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Aerosol Optical Depth spatiotemporal variability and contribution of different aerosol types over Eastern Mediterranean

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In this work, we study the aerosol spatiotemporal variability over the region of Eastern Mediterranean, for the time period 2000-2012, using a 0.1-degree gridded dataset compiled from level-2 MODIS TERRA and MODIS AQUA AOD550 and FMR550 data. A detailed validation of the AOD550 data was implemented using ground-based observations from the AERONET, also showing that the gridding methodology we followed allows for the detection of several local hot spots that cannot be seen using lower resolutions or level-3 data. By combining the MODIS data with data from other satellite sensors (TOMS, OMI), data from a global chemical-aerosol-transport model (GOCART), and reanalysis data from MACC and ERA-interim, we quantify the relative contribution of different aerosol types to the total AOD550 for the period of interest. For this reason, we developed an optimized algorithm for regional studies based on results from previous global studies. Over land, anthropogenic, dust, and fine-mode natural aerosols contribute to the total AOD550, while anthropogenic, dust and maritime AODs are calculated over the ocean. The dust AOD550 over the region was compared against dust AODs from the LIVAS CALIPSO product, showing a similar seasonal variability. Finally, we also look into the aerosol load short-term trends over the region for each aerosol type separately, the results being strongly affected by the selected time period.

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