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Investigation of surface ozone variability in the central Mediterranean basin by observations at the Lampedusa and Capo Granitola WMO/GAW Regional Stations.

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The Mediterranean Basin is considered a hot-spot region in term of air-quality and climate change due to the impact of anthropogenic and natural processes. Meteorological conditions such as frequent clear sky and high solar radiation in summer enhance the formation of photochemical ozone (O_3) due to the availability of natural and anthropogenic precursors. In particular, large amounts of anthropogenic pollutants emitted in continental Europe and northern Africa are transported towards the basin where intense photochemical O_3 production occurs. Modeling scenarios and satellite investigations show the central Mediterranean basin (i.e. from 5°E to 20°E) as the region where O_3 is maximized in summer at the surface. Moreover, stratospheric-tropospheric exchange, STE, was recognized to affect tropospheric O_3 variability in the Eastern basin but with signal still detectable in the central Mediterranean basin.
Continuous surface O_3 observations have been carried out since 2015 at two locations in the central Mediterranean basin: Lampedusa Island (35.52°N, 12.63°E, 45 m a.s.l.) and Capo Granitola (southern Sicily, 37.57°N, 12.59°E, 5 m a.s.l). Capo Granitola is well representative of the atmospheric background conditions, with a limited impact of local/regional emissions under land breeze circulation. Lampedusa is a small island South of the Strait of Sicily with very limited local anthropogenic emissions. The comparison of surface O_3 and other atmospheric variables at these two measurement sites, together with the integration of Lagrangian and Eulerian modeling tools, provides the unique opportunity to investigate several processes able to affect surface O_3 in the Mediterranean basin, namely Saharan dust transport, stratosphere-to-troposphere exchange, ship and biomass burning emissions and air-mass outflow from southern Italy. To identify the occurrence of these kind of events and provide a preliminary assessment on the O_3 variability, we analysed 3D air-mass back-trajectories and the variability of co-located in-situ atmospheric tracers (CO, eqBC, SO_2, PM10, AOD).