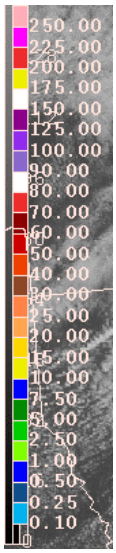
GLD360 Lightning Density Product (Operational Use)

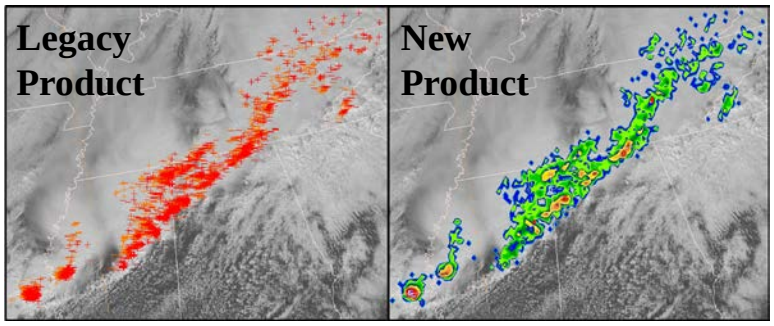


GLD360 Lightning Density Product

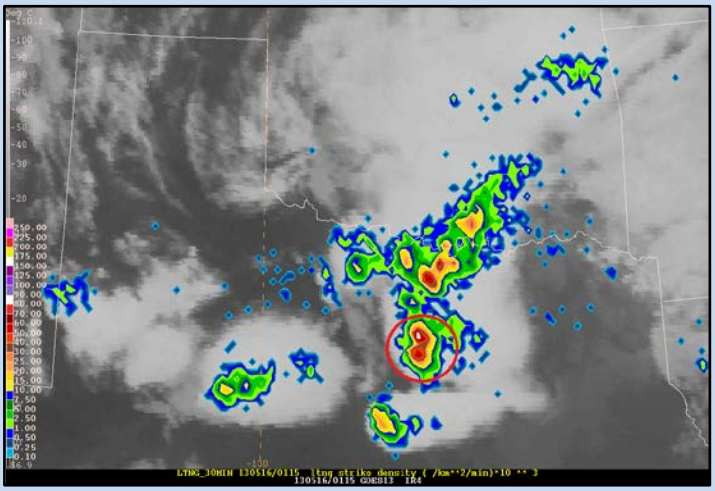
- Lightning density is the number of strokes in a grid cell over a given period of time.
- Density units are strokes per km^2 per min, and are multiplied by a scaling factor to obtain the scale units.
- The frequency of lightning strokes often is indicative of convective intensity.
- Product is provided at 2-min, 5-min, 15-min, and 30-min intervals on 8×8 km grids.

Suggested Product Pairings

- Visible and IR Imagery
- RGB Imagery
- Wind Vectors
- Surface Map
- Model Precipitation Estimates
- Sea Surface Temperatures
- Overshooting Top Detections
- Convective Initiation
- Cloud Top Cooling



Example Usage: Identify Splitting Supercells

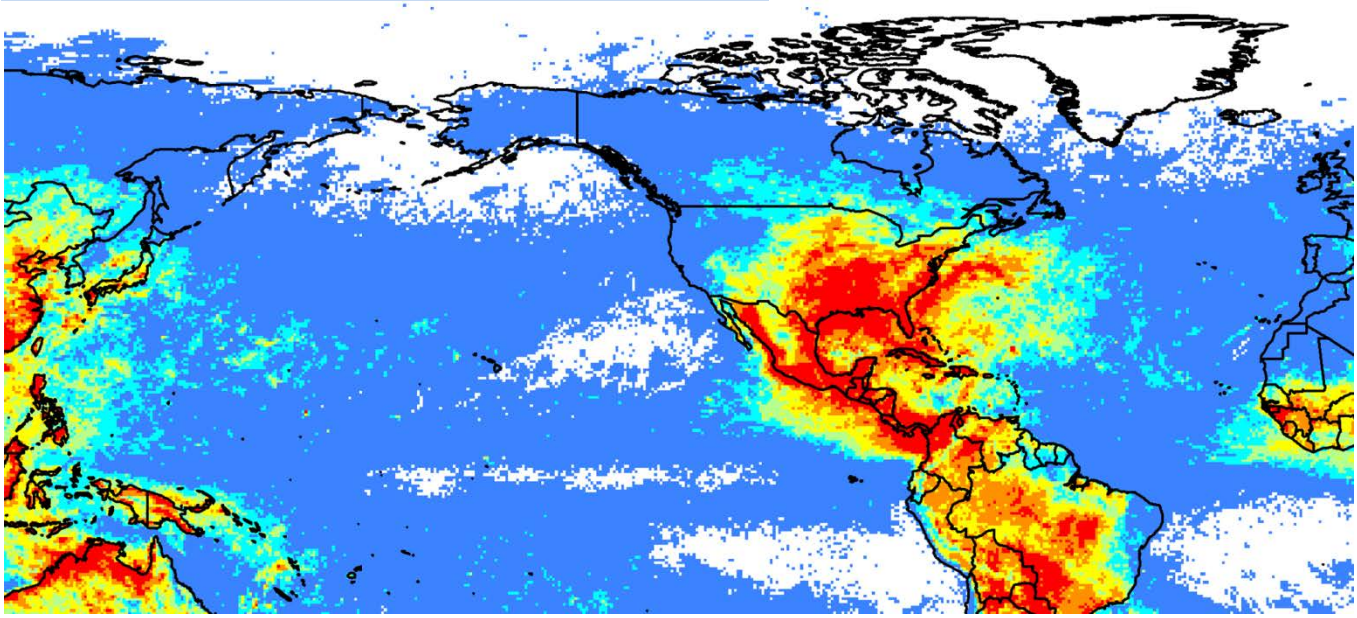


Animated Examples: http://alturl.com/24iqz

Operational Usage and Benefits

- Track convective cells beneath cloud shields
- Distinguish thunderstorms from rain-only areas
- Identify strengthening or weakening convection
- Monitor convective mode and thunderstorm evolution
- Diagnose initial atmospheric conditions
- Supplement/verify short-term model forecasts

GLD360 2012 Stroke Distribution



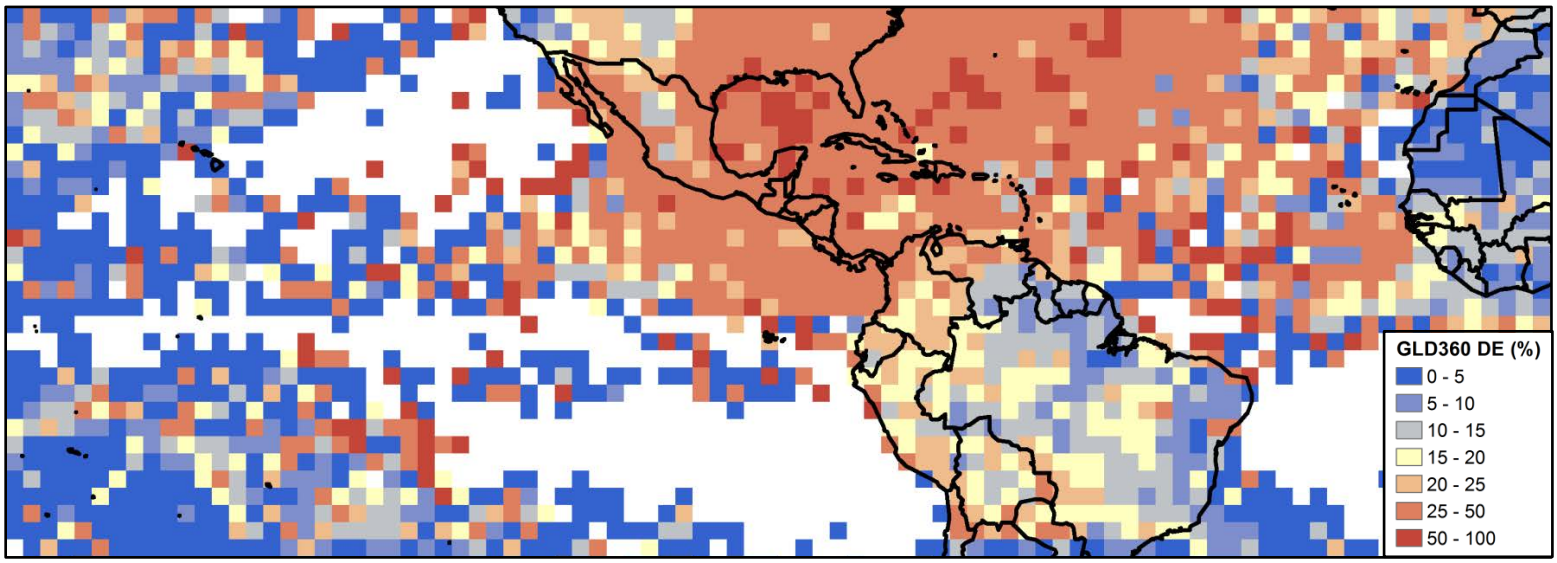
Stroke count per 0.5° grid cell

Domain:
115° E – 0°
80° N – 25° S

Stroke Count

- 0
- 1 - 1,500
- 1,500 - 4,000
- 4,000 - 8,000
- 8,000 - 16,000
- 16,000 - 28,000
- > 28,000

GLD360 Lightning Density Product (Data Properties)



GLD360 Detection Efficiency (DE)

- GLD360 DE was computed relative to the polar-orbiting TRMM Lightning Imaging Sensor (LIS).
- Analysis assumes that LIS observes all flashes, but the actual LIS DE varies from 90% during night to 70% at noon.
- The map above displays the fraction of all LIS flashes that were detected by the GLD360 during 2012.
- White cells indicate no LIS flashes for comparison.
- Regional Detection Efficiencies:
  W. Hemisphere = 25.3% Oceans = 33.0%
  North America = 33.4% South America = 17.5%

GLD360 is not the GOES-R GLM

- GLD360 detects VLF radio waves emitted by lightning, while the GLM is an optical detector.
- GLD360 detects primarily CG strokes, whereas the GLM will detect total lighting (IC + CG).
- GLD360 detected 25% of LIS flashes in the Western Hemisphere during 2012, while GLM will detect at least 70% of all flashes in its field of view.
- GLD360 detection efficiency varies spatially, while GLM will provide nearly uniform observations.
- Despite these differences, both systems provide instantaneous observations at the same spatial scale.

GLD360 Detection Method

- The GLD360 is a global network of ground-based sensors which detect very low frequency (VLF) radio waves emitted by lightning.
- Global coverage is achieved with relatively few sensors because the VLF radio waves are trapped by the earth-ionosphere waveguide and propagate for thousands of kilometers with minimal attenuation.
- Uses a combination of arrival time, arrival azimuth angle, range estimation, and amplitude to locate strokes. Strokes must be detected by at least three sensors to be accurately located.
- GLD360 detects primarily cloud-to-ground (CG) strokes, but also detects some strong intra-cloud (IC) flashes (network does not distinguish between CG and IC).

Forecaster Notes: