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Measurement of Mesospheric Ozone Using Meteor Decay Times

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Mesospheric Ozone has significant chemical impact in the upper atmosphere, and its seasonal and annual variability needs to be better understood. Many large and expensive satellites have been flown over the last 20 years in search of such measurements.

By carefully investigating the role of ozone in the high-temperature, hypersonic environment of overdense meteors, we have been able to develop a procedure by which the complementary cumulative histogram of overdense meteor decay times can be used to determine the absolute ozone density in the height region from 80 to 95 km with time resolutions of a few days, and height resolution of about 2-3 km. We present the basic theory behind the technique, and show temporally coincident comparisons with previous satellite data, demonstrating good agreement. Given that there are over 40 existing radars world-wide that can use this technique, the method has the potential to produce global-scale maps of the ozone density on a continuous basis.

Author: Prof. HOCKING, Wayne (University of Western Ontario)

Co-author: Mr SUKARA, Reynold (University of Western Ontario)

Presenter: Prof. HOCKING, Wayne (University of Western Ontario)

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