheric winds: Arctic, 2001.

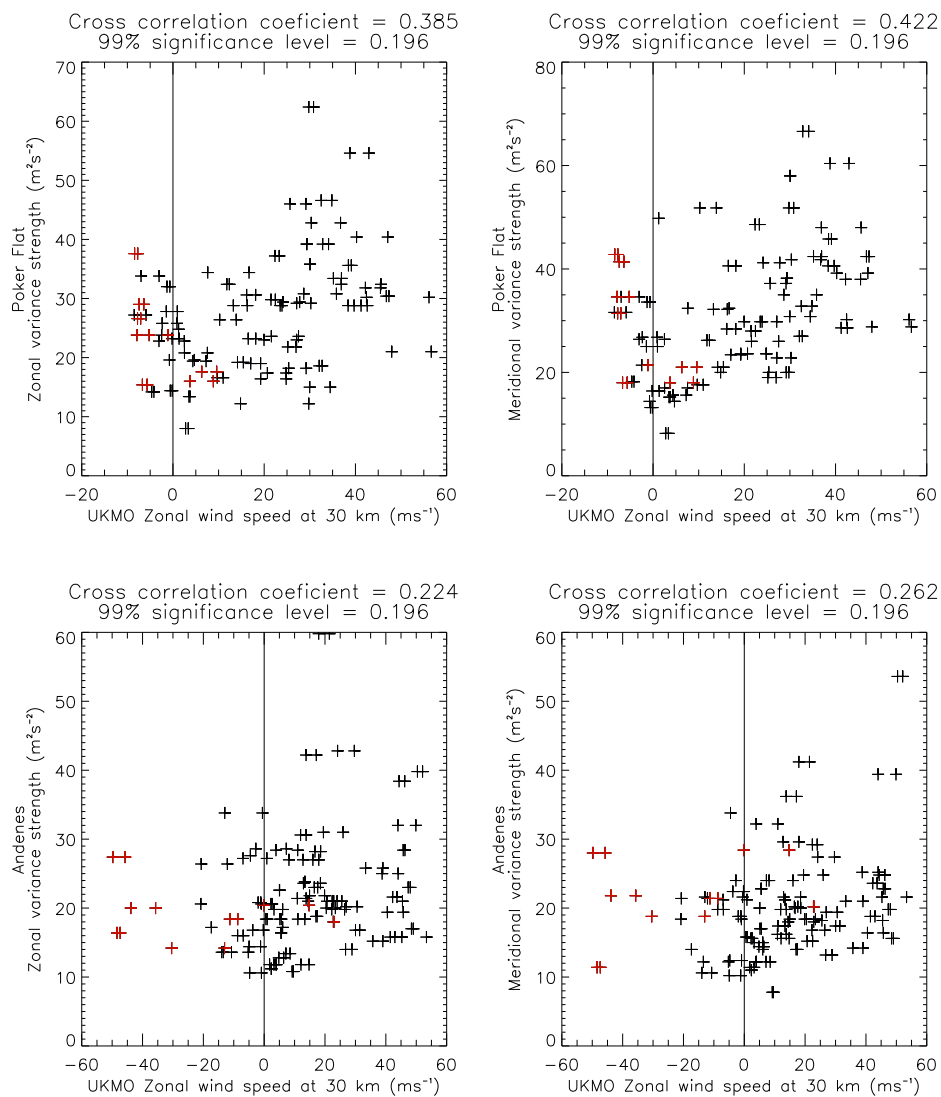


Figure E.1: Scatter plot of mesospheric zonal and meridional variance strength averaged from 76-84 km and stratospheric zonal wind speed at 10 hPa (~ 30 km) at Poker Flat and Andenes. Variances are daily averages in the period range 20-120 minutes. The stratospheric wind data are obtained from the UKMO assimilated data set. Data are shown in red during the major stratospheric warming and in black for the rest of the winter months (November, December, January, February and March).

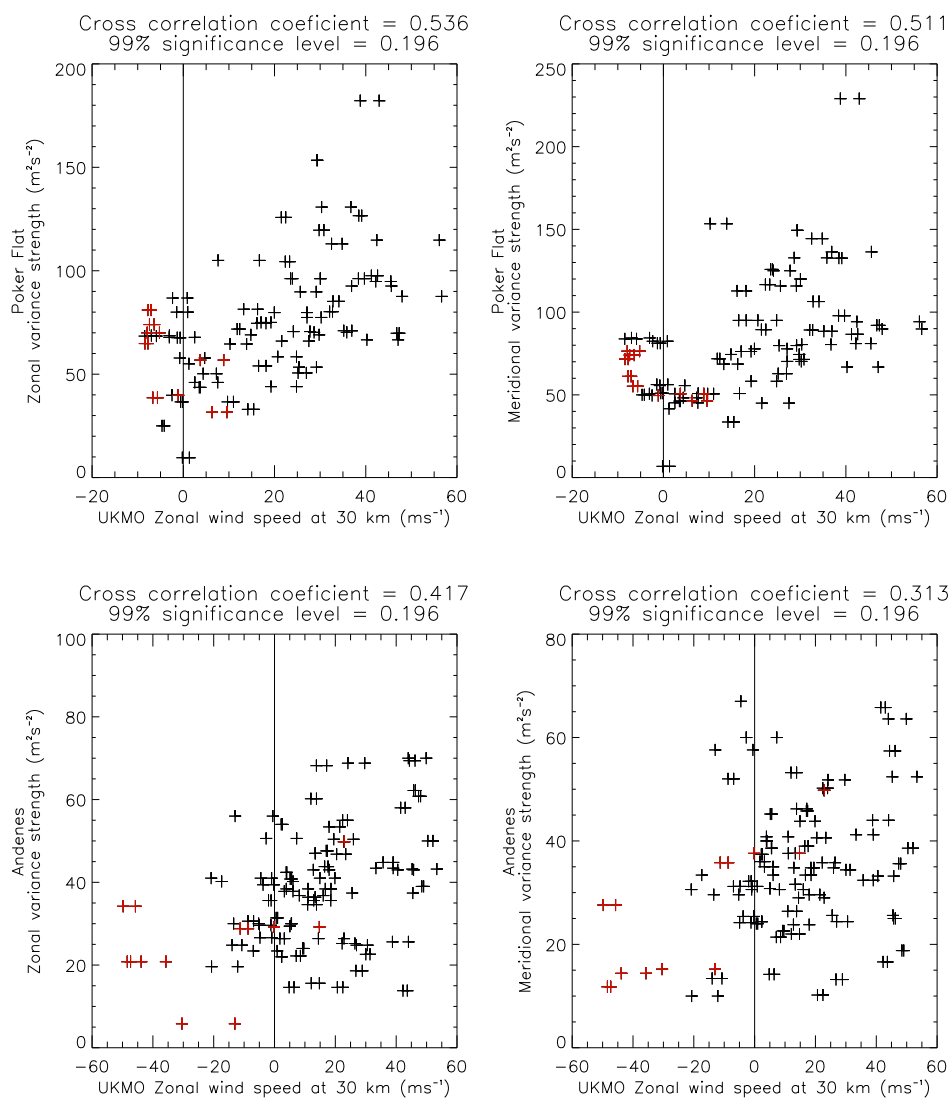


Figure E.2: As for Figure E.1, but for variances of period 120-480 minutes averaged in the height range 76-84 km.

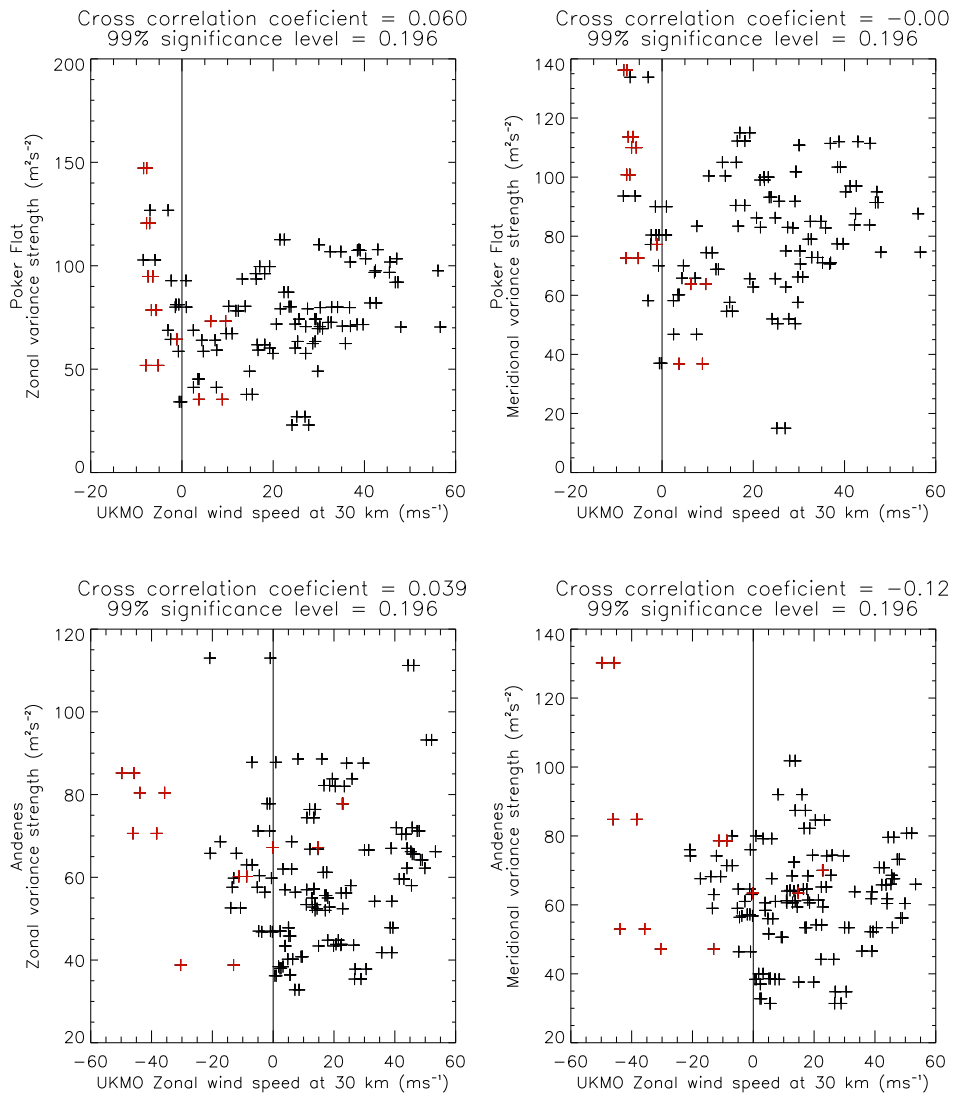


Figure E.3: As for Figure E.1, but for variances of period 20-120 minutes averaged in the height range 86-94 km.

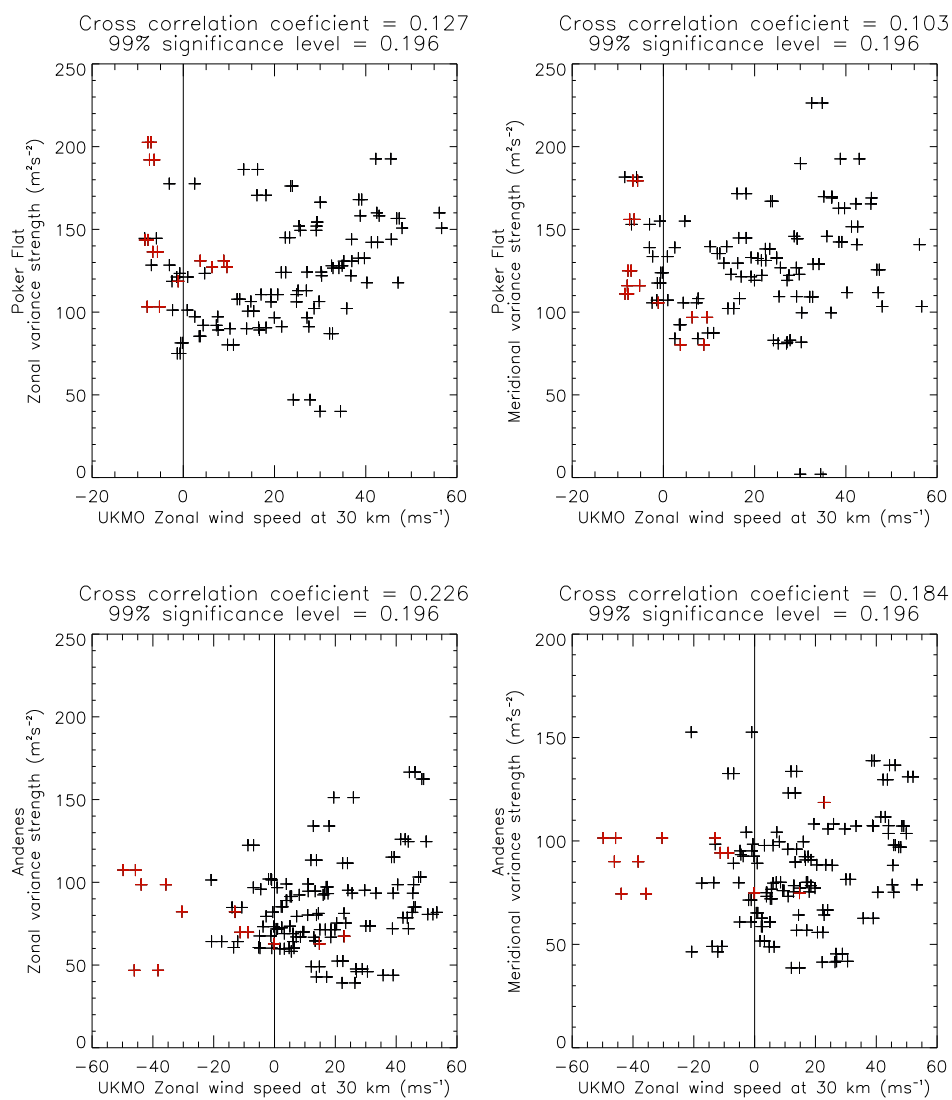


Figure E.4: As for Figure E.1, but for variances of period 120-480 minutes averaged in the height range 86-94 km.

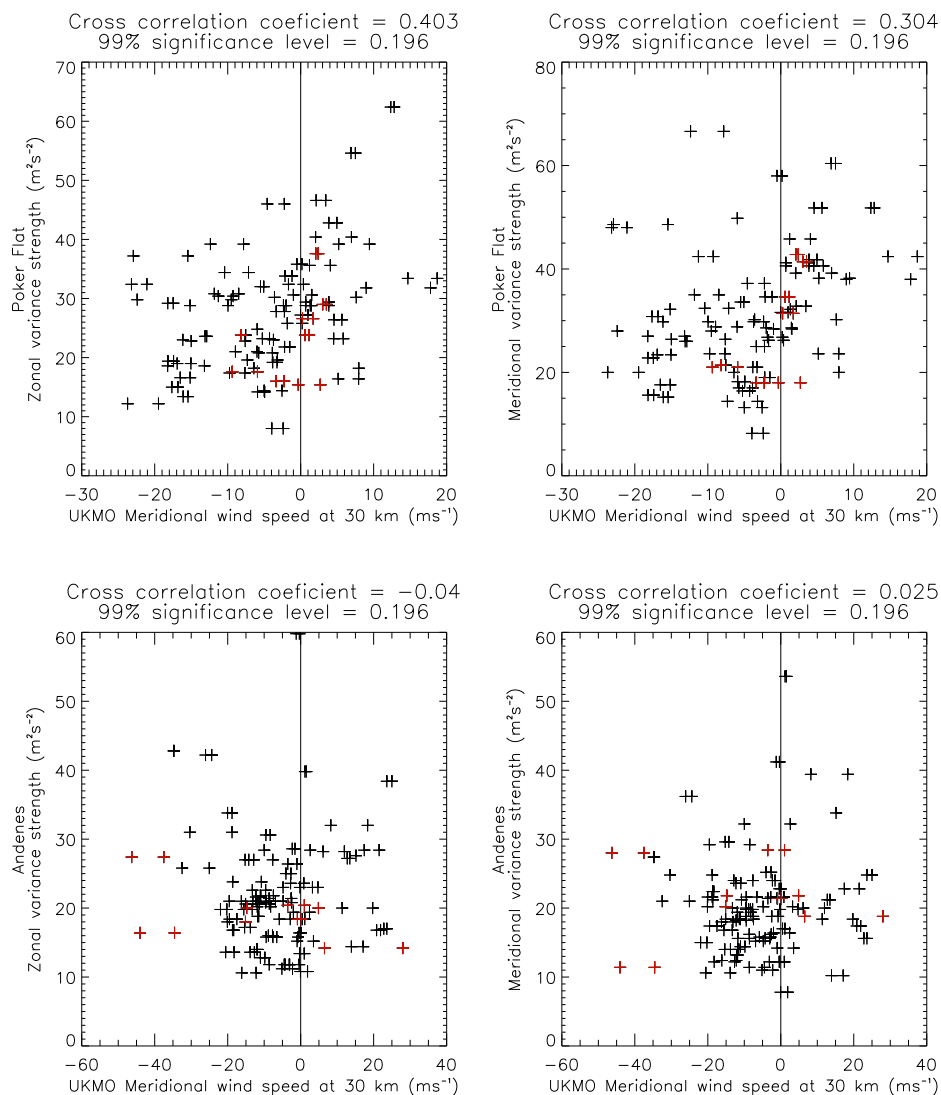


Figure E.5: Scatter plot of mesospheric zonal and meridional variance strength averaged from 76-84 km and stratospheric meridional wind speed at 10 hPa (~ 30 km) at Poker Flat and Andenes. Variances are daily averages in the period range 20-120 minutes. The stratospheric wind data are obtained from the UKMO assimilated data set. Data are shown in red during the major stratospheric warming and in black for the rest of the winter months (November, December, January, February and March).

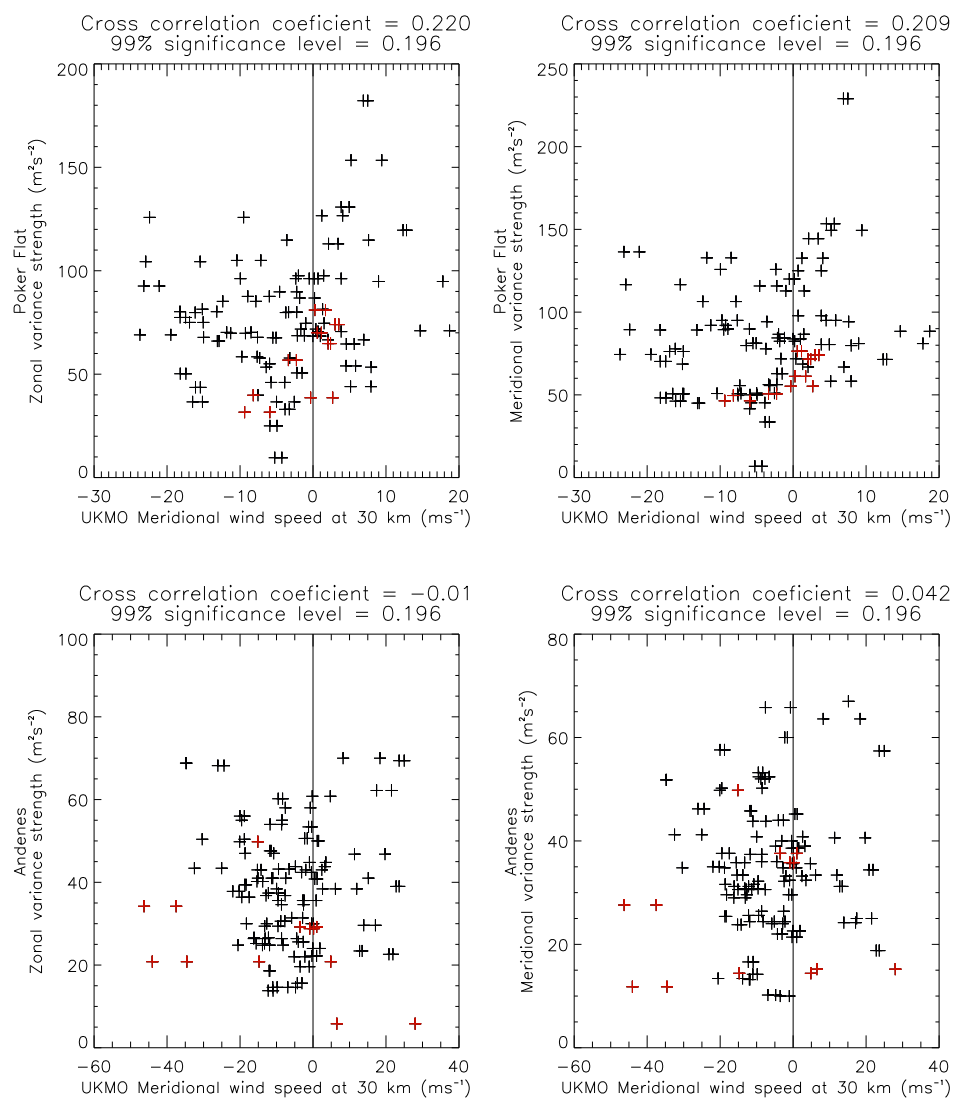


Figure E.6: As for Figure E.5, but for variances of period 120-480 minutes averaged in the height range 76-84 km.

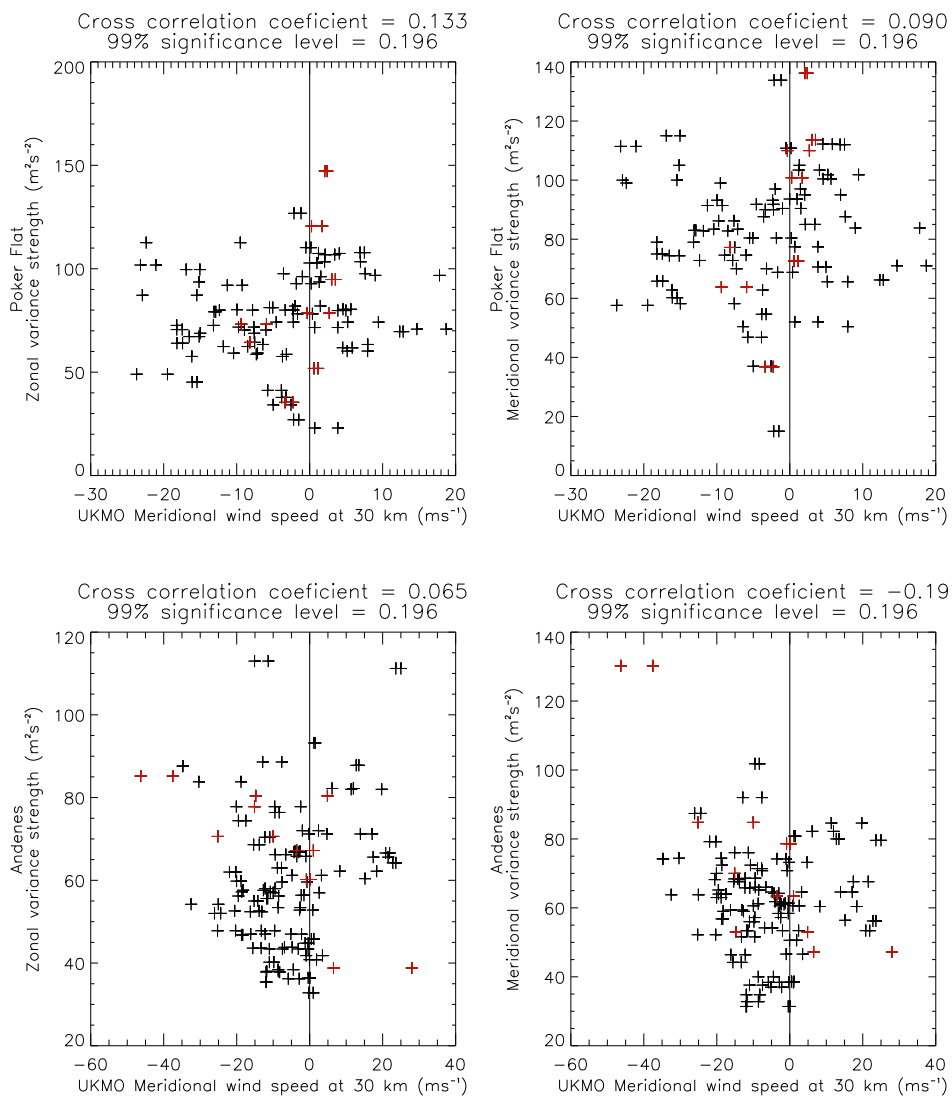


Figure E.7: As for Figure E.5, but for variances of period 20-120 minutes averaged in the height range 86-94 km.

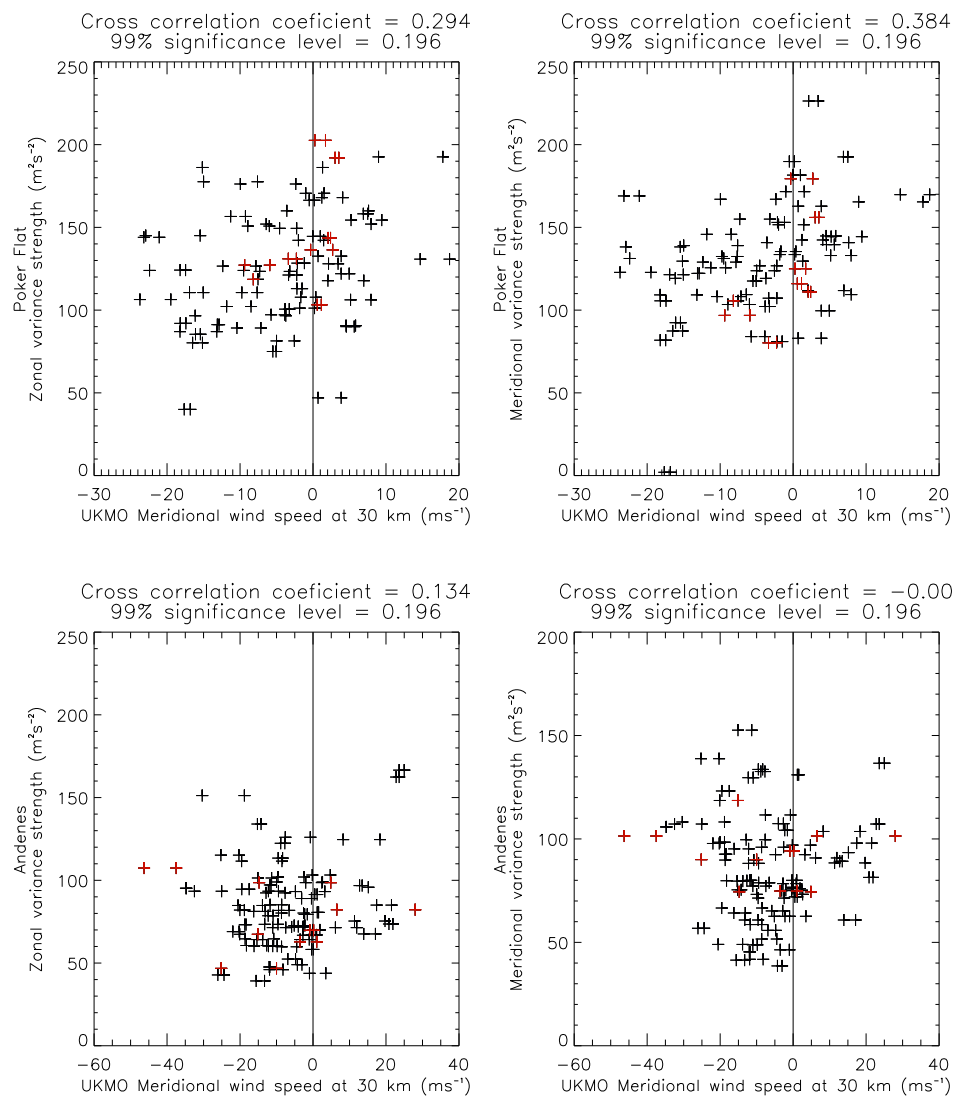


Figure E.8: As for Figure E.5, but for variances of period 120-480 minutes averaged in the height range 86-94 km.

Appendix F

Published paper 1

Dowdy, A. J., R. A. Vincent, K. Igarashi, Y. Murayama and D. J. Murphy, A comparison of mean winds and gravity wave activity in the northern and southern polar MLT, *Geophysical Research Letters*, **28(8)**, 1475-1478, (2001).

Dowdy, A.J., Vincent, R.A., Igarashi, K., Murayama, Y., and Murphy, D.J. (2001)
A comparison of mean winds and gravity wave activity in the northern and southern polar
MLT
Geophysical Research Letters, v. 28, no. 8, pp. 1475-1478

NOTE: This publication is included in the print copy of the thesis held in the
University of Adelaide Library.

Appendix G

Published paper 2

Kishore, P., S. P. Namboothiri, Y. Murayama, R. A. Vincent, A. Dowdy, D. J. Murphy and B. J. Watkins, Further evidence of hemispheric differences in the MLT mean wind climatology: Simultaneous MF radar observations at Poker Flat (65°N,147°W) and Davis (69°S,78°E), *Geophysical Research Letters*, **30(6)**, 10.1029/2002GL016750 (2003).

Kishore, P., Namboothiri, S.P., Igarashi, K., Murayama, Y., Vincent, R.A.,
Dowdy, A., Murphy, D.J., and Watkins, B.J. (2003)
Further evidence of hemispheric differences in the MLT mean wind climatology:
Simultaneous MF radar observations at Poker Flat (65°N, 147°W) and Davis (69°S
78°E)
Geophysical Research Letters v.30 (6) pp 69-1 – 69-4

NOTE: This publication is included in the print copy of the thesis
held in the University of Adelaide Library.

It is also available online to authorised users at:

<http://dx.doi.org/10.1029/2002GL016750>

Appendix H

Published paper 3

Dowdy, A. J., R. A. Vincent, D. J. Murphy, M. Tsutsumi, D. M. Riggin and M. J. Jarvis, The large-scale dynamics of the mesosphere-lower thermosphere during the Southern Hemisphere stratospheric warming of 2002, *Geophysical Research Letters*, **31**, 10.1029/2004GL020282, (2004).

Dowdy, A.J., Vincent, R.A., Murphy, D.J., Tsutsumi, M., Riggin, D.M., and Jarvis, M.J. (2004)
The large-scale dynamics of the mesosphere-lower thermosphere during the Southern Hemisphere stratospheric warming of 2002
Geophysical Research Letters, v. 31, L14102, pp. 1-4

NOTE: This publication is included in the print copy of the thesis held in the University of Adelaide Library.

It is also available online to authorised users at:

<http://dx.doi.org/10.1029/2004GL020282>

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