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Ozone retrievals from MAGEAQ GEO TIR+VIS for air quality

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Nowadays, air quality monitoring is based on the use of ground-based stations (GBS) or satellite measurements. GBS provide accurate measurements of pollutant concentrations, especially in the planetary boundary layer (PBL), but usually the spatial coverage is sparse. Polar-orbiting satellites provide good spatial resolution but low temporal coverage -this is insufficient for tracking pollutants exhibiting a diurnal cycle (Lahoz et al., 2012). However, pollutant concentrations can be measured by instruments placed on board a geostationary satellite, which can provide sufficiently high temporal and spatial resolutions (e.g. Hache et al., 2014).

In this work, we investigate the potentiality of a possible future geostationary instrument, MAGEAQ (Monitoring the Atmosphere from Geostationary orbit for European Air Quality), for retrieving ozone measurements over Europe. In particular, MAGEAQ can provide 1-hour temporal sampling at 10x10km pixel resolution for measurements in both visible (VIS) and thermal infrared (TIR) bands -thus, we will be able to measure during the day and at night. MAGEAQ synthetic radiance observations are obtained through radiative transfer (RT) simulations using the VLIDORT discrete ordinate RT model (Spurr, 2006) based on output from the GEOS-5 Nature Run (Gelaro et al., 2015) providing optical information, plus a suitable instrument model. Ozone is retrieved from these synthetic measurements using the optimal estimation inversion scheme of Levenberg-Marquardt. Finally, we examine an application of the air quality concept based on these ozone retrievals during the heatwave event of July 2006 over Europe.

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