

Origin-Dependent Variations in the Atmospheric Microbiome Community in Eastern Mediterranean Dust Storms

DANIELLA GAT,¹ YINON MAZAR,² EDDIE CYTRYN,³
YINON RUDICH⁴

¹Department of Earth and Planetary Sciences, Weizmann
Institute of Science, Rehovot 7610001, Israel, Email:
daniela.gat@weizmann.ac.il

²Department of Earth and Planetary Sciences, Weizmann
Institute of Science, Rehovot 7610001, Israel.

³Institute of Soil, Water and Environmental Sciences, The
Volcani Center, Agriculture Research Organization,
Rishon Lezion 7528809, Israel, Email:
eddie@volcani.agri.gov.il

⁴Department of Earth and Planetary Sciences, Weizmann
Institute of Science, Rehovot 7610001, Israel, Email:
Yinon.rudich@weizmann.ac.il

Microorganisms carried by dust storms are transported through the atmosphere and may affect human health and the functionality of microbial communities in various environments. Characterizing the dust-borne microbiome in dust storms of different origins, or that followed different trajectories, provides valuable data to improve our understanding of global health and environmental impacts. We present a comparative study on the diversity of dust-borne bacterial communities in dust storms from three distinct origins—North Africa, Syria and Saudi Arabia—and compare them with local bacterial communities sampled on clear days, all collected at a single location, in Rehovot, Israel. Storms from different dust origins exhibited distinct bacterial communities, with signature bacterial taxa for each source. Dust storms were characterized by a lower abundance of selected antibiotic resistance genes (ARGs) compared with ambient dust, asserting that the origin of these genes is local, possibly anthropogenic. With the progression of the storm, the storm-borne bacterial community showed increasing resemblance to ambient dust, suggesting mixing with local dust. These results show, for the first time, that dust storms from different sources display distinct bacterial communities, suggesting possible distinct effects on the environment and public health.