

Initial Results from the Lightning Imaging Sensor (LIS) on the International Space station (ISS) and Comparison with Observations from the Tropical Rainfall Measuring Mission (TRMM) LIS

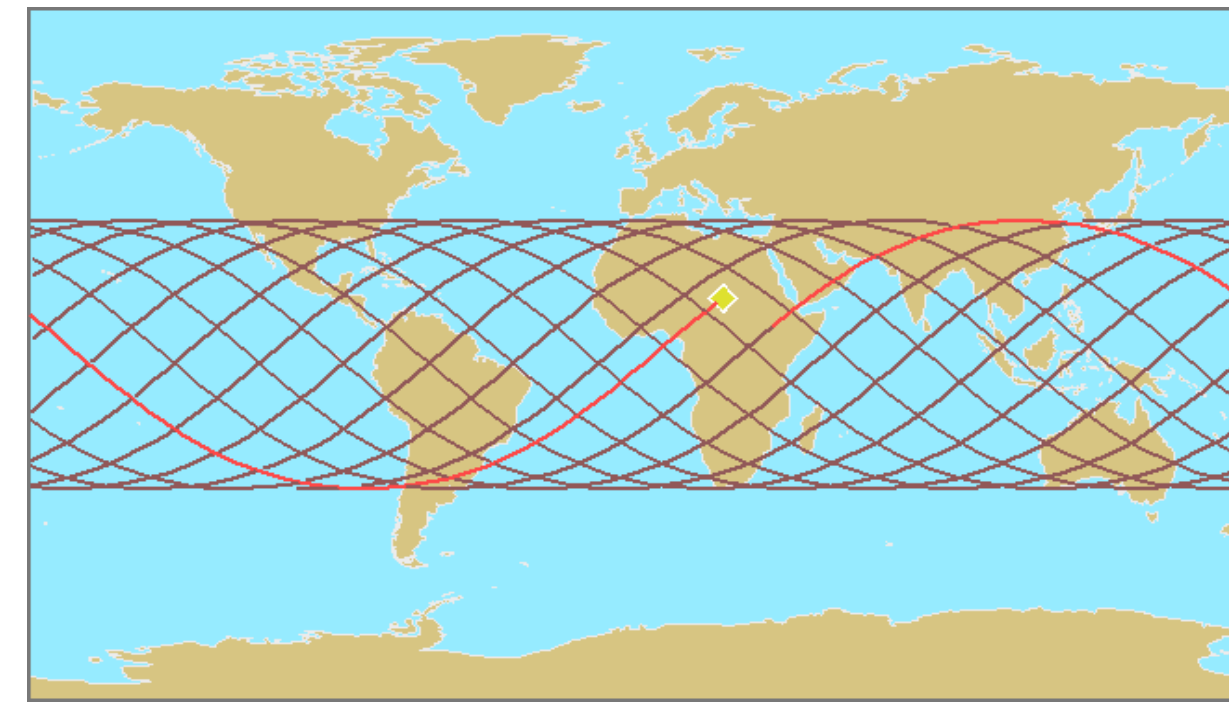
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INTRODUCTION: The Lightning Imaging Sensor (LIS) was designed for the Tropical Rainfall Measuring Mission (TRMM). The TRMM LIS collected lightning data from space from 1998-2015 onboard the TRMM satellite. During August 2001 the TRMM satellite was boosted from 350 to 402.5 km altitude. In 2017 another LIS (built as a backup to the TRMM LIS) was launched into orbit and located on the International Space Station (ISS). The ISS LIS has been observing lightning from space since February 2017 from an orbital altitude of about 410 km. This study compares ISS LIS lightning observations with those obtained from post-boost TRMM LIS.

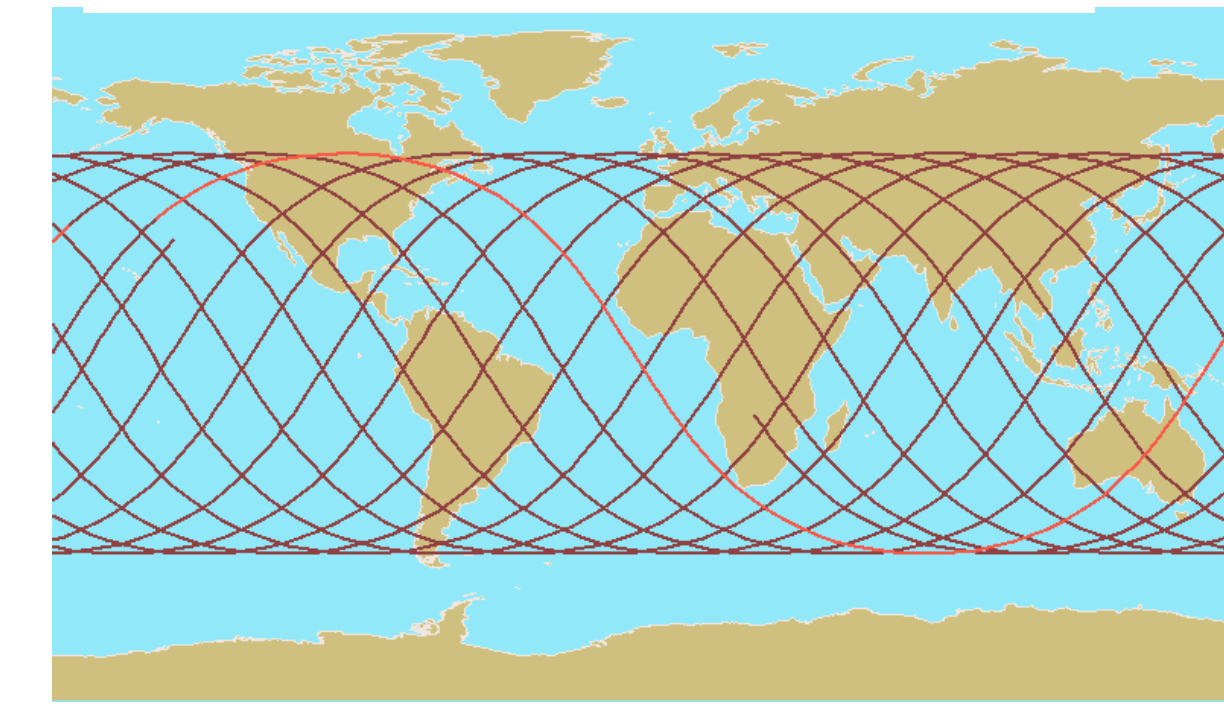
In addition, initial annual and seasonal maps of lightning flash rate climatology are shown using the ISS LIS observations. These ISS LIS lightning climatological maps compare favorably with those previously obtained from TRMM LIS and Optical Transient Detector (OTD) observations.

Orbit Characteristics

TRMM-LIS

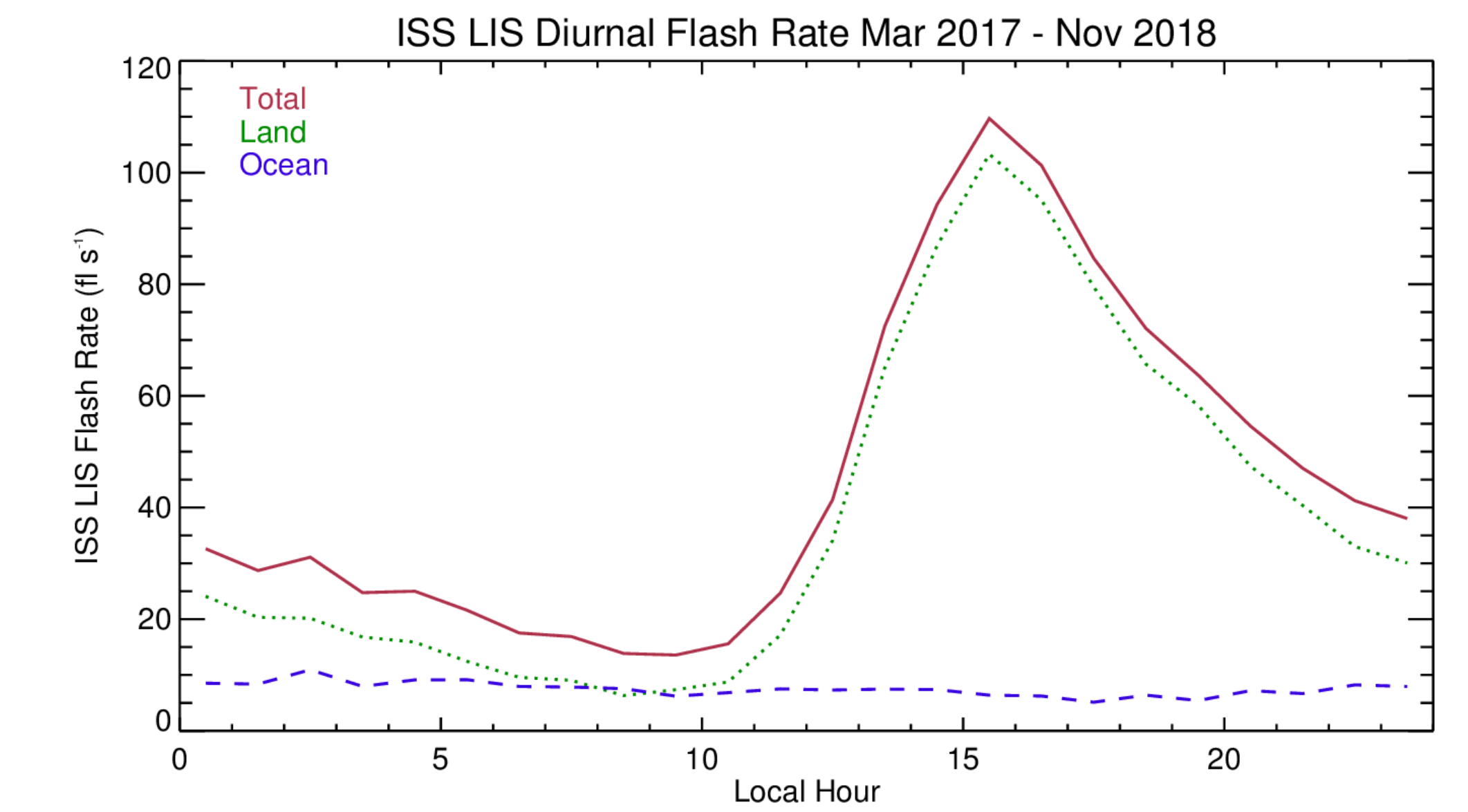


ISS-LIS



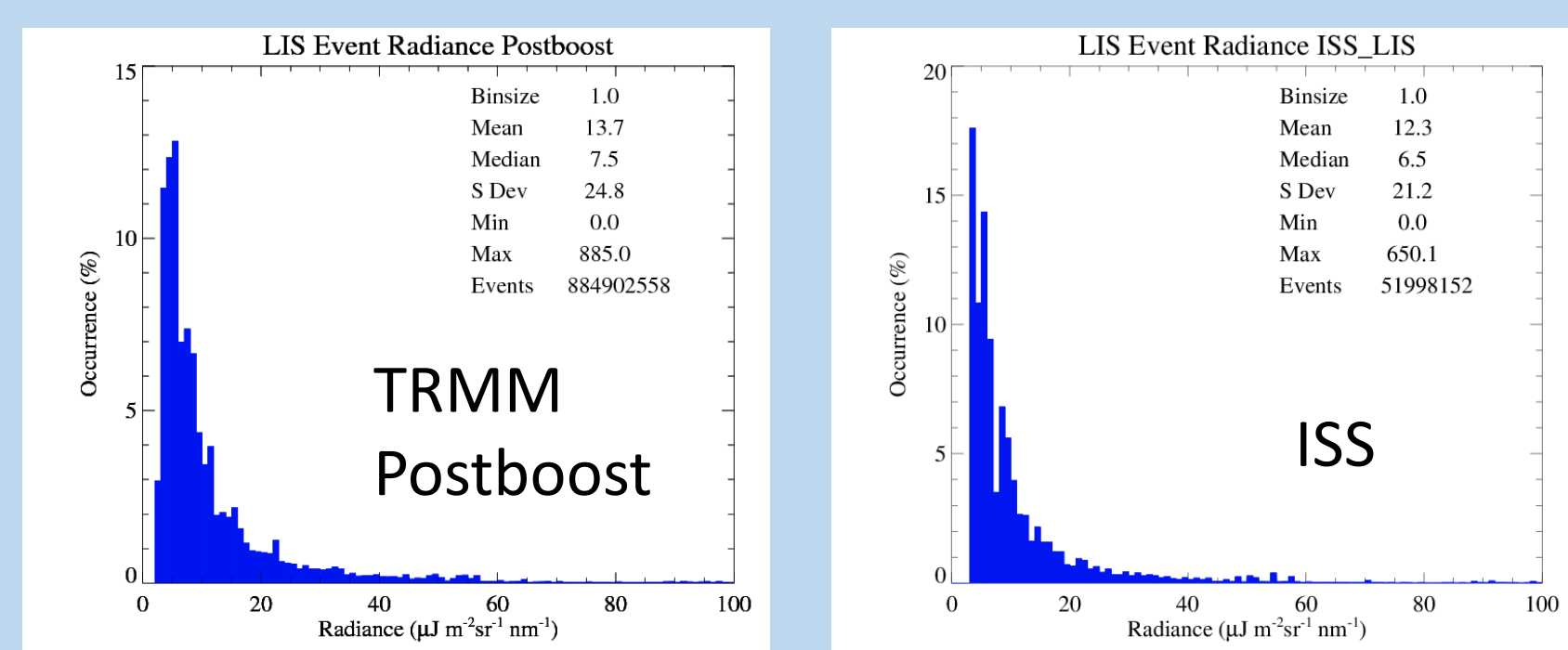
	TRMM Postboost (8/2001-2013)	ISS (2017-2018)
Inclination	35°	51.6°
Altitude (km)	402.5 km	405 km
Observation Limits	±38.5° Lat	±55° Lat
FOV (across)	650 km	655 km
FOV (edge)	700 km	707 km
FOV (diagonal)	990 km	1000 km
FOV area	454750 km ²	458340 km ²
Orbit revisit time	47 days	60 days
Pixel size (min.)	4.5 km	4.5 km
Pixel size (max.)	6.1 km	6.2 km
Pixel size (mean)	5.2 km	5.3 km

ISS LIS Diurnal Lightning



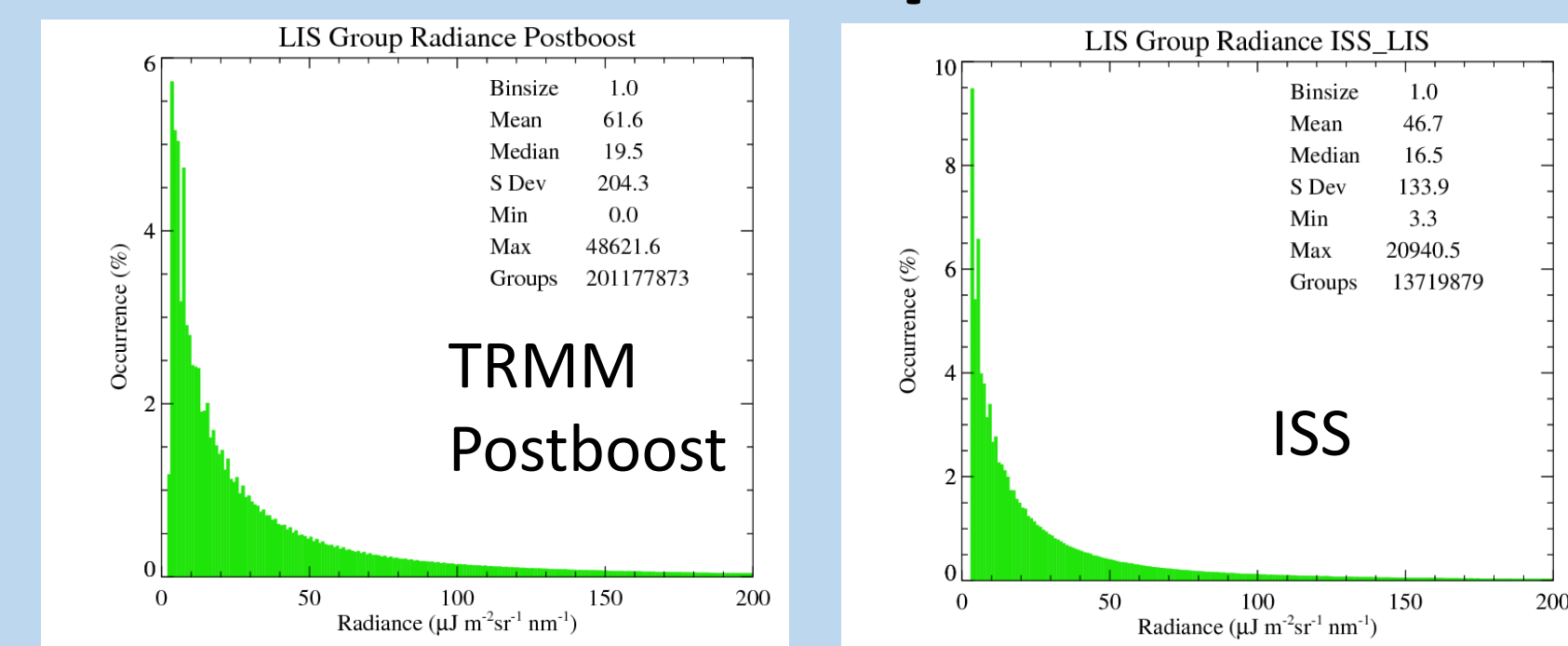
ISS TRMM LIS Comparison

Events

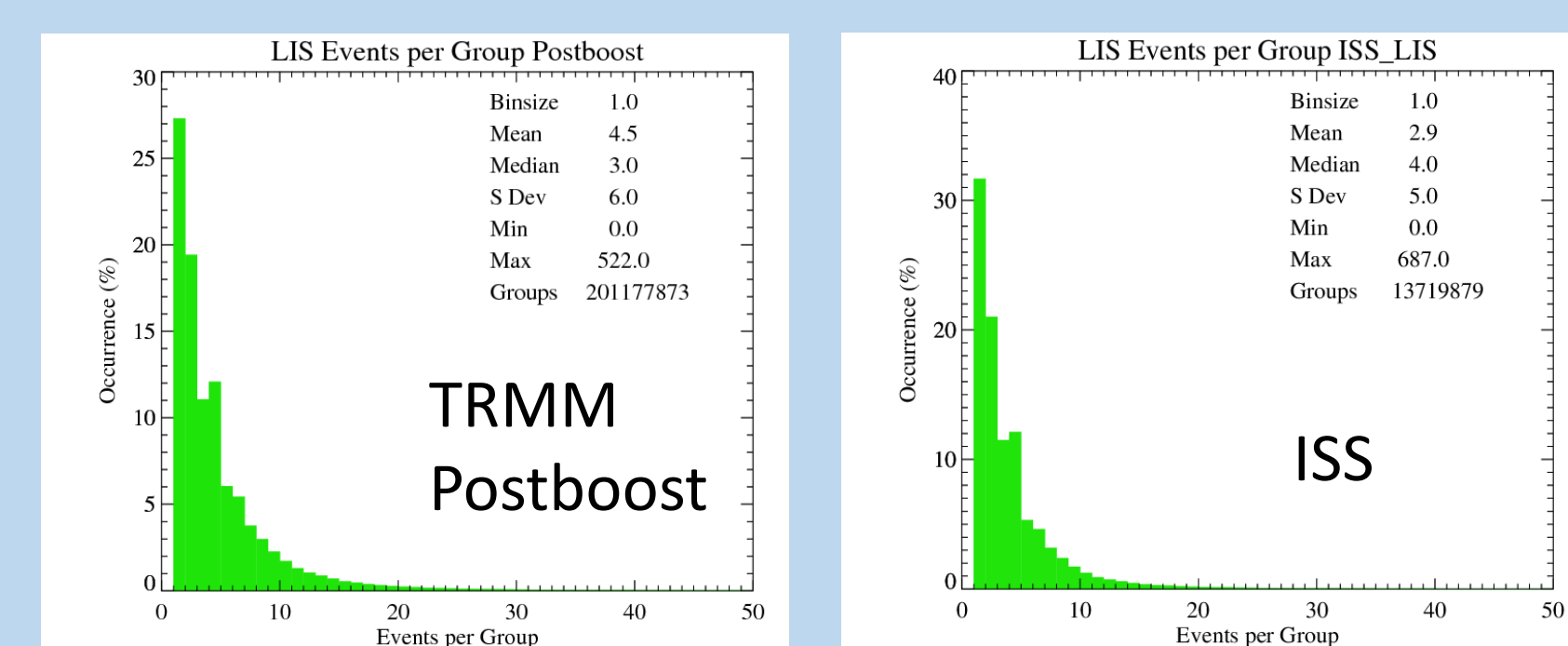


Radiance ($\mu\text{J m}^{-2} \text{sr}^{-2} \text{nm}^{-1}$)

Groups

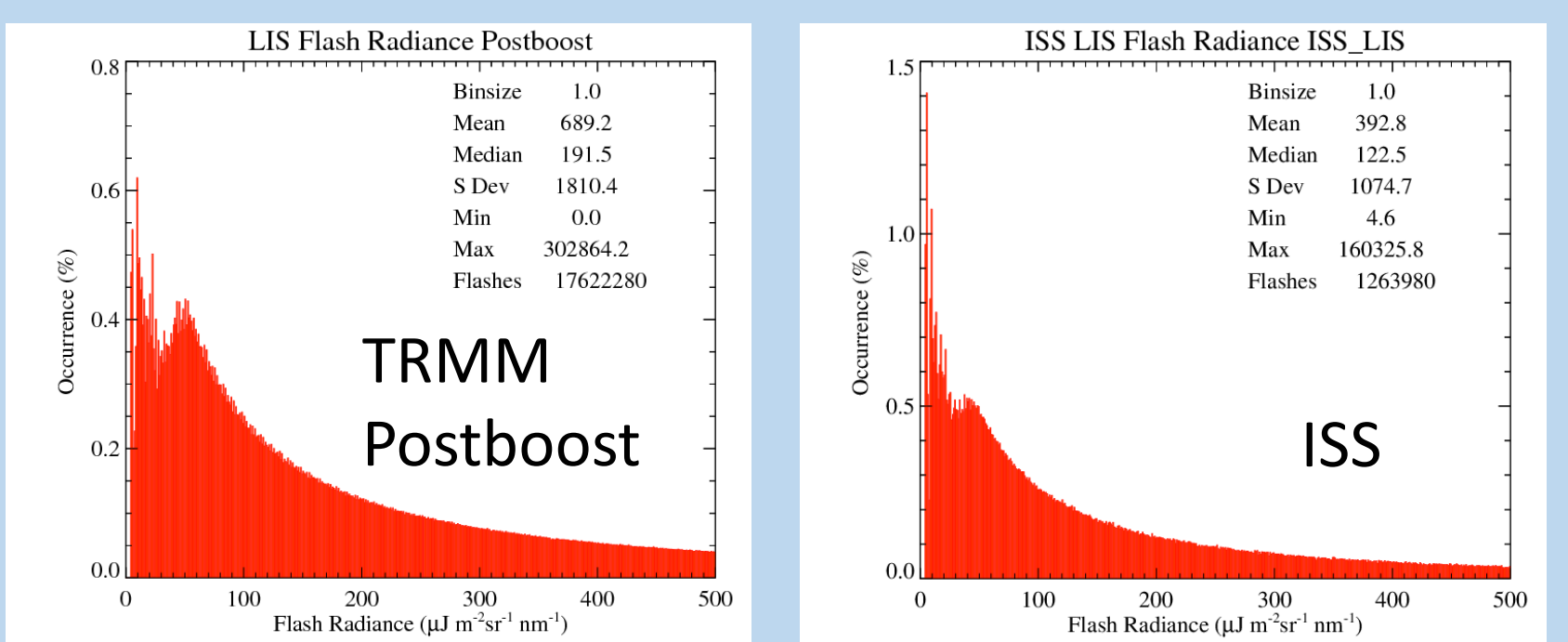


Radiance ($\mu\text{J m}^{-2} \text{sr}^{-2} \text{nm}^{-1}$)

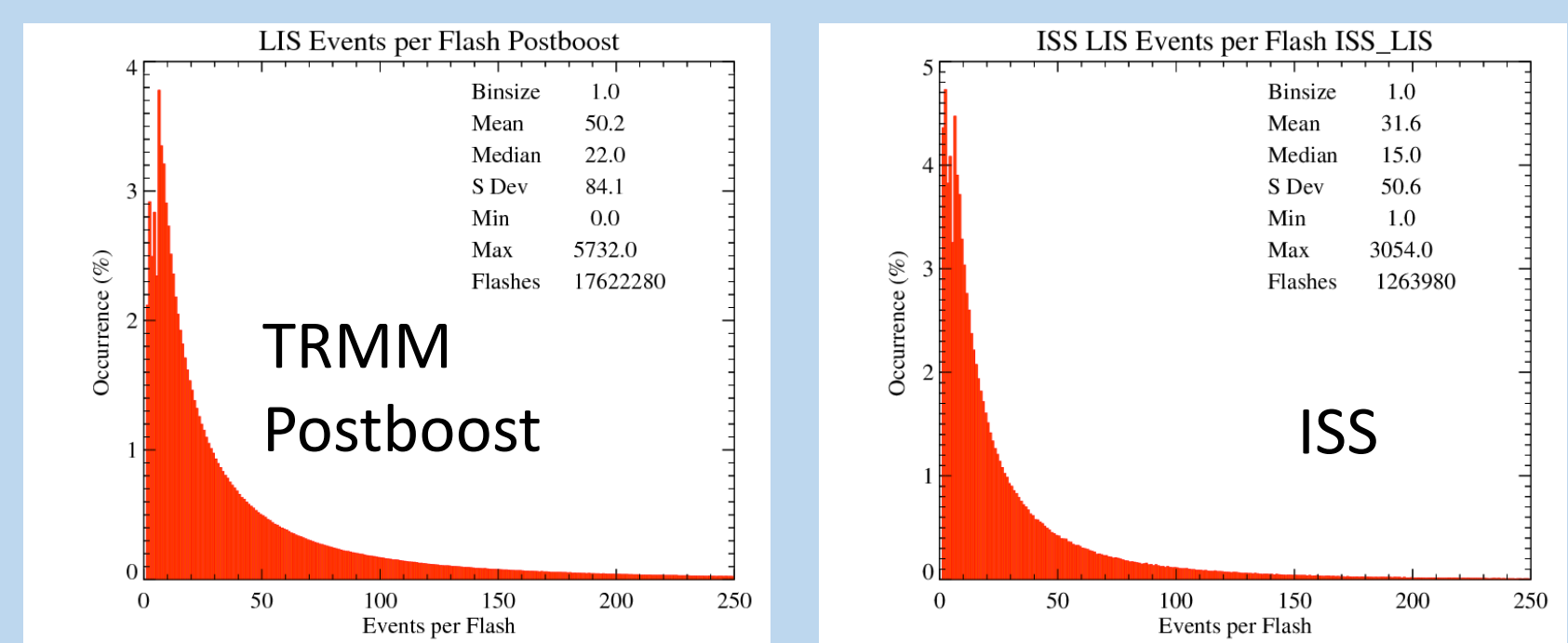


Events per group

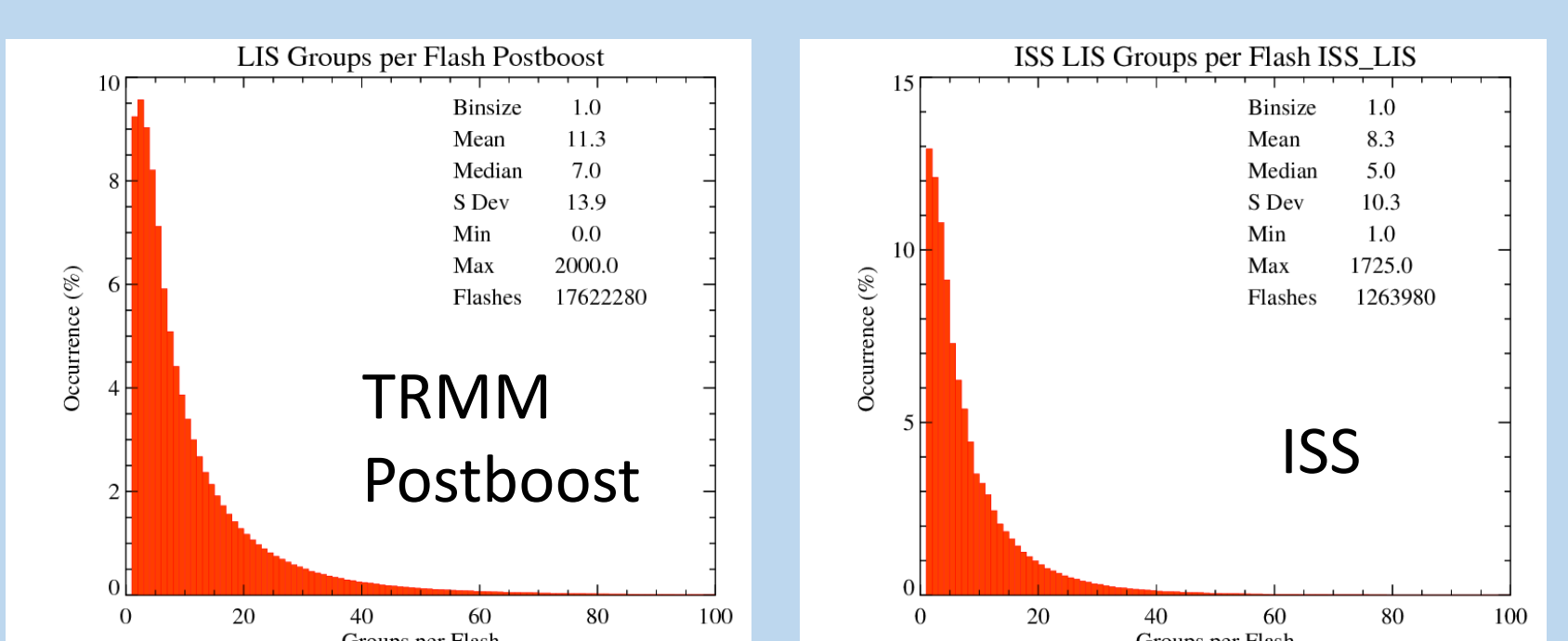
Flashes



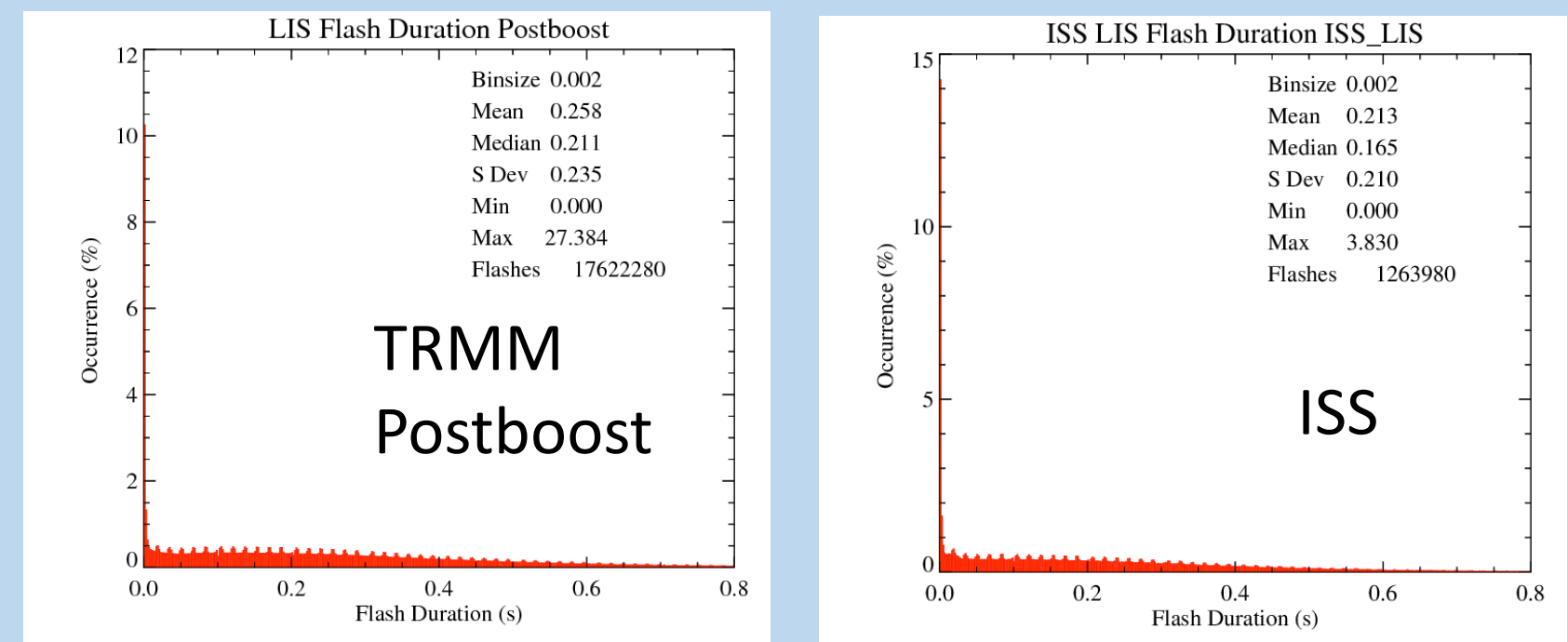
Radiance ($\mu\text{J m}^{-2} \text{sr}^{-2} \text{nm}^{-1}$)



Events per flash

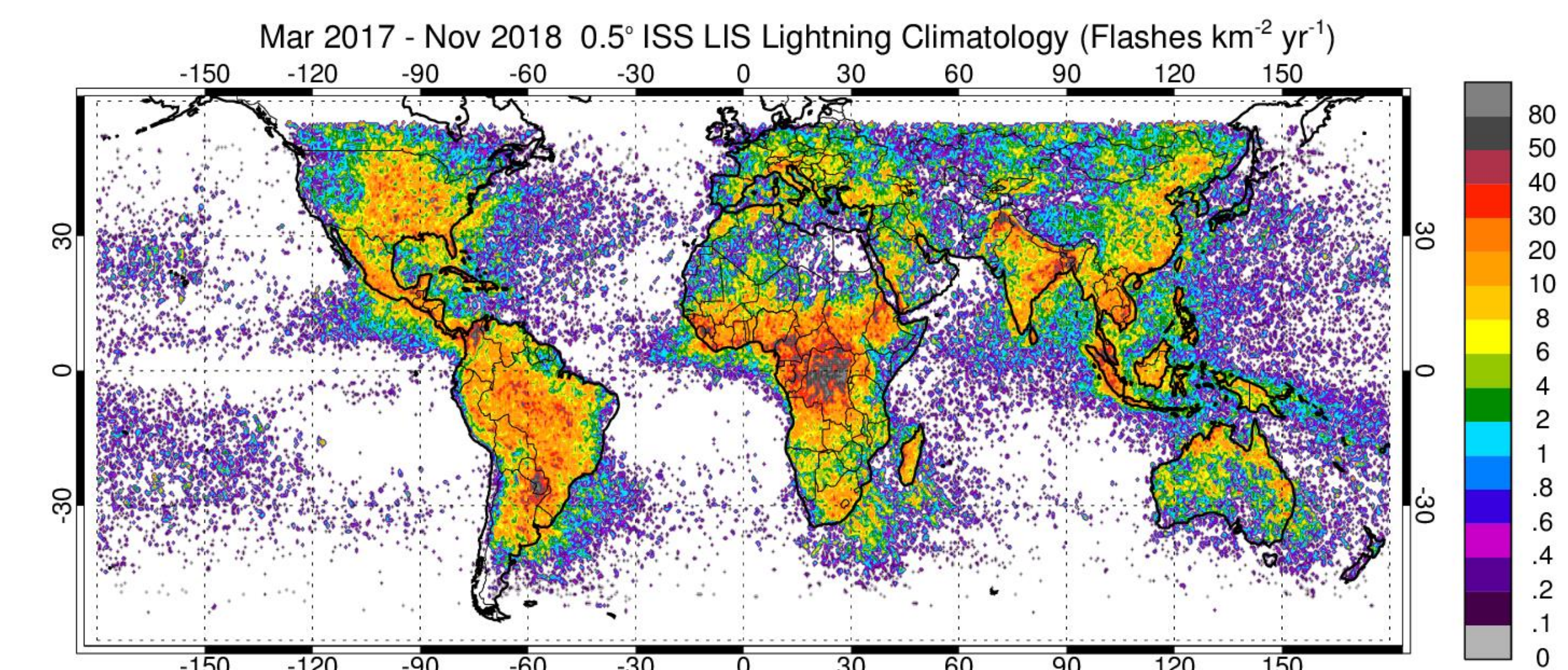


Groups per flash



Flash Duration (ms)

Annual ISS LIS Lightning Climatology



Seasonal ISS LIS Lightning Climatology

