

Mesospheric wind measurements using the 50 MHz Jicamarca MST radar

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50 MHz radar backscatter from the equatorial mesosphere observed at Jicamarca is highly structured with typical turbulent layer widths ranging from several hundred meters to a few kilometres and with typical layer separations of the same order. Doppler wind measurements from the region are naturally only possible at heights and times of such layers which vary with time scales typical of gravity waves and semi-diurnal and diurnal tides. The layered structure of mesospheric backscatter has also a tendency for enhancing the relative importance of sidelobe contaminations in measured Doppler spectra, line-of-sight Doppler velocity estimates, and ultimately derived vector winds. This results from spectral peaks originating from signals arriving from oblique angled beam sidelobes overtaking the spectral peaks of mainlobe signal returns as a function of increasing radar range. In this talk we describe how to overcome this difficulty by conducting multi-peak least-squares fits to measured Doppler spectra and utilizing sorting algorithms to make vector wind estimation after matching distinct fitted spectral fits with distinct lobes of the utilized radar beams. This technique has been applied to MST-ISR-EEJ mode spectral data acquired at Jicamarca since 2005.

References

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