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Atmospheric Measurement Techniques Discussions

Interactive comment on "Geostationary Emission Explorer for Europe (G3E): mission concept and initial performance assessment" *by* A. Butz et al.

Anonymous Referee #1

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<General Comments> Regional scale monitoring of diurnal variation from the GEO orbit is very important. The paper is worth publishing as an AMT paper after revisions. The GEO geometry of the sun-the earth's surface-the satellite are quite different from the LEO GOSAT and OCO-2 geometries. Brief description of typical scattering angle of observation, modeled-phase function of aerosols and cirrus clouds, and BRDF of the Earth's surface will help readers understating. In addition to random electrical noise and aerosol/cirrus scattering, possible error sources should be listed. From the GEO orbit, 2km spatial-scale measurement with relatively longer integration time of 2.88s is technically challenging. Signal to noise ratio is well discussed. The pointing speed, accuracy, and settling down stability should be described briefly. When the authors use a priori meteorology data such as surface pressure as an input to their

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forward calculation, non-flat topography, especially over mountains valleys and basins in Europe also might cause errors.

<Specific Comments> (1) Page 6956, Line 17: Authors mentioned the availability of a 2000-pixel detector. Brief description of how the use of wider spectral range improves retrieval is needed.

(2) Page 6957, Line 2: In addition to viewing and solar zenith angle ranges, description of scattering angle range between the sun, target and the satellite will help readers' understanding of scattering by aerosol and the earth's surface reflection

(3) Page 6959, Line 19: The authors use MODIS MCD43A41 surface-albedo product. Is it MCD43A4? Nadir albedo is sometimes too conservative to estimate SNR. MODIS BRDF MCD43B1 products will be helpful to estimate the BRDF dependency (non Lambertian portion). From the GEO geometry, bare soil and forest at high latitude show stronger backward reflection.

(4) Page 6960, Line 21: The brief explanation of why authors selected "factor of 0.7 to extrapolate MODIS albedo to this study".

(5) Page 6967. Line 17: Why is "a substantial improvement over the nonscattering assumption?"

<Technical Corrections> (1) Figure 3: Why is all-included black line narrower than colored single molecule absorption?

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