MONITORING AIR POLLUTION FROM SPACE:
THE MAJOR URBAN AREAS OF THE EASTERN MEDITERRANEAN BASIN

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ABSTRACT

This study focuses on monitoring of key pollution processes, namely glyoxal (HCHO), formaldehyde (HCHO), nitrous acid (HONO), nitric acid (HNO₃), and peroxyacetyl nitrate (PAN). HCHO is mainly produced by anthropogenic activities leading to high ambient and biomass burning, and HONO is released by both vehicle emissions and biomass burning.

The main sources of NO₂ are the use of motor vehicles, especially in urban areas, and coal burning.

Sinks

The main sink of NO₂ is the reaction with OH radicals.

INSTRUMENTATION

DOAS ANALYSIS

The vertical column of NO₂ [NO₂] and HCHO is calculated by applying the Differential Optical Absorption Spectroscopy (DOAS) technique to satellite data and ground-based observations.

GLOBAL TROP. VCD

REGIONAL TROP. VCD

LINEAR REGRESSION

GLOBAL TROP. VCD

REGIONAL TROP. VCD

LINEAR REGRESSION

COMPARISON OF SATELLITE AND IN SITU MEASUREMENTS

ANNUAL MEAN VALUES OF THE VCD NO₂

SEASONAL VARIATION OF NO₂

çoğrafi konumunun bilgisi için kullanılmak üzere, en iyi hava durumu koşullarını, özellikle anaotokomalı ve hava sıcaklığının dağılımı ile tanımlanır.

SOURCES AND SINKS (HCHO AND CHOCHO)

The main sources of HCHO and CHOCHO are:

- reaction with OH radicals
- photolysis leading to an enhanced lifetime of HCHO

SOURCES AND SINKS

The main sources of NO₂ are:

- use of motor vehicles
- coal burning

SOURCES

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- use of motor vehicles
- coal burning

Sinks

The main sink of NO₂ is the reaction with OH radicals.

Ankara

Istanbul

Antalya

Izmir

Finokalia

Athens

Thessaloniki

Cairo

Guangzhou

Seoul

VCD NO₂ [molecules cm⁻²]

0.0

4.0x10¹⁵

8.0x10¹⁵

1.2x10¹⁶

1.6x10¹⁶

2.0x10¹⁶

3.0x10¹⁶

4.0x10¹⁶

5.0x10¹⁶

Annual mean values of the VCD NO₂ are calculated using a weighted average of the DOAS technique and satellite data.

Seasonal variation of NO₂ is also analyzed to identify the main sources and sinks.

The sensitivity of the DOAS technique is compared with the satellite data to assess the accuracy of the measurements.