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Are flashes over the U.S. particularly powerfull? Global patterns of lightning properties derived by the satellite instruments OTD and LIS

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The satellite instruments Optical Transient Detector (OTD) and Lightning Imaging Sensor (LIS) provide unique empirical data about the frequency of lightning flashes around the globe (OTD), and the tropics (LIS). Here we present a statistical analysis of various lightning properties derived from OTD/LIS, i.e. the number of so-called "events" and "groups" per flash, as well as the mean flash duration, footprint and radiance. These normalized quantities, which can be associated with the flash "strength", show consistent spatial patterns; most strikingly, oceanic flashes show higher values than continental flashes for all properties. Over land, regions with high (Eastern US) and low (India) flash strength can be clearly identified. We discuss possible causes and implications of the observed regional differences. Although a direct quantitative interpretation of the investigated flash properties is difficult, the observed spatial patterns provide valuable information for the interpretation and application of climatological flash rates. Due to the systematic regional variations of physical flash characteristics, viewing conditions, and/or measurement sensitivities, e.g. parametrisations of lightning NO_x based on total flash rate densities alone are probably affected by regional biases.