NITROGEN OXIDES, AEROSOLS AND OXYGENATED VOC: APPLICATIONS OF VISIBLE CAVITY ENHANCED OPTICAL EXTINCTION SPECTROSCOPY TO ATMOSPHERIC MEASUREMENTS

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Cavity enhanced extinction spectroscopy, in which the long effective path lengths available within an optical cavity provide a highly sensitive measurement of optical extinction, has seen increasing application as an analytical method in atmospheric science in recent years. This presentation will survey recent developments of field instrumentation based on of cavity enhanced spectroscopy from our laboratories, with an emphasis both on the evolution of the technology and lessons learned from deployment on platforms such as tall towers, ships and aircraft. Examples include detection of nocturnal nitrogen oxides (NO_2, NO_3 and N_2O_5) by cavity ring-down spectroscopy, beginning with pulsed lasers but more recently with diode lasers; aerosol extinction spectroscopy; and measurements of α-dicarbonyls using broadband methods. Although all of these examples are based on visible spectroscopy, they are illustrative of the variety of different light sources now in use, and they allow for some comparison between different approaches in terms of sensitivity and specificity.