タンザニアのダルエスサラームにおける気相中オゾン及び窒素酸化物の研究並びに沖縄の海水中で光化学的に生成する酸化剤に関する研究

Form 3

Abstract

Title Study on ozone and nitrogen oxides in gaseous phase in Dar es Salaam, Tanzania and photochemical formation of oxidants in sea waters in Okinawa, Japan

Surface ozone and NO_x, (NO_2 and NO) levels were measured at three urban sites (Mapipa, Ubungo, Posta) and suburban sites (Kunduchi and Vijibweni) in the city of Dar es Salaam, and Mwotemo village, a rural area Bagamoyo, Tanzania, from 2012 to 2015. O_3 levels at suburban sites were generally higher than at urban sites. There was a strong diurnal variation observed in Dar es Salaam while Bagamoyo showed little variation. At Dar es Salaam, surface O_3 concentrations increased from a minimum near sunrise to a maximum in late afternoon, and then decreased toward midnight. NO_2 concentrations were higher at urban sites of Ubungo and Posta sites. Since high NO_x concentrations were observed, continuous air quality monitoring and effective air pollution control measures are required in Dar es Salaam to prevent further deterioration of air quality and limit impacts on humans and vegetation. Regarding photochemical formation of oxidants, Fenton reaction ($Fe(II) + H_2O_2 \rightarrow OH + OH^- + Fe(III)$) in coastal seawater samples of Okinawa were studied by measuring Fe(II) and OH radical concentrations during photochemical experiments. Under coastal seawater conditions, the Fenton reaction was found to be an important pathway for H_2O_2 decomposition in comparison to direct photolysis, but only a minor source of OH. Experimentally observed H_2O_2 destruction rate constants could be accounted for by reactions of H_2O_2 with Fe^{2+} and $FeOH^+$.

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