Assessment of the GOES-16 Geostationary Lightning Mapper for global severe convection aviation applications

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The Geostationary Lightning Mapper (GLM) instrument on the GOES-R series of geostationary weather satellites operated by NASA/NOAA is the first optical lightning location instrument to operate from geostationary orbit. It provides the opportunity to monitor lightning activity over an area in excess of 100 million square kilometres continuously using a single instrument, with the coverage of the GOES-16 GLM extending from South America up to Southern Canada, and from the East Pacific to near the West Coast of Africa. The Met Office, in partnership with US partners, has a responsibility to provide automated global gridded hazard forecasts for cumulonimbus (Cb) clouds for strategic flight planning as part of the World Area Forecast Service (WAFS). Therefore, this new satellite lightning capability provides a new opportunity to assess the performance of deterministic and probabilistic forecasts of convection for aviation users over remote regions with limited datasets of observations. Additionally, the new data can be used to calibrate the Met Office' prototype probabilistic global Cb forecast product. GLM data from the GOES-16 satellite has been collected by the Met Office, with a view to assessing the characteristics and performance of the instrument and data produced. Data from May 2018 to January 2019 has been assessed and compared to data from the Met Office ATDnet lightning location system (LLS). ATDnet is a ground-based, long-range LLS, using 10 sensors distributed across Europe to detect electromagnetic waves in the very low frequency (VLF) spectrum created by lightning. Results of this comparison and features (e.g. errors suspected to be caused by solar impacts on the sensor and satellite manoeuvres) of the GLM data are discussed.