The Use of GPS/COSMIC Occultations to Analyze Turbulent Structures in the Atmosphere

Larry Cornman
National Center for Atmospheric Research
Robert Goodrich
University of Colorado
Andrew Weekley
National Center for Atmospheric Research

A feasibility study regarding the use of GPS/COSMIC occultations to detect or diagnose turbulence has been performed. The techniques that have been developed are straightforward, albeit mathematically complicated, extensions to previous work in the field. These extensions include accounting for a moving transmitter and receiver, and the assumption of the line-of-sight going through an isolated patch of turbulence – as opposed to space-filling or infinitely thin screen models. These methodologies are general, in that any moving transmitter and receiver pair can be accommodated. The focus of our work in the past has been on the application of these techniques to a GNSS satellite transmitter/airborne receiver scenario. Our current efforts are focused on the application of the methods to the GPS/COSMIC situation. There can be a significant difference in the qualitative and quantitative features for these two scenarios, due to the increased distances and relative velocities for the COSMIC case. A brief description of the techniques and a more thorough presentation of the results of simulation studies will be presented. (A companion abstract will be submitted that discusses the application of the methods to actual GPS/COSMIC occultations.)