



INVESTIGATION
OF
TROPOSPHERIC TURBULENCE
USING THE
ADELAIDE VHF RADAR

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B. Sc. (Hons.)

A Thesis
Submitted for the Degree of
MASTER OF SCIENCE
at
THE UNIVERSITY OF ADELAIDE
(Department of Physics & Mathematical Physics)

November 6, 1991

Abstract

Turbulence is an important aspect of the whole makeup of atmospheric motions. It is the product of other atmospheric events such as atmospheric gravity waves and wind shear induced Kelvin Helmholtz instability, etc. To understand the morphology of turbulence, it is necessary to calculate certain parameters associated with it, and this involves determining the refractive index structure constant $\overline{C_n^2}$ and the average kinetic energy dissipation rate $\bar{\epsilon}$, which is a measure of the severity of turbulence.

Measurements of $\bar{\epsilon}$ can be made in several ways, and these are briefly described in the second chapter of this report. The method to be used for this experiment will be based on a statistical model proposed by VANZANDT *et. al.* (1978) and involves making measurements of the refractive index structure function $\overline{C_n^2}$ using radar observations during both clear as well as cloudy air conditions, from which the energy dissipation rate may be derived. This method is heavily dependent on the statistical analysis of wind shears, and the calculated values may be in error by as much as an order of magnitude. The studies include a careful analysis of biases and systematic errors which may be introduced by the radar measurements.

Preface

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University, and to the best of the author's knowledge and belief, it contains no material previously published or written by any other person, except when due reference is made in the text. I consent to this thesis being made available for photocopying and loan by the librarian of the University of Adelaide upon acceptance of the degree.

K. L. Mu

Acknowledgements

Firstly, as this work was made in conjunction with the *Adelaide Meteorological Bureau*, the author would like to thank all the staff at the 'airport' and 'Kent-Town' for their helpful assistance and friendliness shown to him during the time he was working there.

Secondly, I am very grateful for the assistance given to me by one of my supervisors, *Dr. W. K. Hocking*, who helped greatly with the final format and contents of the thesis. In addition, I would like to acknowledge the *radio physics* group for their help in the initial part of the project work and also to *Trevor Harris* for the use of his `image_cont` procedure.

Finally, I would like to thank all the members of the *atmospheric physics* and *theoretical physics* group, especially for the friendships made over the years.

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