



A Tale of Two Cities - HSI-DOAS Measurements of Air Quality

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Differential Optical Absorption Spectroscopy is now commonly used as an air quality measuring system; primarily through the measurements of nitrogen dioxide (NO₂) both as a ground-based and satellite technique. CityScan is a Hemispherical Scanning Imaging Differential Optical Absorption Spectrometer (HSI-DOAS) which has been optimised to measure concentrations of nitrogen dioxide. CityScan has a 95° field of view (FOV) between the zenith and 5° below the horizon. Across this FOV there are 128 resolved elements which are measured concurrently, the spectrometer is rotated azimuthally 1° per second providing full hemispherical coverage every 6 minutes. CityScan measures concentrations of nitrogen dioxide over specific lines of sight and due to the extensive field of view of the instrument this produces measurements which are representative over city-wide scales. Nitrogen dioxide is an important air pollutant which is produced in all combustion processes and can reduce lung function; especially in sensitised individuals. These instruments aim to bridge the gap in spatial scales between point source measurements of air quality and satellite measurements of air quality offering additional information on emissions, transport and the chemistry of nitrogen dioxide. More information regarding the CityScan technique can be found at <http://www.leos.le.ac.uk/aq/index.html>.

CityScan has been deployed in both London and Bologna, Italy during 2012. The London deployment took place as part of the large NERC funded ClearLo project in January and July/August. CityScan was deployed in Bologna in June as part of the large EU project PEGASOS. Analysis of both of these campaigns of data will be used to give unprecedented levels of spatial information to air quality measurements whilst also showing the difference in air quality between a relatively isolated mega city and a smaller city situated in a very polluted region; in this case the Po Valley.

Results from multiple CityScan instruments will be used in conjunction with data from ground based in-situ monitor networks to evaluate the ability of in-situ monitors to effectively assess the air quality in an urban environment. Trend analysis will also be shown to demonstrate any changes in the air quality in London during the time of the Olympic Games in comparison with a normal summer.