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Comparison of lightning observed by ASIM on the International Space Station and GLM on the GOES-16 geostationary satellite

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The Atmosphere-Space Interactions Monitor includes an optical imaging array consisting of 5 nadir-viewing sensors, dedicated to monitor electrical discharges in and above thunderstorms. Three photometers sample in 337.0/4 nm, the VUV band 180-230 nm and 777.4/5 nm with a sample rate of 100 kHz while the 2 cameras record in 337.0/3 nm and in 777.4/3 nm with a temporal and spatial resolution of 12 frames per second and ~400 m, respectively. The Geostationary Lightning Mapper (GLM) on the GOES-16 satellite is the first operational space-based lightning detector in geostationary orbit measuring in 777.4/1 nm, with a pixel size of ~8-14 km and temporal resolution of up to 500 frames per second.

We present an analysis of the signal amplitudes and detection efficiencies of ASIM and GLM based on three mutually detected storms: one in the center and two on the edges of GLM field of view. We find a dependence of the amplitudes and detection efficiencies on the cloud structure and the observation angles of ASIM and GLM. The best agreement between the instruments appears when ASIM detects towards the nadir, but differences in amplitudes may vary by several orders of magnitude. The cloud structure offers a potential explanation for these differences which we will explore in the presentation.