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Investigation of emissions sources and characterization at Mamelodi Township, Gauteng, South Africa using conditional probability function modelling

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Abstract

This paper aims to investigate pollution sources affecting Mamelodi Township within the City of Tshwane in Gauteng Province, South Africa. The province has the largest population and multi emission activities in South Africa. The ambient pollution concentration depends on the various activities emanating from biogenic and anthropogenic. Anthropogenic activities are the man-made sources such as domestic fuel burning, industrial activities and transport emissions. The objective of this study is to investigate emissions sources and characterisation affecting Mamelodi Township using correlation, pollution roses and probability functions modelling. Investigations will focus on the following pollutants: Sulphur dioxide, Nitrogen dioxide, Ozone and Particulate Matter of less than ten micro diameter. K-Means clustering techniques have been applied to bivariate polar plot to identify and group similar features.The study uses pollution rose polar coordinates plots to provide a useful graphical technique which provides directional information on sources. Ambient concentration and wind direction together with wind speed can be highly effective in discriminating different emission sources affecting the ambient station. The results display strong positive correlation of Oxides of Nitrogen and Nitrogen dioxide. Nitrogen dioxide and nitric oxide sources have displayed positive moderate correlation of ambient concentrations. The problematic areas emission sources were discovered for ozone and particulate matter less than ten micro diameter per cubic meter on the North West of ambient monitoring station. The investigations of sources and characterisation by the application of ambient correlation parameters helped in discriminating of pollutions configuration behaviour at the receiving environment.

Biography:

Shonisani Norman Singo submitted PhD Thesis in December 2019 at the University of the Witwatersrand, Johannesburg, South Africa in the field of Chemical Engineering. His study focuses on the Investigation of emission sources and characterization using conditional probability function modelling. He has 11 year's of experience in the field of Air Quality Management as an Air Quality Specialist employed by the Government at Gauteng Province, South Africa. He has been identifying, licensing, monitoring and compliance of air quality activities. The approach on the paper will help regulators in identifying problematic emission sources and apply relevant reduction strategies

Speaker Publications:

1. "Impact of Climate Change on Children's Health in Limpopo Province, South Africa";MDPI. / 2017 / Volume 9, Issue 3(2012) 9(3), 831-854
2. "Highlighting mass spectrometric fragmentation differences and similarities between hydroxycinnamoyl-quinic acids and hydroxycinnamoyl-isocitric acids";BMC chemistry/ 29 (2017).
3. "Purification and partial characterization of ostrich skeletal muscle cathepsin D and its activity during meat maturation"; Meat Science,Volume 87, Issue 3(2011), Meat Science.
4. "Evaluation of the Content of Polyphenols, Antioxidant Activity and Physicochemical Properties of Tortillas Added with Bambara Groundnut Flour", MDPI, Vol 25, Issue 3,2020.

8th Global Summit and Expo on Pollution Control; Webinar- August 24-25, 2020, 2020.

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