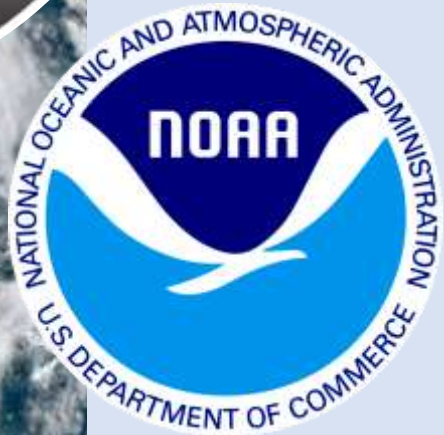# GeoXO Program Update

GLM Science Meeting
Nov. 13, 2023

NOAA
National Environmental Satellite,
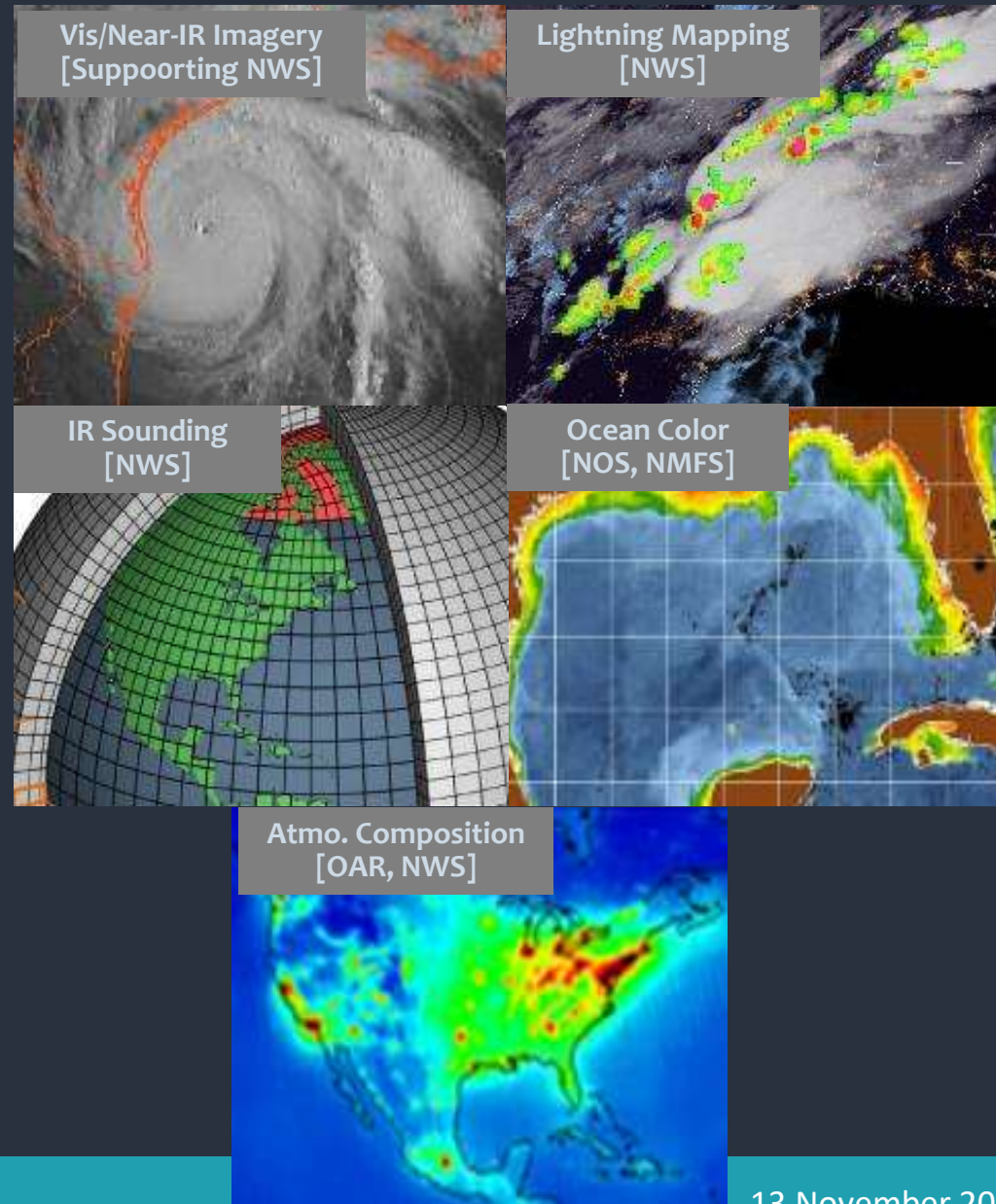Data, and Information Service

Andrew Heidinger, GEO Senior Scientist

Geostationary Extended Observation (GeoXO), the series to follow GOES-R, has been officially initiated by the Dept of Commerce

- DOC Milestone 2 approved November 2022
- Planning towards 1st Launch in 2032

GeoXO will expand the capabilities of the GOES-R series

- GXI – GeoXO Imager
- LMX – GeoXO Lightning Mapper
- GXS – GeoXO Infrared Sounder
- OCX – GeoXO Ocean Color
- ACX – GeoXO Atmospheric Composition

Vis/Near-IR Imagery [Suppoorting NWS]

Lightning Mapping [NWS]

IR Sounding [NWS]

Ocean Color [NOS, NMFS]

Atmo. Composition [OAR, NWS]

GeoXO Flight Summary

- Imager (GXI), L3Harris (awarded implementation contract)
  - Integrated Baseline Review completed 10/24-25

- Sounder (GXS)
  - Contract awarded to Ball Aerospace on 9/11; Protest received on 9/25

- Ocean Color (OCX)
  - Source Evaluation Board in progress

- Lightning Mapper (LMX)
  - Source Evaluation Board in progress

- Atmospheric Composition (ACX)
  - Final RFP 10/25; Proposals due 12/11/23

- Spacecraft
  - Final RFP released on 9/29; Proposals due 11/30/23
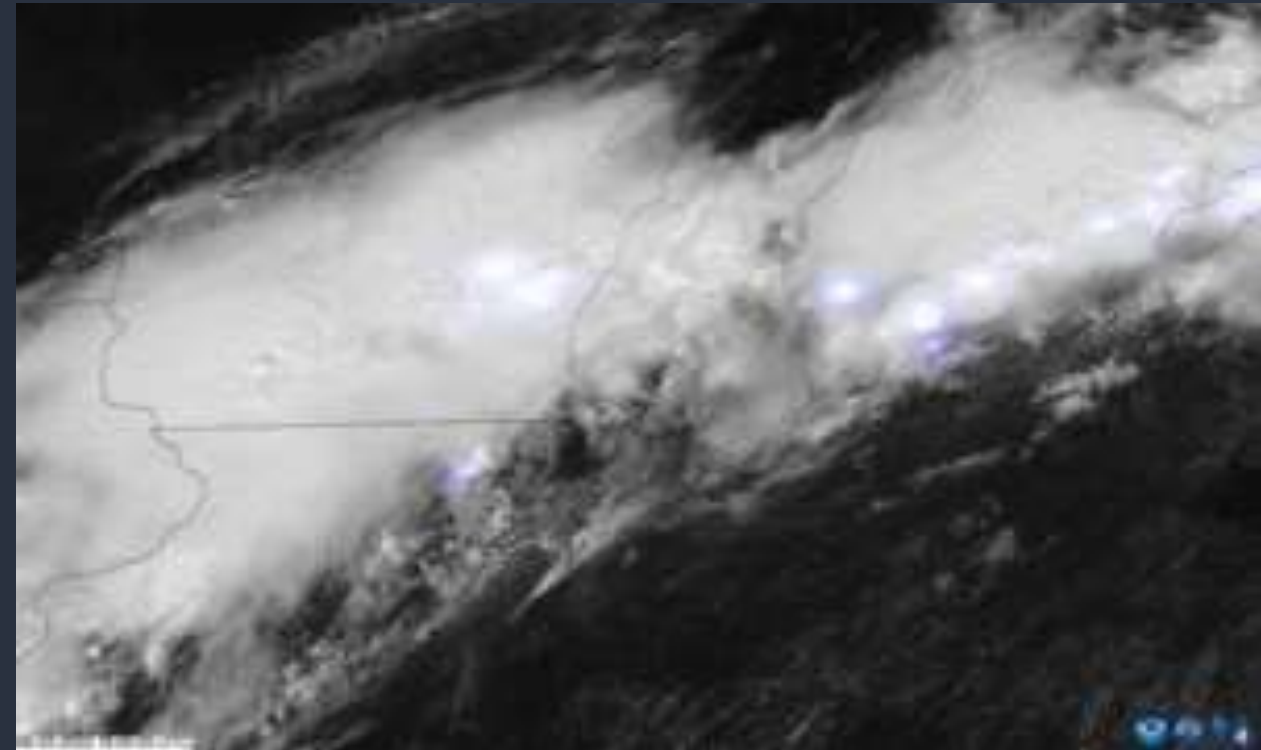
GeoXO Lightning Mapper: *LMX*

Parameter	Performance Requirement
Geographic coverage	84%
Ground sample distance (nadir)	8 km
Spectral Band	777.4 nm
Frame Rate	500 Hz
Data Latency	10 sec
SNR (daytime)	4
Navigation error	84 urad
Event detection	70%
False events	5%
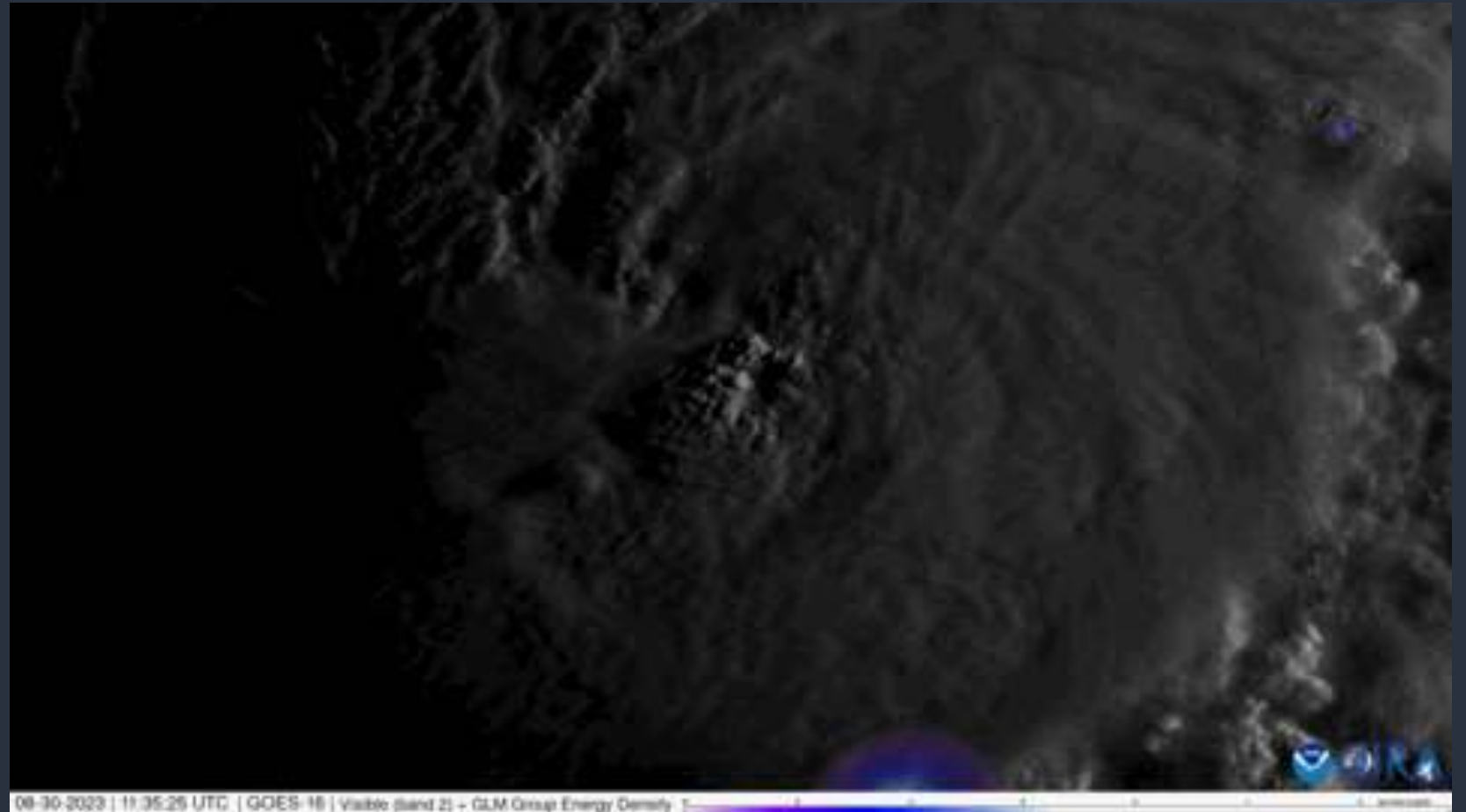
Hurricane Idalia – 30 Aug. 2023 – ABI+GLM – courtesy of CIRA

LMX Phase A Trade Studies

- **Frame Rate, ADC Effective Number of Bits, & Detector Noise Study**
  - Detector characteristics (quantum efficiency, pixel size, noise figure, and quantization number of bits) analyzed relative to improved lightning performance
  - Overall detector architecture and optical parameters defined for baseline designs
- **On-board event filtering**
  - Assessment of false events filtering due to line-of-sight angular motion, including dynamic filter adjustments and digital image stabilization
  - Defined flexible set of methodologies to effectively reduce false event rates without significant deterioration of detection probability
- **Detector Management Study**
  - Address anomalous pixels, detector defects and damage, additional false transient detections outside of onboard filtering, detector degradation
  - Methods and algorithms defined to identify and mitigate defective pixels
- **Heritage Build vs LMX Requirement Assessment**
  - Allowed for detailed evaluation of planned changes impacts

taken from Monica Todirita's EUMETSAT 2023 Talk

LMX Science Organization

- GeoXO has set up Science Working Groups for each sensor.
    - Instrument Scientist: Peter Armstrong (MIT/LL)
    - Product Scientist: Scott Rudlosky (NOAA/NESDIS)
    - User Scientist: Brian Gockel (NOAA/NWS)

- We expect these SWGs to evolve into larger Science Teams over time (i.e. GLM Science Team).

- We are funding the LMX Team to help with LMX formulation and to conduct value studies.

- We'll continue to fund to LMX, but we'll start funding these activities:
    - L2 innovation in Fy24
    - Calibration Activities in Fy26

- Given that GXI and LMX are incremental improvements over GOES-R, we expect to continue the innovation activities with GOES-R.