High Abundance of Non-Fossil Derived Organics in Fine Aerosols in the Eastern Mediterranean Troposphere

CHANDRA MOULI PAVULURI[1,2], NIKOLAOS MIHALOPOULOS[3,4], MASAO UCHIDA[5], PINGQING FU[1], CONG-QIANG LIU[1] and KIMITAKA KAWAMURA[2,6]

[1] *Institute of Surface-Earth System Science, Tianjin University, Tianjin, China*

[2] *Institute of Low Temperature Science, Hokkaido University, Sapporo, Japan*

[3] *ECPL, Department of Chemistry, University of Crete, Heraklion, Greece*

[4] *Present address: National Observatory of Athens, Palea Penteli, Greece*

[5] *AMS Facility (NIES-TERRA), National Institute for Environmental Studies, Tsukuba, Japan*

[6] *Now at Chubu Institute for Advanced Studies, Chubu University, Kasugai, Japan*

Organic aerosols (OA) that represent a large fraction of fine aerosol mass have serious impacts on the Earth's climate system directly by scattering and absorbing solar radiation and indirectly by acting as cloud condensation nuclei. They also cause adverse effects on human health and play an important role in atmospheric chemistry. It is well recognized that summertime ozone is enhanced in the Mediterranean troposphere and the aerosol radiative forcing is among the highest in the world over this region in summer. However, the studies on organic aerosols are sparse and their origins and atmospheric processing are not yet fully understood in the Mediterranean. We collected fine ($PM_{1.0}$) aerosols collected at a remote marine background site, the Finokalia research station (3532′N, 25º67′E), in the Eastern Mediterranean troposphere on a weekly basis for two consecutive days each during a one-year period: October 2009 to October 2010. Here we report (i) percent of modern carbon in total carbon, a unique tracer for distinct fossil and non-fossil carbon, (ii) molecular and stable carbon isotopic compositions of diacids, oxoacids and α-dicarbonyls, which could serve as tracers for secondary formation and atmospheric processing (aging), and (iii) molecular marker species (levoglucosan, hopanes and isoprene-, α-pinene- and β–caryophyllene-derived compounds) in $PM_{1.0}$. In addition, the $PM_{1.0}$ samples were analyzed for carbonaceous components. Based on the results obtained, we discuss the molecular distributions of diacids and related compounds and the importance of non-fossil sources and aging of OA in the Eastern Mediterranean.

Key words: Organic species, Isotope ratios, $PM_{1.0}$, the Eastern Mediterranean.