No Emission Estimation and Modeling From Ships At Berth in Said bin Sultan Naval Base

Abdullah Said Al Balushi

Abstract

Nitrogen oxides (NOx) emissions generated by ships contribute to poor air quality that negatively impacts public health and communities in coastal areas and far inland. These emissions often excessively harm human health, environment, wildlife habituates, and quality of life of communities and indigenous of people who live near ports. This project was designed to assess exhaust emissions, from ships on a nearby port at Saïd Bin Sultan Naval base in Wullayat Al-Mussana during the year 2005 and focused on the development, implementation and validation of an Industrial Source Complex Short Term (ISCST) model that was designed to determine the concentration distribution of emissions of multiple points. Ships data was collected from the Royal Navy of Oman for the study year of 2005. The hourly meteorological data was obtained from Wullayat Rustaq station, through the Directorate General of Civil Aviation at Seeb International Airport. This station is the nearest station, to the study area for the collected information and was used to calculate the emission rates. The ISCST model was used for the purpose of simulating the spatial distribution of NOx emissions, in the port and surrounding areas. The emission rates, meteorological data and ship characteristics were used as input parameters to this model. The hourly and monthly contours (isopleths) of NOx concentrations for ships in port for year 2005 were plotted by running the ISCST model. The results were analyzed to determine the affected area and the level of concentrations. The highest concentration points in the studied area were also identified. The results showed that the highest ground level concentrations were predicted to occur during winter months of January and February and in summer occur during the months of July and August. The highest predicted ground level concentration of the entire study period occurred in the month of February with highest predicted ground level concentration of 4856.431 ug/rrr'. This may be due to the high wind speed and direction during the winter period and also because ships operate during the month of February. Generally, the highest NOx concentration was found to occur relatively close to original position of the sources. Finally, research implications are outlined and future research directions are recommended.