Measurement of Atmospheric Turbulence by Means of Light, Sound, and Radio Waves

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How light and sound propagate through the optically clear atmosphere has been of interest to children, philosophers, scientists, and engineers since antiquity. The quantum leap in our understanding of wave propagation through the turbulent atmosphere, however, came with the pioneering work by Valeryan Tatarskii and collaborators in the 1950's and 1960's. Their work enhanced dramatically our ability to develop and apply technology to remotely sense the optically clear atmosphere by means of light, sound, and radio waves.

This talk consists of two parts: First, I will provide a brief overview of the theoretical foundations of wave propagation through the turbulent atmosphere. Second, I will discuss some subtleties that have not been accounted for in Tatarskii's classical theory but whose importance for atmospheric remote sensing has become more and more obvious during the last decade or so: anisotropic turbulence, quasi-horizontal interfaces, and internal intermittency.