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Thesis Title: Assess the capability of MODIS data to measure the $PM_{2.5}$ concentration in relation to ground-based data in Mashhad

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Abstract

Particulate air pollutants, may cause severe effects such as creating or aggravating heart - cardiovascular and breathing disease. Optical and physical properties of aerosols to help with field and remote sensing methods, are calculated.The aim of this study was to evaluate the ability of MODIS sensor data, to measure air pollution in urban areas and creating daily maps of air pollution by using the visible and mid-infrared spectrum data. For this purpose satellite images MODIS Level 1B-1KM and MODIS Level 1B-250M and MOD04-Level 2 data were used for modeling extraction of information from satellite images with data obtained from ground stations air pollution measurements to qualitative and quantitative analysis of these models in Mashhad. The results show that in general, there is a good correlation between the remote sensing calculations and ground measurements. This correlation was modeled. model Based on using linear spectral decomposition to separate the two net share is that one is reflective surface and another is reflectivity that caused by suspended particles. In this regard, the first one from images in a clear day,and the second one from a day of a highly contaminated that ground surface can not be seen were extracted. The results of modeling, were quantitative detection of $PM_{2.5}$ with high accuracy 70% and RMSE pollution equivalent to 109.01 in the city of Mashhad. Compare the value of $PM_{2.5}$ obtained from the model and the concentration of ground $PM_{2.5}$ showed that for concentration of (about 100 micrograms per cubic meter) margin of error is high and model exaggerate in prediction of values, but in general, a correlation between the remote sensing calculations and ground-based measurements, indicate satellite images are usable for monitoring of particulate pollution condition in urban areas and in extensive coverage. In this study, uncertainty sources are discussed and conclusions.

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