



# ISSRDC

## Explore Astronaut Photography of Earth: New GIS Data Portal

**Dr. Kenton Fisher**

*Additional Content provided:*

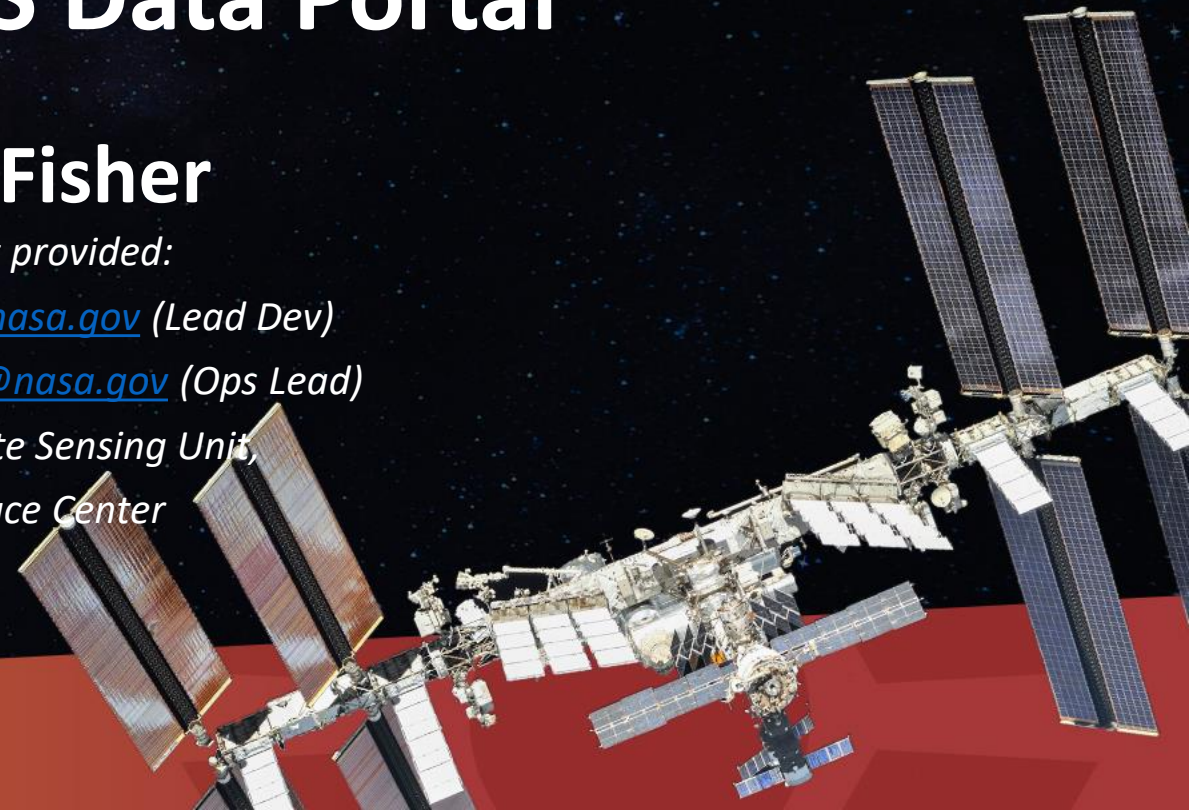
Alex Stoken [alex.h.stoken@nasa.gov](mailto:alex.h.stoken@nasa.gov) (Lead Dev)

Sara Schmidt [sara.e.schmidt@nasa.gov](mailto:sara.e.schmidt@nasa.gov) (Ops Lead)

*Earth Science and Remote Sensing Unit,  
NASA Johnson Space Center*

**AIRBUS**

Technical Session Sponsor





# Earth Science and Remote Sensing at NASA Johnson Space Center



We're a creative team of Earth scientists, GIS analysts, and computational scientists that work with astronaut photos of Earth

- Support NASA International Space Station (ISS) Program Office
- Payload operations for Crew Earth Observations (CEO) facility
- Curate and host astronaut photography of Earth online database
  - <https://eol.jsc.nasa.gov/>

# ISS Program Support



# Imagery Requests



# Disaster Response



# Weekly Articles



# Machine Learning



# Photo Database



# Gateway to Astronaut Photography of Earth

<https://eol.jsc.nasa.gov/>

GATEWAY TO  
ASTRONAUT PHOTOGRAPHY OF  
EARTH

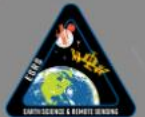


SEARCH PHOTOS **EXPLORE PHOTOS** COLLECTIONS ARCGIS ONLINE BEYOND THE PHOTOGRAPHY CREW EARTH OBS REQUEST NEW IMAGERY LATEST ISS IMAGERY TOOLS FAQ

New Map Portal



This service is provided by the [International Space Station](#) program and the [JSC Earth Science & Remote Sensing Unit](#), [ARES Division](#), Exploration Integration Science Directorate.




NASA Responsible Official: [Kenton Fisher](#) | Curator: [jsc-earthweb@mail.nasa.gov](mailto:jsc-earthweb@mail.nasa.gov) | [Terms of Use](#) | [NASA Web Privacy Policy & Important Notices](#) | [Accessibility](#) | [Policies & Contacts](#) | Server: 1

## Over 5 million images of Earth taken by astronauts

# Astronaut photos of Earth are freely available to view & download

*ISS060-E-7325*



<i>NASA Photo ID</i>	ISS060-E-7325
<i>Focal Length</i>	78mm
<i>Date taken</i>	2019.07.13
<i>Time taken</i>	11:35:31 GMT

*Resolutions offered for this image:*

[5568 x 3712 pixels](#) [640 x 427 pixels](#)

*Cloud masks available for this image:*

Zoom image at cursor


[Map Location](#) [Image Details](#) [Camera Information](#) [Download Options](#)

*Spacecraft nadir point:* 19.0° N, 69.9° W

*Photo center point:* 18.0° N, 67.0° W

*Nadir to Photo Center:* East

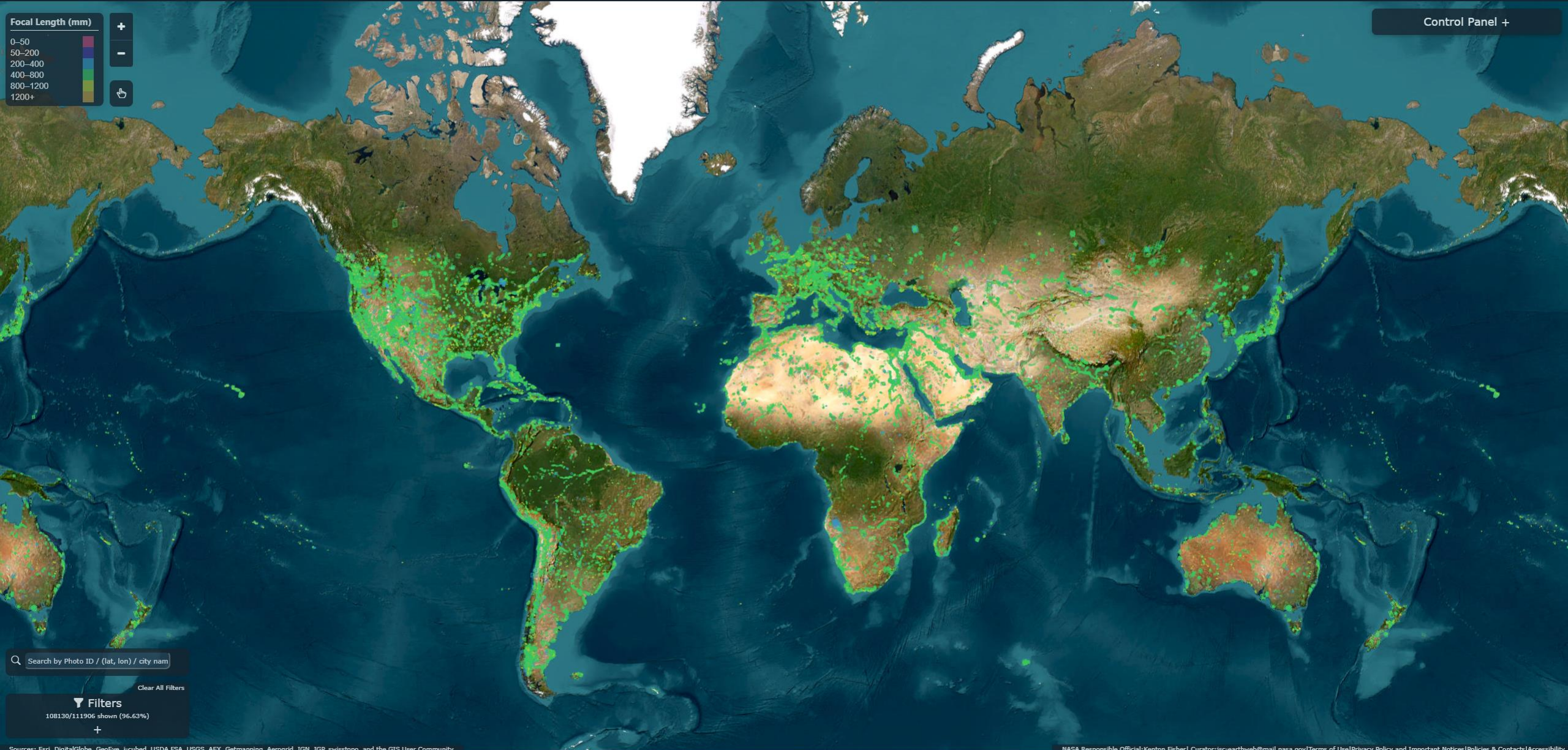
*Spacecraft Altitude:* 220 nautical miles (407km)



# New GIS Map Tool for GAPE

- Designed to make it easier for the public to interact with astronaut photography data
- Intuitive display of photography data
  - Looked at Google Earth and other popular GIS platforms for inspiration
- Built to leverage our new tools for auto-georeferencing day-time and night-time images





Sources: Esri, DigitalGlobe, GeoEye, Fcubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

NASA Responsible Official:Kenton Fisher| Curator:jsc-earthweb@mail.nasa.gov|Terms of Use|Privacy Policy and Important Notices|Policies & Contacts|Accessibility

# 2024 Technical Sessions





**Focal Length (mm)**

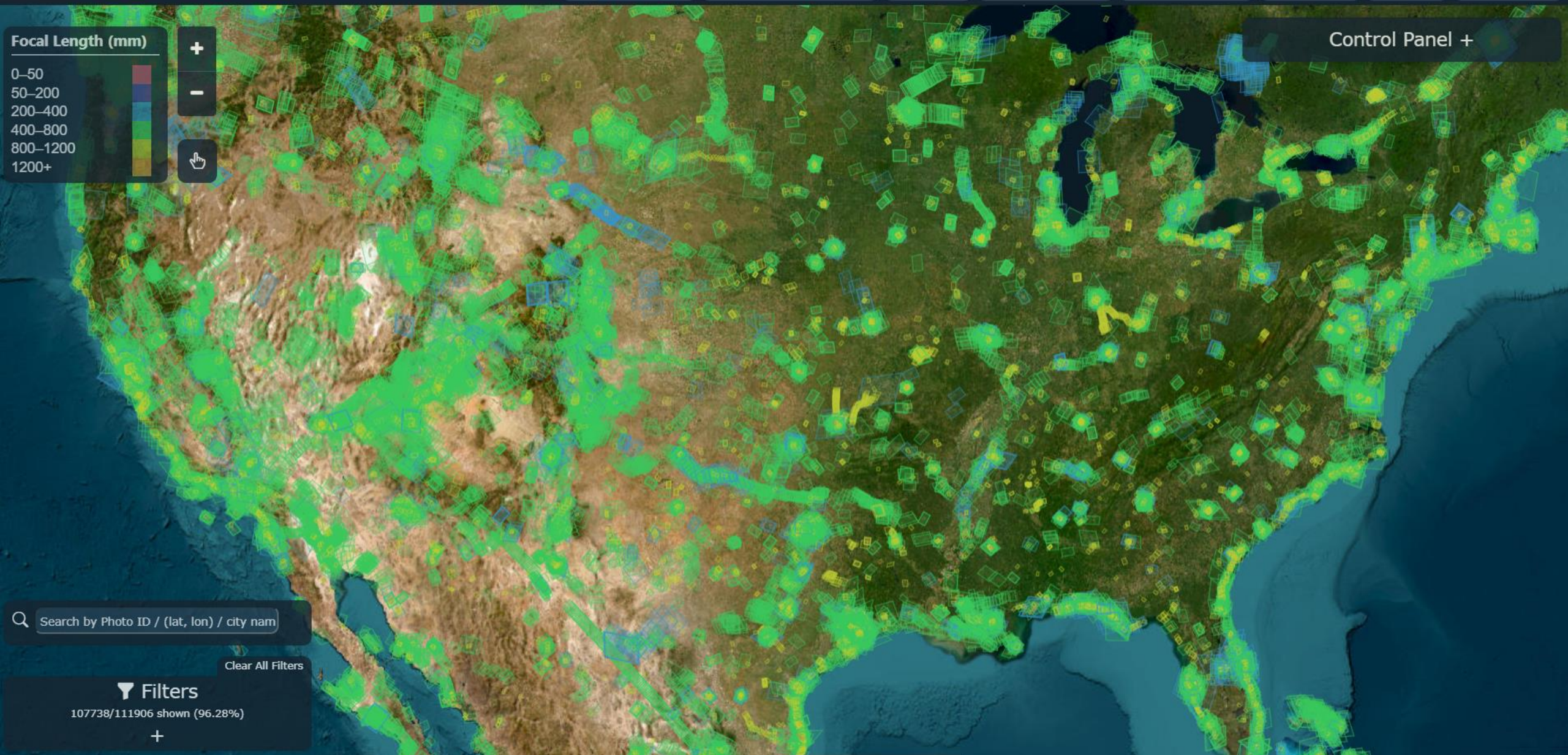
0-50  
50-200  
200-400  
400-800  
800-1200  
1200+

+

-

👉

Control Panel +



🔍 Search by Photo ID / (lat, lon) / city name

Clear All Filters

🔿 Filters

107738/111906 shown (96.28%)

+



<b>ISS008-E-15664</b>	
Lens	400 mm
Date	2004-02-13
Sun Elev Angle	18°
Cloud Coverage	25%
Features	REEFS, ANDROS ISLAND, CHANNELS
Spatial Resolution	11.5 mpp

Day/Night

ESRI Satellite

- ESRI Satellite
- OpenStreetMap
- Black Marble

Date (newer to older)

- Date (newer to older)
- Date (older to newer)
- Focal Len (high to low)
- Focal Len (low to high)
- Cloud % (low to high)
- Cloud % (high to low)
- Solar Elev (high to low)
- Solar Elev (low to high)
- Spatial Res (high to low)
- Spatial Res (low to high)

### Control Panel -

Basemap: ESRI Satellite

Borders  City Names

Astronaut Photo Footprints

Opacity: 100

Batch by: Date (newer to older)

with 10 items per batch

Opacity: 100

Select/Unselect All (32)

- ISS070-E-93857
- ISS070-E-93860
- ISS070-E-93858

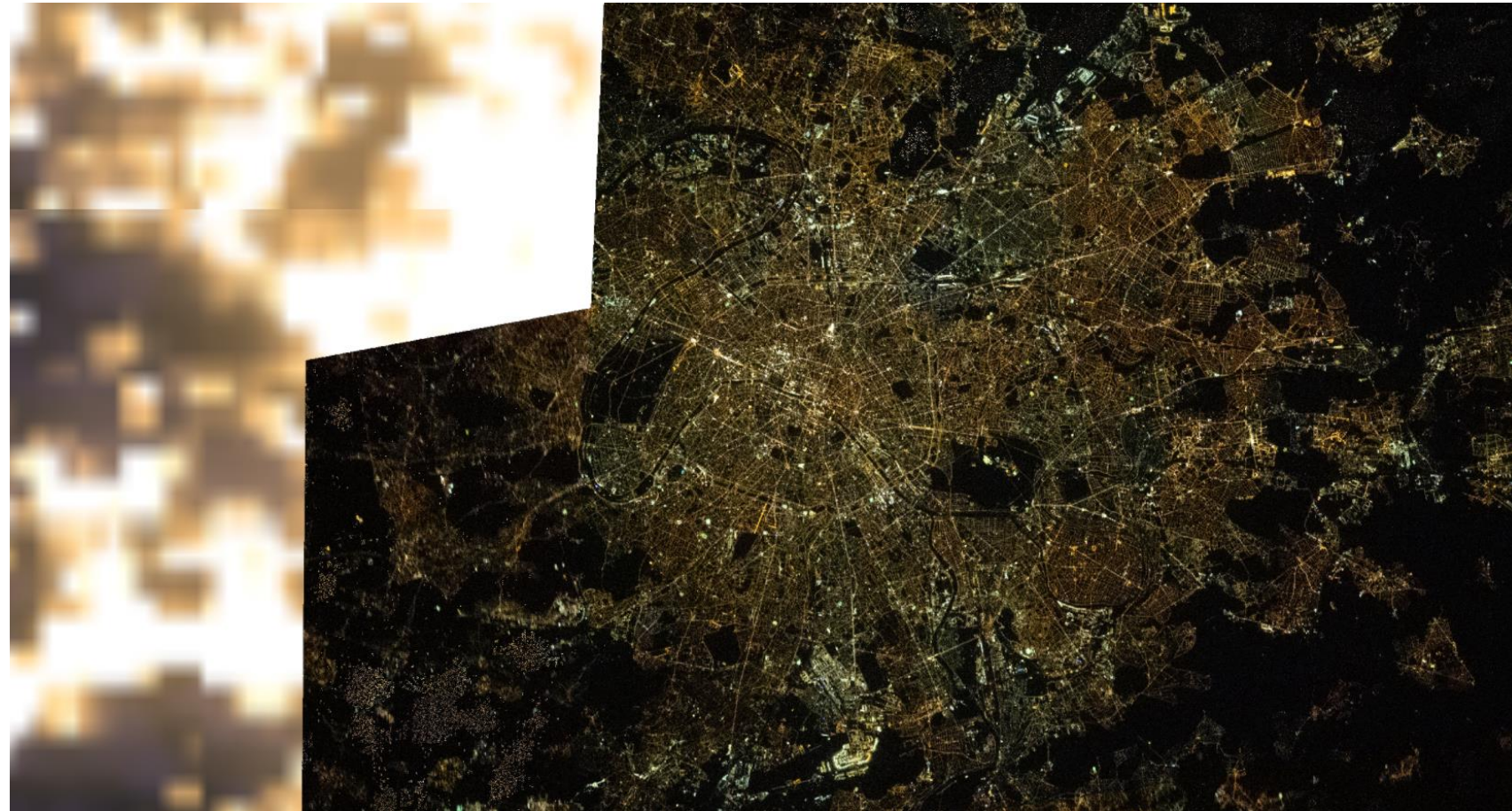
Links for Displayed Photos

# Day & Night Imagery Available



# CEO Astronaut Night Imagery

- Crew Earth Observations continue to provide the highest resolution free night-time data set for researchers
- Thanks to our auto-ref advancements we now have hundreds of thousands of research ready images



Paris at night with CEO images overlaid onto the NASA Black Marble basemap

Check out: Stoken, A. et al. (Street) Lights Will Guide You: Georeferencing Nighttime Astronaut Photography of Earth, IEEE CVPR 2024.

# New Cameras for CEO

- Early in 2024 a new set of Nikon Z9 cameras were launched to the ISS.
- Nikon Z9 provides a significant upgrade:
  - 45.7 MP sensor vs 20.8 MP (Nikon D5)
  - Mirrorless vs DSLR
  - Better autofocus, image stabilization
  - Will be testing low-light performances of the Z9 vs D5 to see if the smaller pixels will affect our nighttime images
    - Smaller pixels decrease signal-to-noise ratio
    - Dual camera bracket setup with simultaneous imaging using both cameras
- Modified Z9 flying this year with a 550nm filter for more research opportunities



# NASA Earth Observatory



- New articles on NASA images published daily
- Once a week on astronaut photos

Lake Van, Turkey



September 12, 2016



Dust Over Seas



June 10, 2020



Frozen Moonrise



December 12, 2019



Cloudy Sulawesi



May 10, 2019



Wide-Eyed Over Mexico



March 23, 2020



# Acknowledgements

Check out our new tools at:

<https://eol.jsc.nasa.gov/ExplorePhotos/>

Thanks to:

Alex Stoken (Autoref and Map Tool Developer)

Sara Schmidt (CEO Ops Lead)

**AIRBUS**

Technical Session Sponsor

2024 Technical Sessions

