

Shared Sensors, Shared Promise: Civil Applications and State-Federal Partnerships

Dan Opstal (dopstal@usgs.gov)
Executive Secretary, Geographer
Civil Applications Committee

Scott Kaplan (skaplan@usgs.gov)
Senior Advisor to the Chairman
Civil Applications Committee

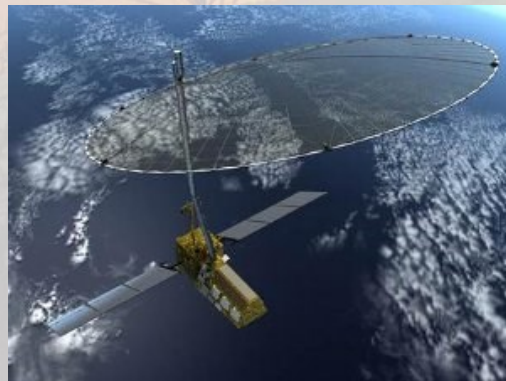
Civil Applications Committee Secretariat (cac@usgs.gov)

**Briefing slides are: UNCLASSIFIED
Not for further distribution**

Satellite Remote Sensing

- 7,000+ active satellites orbit the earth
- Starlink – 3,395 (50%); USGOV – 306 (4%)
- Comms, Nav, Radio frequency, Electro-Optical, Synthetic Aperture Radar, Multi/Hyperspectral
- NASA Alaska Satellite Facility PM – we will see huge file sizes and data!

The NASA-Indian Space Research Org mission (NISAR) ALONE will add 140 Petabytes (PB) to the cloud; all of NASA's earth obs holdings in 2017 were 22 PB.



WHO OWNS THE MOST SATELLITES?



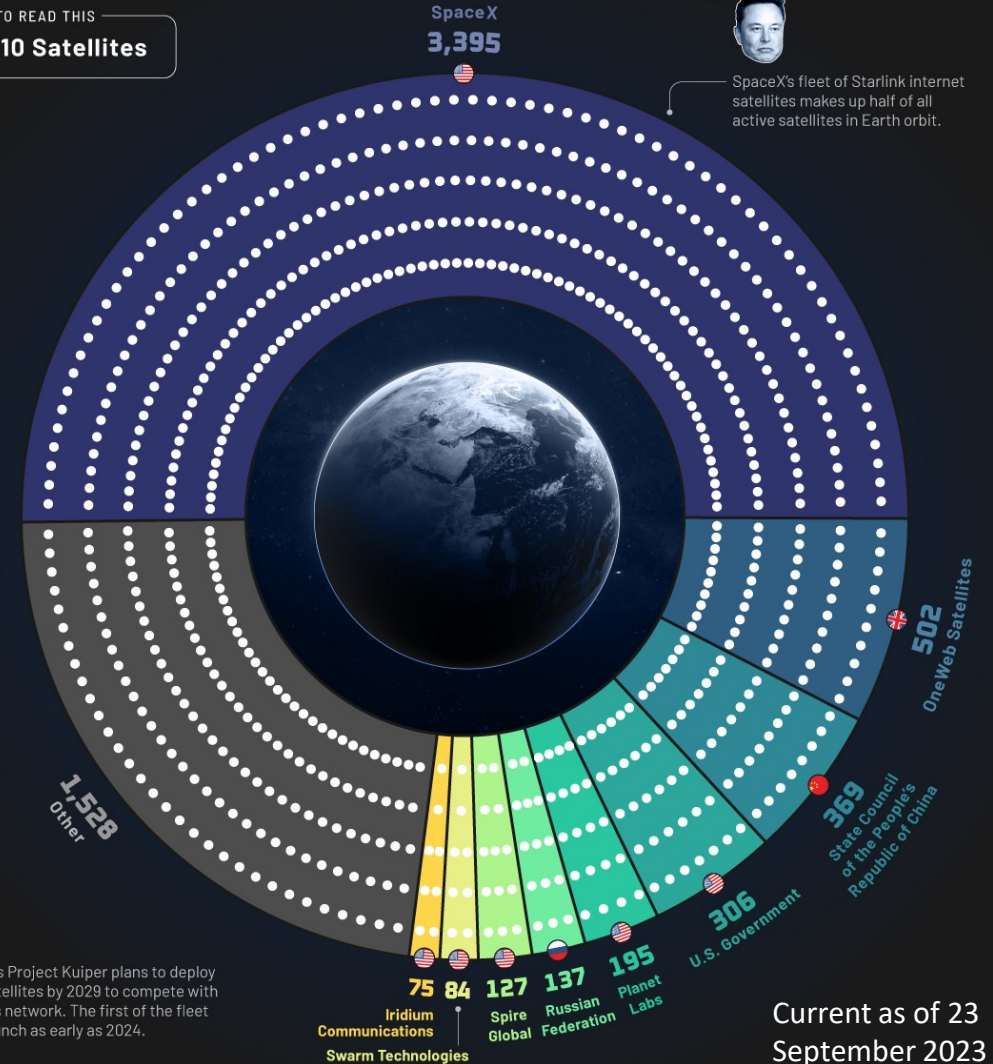
Nearly 7,000 satellites orbit Earth, serving vital functions like communication, navigation, and scientific research.



SpaceX's fleet of Starlink internet satellites makes up half of all active satellites in Earth orbit.

HOW TO READ THIS

● = 10 Satellites



Amazon's Project Kuiper plans to deploy 3,236 satellites by 2029 to compete with SpaceX's network. The first of the fleet could launch as early as 2024.

Current as of 23 September 2023



Source: Union of Concerned Scientists

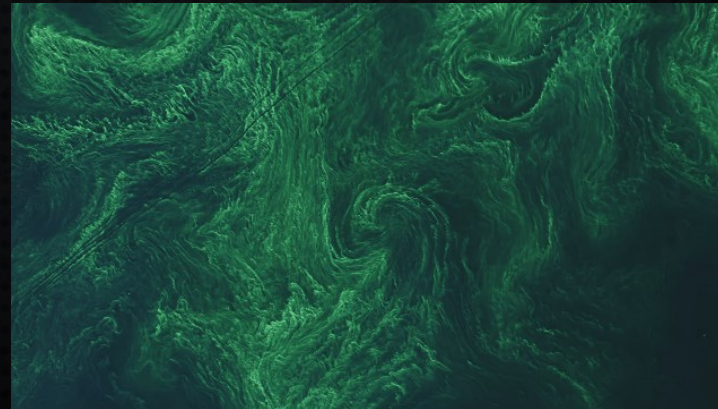
Facebook, YouTube, Instagram, Twitter, LinkedIn icons and handles: /visualcapitalist, @visualcap, visualcapitalist.com

We are part of the USGS National Land Imaging Program

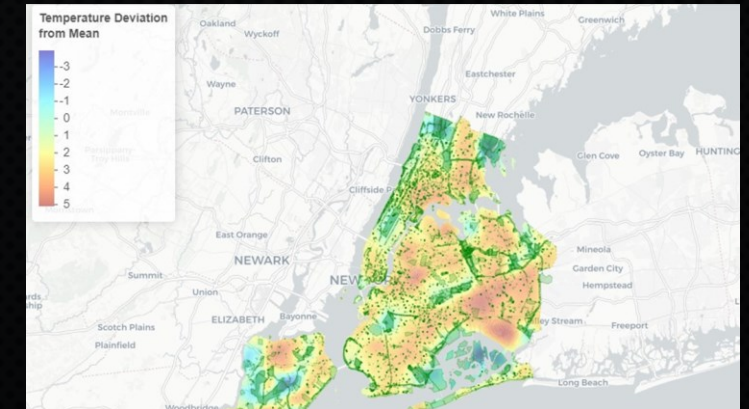
APPLICATIONS INCLUDE:

- **IMPACTS OF CLIMATE CHANGE**
- **QUANTIFYING GLOBAL FOREST CHANGE**
- **MANAGING WATER CONSUMPTION, MANAGEMENT & HUMAN HEALTH**
- **SUPPORTING DISASTER MITIGATION & RECOVERY EFFORTS**

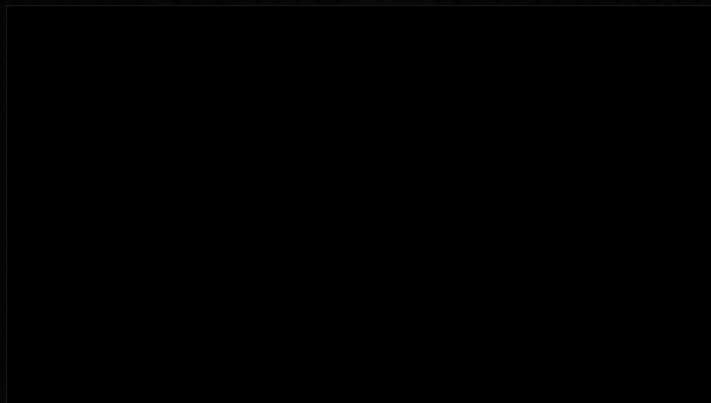
Harmful Algal Bloom - Lake Erie



Urban Heat Map - New York City



Irrigated Farm Lands - New Mexico



Tropical Forest Loss - South America



Disaster Recovery





UNCLASSIFIED

Civil Applications Committee – the Triple Junction

- Provides oversight and facilitation of Federal Civil agency use of IC and DoD remote sensing data, tools, applications, and other capabilities
- Coordinates with Federal Civil Principals and leverages DoD/Intel community for disaster response/hazard tasking through the National Civil Applications Center (a USGS Science Center in Reston, VA and Lakewood, CO)
- CAC is Chaired by the USGS Director (Organization is chartered by Secretary of Interior and the Director of National Intelligence)
 - USGS provides CAC Secretariat, imagery acquisition and analysis staff via the NCAC
 - Two interagency CAC Vice Chairs (currently from National Oceanic and Atmospheric Administration’s National Geodetic Survey and US Department of Agriculture’s Office of Homeland Security)



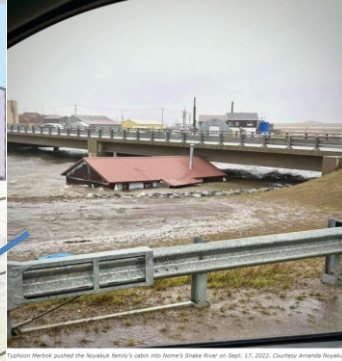
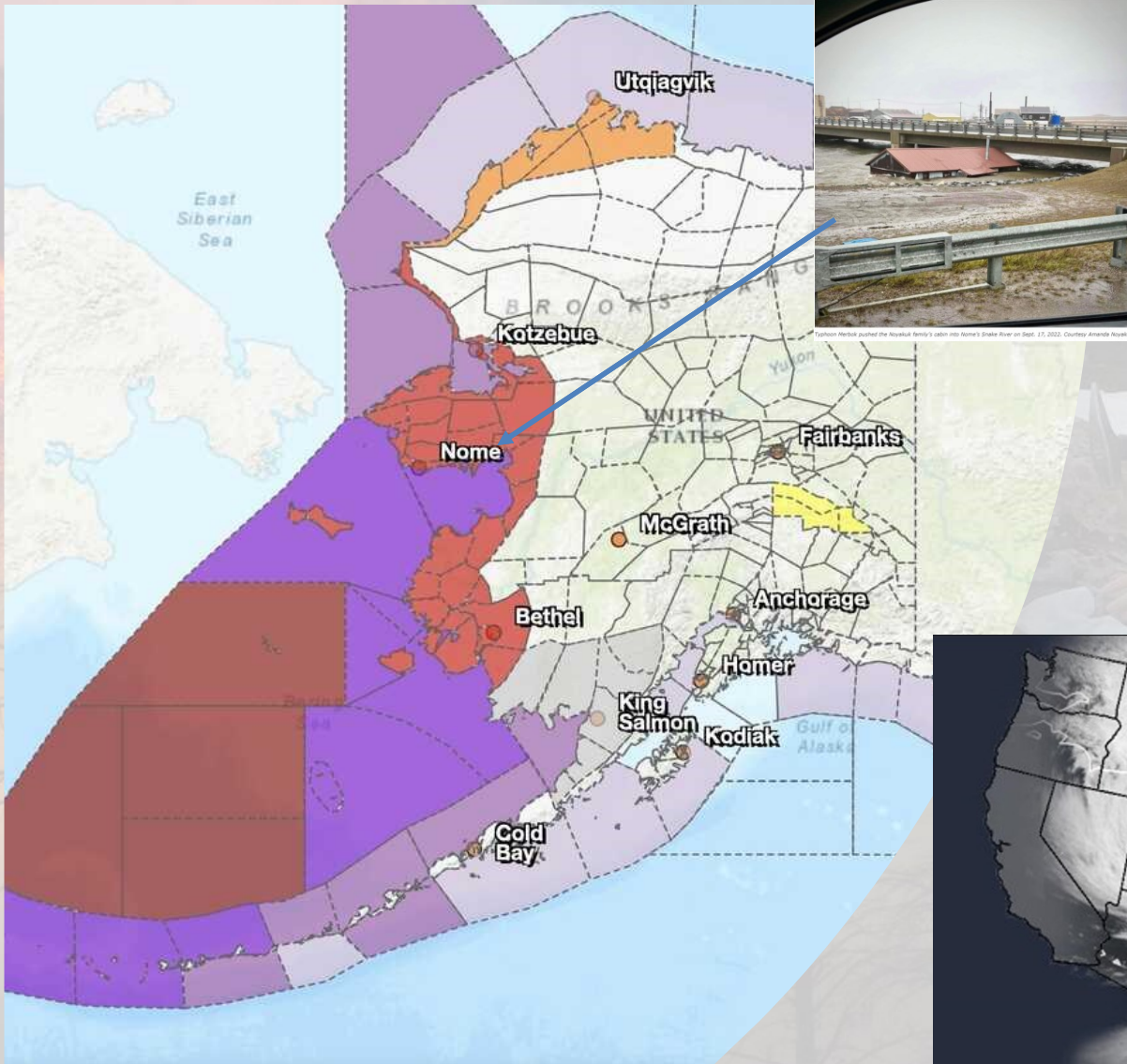
UNCLASSIFIED

Civil Applications Committee Membership Roundtable

Principal	Associate
	<p>Ex Officio</p>

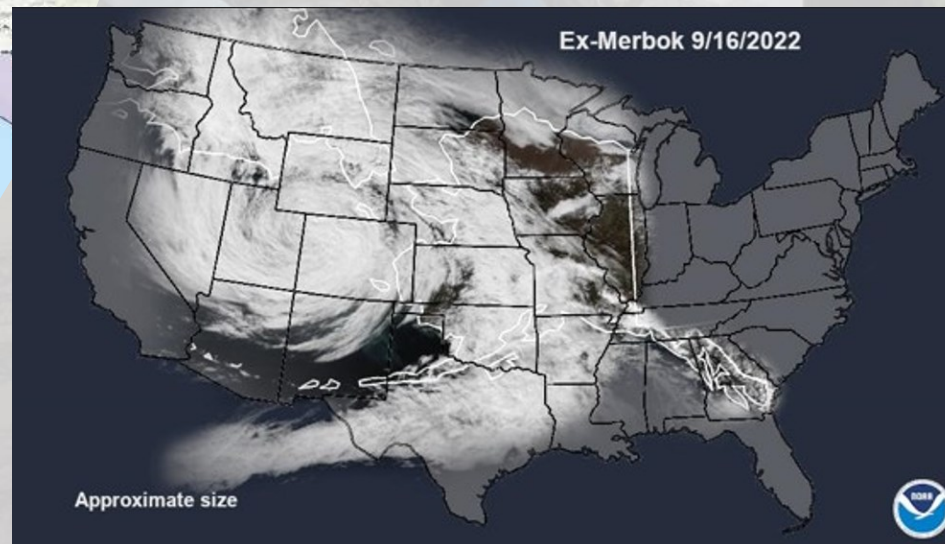


Alaska NCAC Support



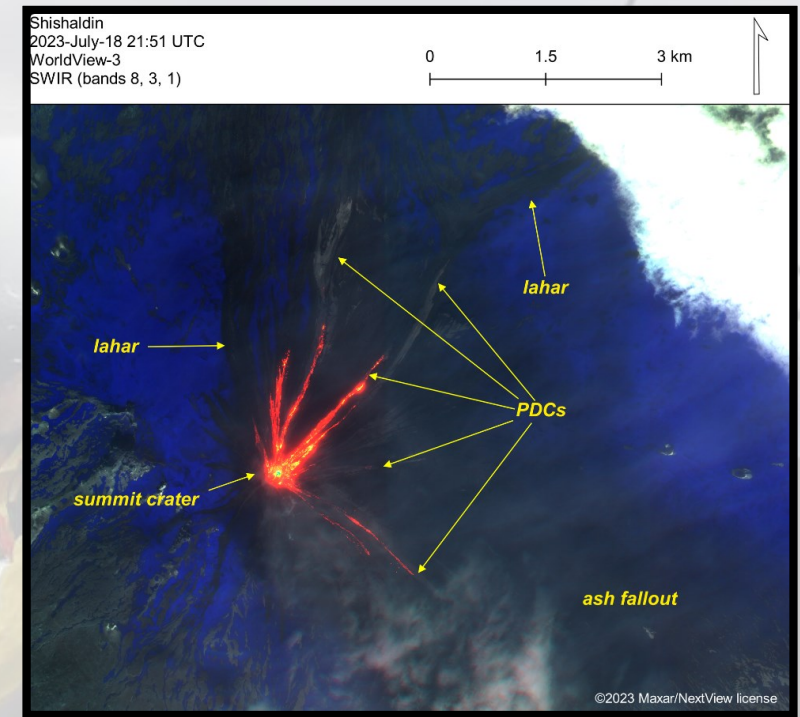
Typhoon MERBOK brings 54-foot seas to Alaska

- NCAC Source collaborated with DHS Source to use the WorldView sensors to task areas for the flooding.
- Area tasked satisfied using WorldView sensors and can be found on Global Enhanced GEOINT Delivery site.

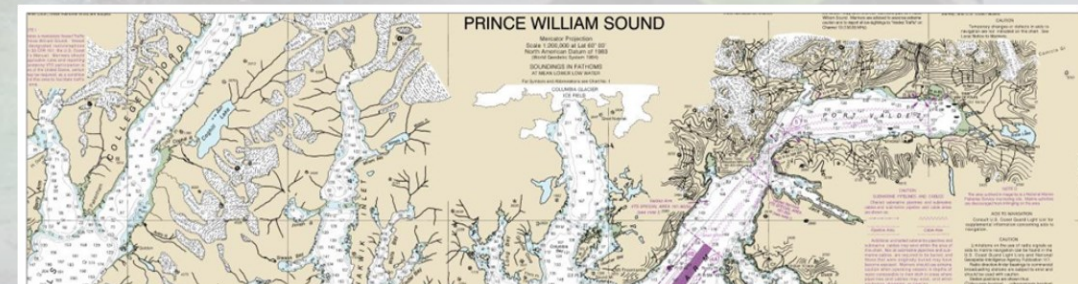


Alaska NCAC Support

- Supported by USGS-CAC Source, Alaska Volcano Observatory uses high-resolution satellite imagery to monitor volcanoes in Alaska and send out prompt eruption and tremor alerts.
- The USGS-CAC Source, which is supporting mapping efforts for NOAA, tasks commercial stereo imagery data for Prince William Sound, Alaska; data supports NOAA Coastal Chart Development



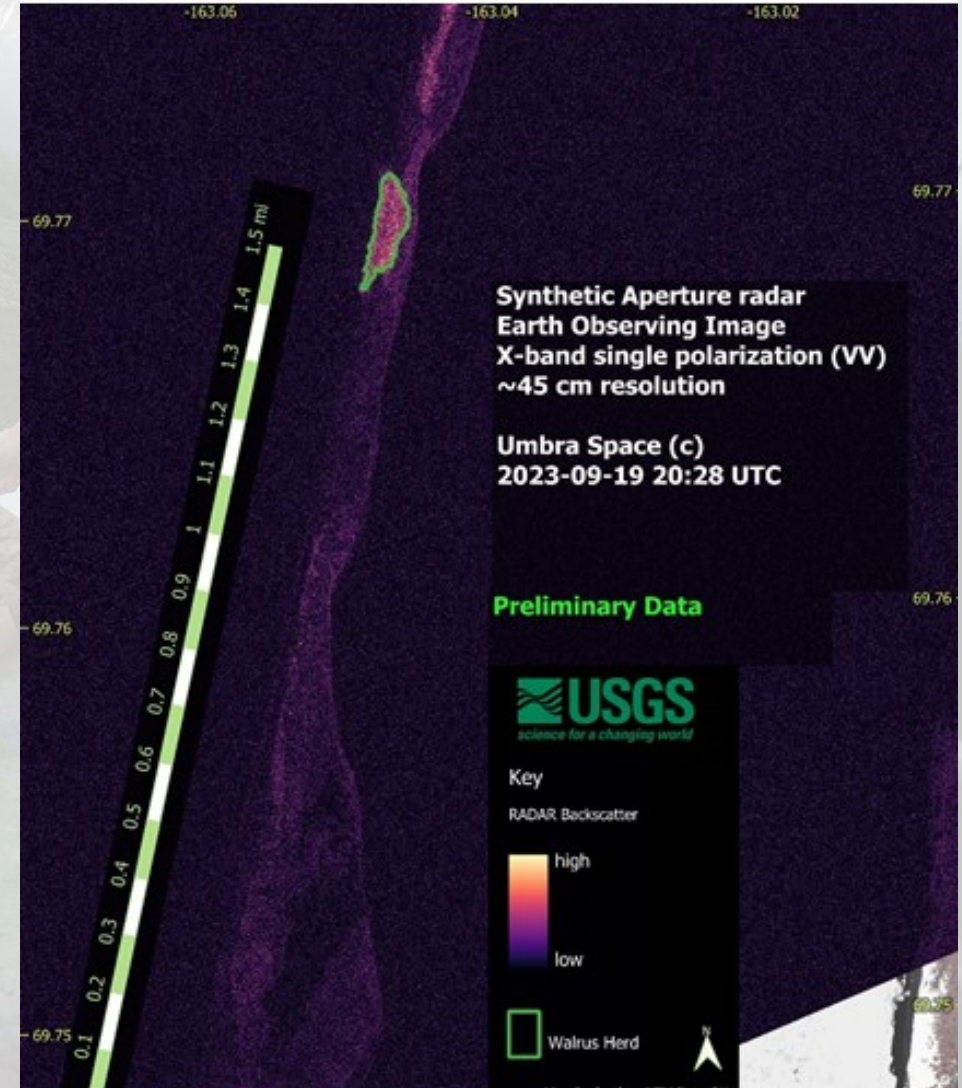
Shishaldin Volcano



Prince William Sound

Alaska NCAC Support

- Walrus haulout analysis using tasked UMBRA/ICEYE SAR satellites
 - Image location where walrus herds had rested using the finest resolution commercial SAR imaging at a time shortly after walrus herds left the beach.
 - Data on the number of walrus killed at large coastal haulouts is required by the Marine Mammal Protection Act Stock Assessment Reporting process.



*UMBRA microsatellite
image of walrus haulout*



UNCLASSIFIED

INTERNATIONAL CHARTER SPACE & MAJOR DISASTERS

A worldwide collaboration through which satellite data are made available for the benefit of disaster management



20 OCT
2000
FOUNDED BY ESA, CNES AND CSA ON 20 OCTOBER 2000

+20 SUPPORTED BY MORE THAN 20 INTERNATIONAL ORGANISATIONS



MORE THAN 80 NATIONAL USERS FROM OVER 80 COUNTRIES CAN REQUEST DATA FROM THE CHARTER. FIND OUT HOW TO REGISTER THROUGH UNIVERSAL ACCESS:

disasterscharter.org/web/guest/how-to-register-as-a-user

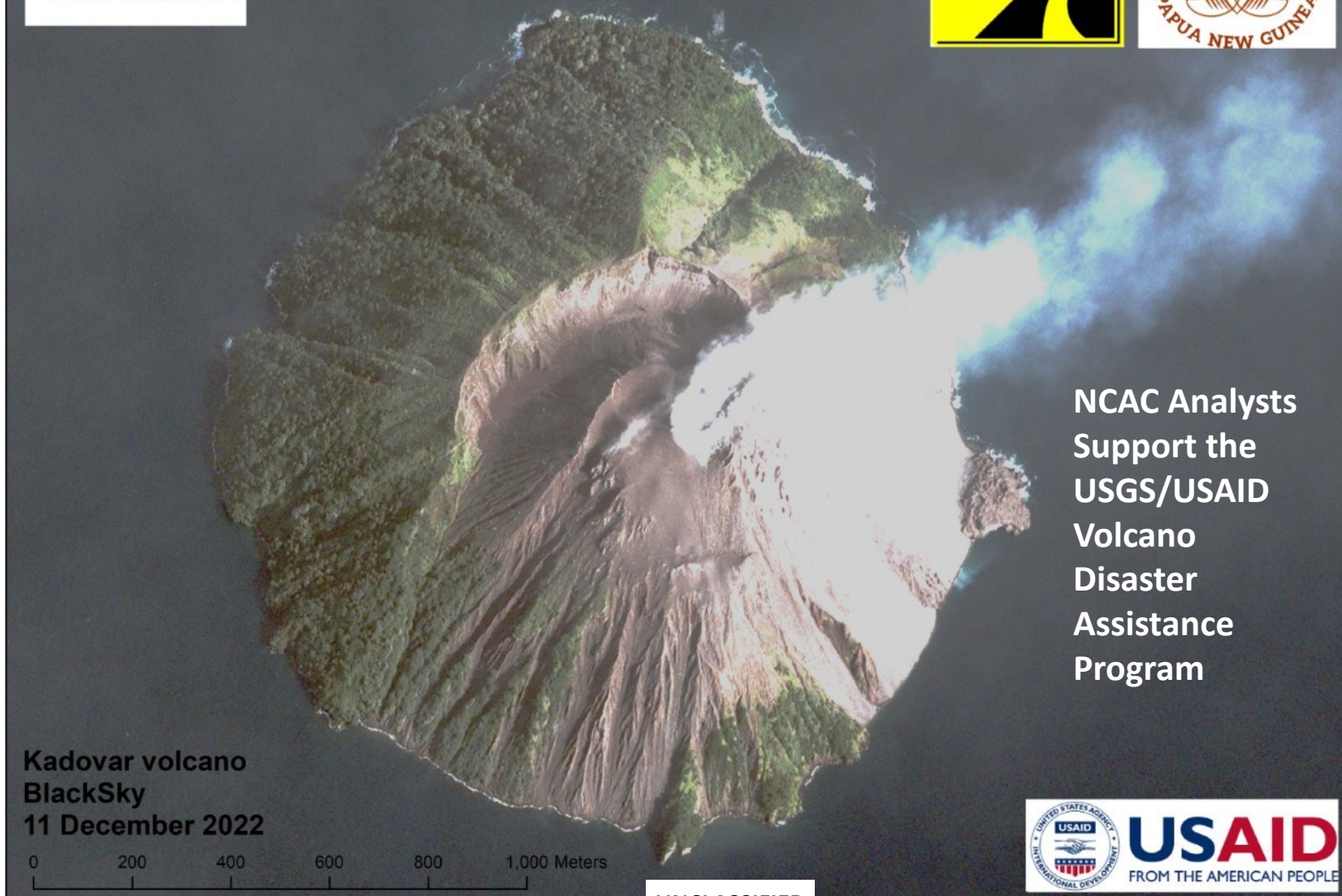


<https://disasterscharter.org/>

UNCLASSIFIED

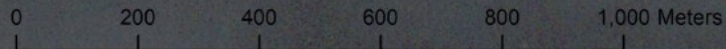


UNCLASSIFIED



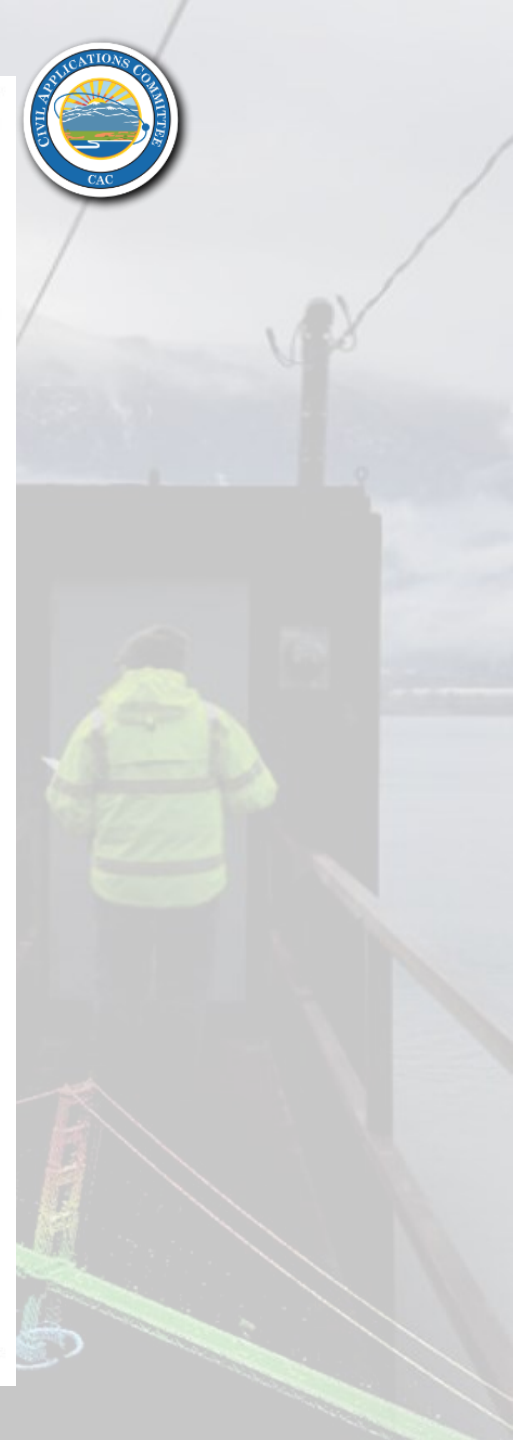
NCAC Analysts Support the USGS/USAID Volcano Disaster Assistance Program

Kadovar volcano
BlackSky
11 December 2022



UNCLASSIFIED

NextView license. WorldView Data © DigitalGlobe, Inc. 2022



CRSSP Imagery Derived Requirements (CIDR)

Commercial Remote Sensing Space Policy (CRSSP) Imagery Derived Requirement (CIDR):

Entry Tool for Federal Civil agencies to submit imagery requirements (new tasking and historical images from the archive)

Complements Hazard Data Distribution System (HDDS)

USGS Home
Contact USGS
Search USGS

CRSSP Imagery-Derived Requirements (CIDR) Tool

Home User's Guide What's New CRSSP Website

Welcome to the CRSSP Imagery Derived Requirements (CIDR) Tool

With this tool, you can

- Enter CRSSP Data Requirements (Federal Users)

Note: This system is not a recommended tool for entering sensitive requirements.

To login, click the login button below. You will be taken to the authentication portal and will be redirected back to CIDR upon successful login.

Login

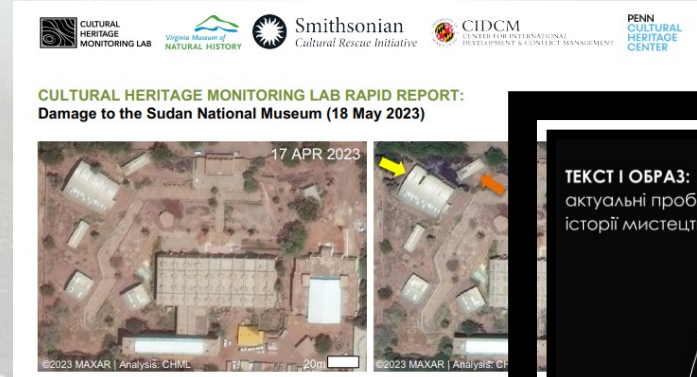
Data entry assistance or questions: 1-800-252-4547, (M-F, 8-4 Central Time) Email: cidr@usgs.gov

	WorldView-2 © DigitalGlobe		IKONOS-2 © DigitalGlobe		QuickBird-2 © DigitalGlobe
Matacha Pass Aquatic Preserve, FL 12/28/2010		Galveston, TX 11/11/2003		San Diego, CA 03/09/2002	

<https://cidr.cr.usgs.gov>

Examining opportunities to build State-Federal Plans to enable use of Commercial Geospatial-Intelligence Data procured by USGS and NASA

- Find a nexus with the Federal Government; develop shared goals
- Look at opportunities where satellite imagery would be useful; work with federal partner and CAC staff to obtain Global Enhanced GEOINT Delivery Accounts: <https://evwhs.digitalglobe.com>
- Task data via CIDR to assist in achieving joint project aims or examine NASA Commercial Smallsat Data Acquisition Program (CSDA) - <https://www.earthdata.nasa.gov/esds/csda>
- Provide feedback to the National Civil Applications Center and the CAC Secretariat (cac@usgs.gov)
- Examples: Virginia Cultural Heritage Museum supporting the Smithsonian, State Department w/ global cultural heritage monitoring (Sudan, Ukraine); Florida Dept of Env. Protection working with NASA on harmful algal bloom monitoring (Red Tide)



Virginia Cultural Heritage Monitoring Lab MAXAR and ground images

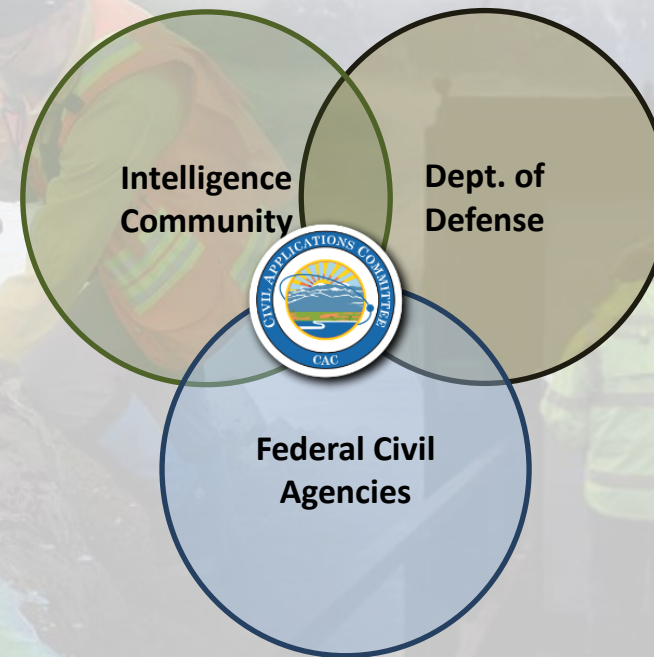




UNCLASSIFIED

Civil Applications Committee – the Triple Junction

- Engages with IC and DoD governance structures via the National System for Geospatial Intelligence (NSG) led by NGA Director (3 star)
- Sits within the USGS National Civil Applications Center
- Established Working Groups (WGs) with a Terms of Reference
 - Thermal
 - Environmental Security
 - Global Fiducials (Environmentally-Sensitive Sites)
 - Historical Imagery
 - Civil Applications Requirements Working Group
- Communities of Interest (COI)
 - Biosecurity/Biotechnology
 - Wildlife Crime
 - Illegal, Unlicensed, and Unregulated Fishing
 - Geodesy/World Magnetic Model
 - Newest COI – hyperspectral!
- Host CAC Topic of Interest Lunches to Focus on WGs and COIs



Conclusion/Questions/Backup Slides

Dan Opstal (dopstal@usgs.gov)
Executive Secretary, Geographer
Civil Applications Committee

Scott Kaplan (skaplan@usgs.gov)
Senior Advisor to the Chairman
Civil Applications Committee



**CAC is not a panacea but provides a forum for
geospatial issues of common concern**



UNCLASSIFIED

Civil Applications Committee Membership Roundtable

Principal



FEMA



Associate



Ex Officio



UNCLASSIFIED

Today's Applications

National Civil Applications Center provides both data and analysis to support:

Natural Hazards / Disasters

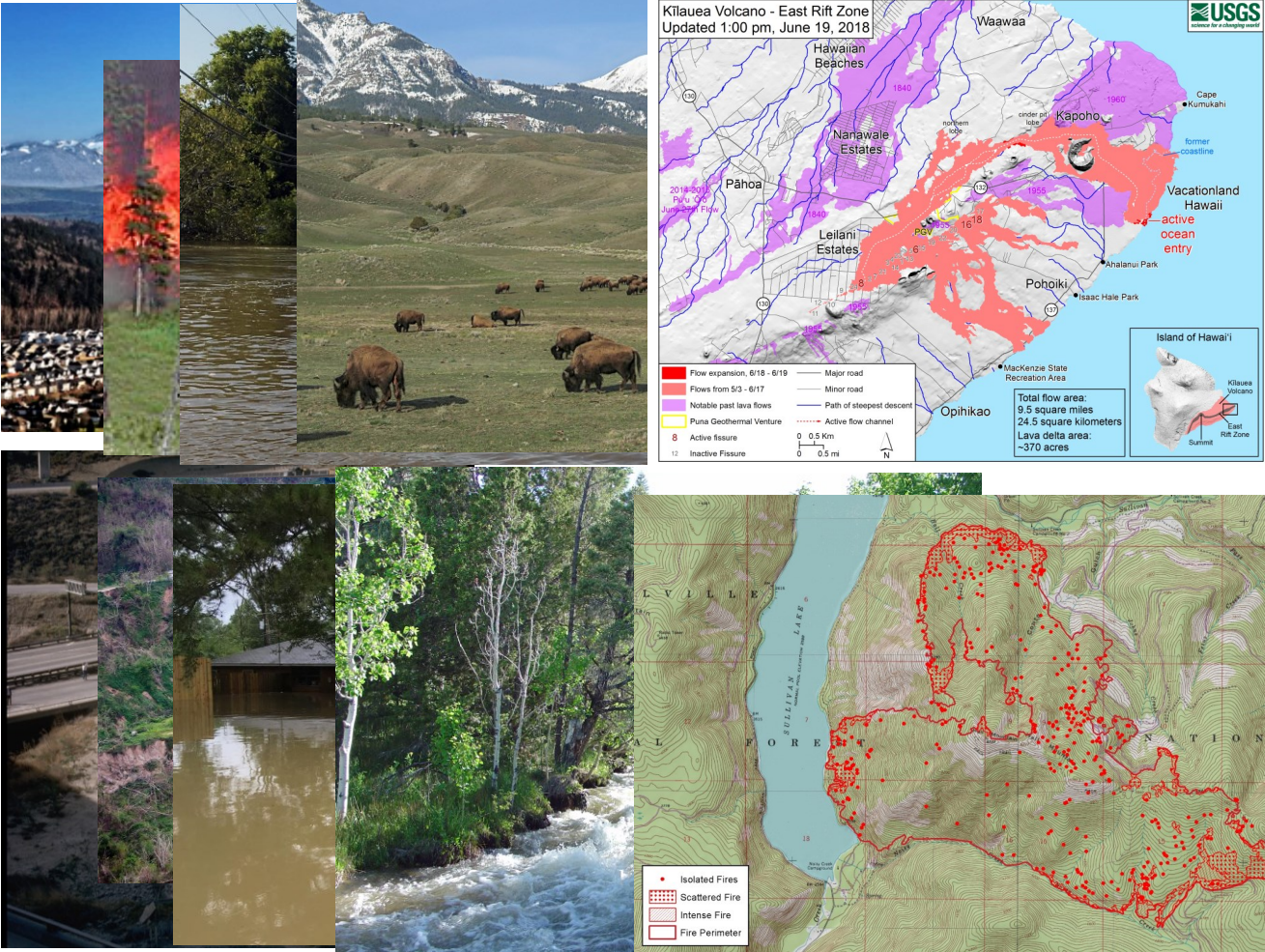
Detection, Assessment, Response, and Mitigation

- Volcanoes
- Wildfires
- Floods
- Earthquakes
- Landslides
- Hurricanes

Scientific Research

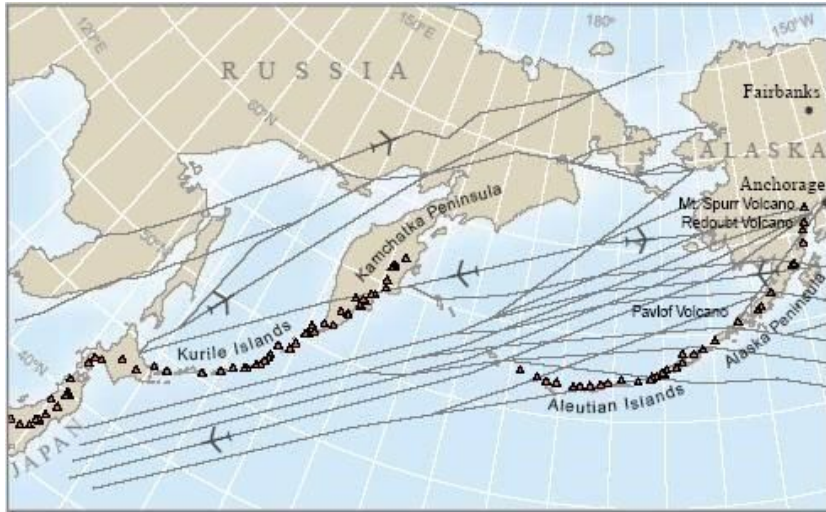
Land, Water, and Resource Management
 Environmental Monitoring

Mapping



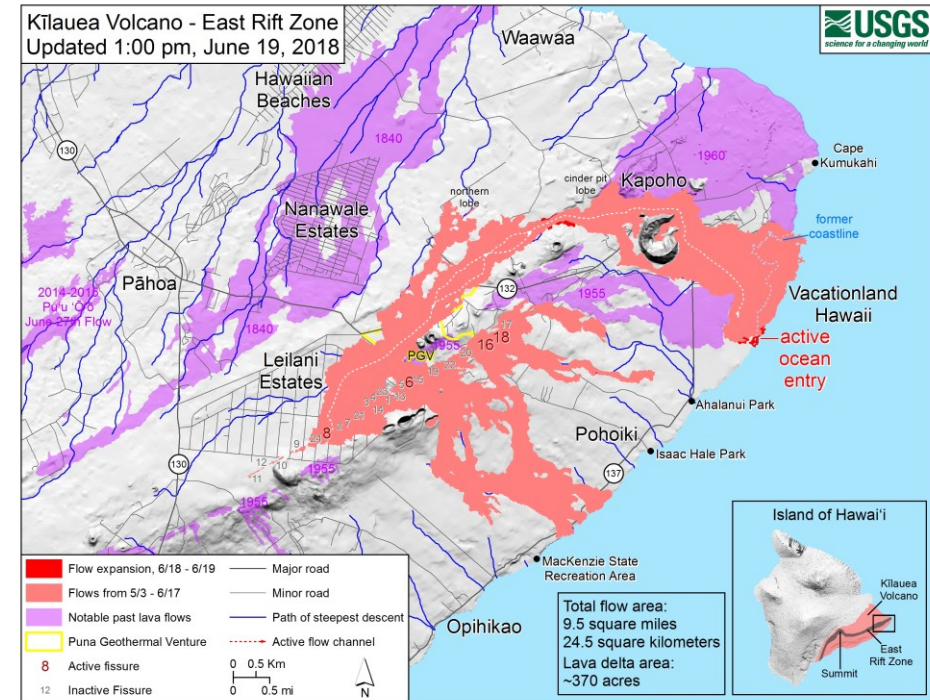
Photograph and map credits: USGS, National Park Service, and National Interagency Fire Center

Aviation Safety / Volcano Monitoring



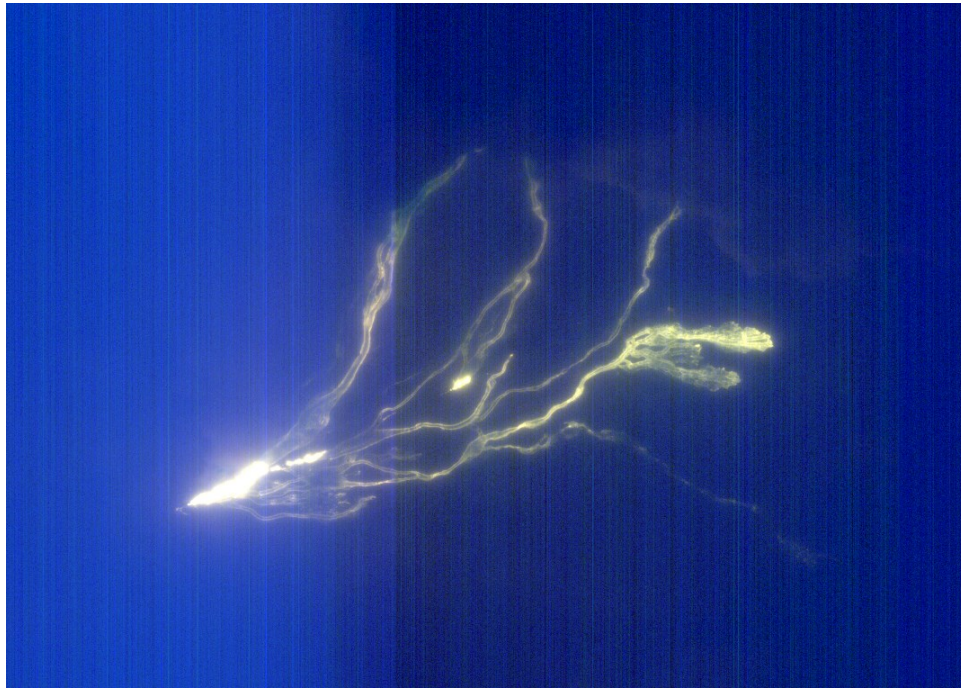
Aviation Safety and Volcano Monitoring

- Aircraft flying the air routes shown above carry more than 50,000 passengers each day
- Ash has caused jet engines to fail
- Several explosive eruptions occur every year
- Supports the USGS Volcano Hazards Program and its Observatories



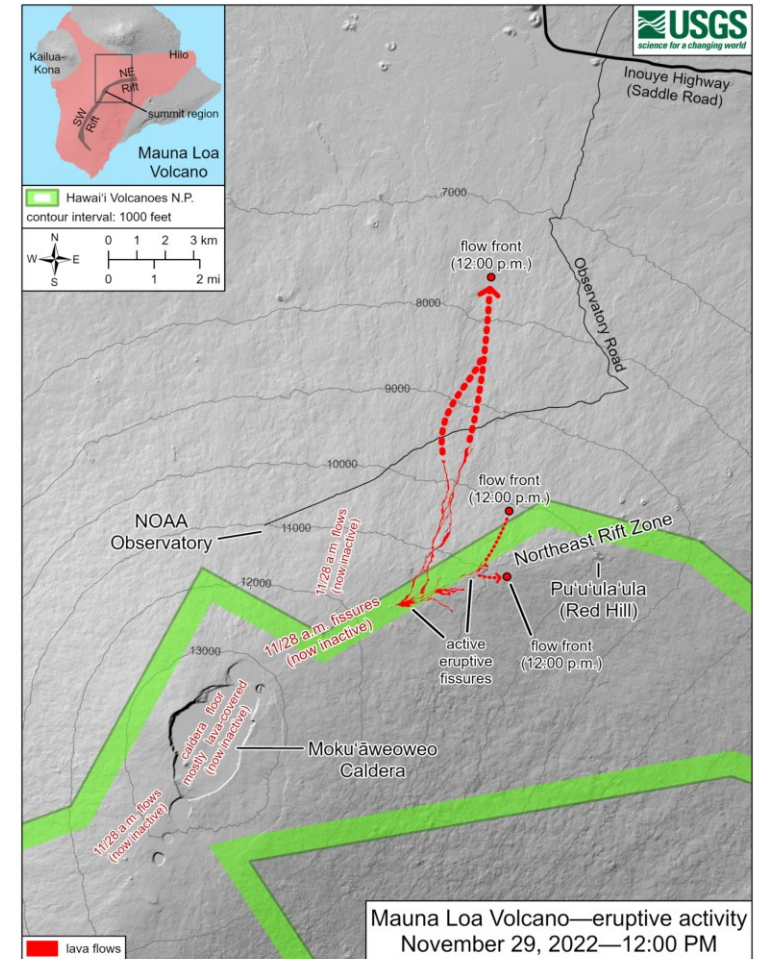
Public Safety: During the eruption of Kilauea volcano maps inform local officials and the public about the danger. The map above was produced by the USGS Hawaii Volcano Observatory with information from the NCAC. This is also an example of an unclassified, image derived product.

Public Safety / Lava Flow Monitoring



Mauna Loa Eruption. Overnight satellite views (left, provided via DoD contract) allowed USGS analysts to accurately map some of the most active flows, shown in red on the map (right).

Maps such as this inform local officials and the public about possible dangers.



Photograph and map credits: USGS Hawaii Volcano Observatory

Recent Volcanic Eruption



- Hunga Tonga-Hunga Ha'apai volcano before and after the massive January 15, 2022 eruption.
- Supports international relief organizations providing aid to the Kingdom of Tonga adversely impacted by the eruption and to scientists studying volcanos.

Wildfire Detection

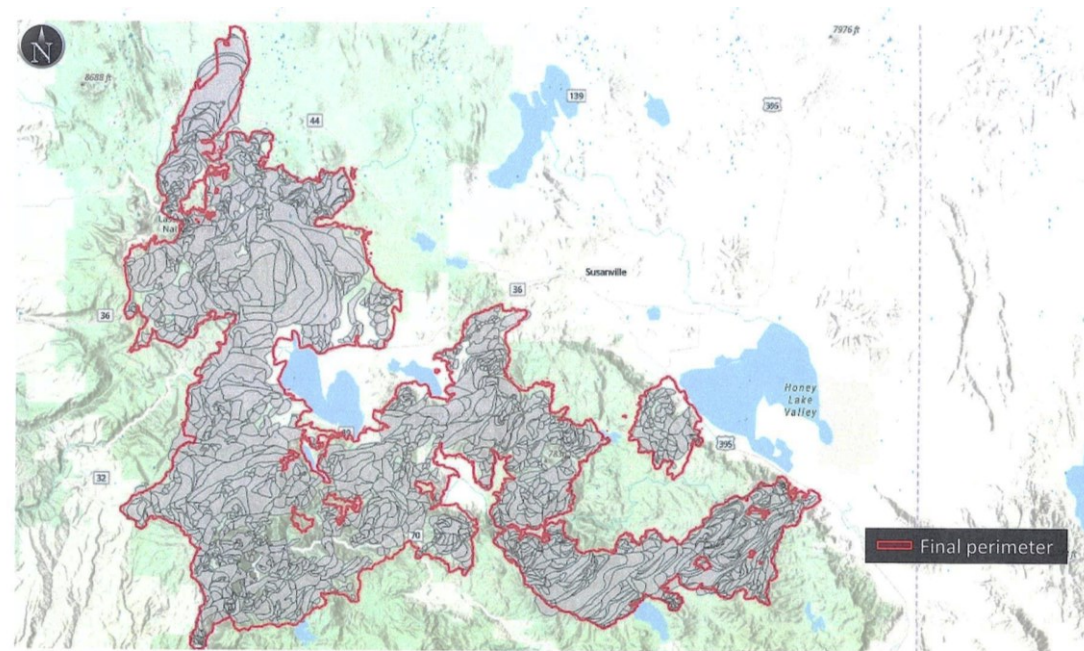
- **Wildfire Detection (FireGuard):**
 - Nationwide 24 x 7 wildfire detection
 - California and Colorado National Guard units derive unclassified reports
 - CAC oversees and facilitates



Creek Fire, CA (2020):
FireGuard warning gave alert that provided time for helicopters to rescue 242 men, women, and children trapped at the Mammoth Pool Campground

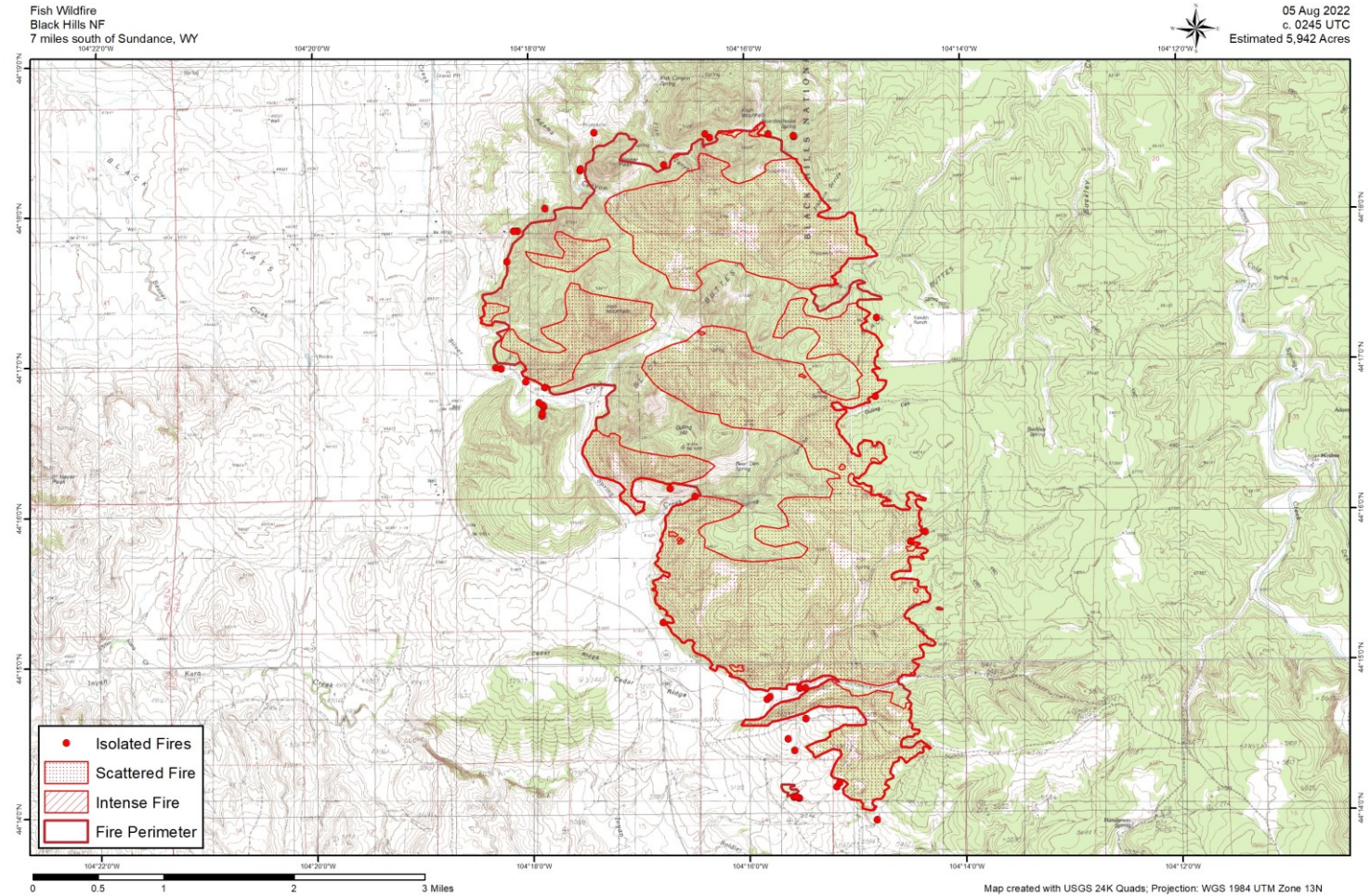
Dixie Fire (2021)

- Largest 2021 fire, burned area equal to Rhode Island
- 24/7 persistent coverage provided
- 23 ignition or urgent alerts sent via mobile devices or email warning system
- 1,841 fire outlines disseminated July 13 to Oct 26



Wildfire Mapping

- **Wildfire Response (Aircraft 3):**
 - Fire perimeter map (right) used by the National Interagency Fire Center's Incident Commanders for daily planning and dispatch
 - Compiled in partnership with the National Geospatial-Intelligence Agency

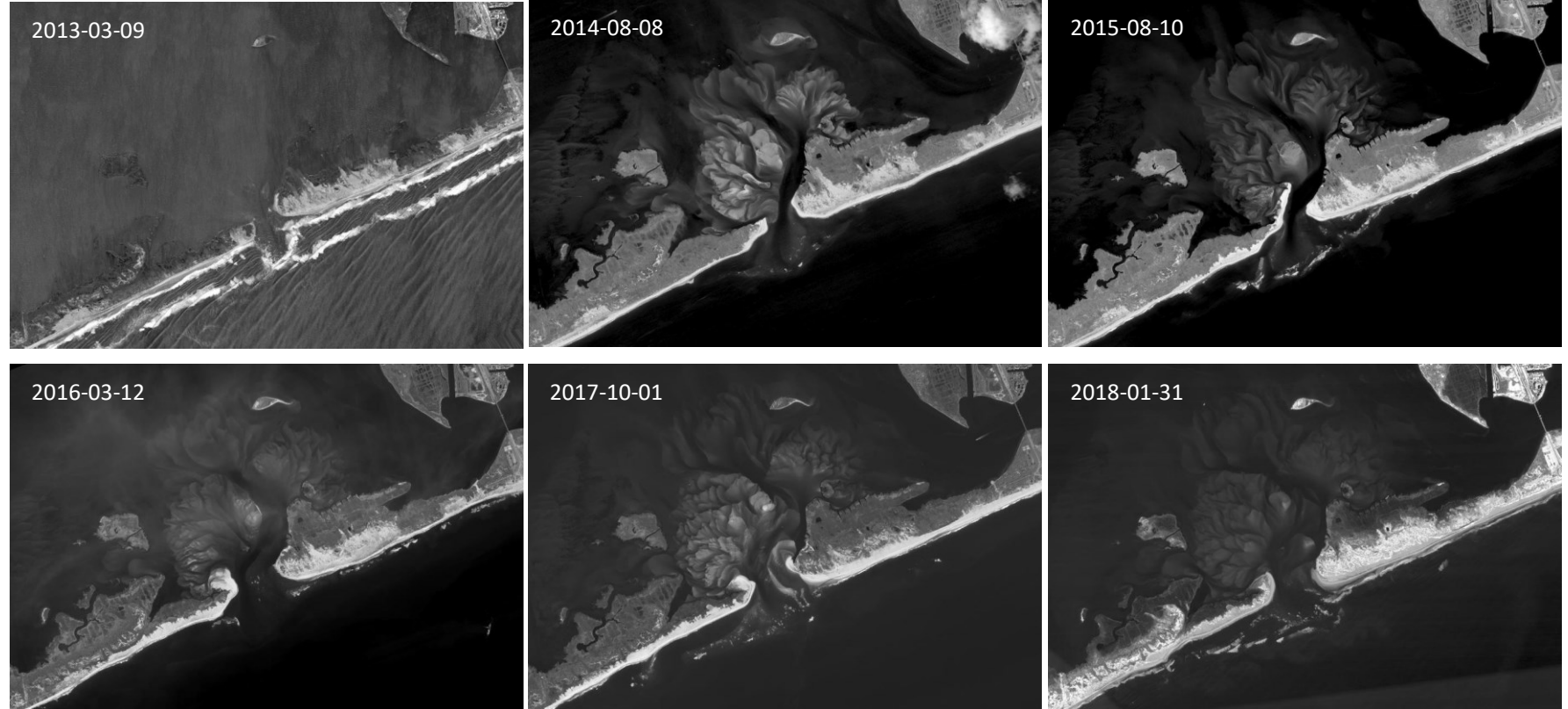


Fish Fire, WY Aug 5, 2022

Long Term Monitoring

National Civil Applications Center maintains the Global Fiducial Library:

- Systematic time series images derived from US National Imagery Systems data of environmental sites across the Globe.
- Started in the 1990's
- Working to add declassified imagery from the 1960's to 1980's and update images on the website.



Fire Island National Seashore, New York, March 2013 to August 2018.
<http://gfl.usgs.gov>

Disaster Response



Hurricane Ian (2022) before and after images, Sanibel Island, FL (top images).

Yellowstone National Park (2021) before and after images show widespread flooding and damage caused by heavy rains (bottom images).

Data such as this supports federal, state, and local government response and recovery.

USGS Earth Resources Observation and Science Center distributes data in support of disaster response via the USGS Hazards Data Distribution System:
<https://hddsexplorer.usgs.gov/>

Disaster Response and Recovery - Landslides

Preliminary Locations of Landslide Impacts from Hurricane Maria, Puerto Rico, Sept 2017

Excerpt of satellite image showing landslide impacts to Highway PR-431 and houses near Rio Blanco in the Lares Municipality.

Red dots identify the approximate location of roads and buildings visibly impacted by landslides.

Supports the USGS Landslide Hazards Program



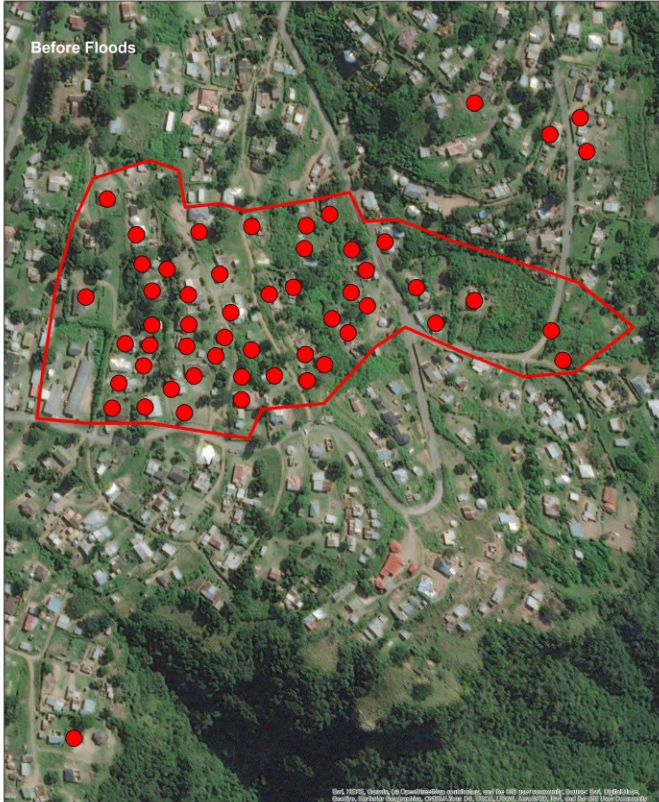
International Support – South Africa Flooding & Landslides

The International Charter Space and Major Disasters: <https://disasterscharter.org/>

- Satellite data to support disaster response worldwide
- Data also available on the USGS Hazards Data Distribution System: <https://hddexplorer.usgs.gov/>
- National Civil Applications Center provides data tasking

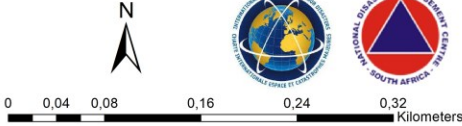


Molweni, Ngqungqulu, eThekweni Metropolitan Municipality, South Africa



Interpretation:
The map indicates flooding and mudslide within Molweni Village, Ngqungqulu in, eThekweni Metro Municipality, South Africa. Satellite imagery showing after floods was acquired on 14 April 2022. The flow of water caused mudslide affecting over 50 households, and a school.

Legend
 ● Affected house
 □ Affected area
 Satellite imagery



Copyright: 2022 Digital Globe, Inc., Map produced by National Disaster Management Centre of South Africa