

Air Quality Mapping Retrieval over Penang Island, Malaysia

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Abstract: A variety of air pollutants have known or suspected harmful effects on human health and the environment. Particulate matter (PM), or aerosol, is the general term that was used for a mixture of the solid particles and the liquid droplets found in the atmosphere. In this study, we propose a new cost effective approach to retrieve Aerosol Optical Thickness (AOT) data in the visible spectrum by using sky transmittance measurements measured by a handheld spectroradiometer. The transmittance values were measured in spectral region from 350nm to 1050nm at the earth surface. The transmittance values were measured in spectral region from 350 nm to 1050 nm at the earth's surface. The well known Beer-Lambert law was used in this study to retrieve AOT values from the measured transmittance value. The concentrations of total particulate were measured simultaneously with the measurements of the transmittance data by using a hand held EPAM - Ambient Air Analyzer over Penang Island, Malaysia. The station locations of the particulate matter with diameters less than 10 micro meter (PM10) measurements were determined using a handheld GPS. Three interpolation techniques, namely Kriging Interpolation, Inverse Distance Interpolation and Natural Neighbour Interpolation, were used for mapping the PM and AOT concentration in this study. The accuracies of the three interpolation techniques were determined in this study in order to select the most suitable technique for mapping the air pollution concentration over Penang Island, Malaysia. The results of the analysis indicated that the AOT values were linearly correlated with the PM readings. AOT and PM maps were generated using an interpolation technique (Kriging) based on the measured data. Basically, both PM and AOT maps agree reasonably well over Penang Island, Malaysia. The highest PM concentrations were found in densely populated and industrialized areas. This study indicates that the spectroradiometer measurements provide useful remotely sensed data for air quality studies.