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Atmospheric composition observations from geostationary orbit

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This paper will examine the value of future observations of tropospheric ozone and its precursors from a geostationary satellite platform and their application in monitoring the distribution and evolution of pollution. Several countries are currently planning such missions, and we describe work carried out in support of the NASA Geostationary Coastal and Air Pollution Events (GEO-CAPE) Mission. Compared to current capability with low-Earth orbit sensors, measurements from GEO-CAPE would have the advantages of increased spatiotemporal resolution and sampling, and for ozone and carbon monoxide, enhanced measurement sensitivity to the lowermost troposphere through multispectral retrievals. We discuss how observing system simulation experiments (OSSEs) using the WRF-Chem regional model together with our current satellite observations help define geostationary measurement requirements and assess capability. This will be illustrated with a case study aimed at quantifying the ability of GEO-CAPE measurements to distinguish the relative contributions of nearby sources and long-range transport to locally observed pollution events.