

Spatiotemporal variability and representativeness of aerosol and clouds over the PANhellenic GEophysical observatory of Antikythera

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The PANhellenic GEophysical observatory of Antikythera, PANGEA, located in the centre of the Eastern Mediterranean basin, at the island of Antikythera (35.86 N, 23.81 E, elevation: 110 m a.s.l.) in Greece is the main station of National Observatory of Athens for atmospheric monitoring. PANGEA is a remote site, located in a hot-spot region in terms of climate change. In the study of Gkikas et al., (2023) the atmospheric homogeneity in the broader area around PANGEA is presented, for a radius up to 100 km away, using climatological MODIS Aqua AOD (Aerosol Optical Depth) measurements as a homogeneity tracer. In this study, the spatial AOD remain almost constant at PANGEA, revealing a horizontal homogeneity of the aerosol load in the broader area. Additionally, the analysis of the total Aerosol Mean Extinction coefficient profiles at 532 nm for different radii around PANGEA site for period Jun 2006 – Dec 2021 reveals that a radius of 100 km is representative for PANGEA.

The cloud statistics for a radius of 100 km around PANGEA from a decadal analysis of CLOUDSAT (Stephens et al., 2008) products are presented in Figure 1 bottom. The monthly variability of the 8 classes of clouds is presented (bottom left), along with their presence per height (bottom right). Maximum cloudiness conditions are observed during the winter months (>70%), while minimum conditions are observed during the summer period (<10%). High clouds (high) prevail also during all months at altitudes higher than 6 km, except for July and August above PANGEA. Nimbostratus (Ns), altostratus (As) and deep clouds are observed at all levels up to 13km.

We conclude that PANGEA is ideal for Cal/Val activities given that the location is representative of a wider region within the Mediterranean.

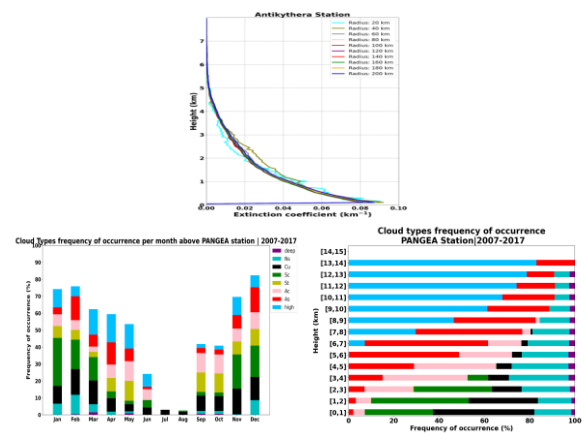



Figure 1. Total Aerosol Mean Extinction coefficient profiles at 532 nm for different radii around PANGEA site for period Jun 2006 – Dec 2021 (up). Frequency of cloud type occurrence (down left) per month, and (down right) per height.

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Gkikas, A., et al. (2023) First assessment of Aeolus Standard Correct Algorithm particle backscatter coefficient retrievals in the eastern Mediterranean, Atmos. Meas. Tech., 16, 1017–1042, <https://doi.org/10.5194/amt-16-1017-2023>, 2023.
Stephens, G.L., et al. (2008) CloudSat mission: Performance and early science after the first year of operation. J. Geophys. Res. 2008, 113.