

Applying Virtual Reality Technology to Improve Lightning Safety



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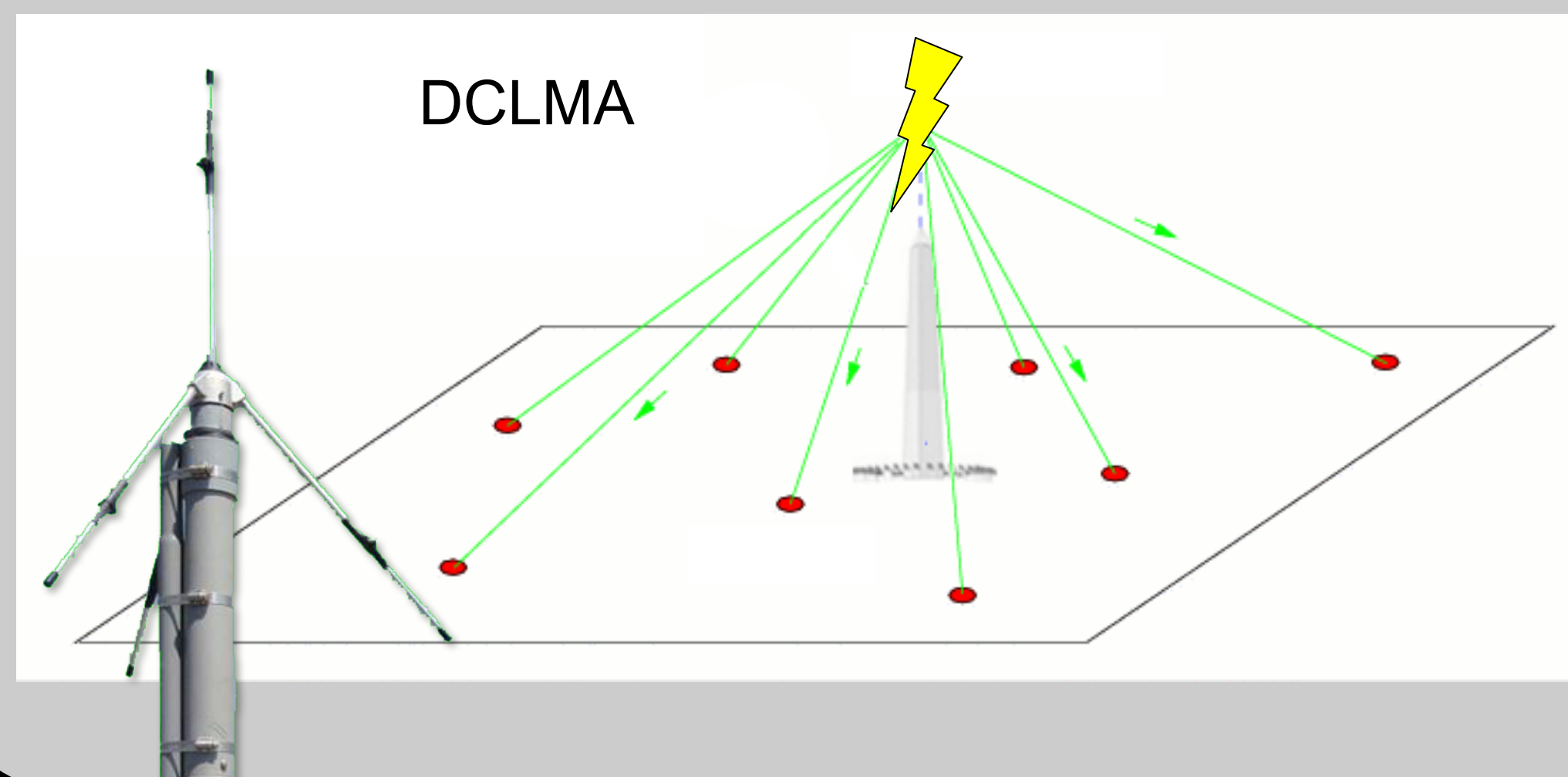


Abstract

Lightning hazards can be difficult to gauge because the strike that comes to ground is one small piece of a larger electrical breakdown that can span dozens to hundreds of kilometers. The remainder of the lightning channel is often obscured by clouds, and appears as a bright flash of light without a definite structure or origin. Lightning still poses a danger when it is hidden by a cloud or appears to be a considerable distance away. The lightning group at the Cooperative Institute for Climate and Satellites (CICS) in the Earth System Science Interdisciplinary Center (ESSIC) is applying Virtual Reality technology to measurements of the full 3D structure of lightning flashes to develop tools that enhance awareness of the lightning hazard.

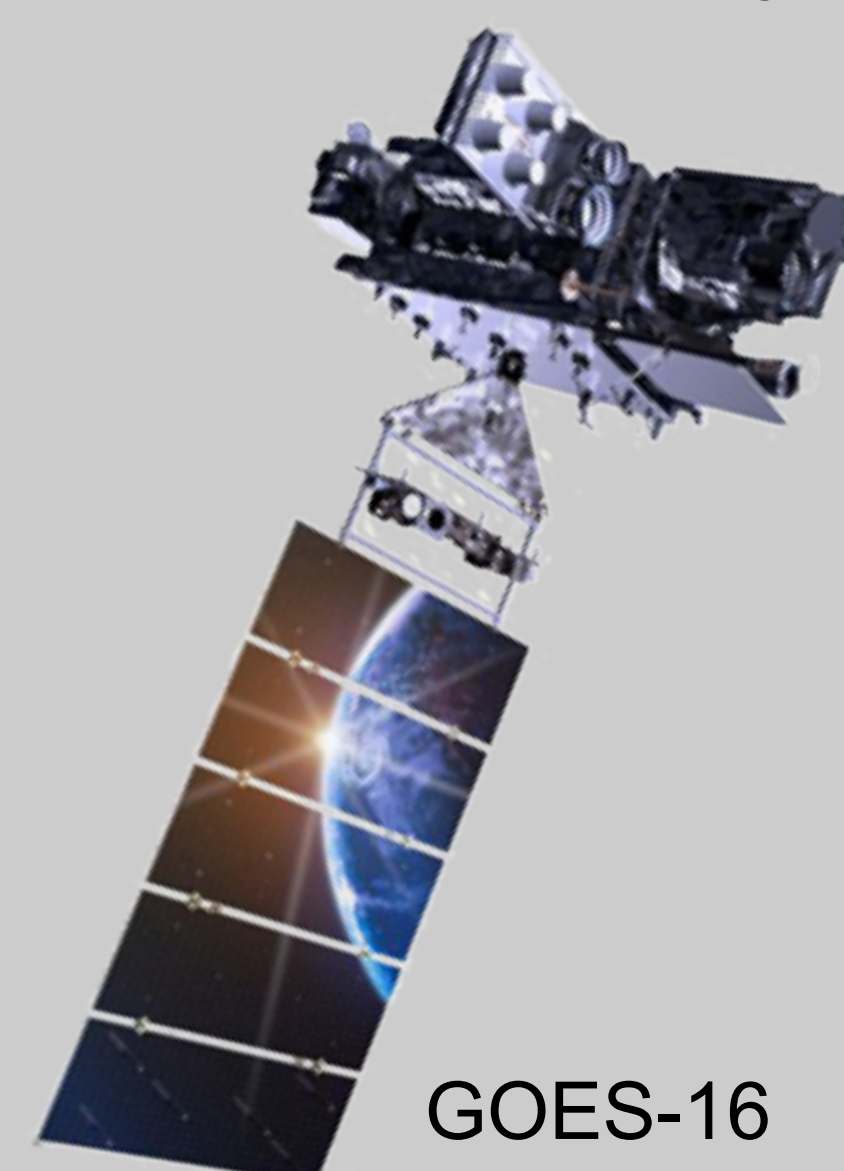
Radio Lightning Measurements

Lightning breakdowns generate radio waves. These atmospheric radio emissions not only cause static in AM stations, they can also be used to make detailed measurements of the breakdown path through the cloud and the ground strike point. The Washington D.C. Lightning Mapping Array (DCLMA) is a network of 9 lightning sensors around the DC metro area that maps the 3D structure of lightning throughout the region.



Lightning Imagery from Orbit

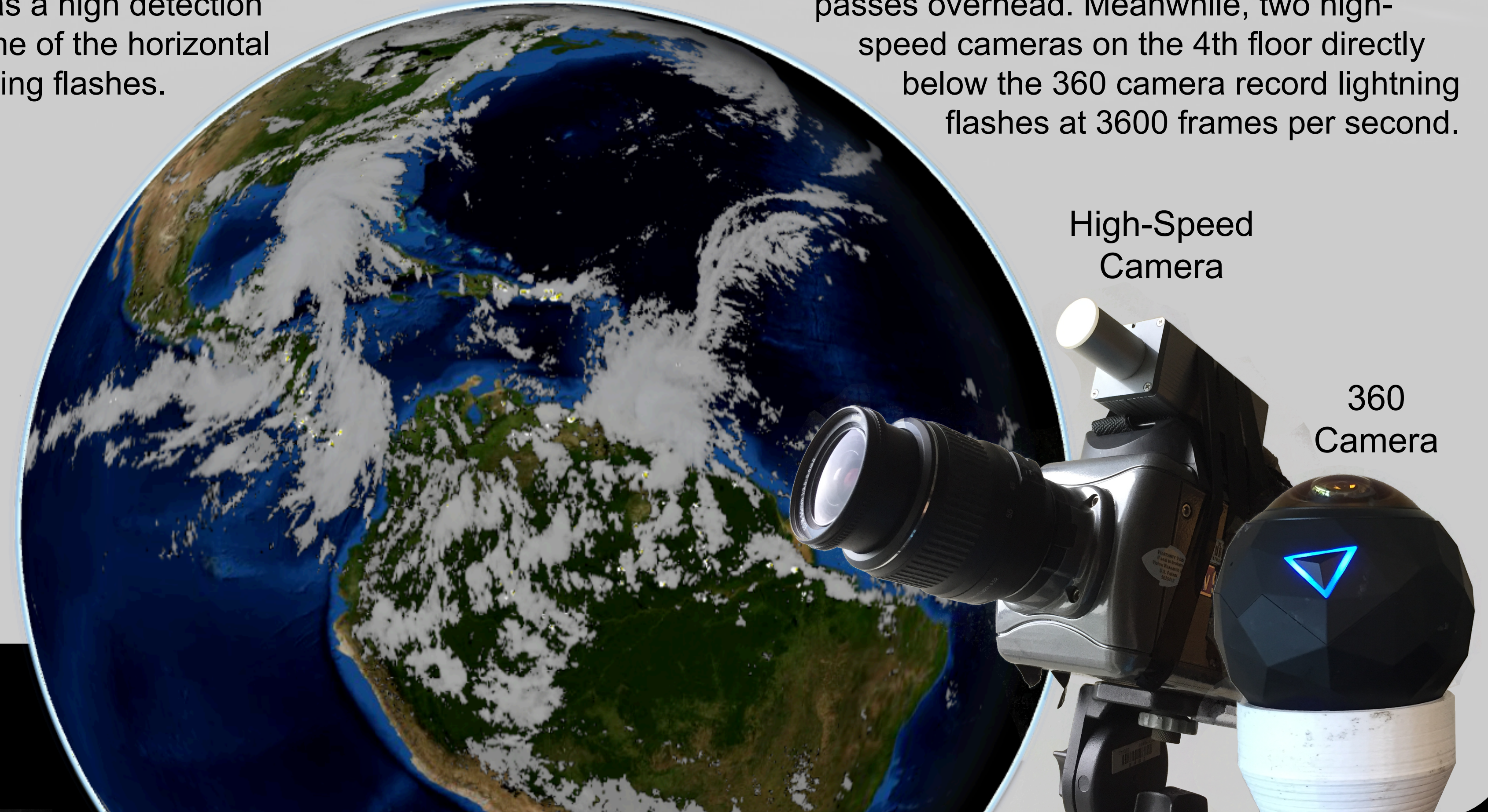
The Geostationary Lightning Mapper (GLM) aboard the Geostationary Operational Environmental Satellite (GOES) 16 satellite photographs lightning from above the thunderstorm. The GLM has a high detection efficiency and can map some of the horizontal structure of individual lightning flashes.



GOES-16

360 and High-Speed Videos

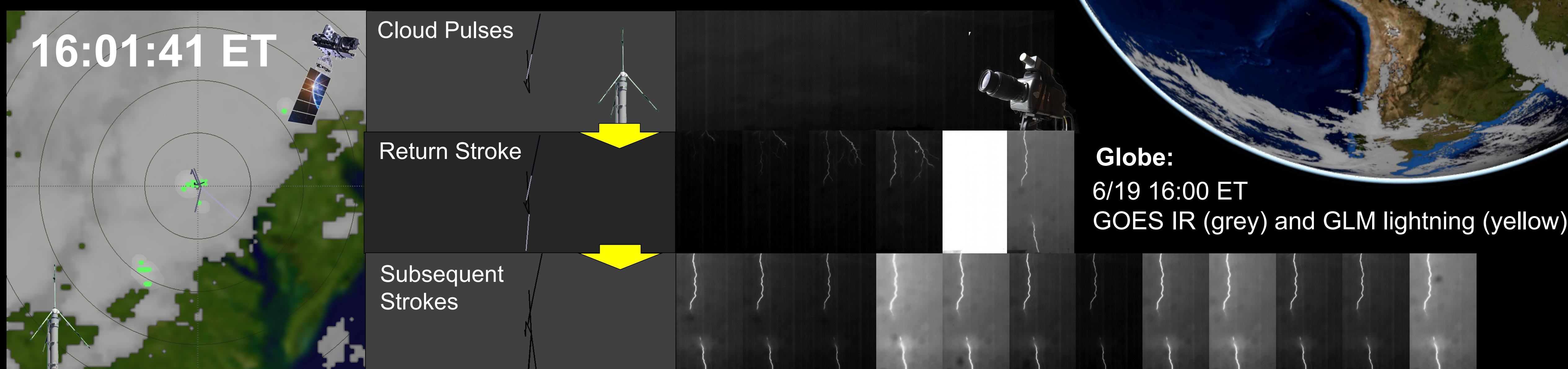
Two terrestrial camera systems are used to record lightning from the University of Maryland. A 360 degree camera on the roof creates whole sky video as the thunderstorm passes overhead. Meanwhile, two high-speed cameras on the 4th floor directly below the 360 camera record lightning flashes at 3600 frames per second.



High-Speed Camera

360 Camera

DC Thunderstorm on 6/19/2017



16:01:41 ET

Cloud Pulses

Return Stroke

Subsequent Strokes

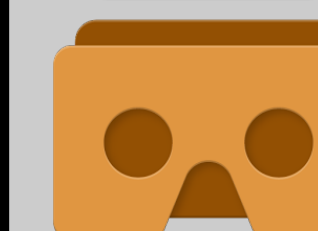
Globe:

6/19 16:00 ET

GOES IR (grey) and GLM lightning (yellow)

Watch Anytime

All of our VR videos are on YouTube, and are Google Cardboard compatible. Visit our channel for VR, satellite, and ground-based lightning videos:



youtube.com/user/sciguyp

15:50:30 ET

WEST

NORTH

EAST

SOUTH

15:50:30 ET

WEST

NORTH

EAST

SOUTH

Composite 15:18 ET – 20:49 ET

WEST

NORTH

EAST

SOUTH