



# OPERA

Observational Products for End-Users from  
Remote Sensing Analysis

## Fifth OPERA Workshop

September 11, 2025

## OPERA Project Status and Updates

# OPERA Project Status and Updates

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This workshop is open to US and non-US participants. The  
material presented has been cleared for unlimited release.

No ITAR information is to be presented.

National Aeronautics and  
Space Administration



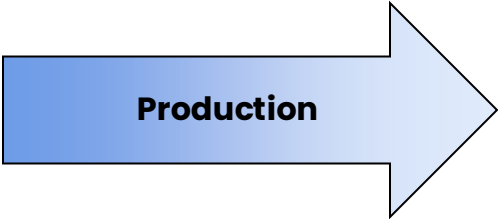
# Project Status

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- OPERA turning **4 ½ years old** since formulation
- Data adopted by **federal, state, city, international and commercial** users
- More than **50M products** archived and downloaded by **21,000+ users** worldwide
- **Six products in production; five in development**

# Production vs. Development



## Production

1. Surface Disturbance [HLS] from Jan 2023
2. Surface Water Extent [HLS] from Apr 2023
3. Radiometric Terrain Corrected SAR Backscatter [ Sentinel-1 ] from Oct 2023
4. Coregistered Single-look Complex [ Sentinel-1 ] from Jul 2016
5. Surface Water Extent [ Sentinel-1 ] from Aug 2024
6. Surface Displacement [ Sentinel-1 ] from Jul 2016



## Development

1. Surface Water Extent [ NISAR ] from Nov 2025
2. Surface Displacement [ NISAR ] from Nov 2025
3. Surface Disturbance [ Sentinel-1 ] from Jan 2026
4. Vertical Land Motion [ Sentinel-1 ] from Oct 2019
5. Vertical Land Motion [ NISAR ] from Nov 2025

# OPERA Enabling Actionable Decisions



## Impacts recognized by diverse federal, state, city and international stakeholders

### FEMA

using OPERA Surface Water Extent



OPERA's disaster support for **FEMA** during Hurricane Helene was cited in the **OMB FY26 President's Budget Request** to illustrate the new **Responsive Science Initiatives**

### City of Los Angeles

using OPERA Surface Displacement

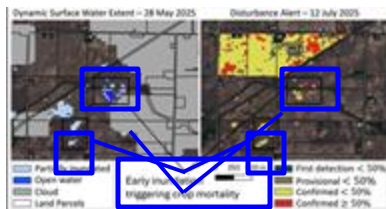


Growing incline of 1/3 inch over 2018-2024 between Menlo Ave and Hoover St in Harbor Gateway community near LA downtown. This neighborhood is home to large natural groundwater movements and active oil well drilling.

OPERA's InSAR analysis for LA City revealed **growing ground uplift** under populated residential area

### USDA

using OPERA Surface Disturbance



OPERA data used by USDA to create **crop yield forecast** to corn producers in Iowa

### Australia National Science Agency CSIRO

using OPERA Vertical Land Motion

#### Sydney Vertical Land Motion 2016-2024



Several subsidence hotspots exceed  $-3$  mm/yr, twice the regional average of  $-1.3$  mm/yr. By 2050, VLM rates are estimated to add 5-10 cm to relative sea level rise.

OPERA Vertical Land Motion prototype helped CSIRO assess **coastal flood risk** due to subsidence



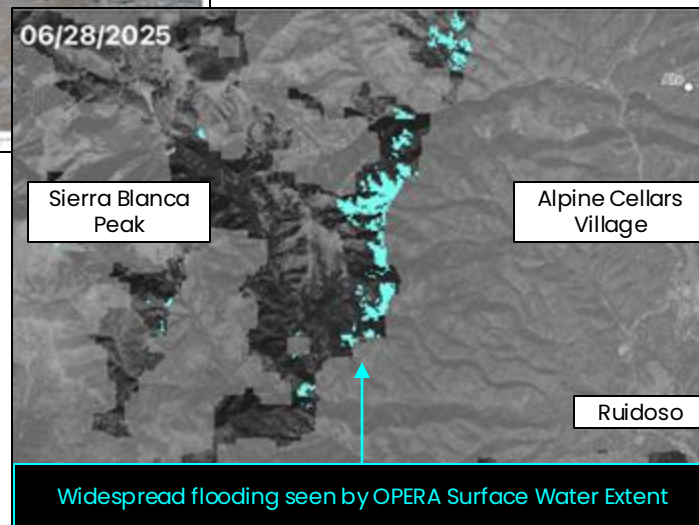
# What Did They Say about Surface Water Extent?



## OPERA data assisted emergency managers during the New Mexico wildfires/floods

*"... They had concerns about which areas along Highway 35 might experience the worst flooding because of the communities, houses, structures, bridges, and low water crossings along it ... These products were helpful in making these decisions and determining which watersheds were most affected. **Thank you for all of your efforts in supporting these responses; these products really do make a difference!**"*

**NASA Disaster Program**



# What Did They Say about Surface Disturbance?



## OPERA data adopted by World Resources Institute to provide global deforestation info

*"... In 2024, a groundbreaking new land surface disturbance monitoring system known as OPERA Land Surface Disturbance Alert, or DIST-ALERT, was developed by the University of Maryland (UMD) and NASA's OPERA project to map per pixel vegetation cover loss globally at a 30×30-meter resolution ... **This new global data set makes it possible to monitor deforestation and other vegetation disturbance events as they happen around the world for the first time.**"*

**World Resources Institute**



- WRI/OPERA product rollout webinar attracted 900 worldwide, showing a strong interest in DIST-HLS
- An example of SNWG solution integrated in stakeholders' environment to address their needs

# What Did They Say about Surface Displacement?

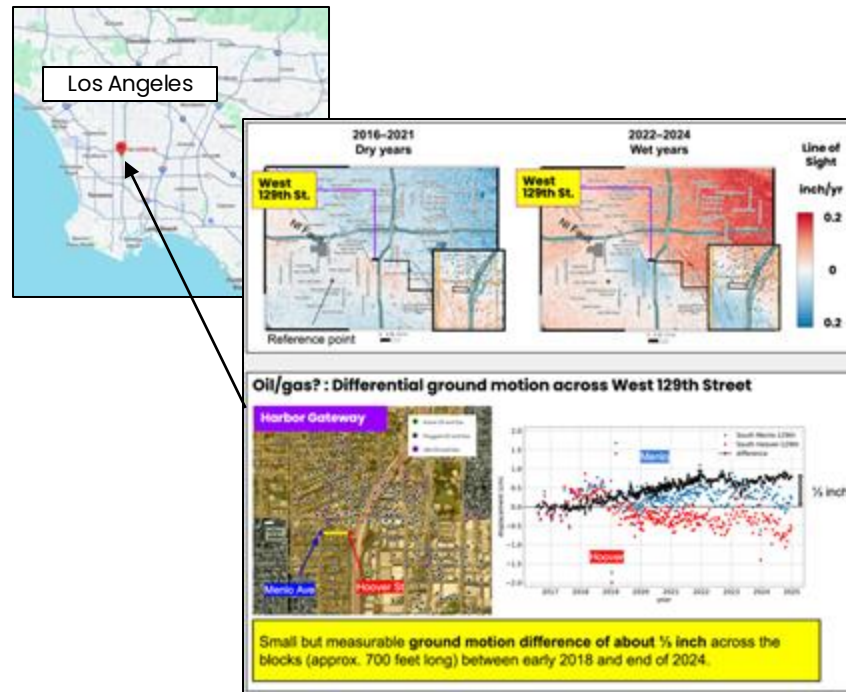
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## OPERA radar experts called upon to address public safety concerns

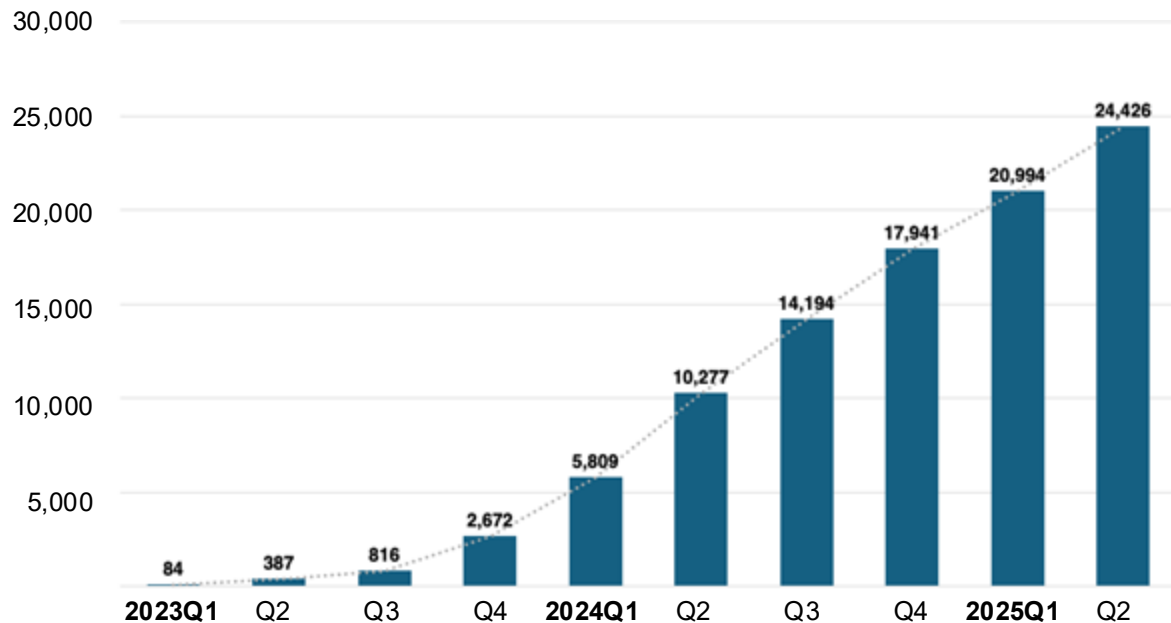
*"... I sincerely appreciate the assistance of Dr. Fielding and the JPL team in reviewing land movement concerns on West 129th Street ... While further analysis and interagency coordination remain necessary, **their contribution has strengthened our ability to elevate these concerns for policy review and action within Council District 15.**"*

**Planning Director, Council District 15  
City of Los Angeles**



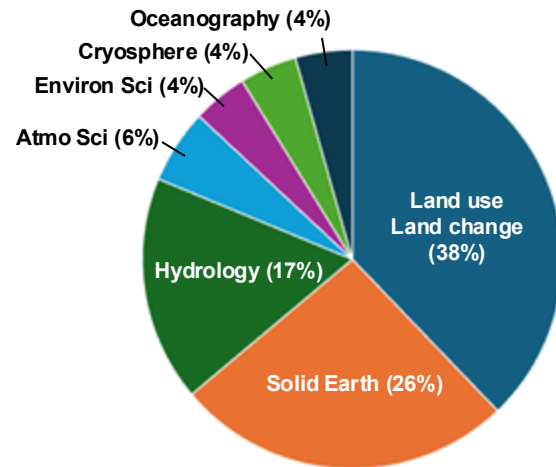


# Growing User Base and Diverse Applications



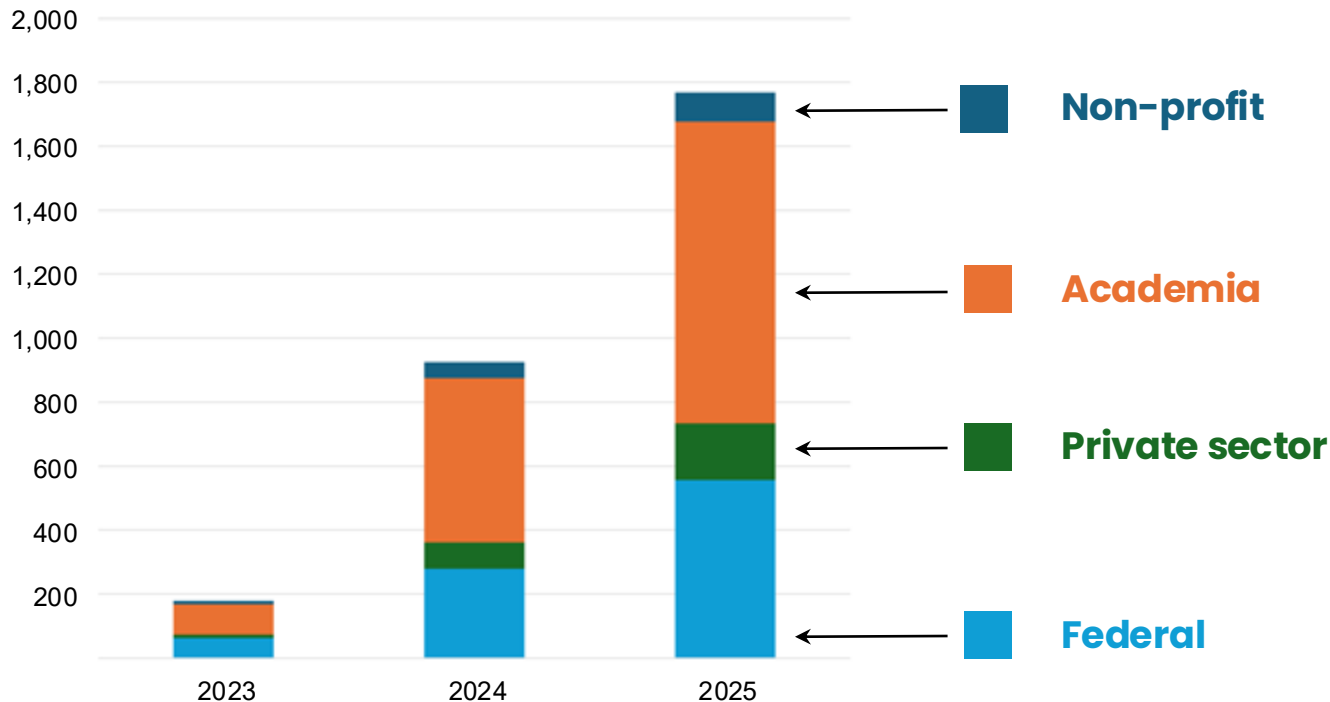
**Cumulative number of users across OPERA products**

Credit: Data analytics provided by [NASA ESDIS](#)



# Steady Growth in Key Stakeholder Groups

National Aeronautics and  
Space Administration



## Cumulative growth in stakeholder groups across OPERA products

Credit: Data analytics provided by [NASA ESDIS](#)

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# Extensive Stakeholder Engagement

Diverse stakeholder engagement activities in 2024-25:

| Categories                                           | Activities                                                                                                        | Total |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------|
| Direct Engagement                                    | 6 workshops, 4 webinars, 4 courses, 1 tutorial, 1 hackathon                                                       | 16    |
| Disaster Support                                     | 5 floods, 3 wildfires, 3 earthquakes, 1 landslide, 1 volcano eruption                                             | 13    |
| Public Presentations                                 | 6 conferences and 2 workshops                                                                                     | 8     |
| Publications                                         | 3 peer-reviewed, 3 NASA EO articles, and 2 JPL articles                                                           | 8     |
| Private Sector                                       | 6 HQ roundtable meetings with finance, insurance, banking, investment, technology, philanthropy, and supply chain | 6     |
| Presentation to International Government Delegations | Japan, Mexico, Germany, and Croatia                                                                               | 4     |

# Production vs. Development



## Production

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# In Stakeholders' Words



| End Users | Stakeholder Group | OPERA Products                              | Use Case                                                                                                                                         |
|-----------|-------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| USACE     | Federal           | Surface Water Extent                        | <i><b>"The impact of varying input data on the flood inundation mapping case study: 2022 Pakistan &amp; 2024 North Carolina, USA floods"</b></i> |
| USDA      | Federal           | Surface Water Extent<br>Surface Disturbance | <i><b>"Inundation and disturbance in farm lands via OPERA"</b></i>                                                                               |
| NGIS      | Commercial        | Surface Disturbance                         | <i><b>"DIST alerts for rapid creation of forestry supply chain geospatial data"</b></i>                                                          |
| USGS      | Federal           | Surface Displacement                        | <i><b>"Monitoring of volcanoes with SAR: Ground deformation and surface changes"</b></i>                                                         |