

Accuracy assessment of moderate resolution image spectroradiometer products for dust storms in semiarid environment.

ABSTRACT

Dust storms are strongly and negatively associated with the annual cycle of rainfall and coincide with the west and southwesterly winds in west and south west of Iran. Accuracy assessment of particulate matter products of moderate resolution image spectroradiometer was studied in this research. Moderate resolution image spectroradiometer products consist of aerosol optical thickness, its corresponding image red, green and blue and moderate resolution image spectroradiometer/ terra calibrated radiances 5 minutes L1B swath 1 km, which shows the environmental information at terrestrial, atmospheric and ocean phenomenology. Daily aerosol optical thickness data retrieved from moderate resolution image spectroradiometer from May 2009 to May 2010 were compared with the amount of particulate matter measured at ground in Sanandaj, Iran, using non-linear correlation coefficient. Results showed that the moderate resolution image spectroradiometer image / terra calibrated radiances 5 minutes L1B swath 1 km is able to detect dust storms distribution and their blowing direction over study area clearly. The air quality conditions obtained in with dust storm period were unhealthy and correlation coefficients between moderate resolution image spectroradiometer aerosol optical thickness and particulate matter concentration in this period were higher than without dust storm period. The moderate resolution image spectroradiometer aerosol optical thickness values lower than 0.1 were acquired uncertainty level. Comparison of moderate resolution image spectroradiometer images/ terra calibrated radiances 5 minutes L1B swath 1 km and image red, green and blue showed that moderate resolution image spectroradiometer has limitation in retrieval of aerosol optical thickness from the dust storm with high concentration of particulate matter. This study reveals that the algorithm which is applied to refine the aerosol optical thickness is not able to recognize the amount of particulate matter in low and very high concentrations sensitively. No study has previously been conducted to investigate the accuracy of the moderate resolution image spectroradiometer particulate matter products.

Keyword: Aerosol optical thickness; Air quality; Particulate matter; Uncertainty level.