Figure S1: Timeseries of spectral aerosol optical depth (AOD) (left y-axis) and Ångström exponent (right y-axis), between 440 and 870 nm, on 10th July 2019 based on AERONET direct sunphotometric measurements (Version 3, Level 1.5) acquired at the Antikythera island. The vertical red dashed line corresponds to Aeolus overpass time.
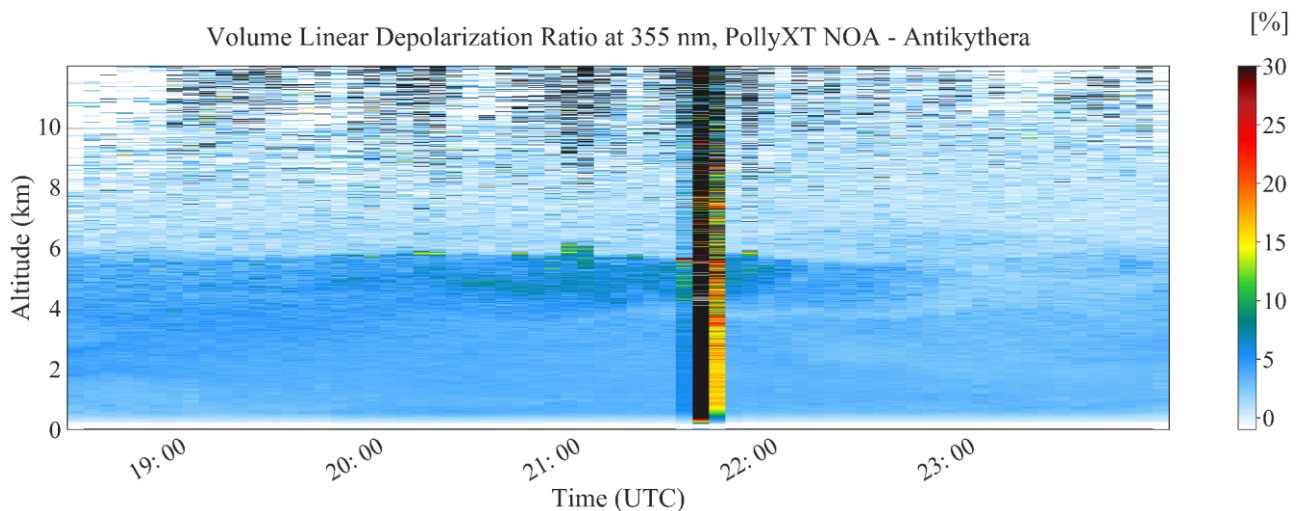
Figure S2: Time-height plot of the Volume Linear Depolarization Ratio (VLDR) at 355 nm at PANGEA station during 10 July 2019, 18:00 - 23:59 UTC. Station elevation is at 193 m a.s.l. The time period between 21:30 and 21:40 UTC corresponds to routine depolarization calibration measurements of the Polly^XT lidar system and is indicated by a thick black vertical line on the plot. Below 6 km, VLDR values (5 - 10%) indicate the presence of non-spherical, depolarizing particles of dust nature.
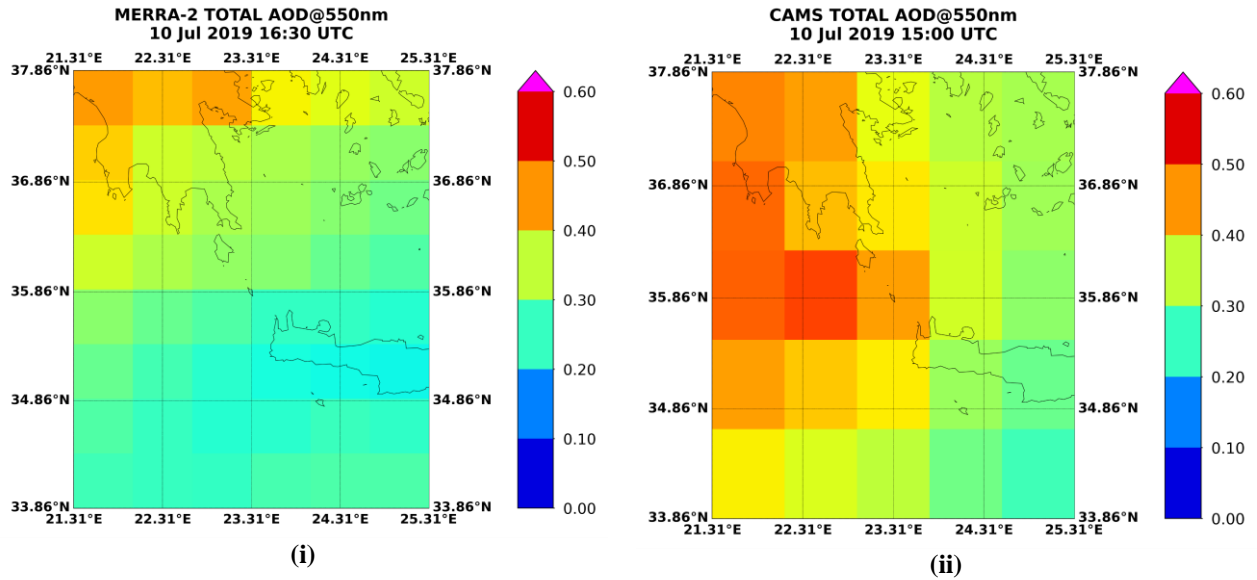
Figure S3: Geographical distribution of total aerosol optical depth at 550nm, in the surrounding area of Antikythera island, based on: (i) MERRA-2 at 16:30 UTC on 10th July 2019 and (ii) CAMS at 15:00 UTC on 10th July 2019.
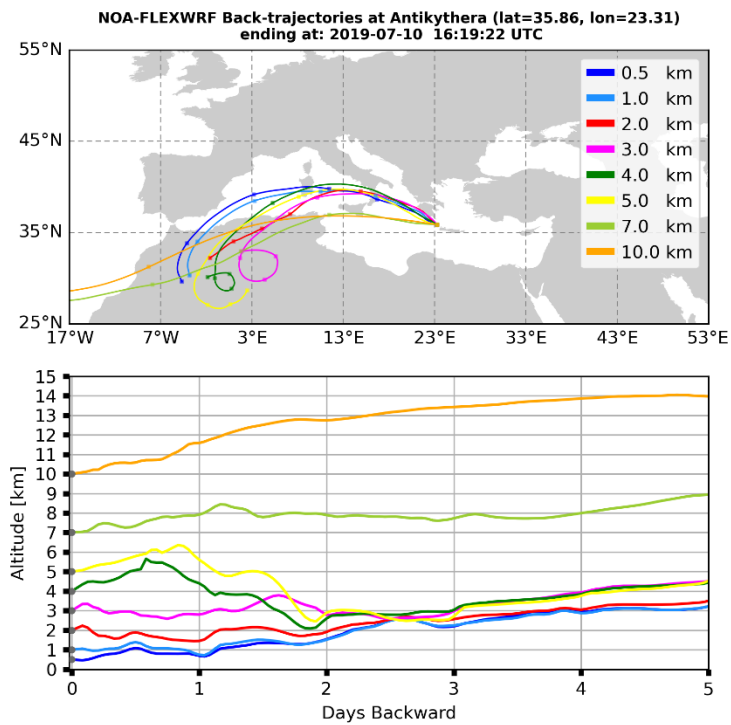
Figure S4: (Upper panel) 5-days air mass backward trajectories, based on FLEXPART simulations, ending at 0.5 (blue), 1 (light blue), 2 (red), 3 (magenta), 4 (green), 5 (yellow), 7 (light green) and 10 (orange) km above Antikythera island on 10th July 2019 at 16:19:22 UTC. (Bottom panel) Altitudes, above ground level, of the air masses on their route prior to their arrival over Antikythera island.
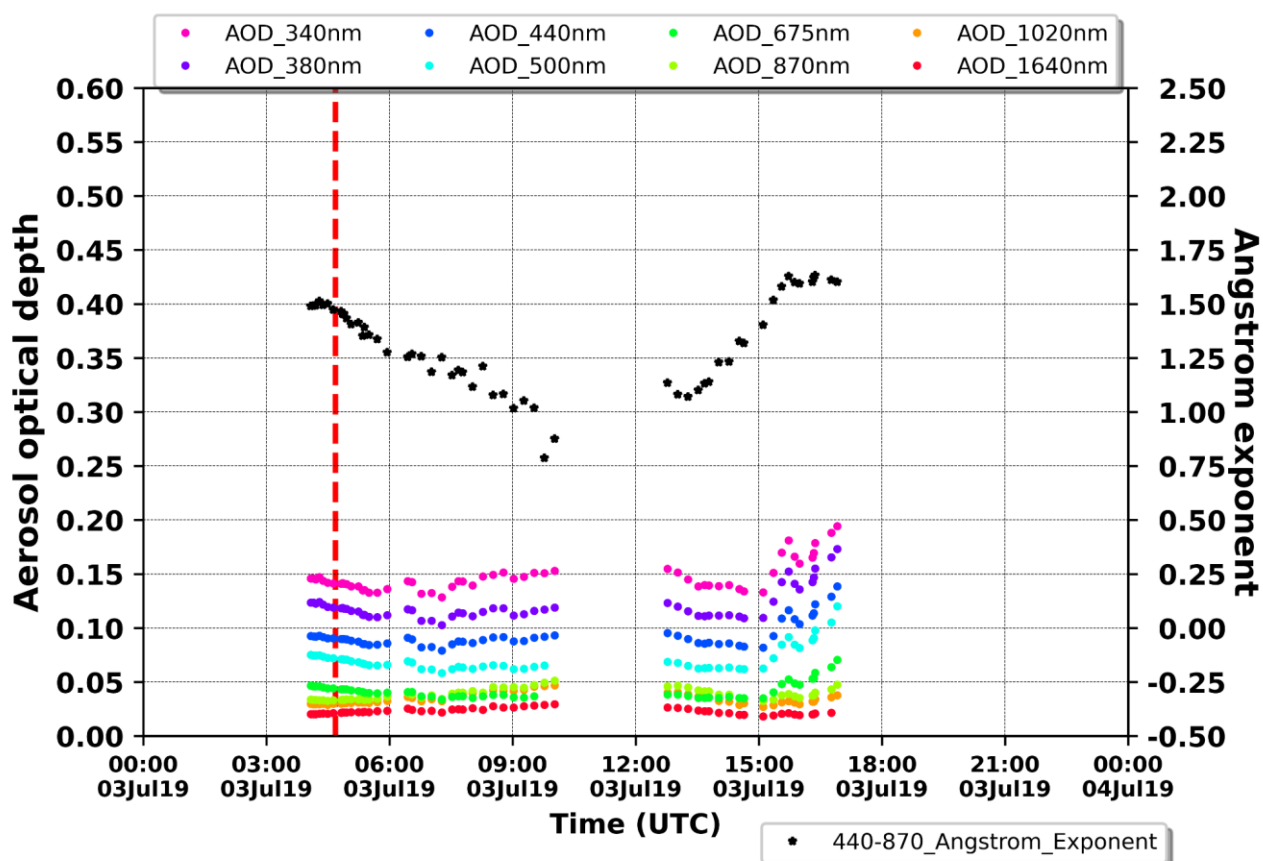
Figure S5: Timeseries of spectral aerosol optical depth (AOD) (left y-axis) and Ångström exponent (right y-axis), between 440 and 870 nm, on 3rd July 2019 based on AERONET direct sunphotometric measurements (Version 3, Level 1.5) acquired at the Antikythera island. The vertical red dashed line corresponds to Aeolus overpass time.
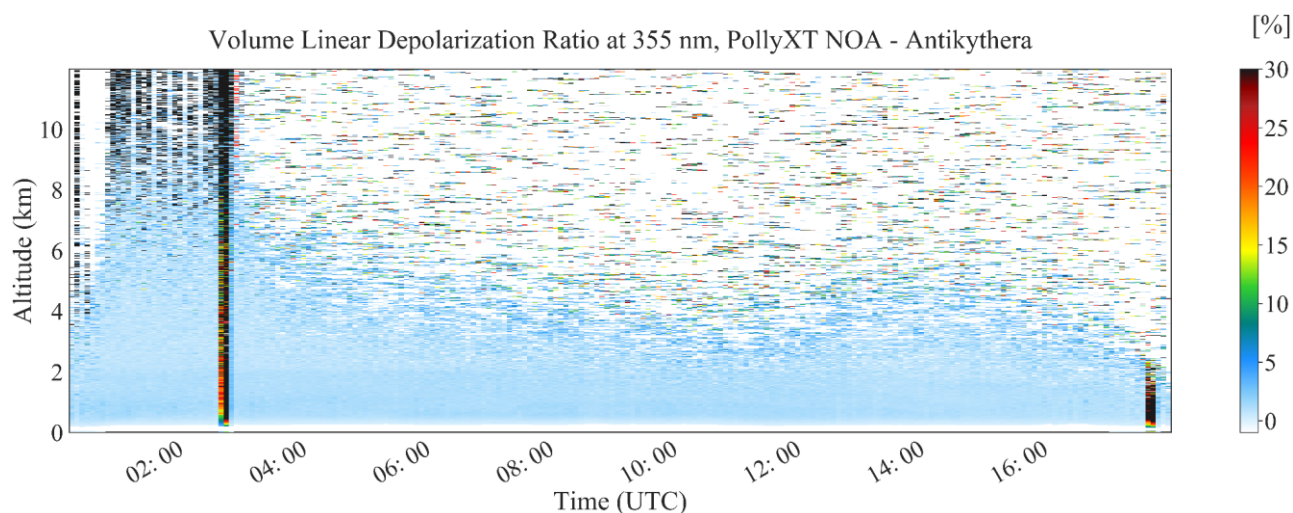
Figure S6: Time-height plot of the Volume Linear Depolarization Ratio (VLDR) at 355 nm at PANGEA station during July 3, 2019 (00:00 - 18:00 UTC). Station elevation is at 193 m a.s.l. The time period between 02:30 and 02:40 UTC and 18:30 - 18:40 UTC correspond to routine depolarization calibration measurements of the Polly^{XT} lidar system and are indicated by thick black vertical lines on the plot. Low VLDR values (<5%) indicate the absence of depolarizing particles.
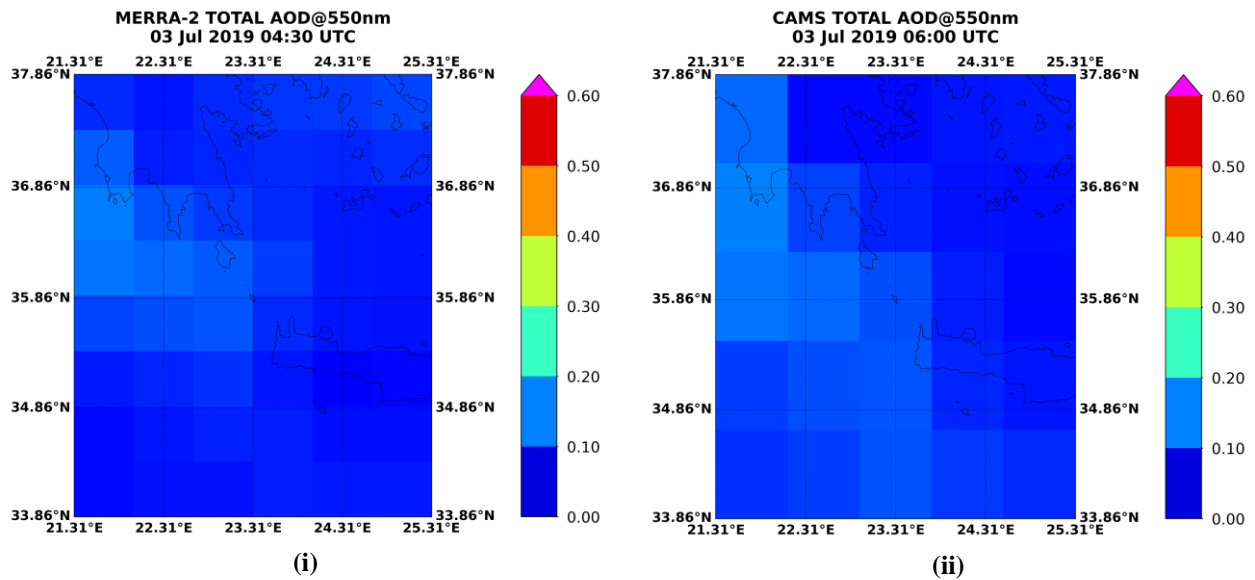
Figure S7: Geographical distribution of total aerosol optical depth at 550nm, in the surrounding area of Antikythera island, based on: (i) MERRA-2 at 04:30 UTC on 3rd July 2019 and (ii) CAMS at 06:00 UTC on 3rd July 2019.
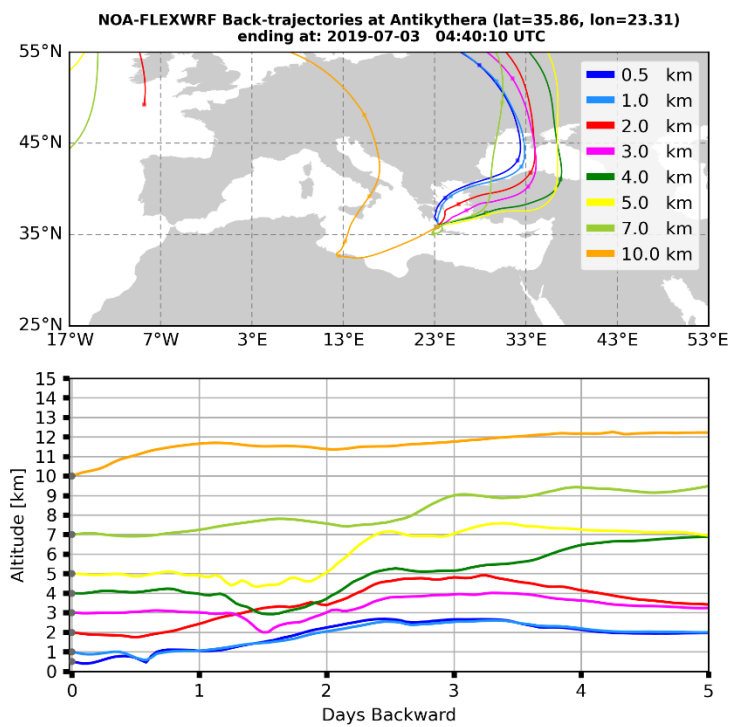
Figure S8: (Upper panel) 5-days air mass backward trajectories, based on FLEXPART simulations, ending at 0.5 (blue), 1 (light blue), 2 (red), 3 (magenta), 4 (green), 5 (yellow), 7 (light green) and 10 (orange) km above Antikythera island on 3rd July 2019 at 04:40:10 UTC. (Bottom panel) Altitudes, above ground level, of the air masses on their route prior to their arrival over Antikythera island.
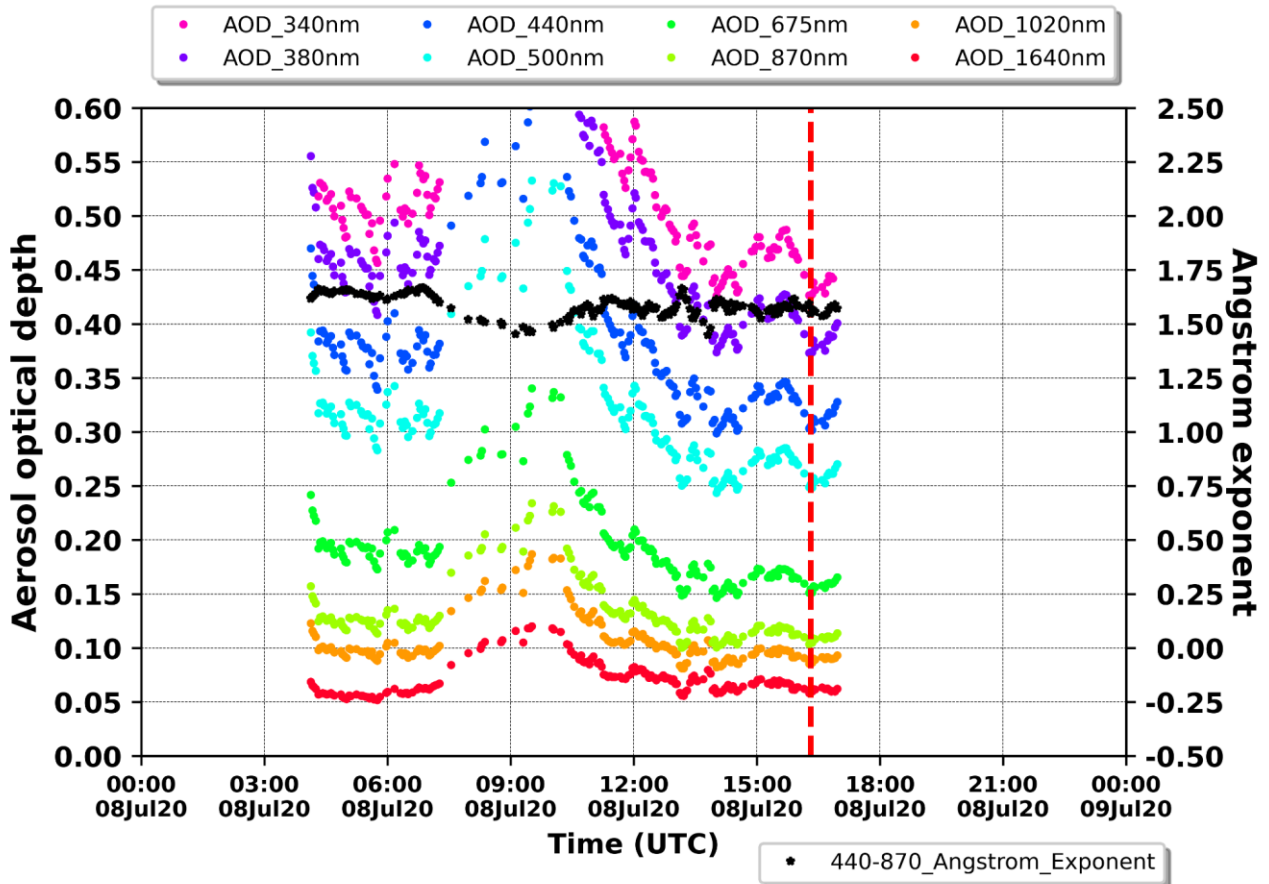
Figure S9: Timeseries of spectral aerosol optical depth (AOD) (left y-axis) and Ångström exponent (right y-axis), between 440 and 870 nm, on 8th July 2020 based on AERONET direct sunphotometric measurements (Version 3, Level 1.5) acquired at the Antikythera island. The vertical red dashed line corresponds to Aeolus overpass time.
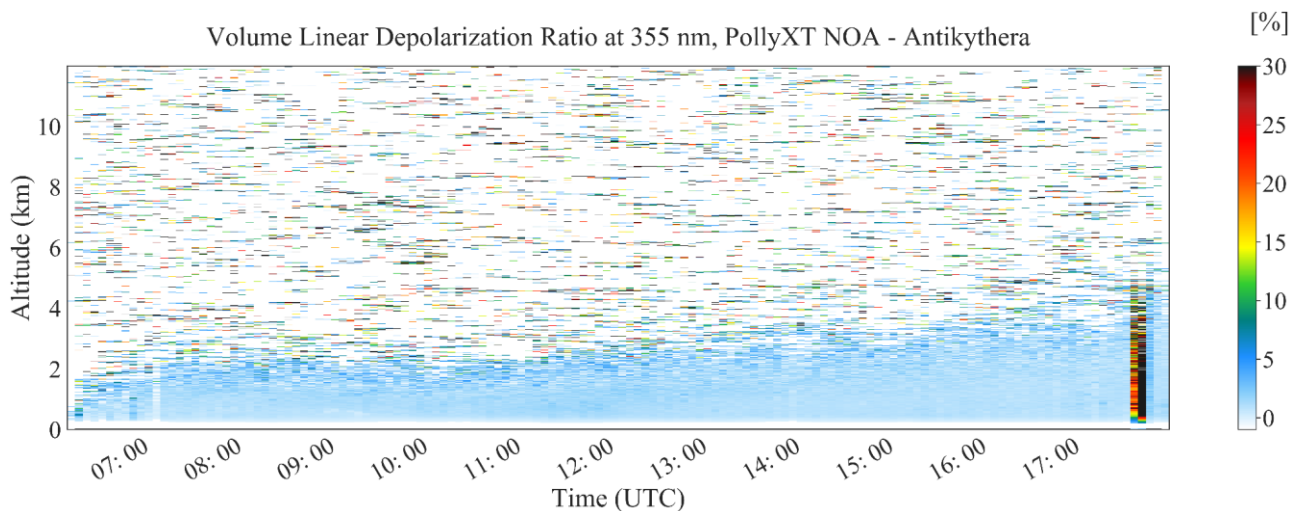
Figure S10: Time-height plot of the Volume Linear Depolarization Ratio (VLDR) at 355 nm at PANGEA station during July 8, 2020 (06:00 - 18:00 UTC). Station elevation is at 193 m a.s.l. The time period between 18:30 - 18:40 UTC corresponds to routine depolarization calibration measurements of the Polly[XT] lidar system and is indicated by a thick black vertical line on the plot. Low VLDR values (<5%) indicate the absence of depolarizing particles.
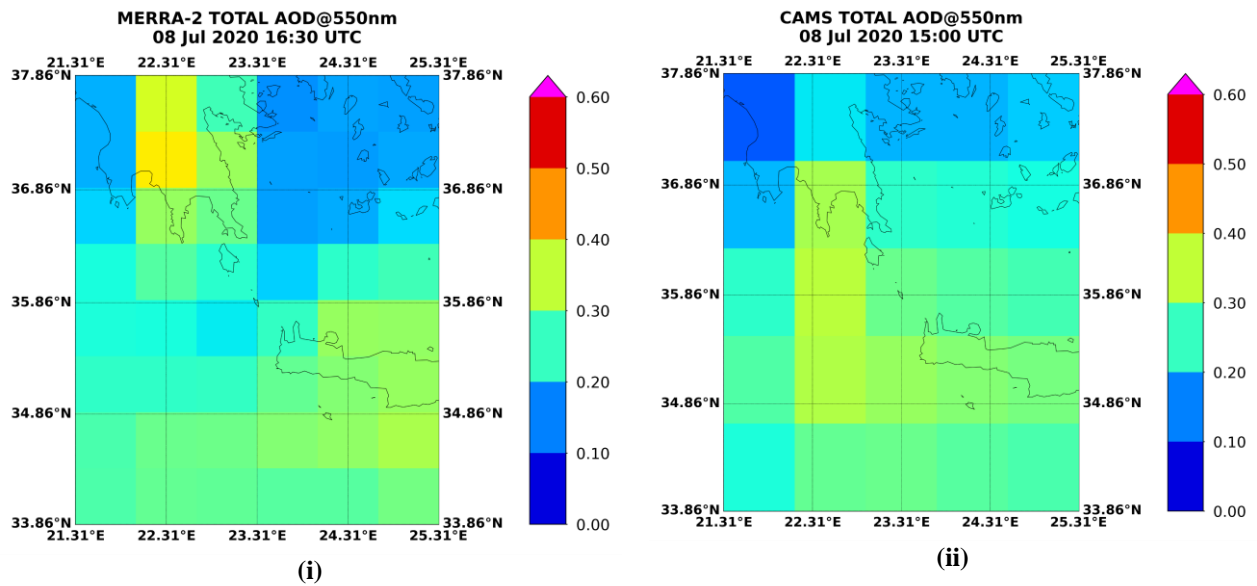
Figure S11: Geographical distribution of total aerosol optical depth at 550nm, in the surrounding area of Antikythera island, based on: (i) MERRA-2 at 16:30 UTC on 8th July 2020 and (ii) CAMS at 15:00 UTC on 8th July 2020.
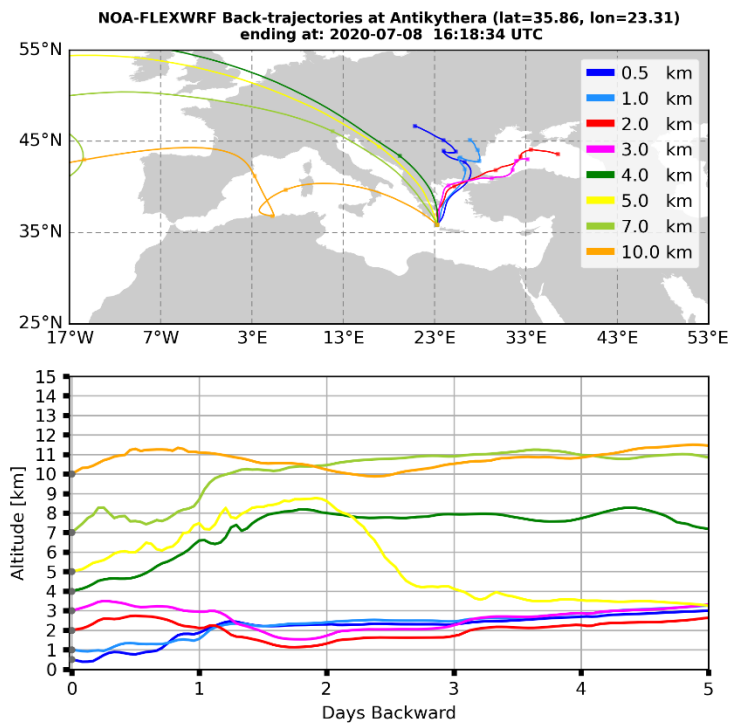
Figure S12: (Upper panel) 5-days air mass backward trajectories, based on FLEXPART simulations, ending at 0.5 (blue), 1 (light blue), 2 (red), 3 (magenta), 4 (green), 5 (yellow), 7 (light green) and 10 (orange) km above Antikythera island on 8th July 2020 at 16:18:34 UTC. (Bottom panel) Altitudes, above ground level, of the air masses on their route prior to their arrival over Antikythera island.
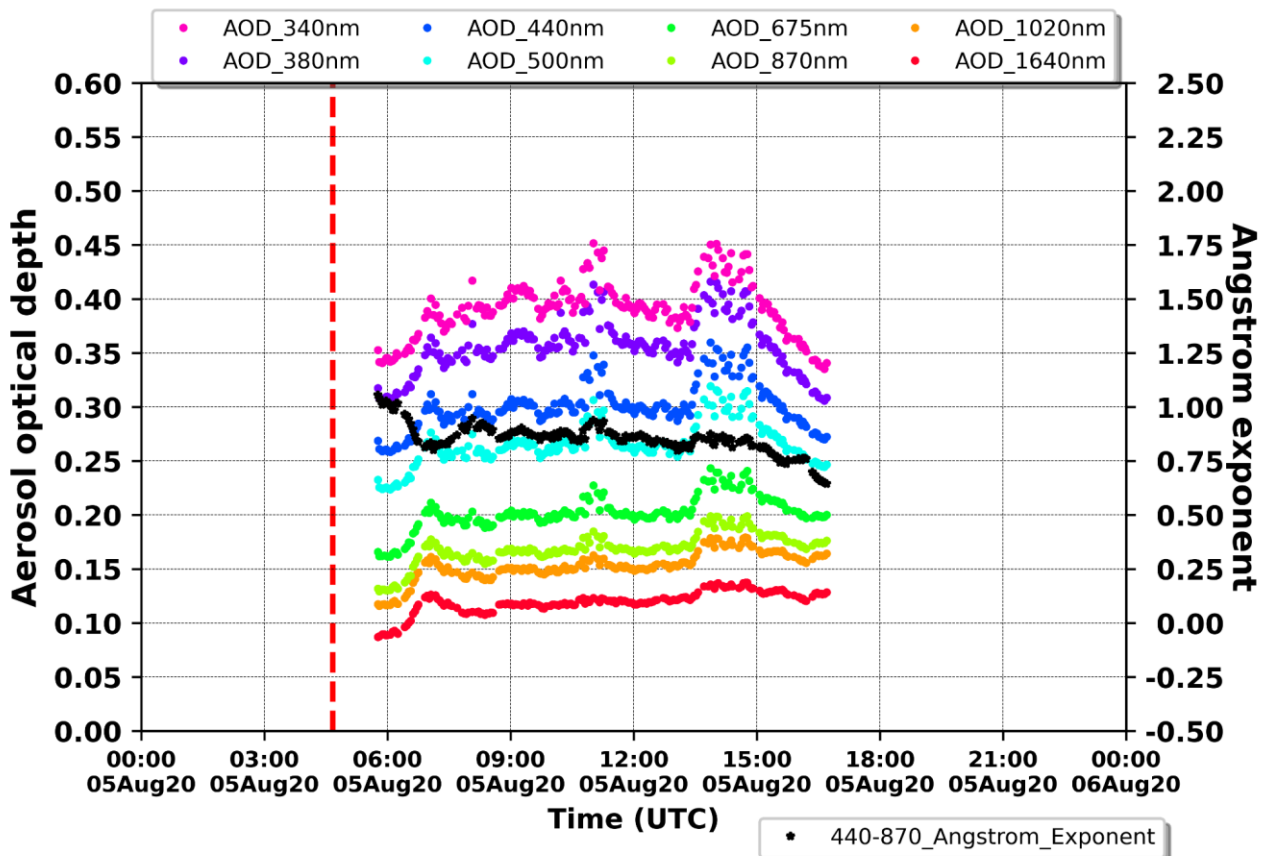
Figure S13: Timeseries of spectral aerosol optical depth (AOD) (left y-axis) and Ångström exponent (right y-axis), between 440 and 870 nm, on 5th August 2020 based on AERONET direct sunphotometric measurements (Version 3, Level 1.5) acquired at the Antikythera island. The vertical red dashed line corresponds to Aeolus overpass time.
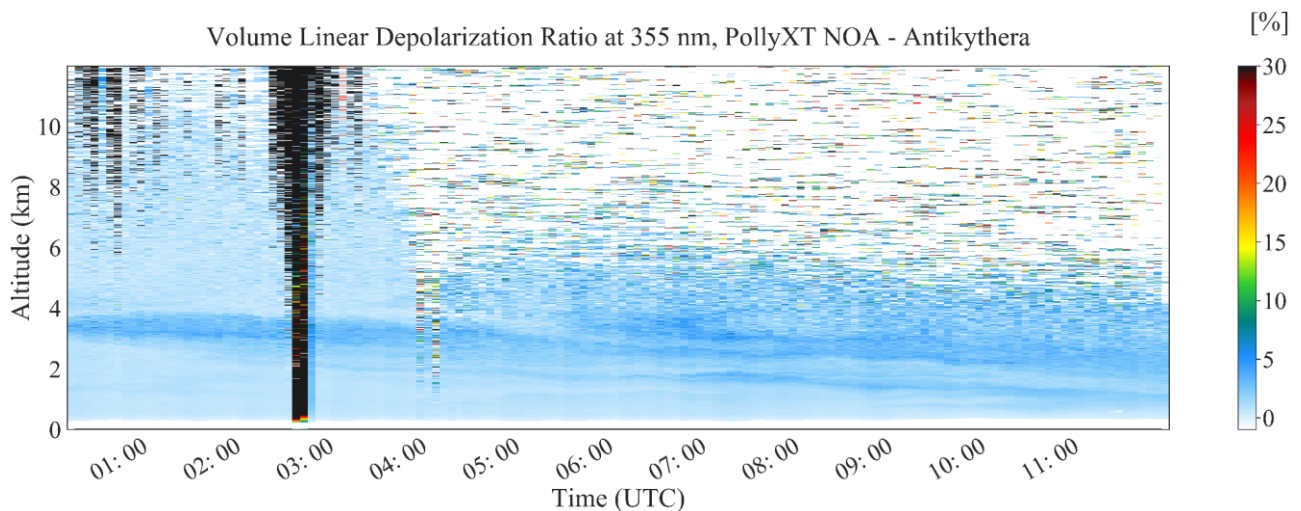
Figure S14: Time-height plot of the Volume Linear Depolarization Ratio (VLDR) at 355 nm at PANGEA station during August 5, 2020 (00:00 - 12:00 UTC). Station elevation is at 193 m a.s.l. The time period between 02:30 - 02:40 UTC corresponds to routine depolarization calibration measurements of the Polly[XT] lidar system and is indicated by a thick black vertical line on the plot. An aerosol layer that carries non-spherical depolarizing particles (VLDR values close to 5%) is located between 1 and 4 km.
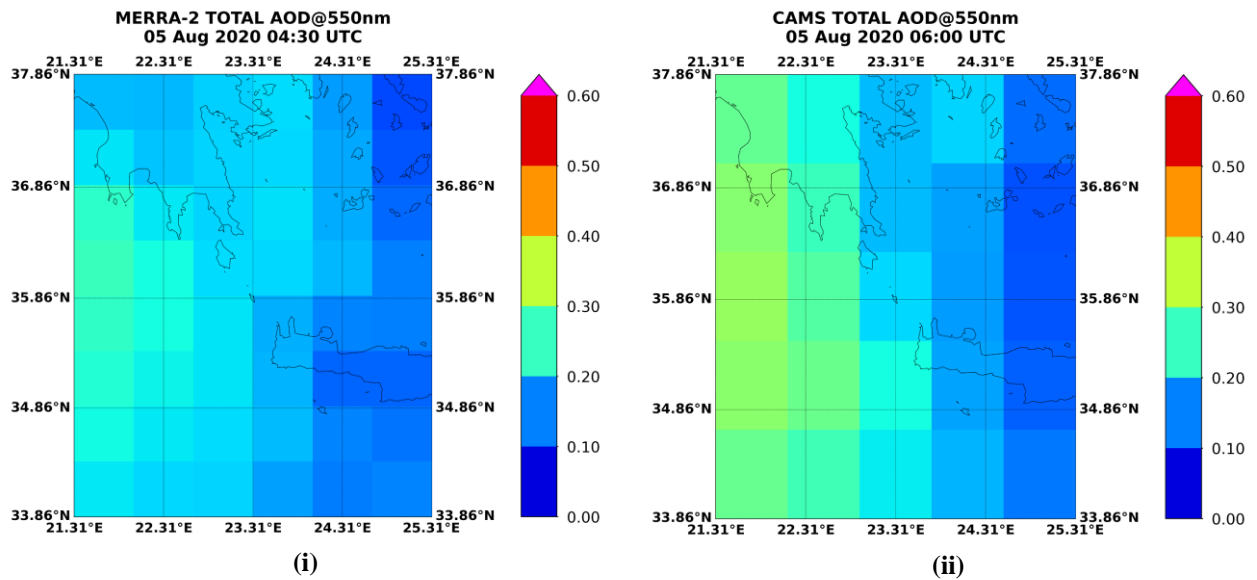
Figure S15: Geographical distribution of total aerosol optical depth at 550nm, in the surrounding area of Antikythera island, based on: (i) MERRA-2 at 04:30 UTC on 5th August 2020 and (ii) CAMS at 06:00 UTC on 5th August 2020.
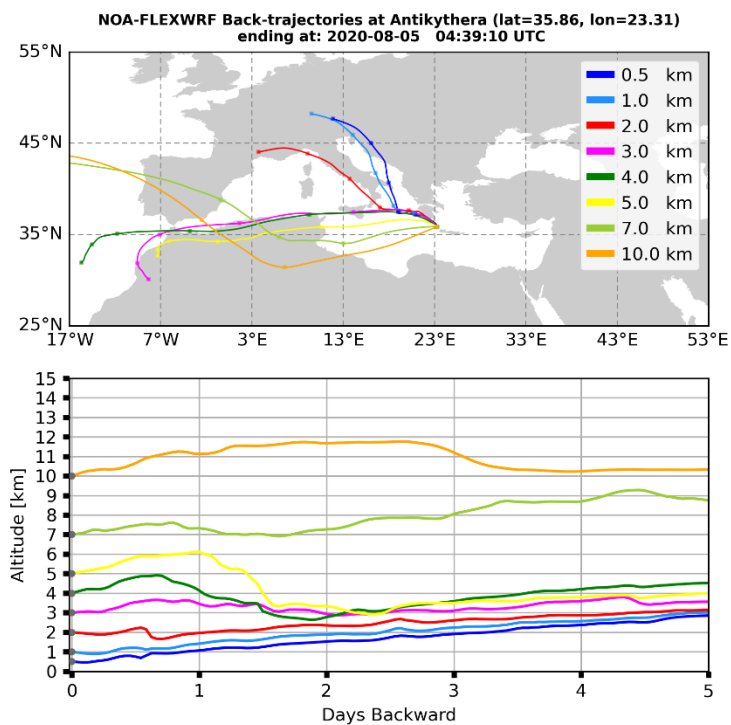
Figure S16: (Upper panel) 5-days air mass backward trajectories, based on FLEXPART simulations, ending at 0.5 (blue), 1 (light blue), 2 (red), 3 (magenta), 4 (green), 5 (yellow), 7 (light green) and 10 (orange) km above Antikythera island on 5th August 2020 at 04:39:10 UTC. (Bottom panel) Altitudes, above ground level, of the air masses on their route prior to their arrival over Antikythera island.