Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09581, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09581
EGU General Assembly 2008

Coupling of Positive Matrix Factorization with TOMS to Identify Saharan Dust Transport: Eastern Mediterranean Atmosphere

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The primary goal of this study is to differentiate chemical compositions of Saharan Dust and local dust generated in the Eastern Mediterranean region. Data set generated by analysis of approximately 1700 daily PM_{10} Hi-Vol aerosol samples, collected on cellulose fiber filters (Whatman 41), between 1993 and 2001, at a station located on the Mediterranean coast of Turkey (30.34˚E, 36.47˚N) were used for this purpose. Major ion content of the collected samples was analyzed by Ion Chromatography (IC) and Colorimetry. Energy Dispersive X-Ray Fluorescence (EDXRF) and Inductively Coupled Plasma Mass Spectrometry (ICP MS) were employed to determine trace element constituents from Li to U. These analytical techniques enable us to measure about 60 ions and elements in each sample. In order to apportion the sources affecting Eastern Mediterranean aerosol composition, Positive Matrix Factorization (PMF) was applied to the generated data set. PMF identified 7 factors, namely, biomass burning, oil combustion, local dust, Saharan dust, general pollution, sea salt and fertilizer use. The scores (or G-scores) of the factor that was identified as the Saharan Dust factor was used to investigate dust transport from north Africa to the Eastern Mediterranean basin. Aerosol Index images provided by Total Ozone Mapping Spectrometer (TOMS) Earth Probe was used to ensure episodes observed in G-scores are indeed due to Saharan Dust transport to the station area. For this purpose, TOMS images were requested for the days that we observed highest G score values. The obtained TOMS

images confirmed the Saharan dust transport to Eastern Mediterranean region in these episode days. This allowed us to differentiate chemical compositions of local dust and Saharan dust as sampled at the Eastern Mediterranean atmosphere.