NOAA's New Strategic and Implementation Plans in Response to the Climate Crisis

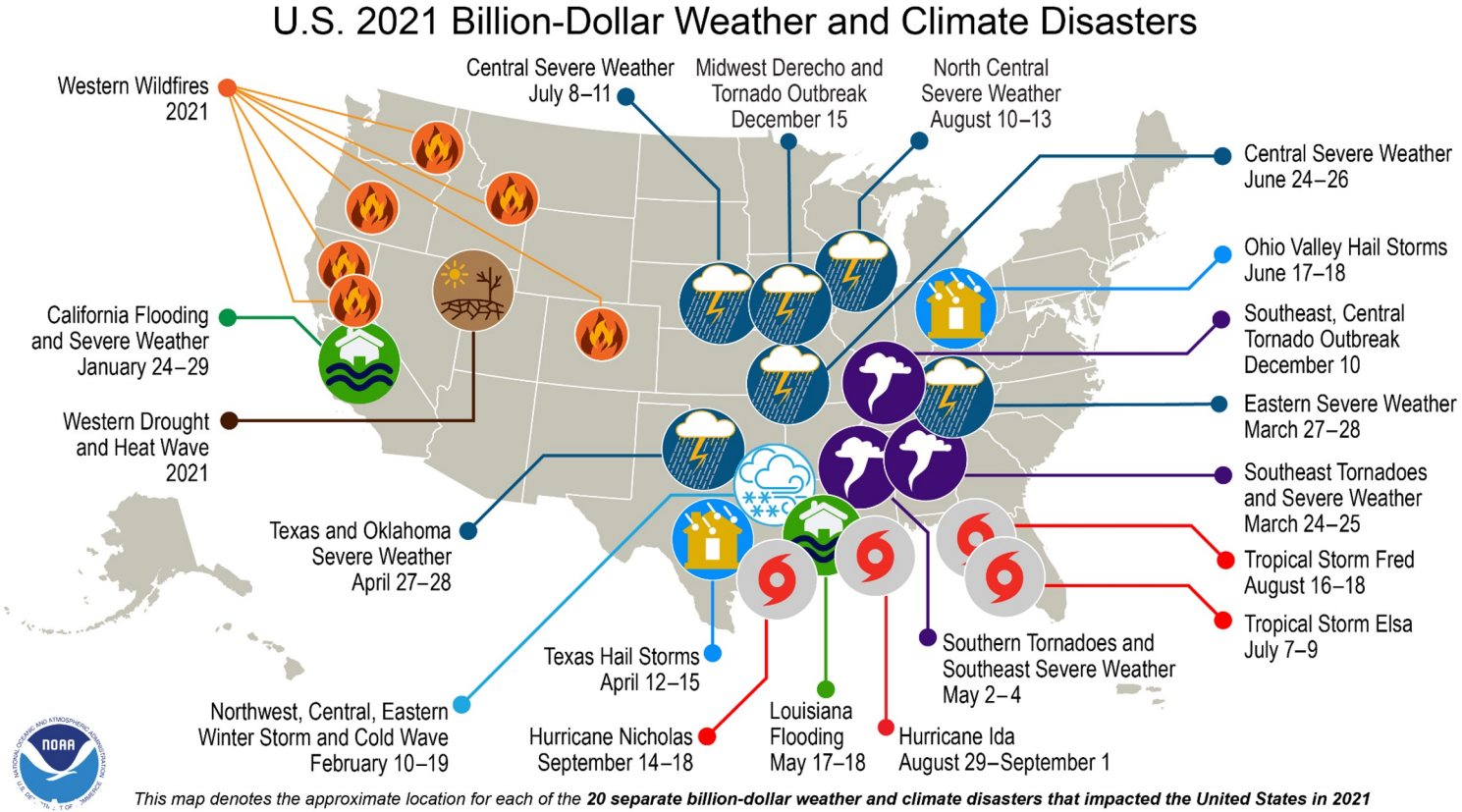
National Environmental Satellite, Data, and Information Service

November 17, 2022

Dr. Mitch Goldberg - Chief Scientist for Satellite and Information Services

AOMSU-12

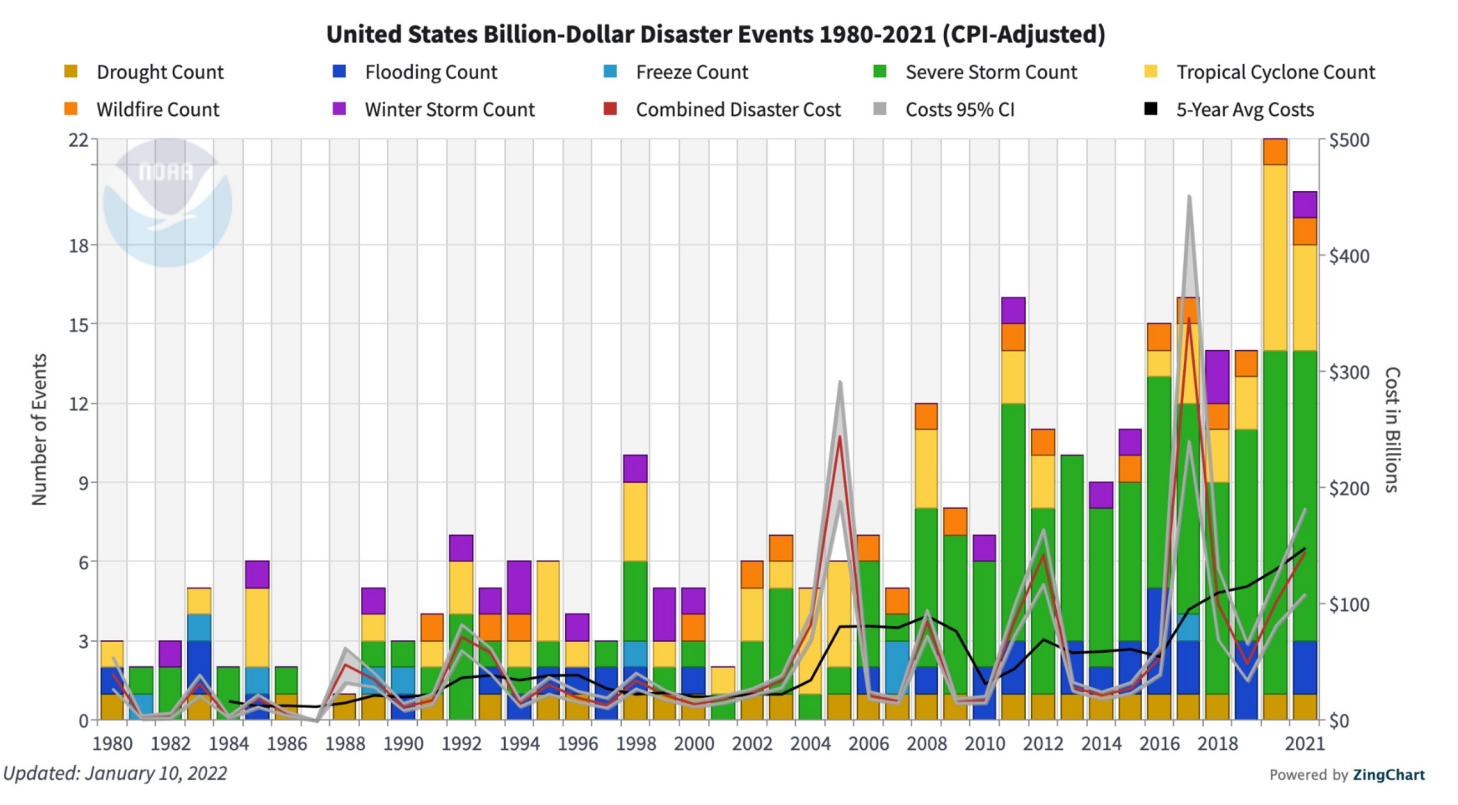
2021 Billion-Dollar Disasters



*This map denotes the approximate location for each of the **20 separate billion-dollar weather and climate disasters that impacted the United States in 2021***

NOAA National Centers for Environmental Information: ncdc.noaa.gov/billions

Events from 1980 to 2021



President's Executive Orders

- Tackling the Climate Crisis at Home and Abroad
- Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis
- Advancing Racial Equity and Support for Underserved Communities

National Oceanic and Atmospheric Administration
U.S. Department of Commerce

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Home / News & Features

New NOAA Climate Council to enhance delivery of climate science and services

Focus areas: Across NOAA, Climate **Topics:** NOAA leadership , climate science **Share:**

July 21, 2021

A collage of typical climate and weather-related events: heatwaves, drought, hurricanes, wildfires and changes in sea ice coverage. (NOAA)
Download Image

Weather, Water, and Climate Strategy

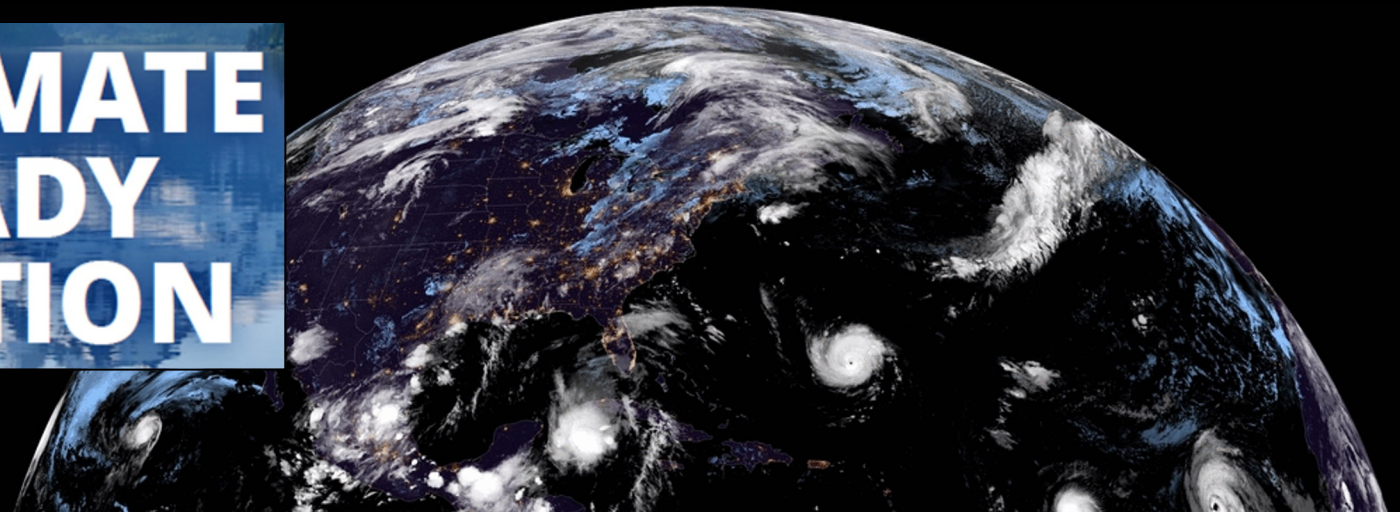
FY 2023-2027

Climate-Ready Nation

2030 Vision Statement

A thriving Nation whose prosperity, health, security, and continued growth benefit from and depend upon a shared understanding of, and collective action to reduce, the impacts of climate change

BUILDING A CLIMATE READY NATION



EXTREME EVENTS & CASCADING HAZARDS

CHALLENGE AREA 1

SOCIETAL CHALLENGE

Communities across the U.S., particularly underserved communities, face enduring, compounding risks from extreme, high-impact weather, water, and climate events, which have become more severe and more frequent in recent decades.

SOCIETAL BENEFIT

NOAA addresses this challenge by leading whole-of-government approaches, in partnership with private enterprise, academia, and non-governmental organizations, to prepare communities to mitigate and adapt to extreme events such as drought, extreme heat and cold, fire weather, flooding, atmospheric rivers, tornadoes, marine heat waves, and tropical cyclones.

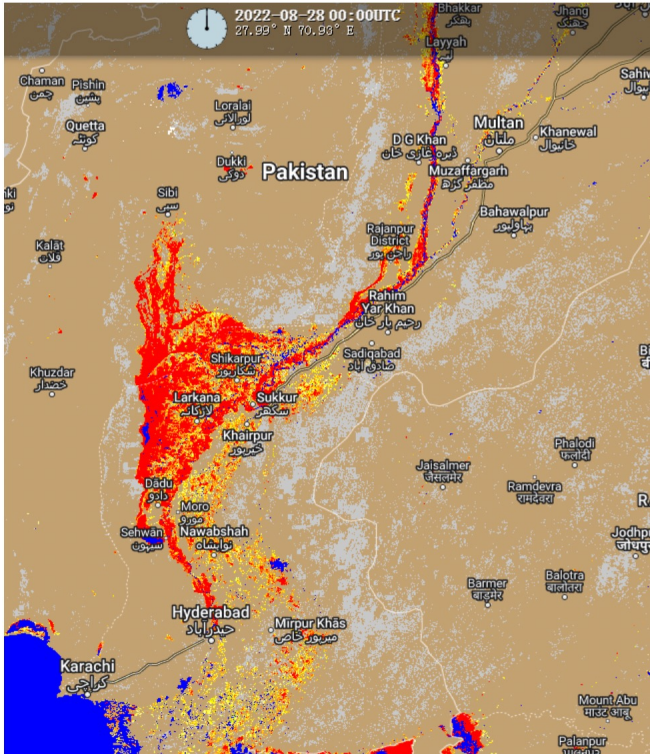
FIVE-YEAR OUTPUTS: EXTREME EVENTS & CASCADING HAZARDS

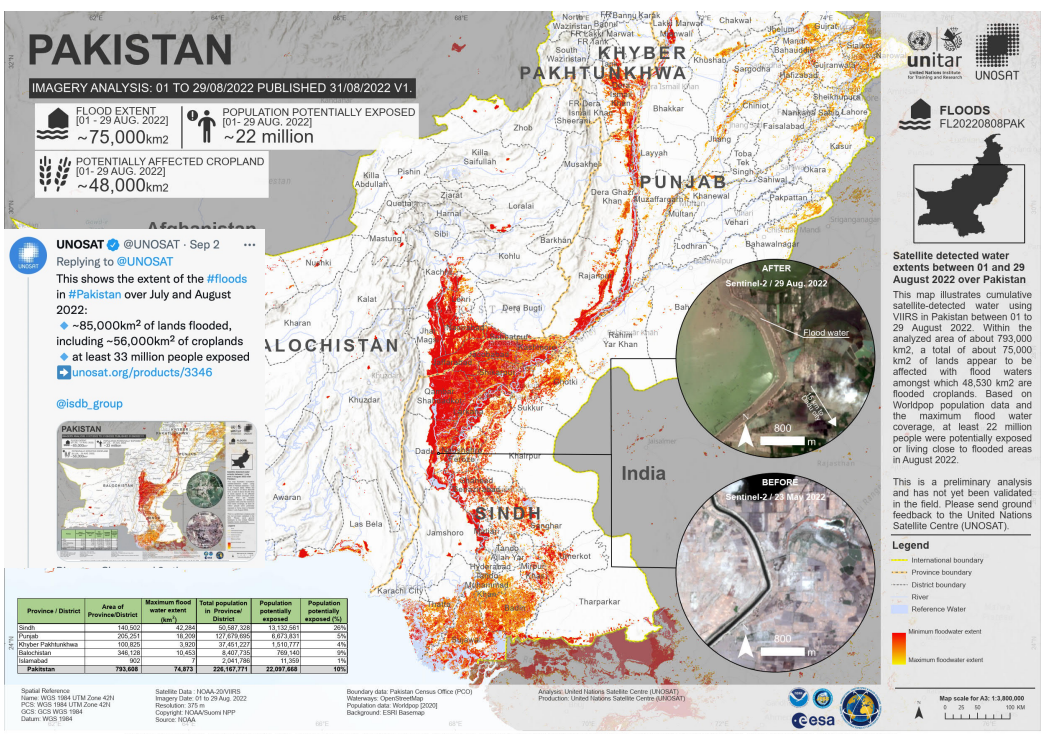
Area	Output
Extreme Heat and Cold	1. Improve extreme heat and cold forecasts, particularly for improving decision support, and deep engagement with vulnerable and underserved communities.
	2. Develop methods and services that place weather forecasts for heat waves and cold waves in context. These services, developed with demographic and socio-economic data from the Census Bureau, other agencies and end users, will convey the relative magnitude of these events in historical context, based on the social science of the personal, institutional, and societal experience(s) of NOAA stakeholders.
	3. Improve modeling and forecasting of urban heat island effects and its impact on air quality, particularly in underserved communities.
	4. Incorporate climate-change science in operational forecasts of extreme heat and cold, in order to improve understanding of extreme event variability and uncertainty in the prediction of high impact events.
Floods	5. Deliver a comprehensive real-time and forecast flood inundation mapping (FIM) capability at the street level for all communities nationwide, to better depict when, where, and how deep flood waters will be for improved Emergency Management decision support before, during, and after an event.
	6. Better inform decisions in support of interagency forecast informed reservoir operations (FIRO), e.g., DOI/USGS, DOI/BoR, FEMA, USACE, to more effectively balance flood and drought risk while maximizing water availability for environmental flows and consumptive uses.
Droughts	7. Deliver regional drought early warnings and forecasts, covering weather-to-climate timescales, for communities and economies across the country by expanding and enhancing the interagency National Integrated Drought Information System (NIDIS), and the many NOAA activities that support improvements in drought information.

FIVE-YEAR OUTPUTS: EXTREME EVENTS & CASCADING HAZARDS

Area	Output
Wildfire	11. Understand the sources of predictability of fire weather, including associated climate phenomena (e.g., ENSO, MJO, droughts), on seasonal, interannual, and decadal timescales, and provide skillful S2S Probabilistic Fire-Risk forecasts and retrospective summaries so that decision makers can evaluate past decisions about assets and seasonal posture.
	12. Incorporate the impacts of wildfire on snowpack properties/evolution and soil hydraulic behavior, and their associated effects on infiltration, runoff, streamflow prediction, and debris flow formation into the NextGen National Water Model.
	13. Integrate fire behavior observations, modeling, and meteorology to better forecast the spread of fire, providing improved short-range, hourly fire forecasts, and explore extending the range of fire and smoke forecasting through the inclusion of forest and ecosystem features with agency partnerships. Test new concepts and forecast techniques leveraging test bed environments and evaluations..
	14. Utilize artificial intelligence and machine learning algorithms to vastly improve early detection of wildfires from satellite data, meeting a long-standing need by the wildland fire community for timely detection and notification of newly ignited wildfires within critical fire environments that support extreme fire behavior.
	15. Accelerate the research, development, and transition to operations of NWS forecasting capability for impacts of wildfires on air quality to support improved community decisions for resulting hazards, which disproportionately impact underserved and vulnerable communities. The project will accelerate development and transition of a new high-resolution forecast capability enabled by the coupled high-resolution Rapid Refresh Forecast System (RRFS) and Community Multiscale Air Quality Modeling System (CMAQ).

Flood–A frequent and costly natural disaster

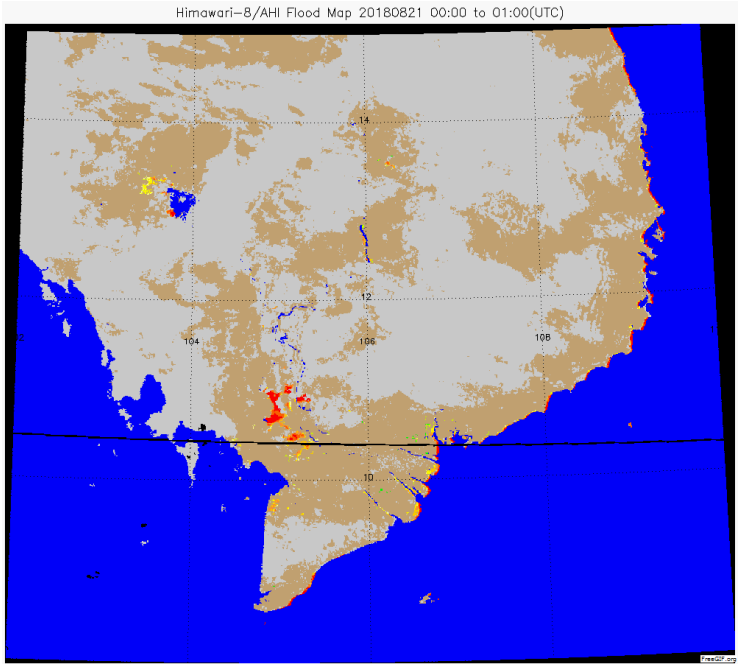




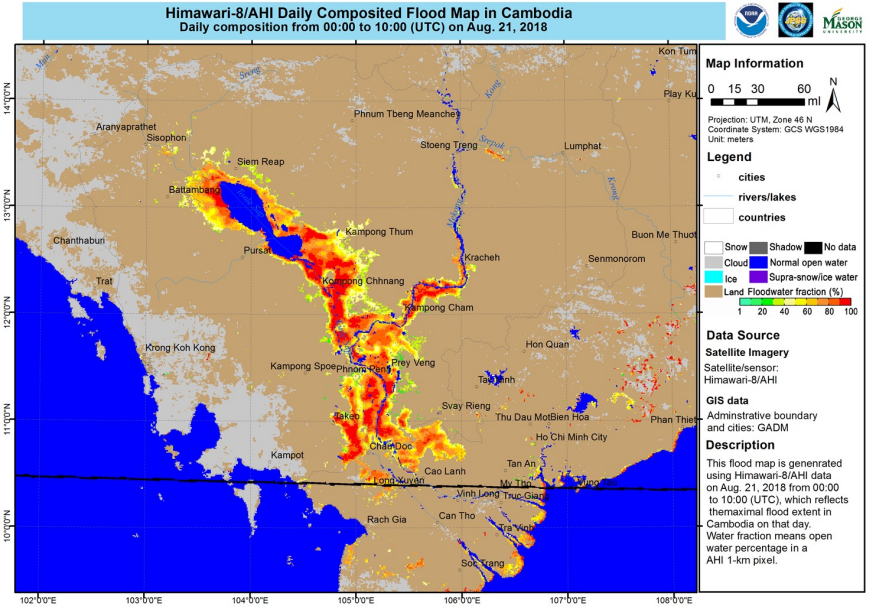
Province / District	Area of Province/District	Maximum flood water extent (km²)	Total population in Province/ District	Population potentially exposed	Population potentially exposed (%)
Sindh	140,902	42,264	50,567,539	13,132,561	26%
Punjab	205,251	18,209	127,679,695	6,673,831	5%
Khyber Pakhtunkhwa	100,825	3,920	37,451,227	1,510,777	4%
Balochistan	348,126	10,453	8,407,735	769,140	9%
Islamabad	902	7	2,041,786	11,359	1%
Pakistan	**793,608**	**74,873**	**226,167,771**	**22,097,668**	**10%**

1500 deaths. $40B losses

GEO-LEO Applications – Using HIMAWARI-8



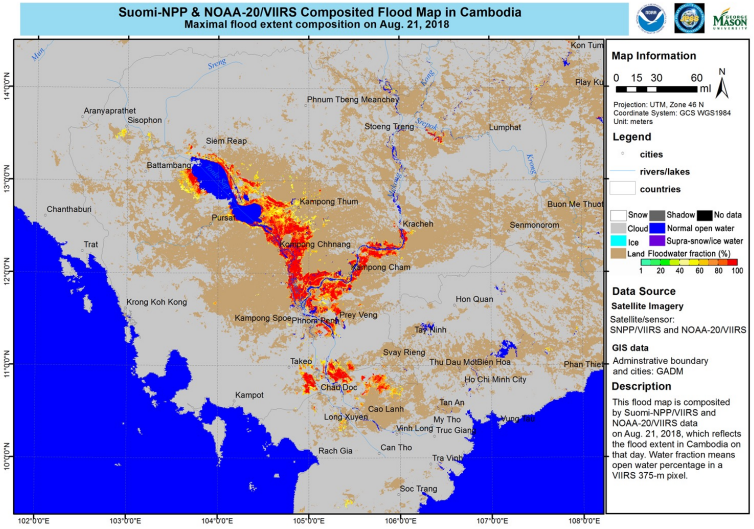
Aggregation of Flood "pixels" using AHI



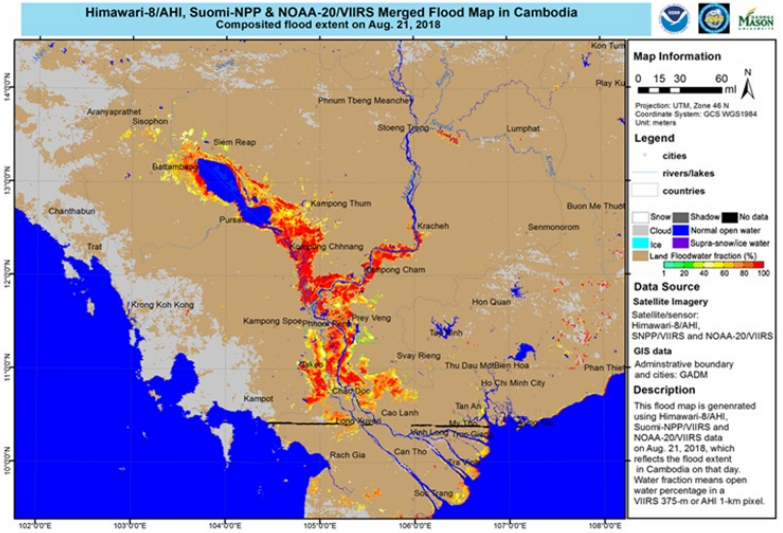
AHI Composite Flood Map (10 hours)

GEO-LEO Applications – Using HIMAWARI-8 & JPSS

Adding the GEO allows better areal extent while preserving LEO better spatial resolution



JPSS (SNPP&NOAA-20) Composite



JPSS + AHI Composite

ssec.wisc.edu/flood-map-demo/

Search SSEC

NOAA Satellite Proving Ground Global Flood Website

NRT NOAA global flood map products and information

HOME | REAL EARTH FLOOD PRODUCTS | SPONSOR, QUICK GUIDES AND REFERENCES | BLOGS AND USEFUL LINKS | TOOLS, ARCHIVE AND TRAINING LINKS

This site is for users access the NOAA LEO/GEO Flood Mapping Product. Products found here are demonstration products and are run on a best effort basis.

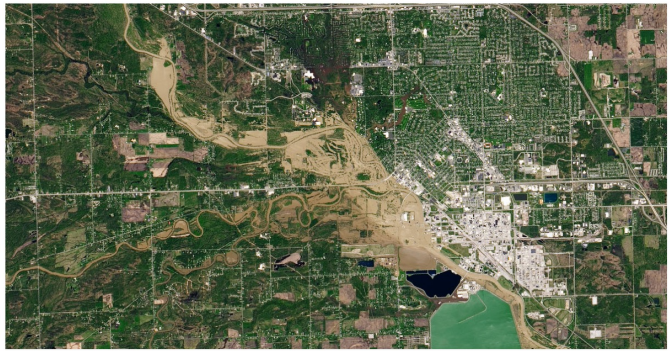
A brief quick guide of and overview of the NOAA LEO/GEO products is shown below Click here to download guide in PDF Form

Click here for Quick links to regional products: US, Asia, Global

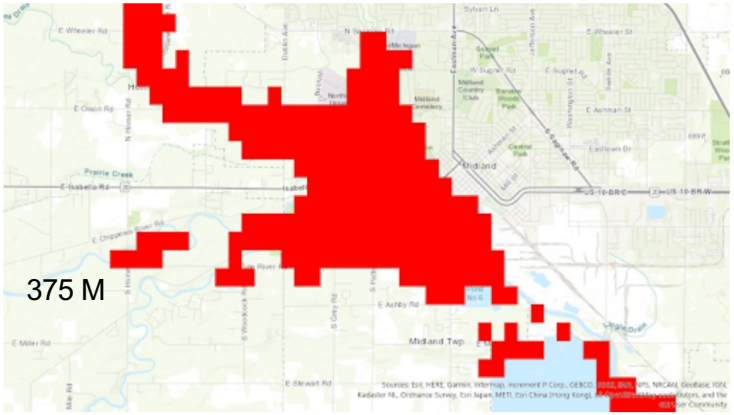
Click here for an embedded *SSEC RealEarth* map with some basic flood products.

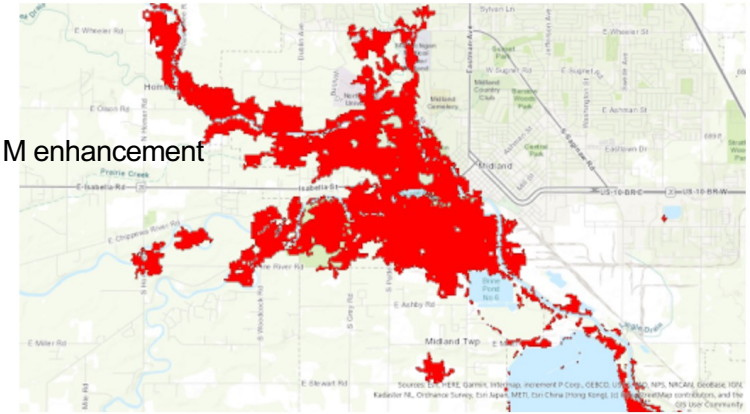
Downscaling VIIRS to 30 meter resolution using DEMs

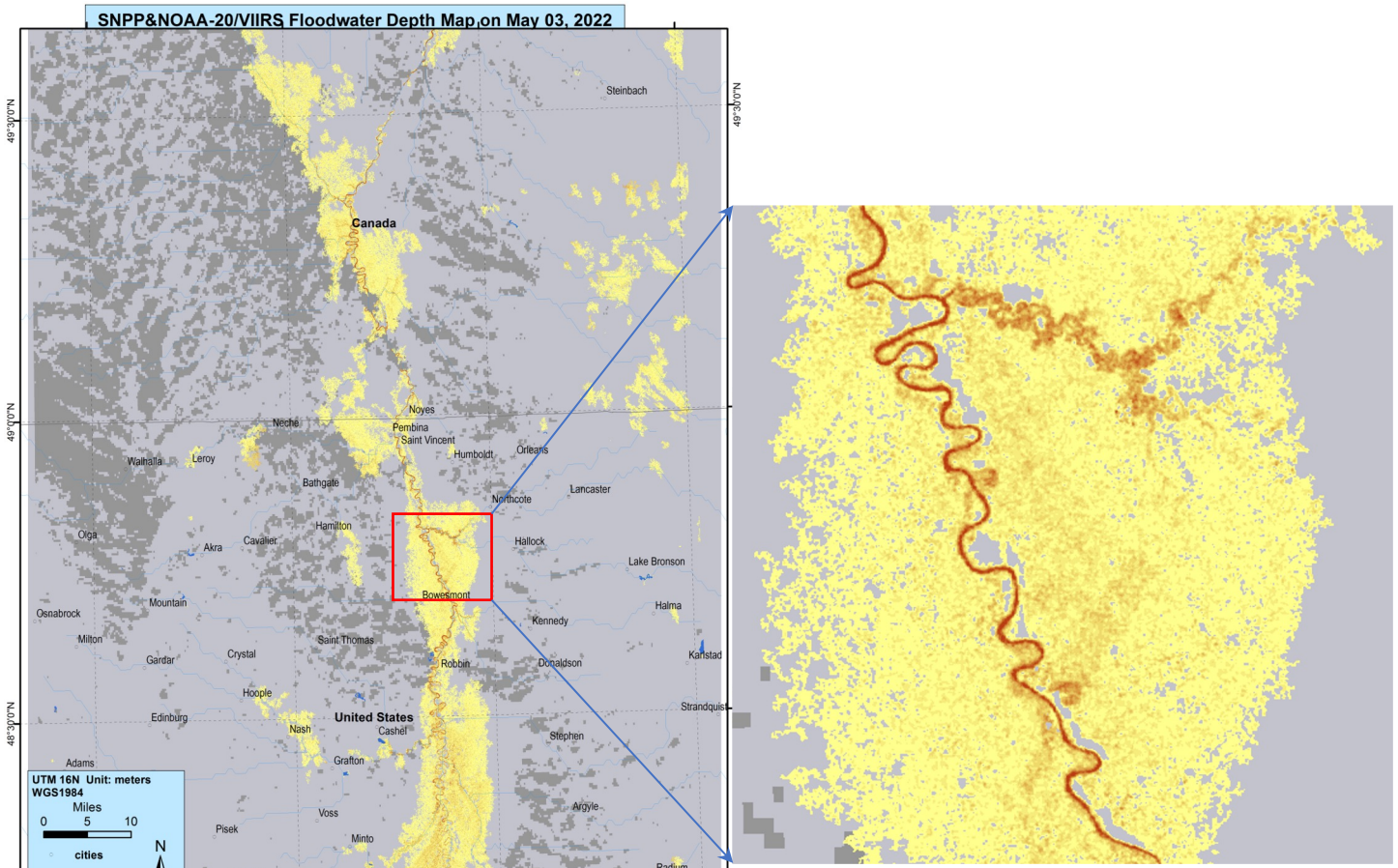
Downtown Midland, Mich., is flooded May 20. (Photo: Kelly Jordan and Junfu Han, Detroit Free Press)



NASA Earth Observatory image of the flooding in Midland, Mich. (light brown areas), as seen from the U.S. Geological Survey satellite, Landsat. Credit: Joshua Stevens.

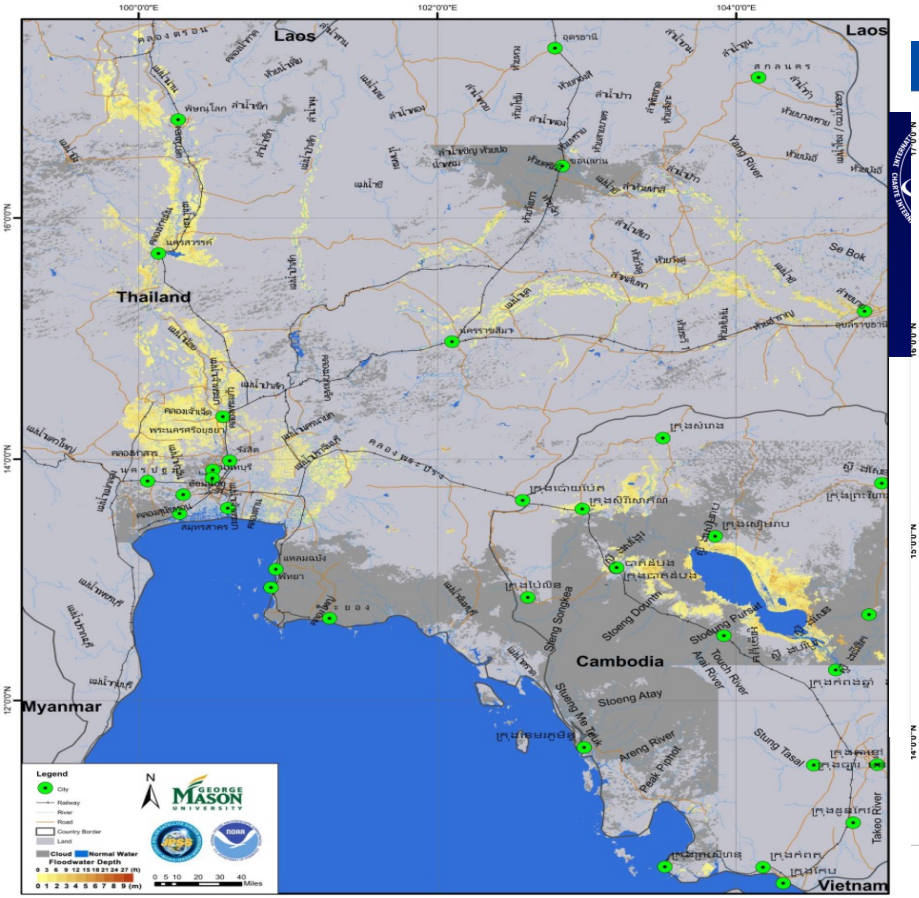






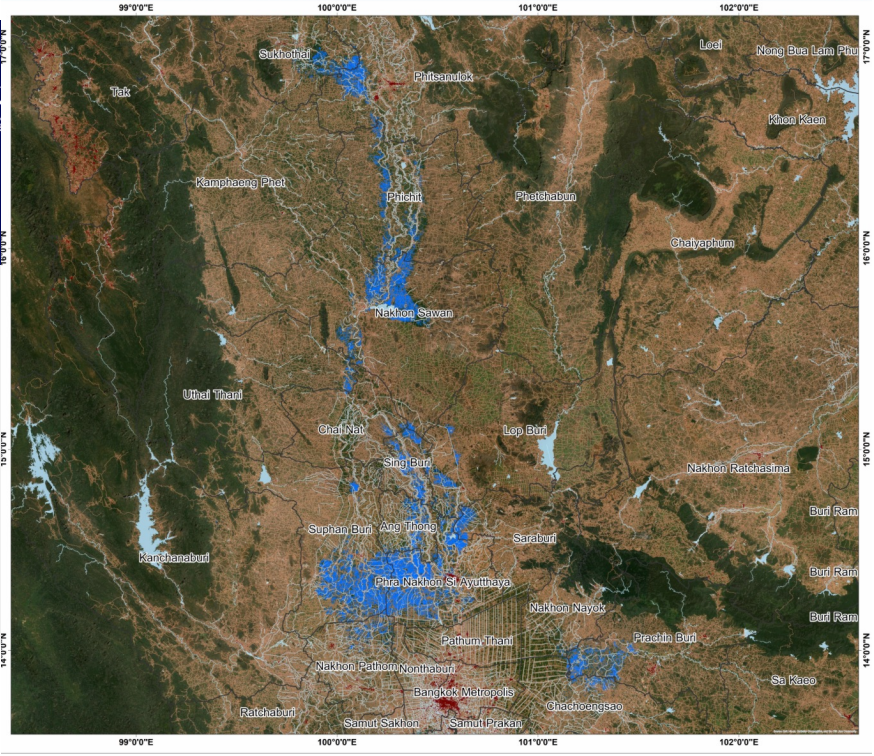
Downscaled VIIRS 30-m flood water depth map

Suomi-NPP&NOAA-20/VIIRS 30m Floodwater Depth Map
in Thailand and Cambodia, Oct. 20th, 2022



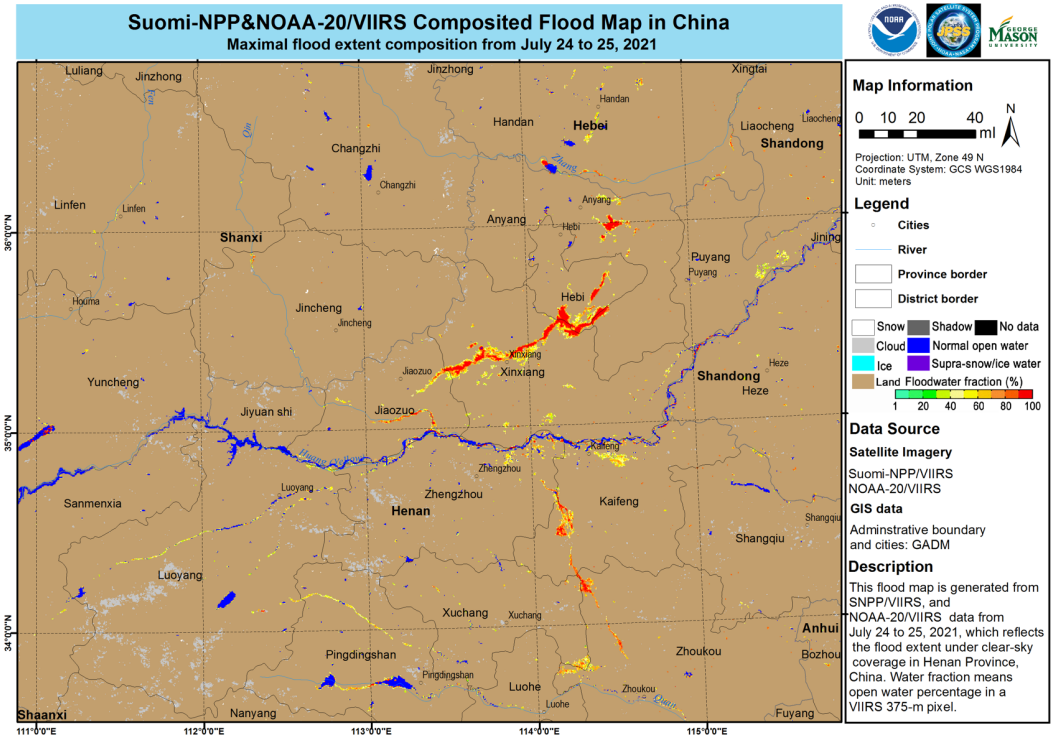
DETECTED FLOOD WATER IN CENTRAL REGION, THAILAND

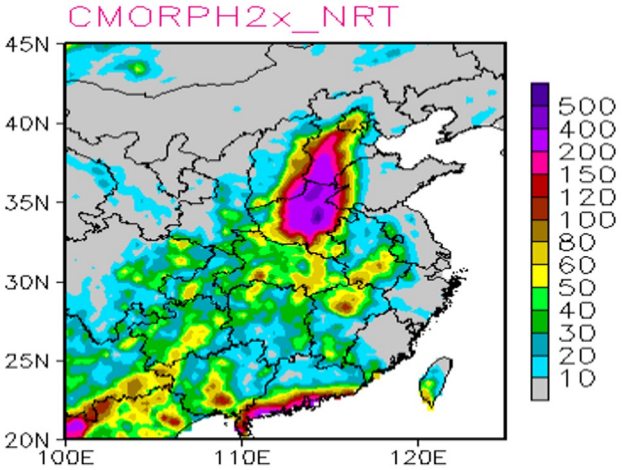
As observed by Sentinel-1 images on 23 October 2022



Central China Heavy Rainfall

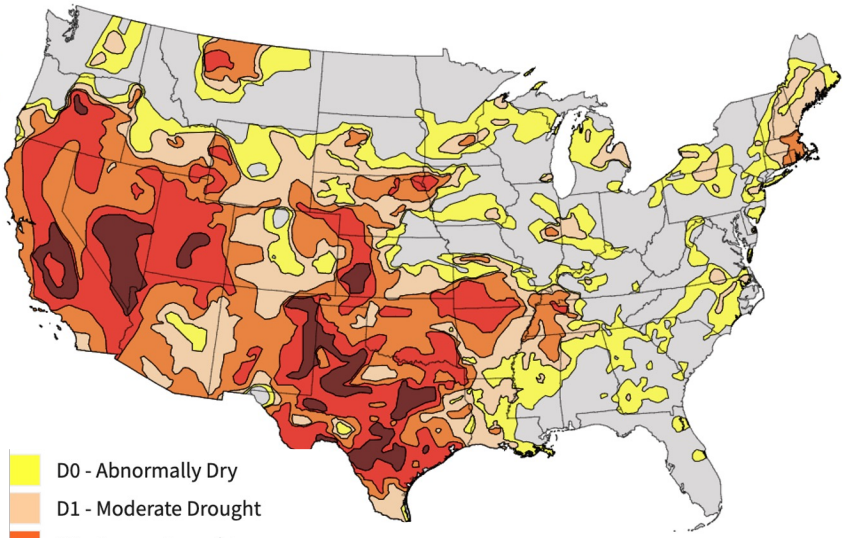
Accumulation over 17 – 21 July, 2021 (mm)



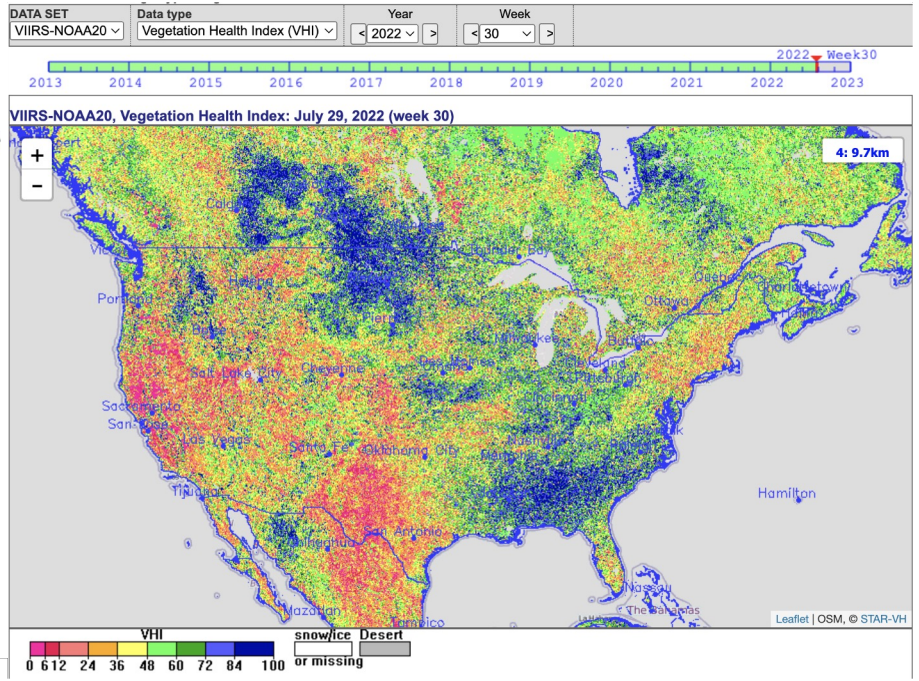


Zhengzhou, China

NIDIS Drought vs VIIRS Vegetation Health



Source(s): NDMC, NOAA, USDA

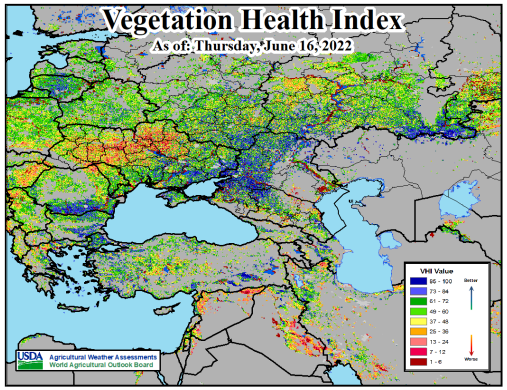


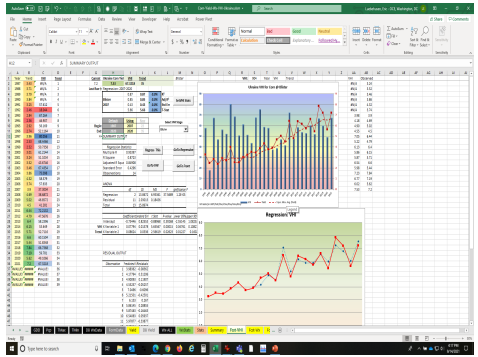
From Felix Kogan (NOAA/STAR)

VIIRS Vegetation Health Index: "Gamechanger" for USDA

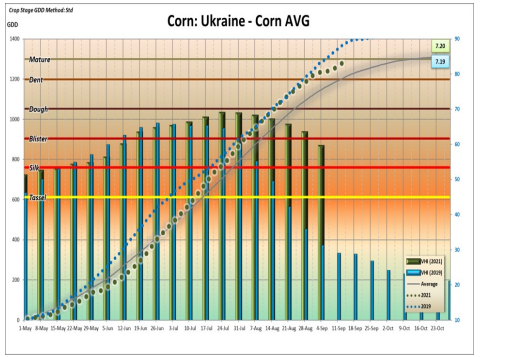
June 30, 2022

VHI: Normalized combination of Vegetation Index & Brightness Temperature





9/15/2021	PSD				Peak	Regression	Regression	Regression	Re
	Last Year	Last Month	Suggestion (E)		(R^2)	(Peak R^2)	Median	Range	
Wheat									
Russia Wheat (Winter):	3.77	3.32	3.60	↑	0.89	3.99	3.94	3.8 - 4.05	19
Ukraine Wheat:	3.71	4.46	4.60	↑	0.94	4.59	4.68	4.59 - 4.79	20
Moldova Wheat:	1.89	4.00	4.25	↑	0.96	4.23	4.39	4.21 - 4.59	20
Russia Wheat (Spring):	1.88	1.72	1.70	=	0.83	1.69	1.65	1.55 - 1.72	19
Kazakhstan Wheat:	1.18	0.98	0.95	↓	0.89	0.96	0.98	0.96 - 1.02	19
Barley									
Ukraine Barley (Winter):	3.08	3.89	3.75	↓	0.90	3.77	3.69	3.52 - 3.77	20
Moldova Barley:	2.25	3.83	3.60	↓	0.89	3.60	3.59	3.15 - 3.6	20
Russia Barley (Spring):	2.53	2.32	2.30	=	0.89	2.33	2.28	2.24 - 2.33	20
Kazakhstan Barley:	1.34	1.14	1.15	=	0.88	1.17	1.24	1.17 - 1.29	19
Corn									
Russia Corn:	5.08	5.54	5.60	=	0.95	5.69	5.72	5.55 - 5.76	20
Ukraine Corn:	5.62	7.20	7.55	↑	0.90	7.57	7.55	7.42 - 7.63	20
Moldova Corn:	2.65	4.80	5.05	↑	0.88	5.07	5.05	4.16 - 5.96	20
Belarus Corn:	6.00	5.31	5.35	=	0.72	5.67	5.38	5.22 - 5.67	20
Oilseeds									



USDA Agricultural Weather Assessments
World Agricultural Outlook Board

The USDA Monthly Crop Report

USDA United States Department of Agriculture

World Agricultural Supply and Demand Estimates

ISSN: 1554-9089

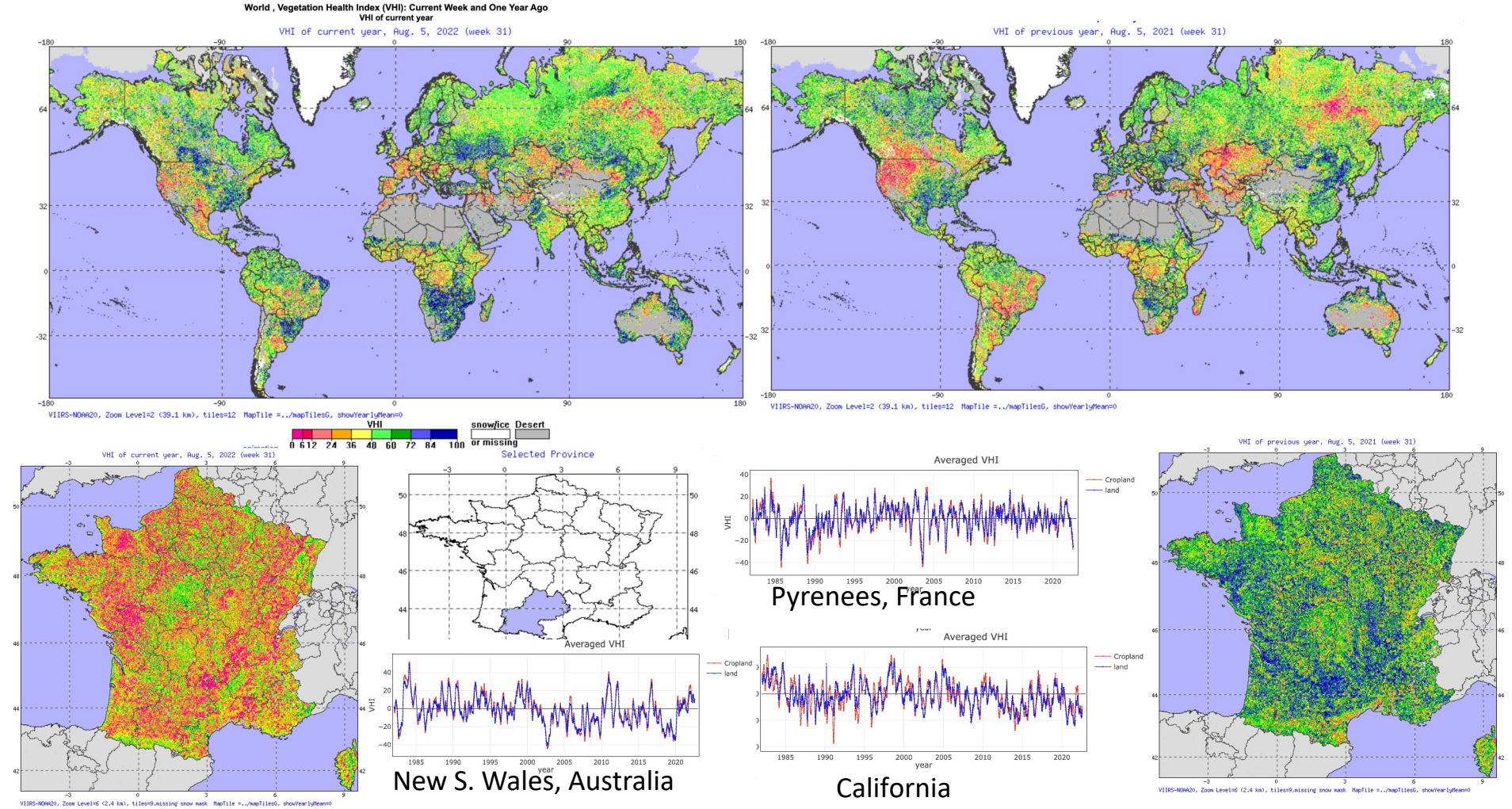
Office of the Chief Economist	Agricultural Marketing Service Farm Service Agency	Economic Research Service Foreign Agricultural Service
WASDE - 625	Approved by the World Agricultural Outlook Board	June 10, 2022

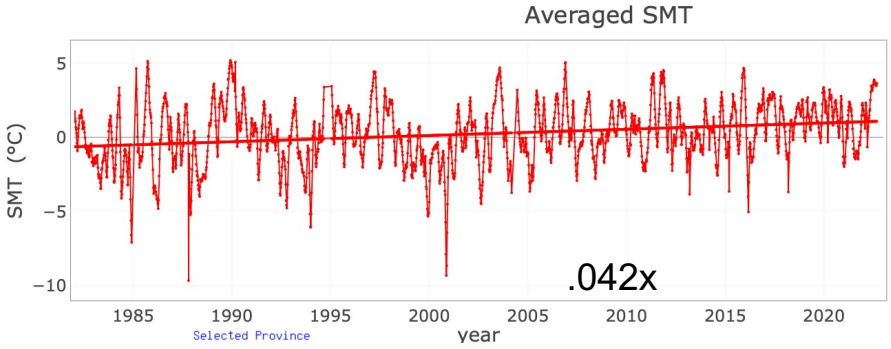
WHEAT: The outlook for 2022/23 U.S. wheat this month is for increased supplies, unchanged domestic use and exports, and higher stocks. Supplies are raised on higher production with all wheat production projected at 1,737 million bushels, up 8 million from last month. NASS raised winter wheat production to 1,182 million bushels as increases for Soft Red Winter and White Winter more than offset a reduction for Hard Red Winter. The all wheat yield is 46.9 bushels per acre, up 0.3 bushels from last month. Projected 2022/23 ending stocks are raised 8 million bushels to 627 million, still down 4 percent from 2021/22. The projected 2022/23 season-average farm price is unchanged at $10.75 per bushel, compared to $7.70 for 2021/22.

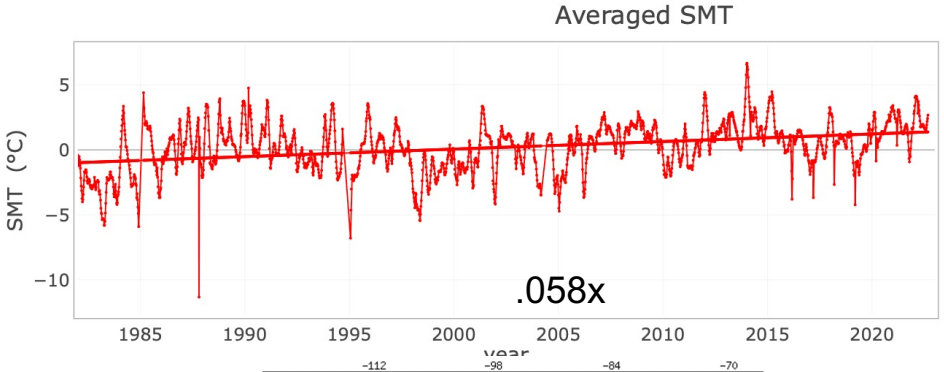
The global wheat outlook for 2022/23 is for lower supplies, reduced consumption, fractionally lower trade, and slightly lower ending stocks. Supplies are decreased by 1.7 million tons to 1,052.8 million as lower India production more than offsets an increase for Russia. India's production is lowered 2.5 million tons to 106.0 million as extreme temperatures in March and April reduced yields during grain fill. Russia's production is raised 1.0 million tons to 81.0 million with all of the increase in winter wheat on generally favorable weather conditions to date. Projected 2022/23 world consumption is reduced 1.5 million tons to 786.0 million mainly on lower feed and residual use for India and less food, seed, and industrial use for Sri Lanka and Argentina.

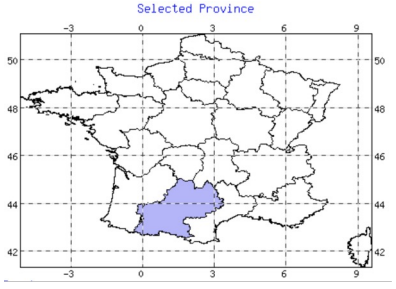
Projected 2022/23 global trade is decreased 0.3 million tons to 204.6 million as lower exports from India are not completely offset by higher exports from Russia and Uzbekistan. India's exports are reduced 2.0 million tons to 6.5 million as the government intends to restrict exports to some destinations to ensure sufficient domestic supplies. Russia's exports are raised 1.0 million tons to 40.0 million, which would be the second largest on record. Russia's supplies are projected higher for 2022/23 and its export prices are more competitive than most other exporters. Projected 2022/23 world ending stocks are lowered 0.2 million tons to 266.9 million, a six-year low.

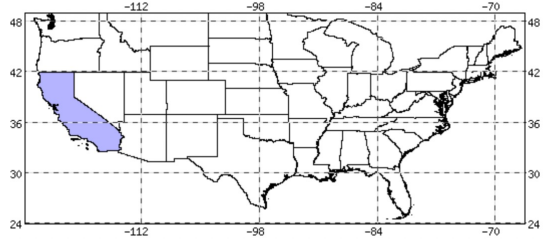
Thanks to Eric Luebehusen
USDA/OCE/WAOB

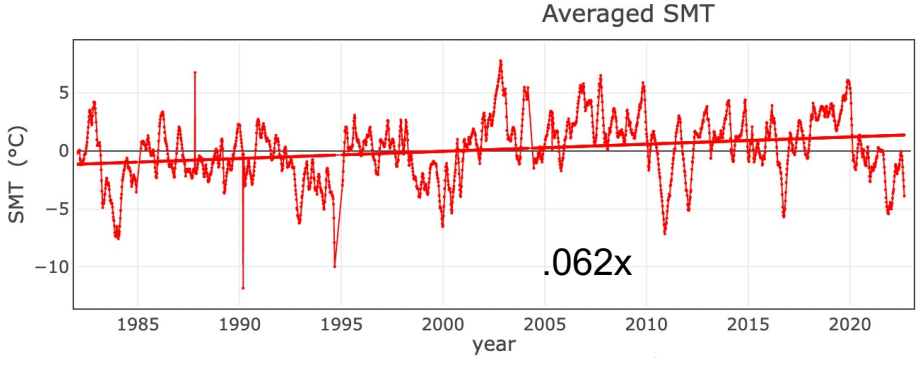

World , Vegetation Health Index (VHI): Current Week and One Year Ago
VHI of current year
VHI of current year, Aug. 5, 2022 (week 31)
VHI of previous year, Aug. 5, 2021 (week 31)
VIIRS-NOAA20, Zoom Level=2 (39.1 km), tiles=12 MapTile =../mapTilesG, showYearlyMean=0
VHI
0 6 12 24 36 48 60 72 84 100
snow/ice
Desert
or missing
Selected Province
Averaged VHI
Cropland
land
VHI
year
Pyrenees, France
New S. Wales, Australia
California

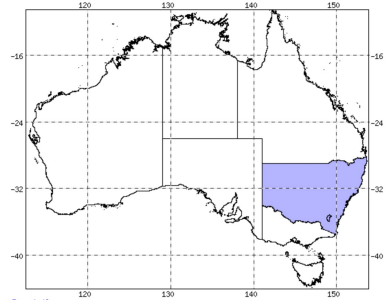

Averaged SMT
SMT (°C)
year
.042x


Averaged SMT
SMT (°C)
year
.058x

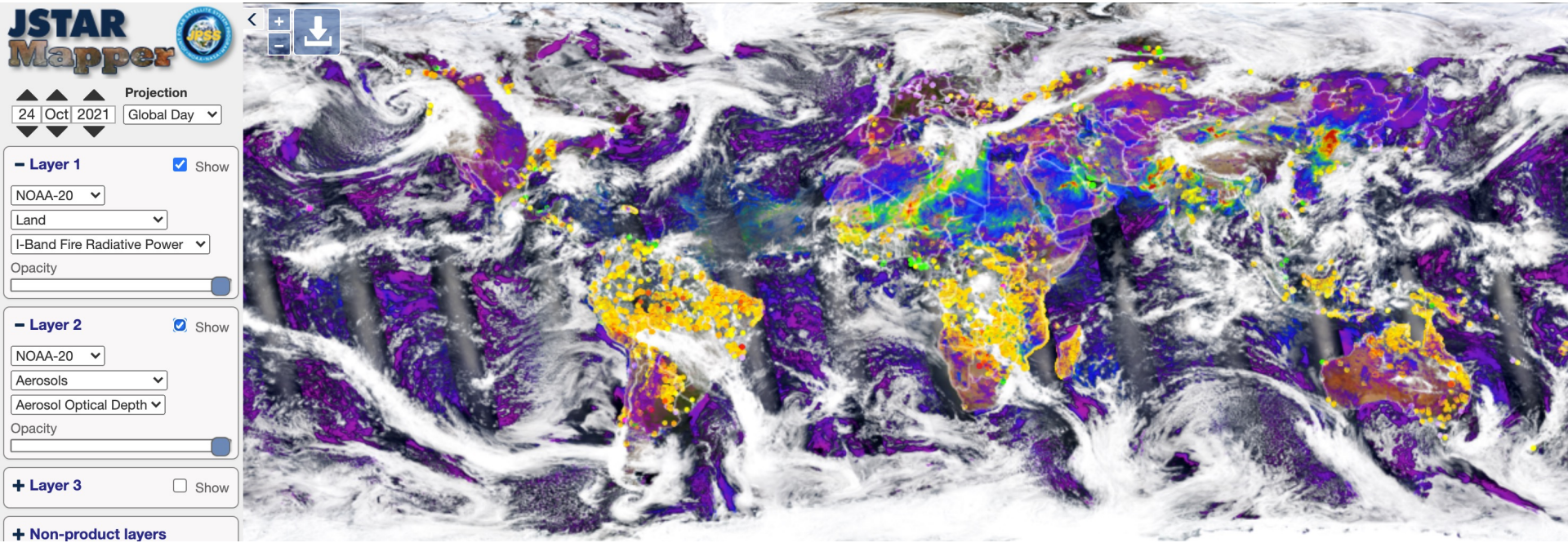

Selected Province




Averaged SMT
SMT (°C)
year
.062x

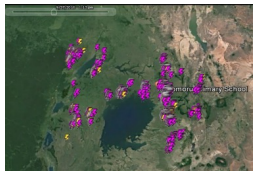
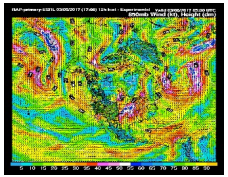


Fire and aerosols monitoring

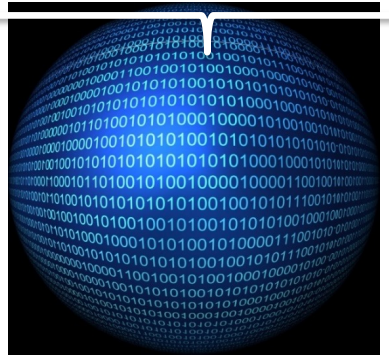


Applications need to be automated for actionable decision making



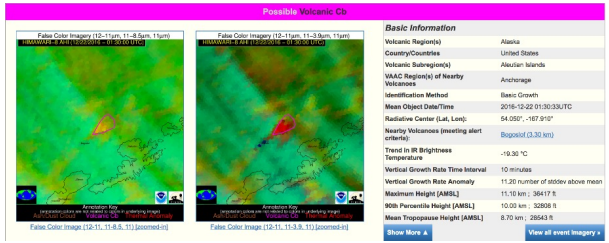



Operational applications require "Big Data" to be automatically transformed into information and insight for decision making



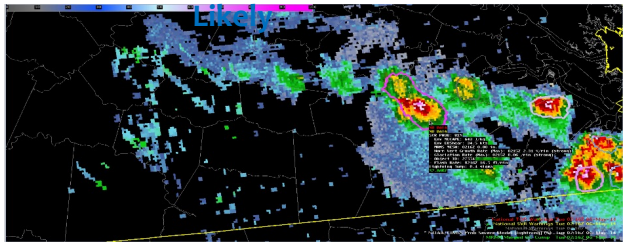
VOLCAT

Volcanic Eruption Detected!



ProbSevere

Severe Weather

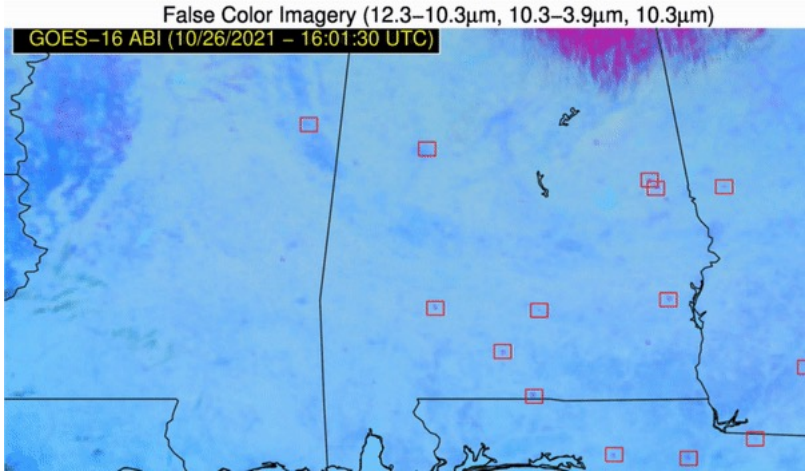


New experimental automatic fire alerting system

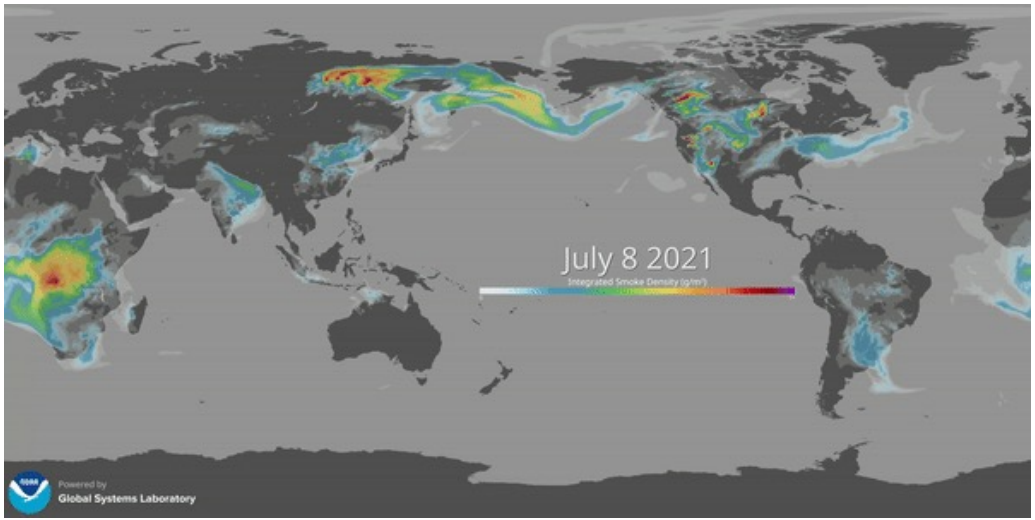
Last updated: 16:29:03 UTC

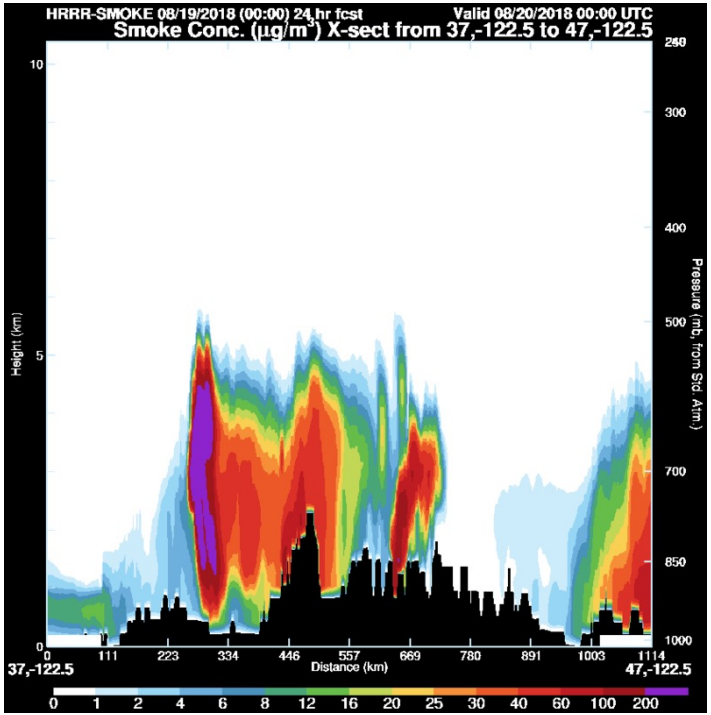
Satellite-derived Thermal Anomaly Detection in Support of Wildfire Monitoring

Barbour County, Alabama	Country: USA	NWS WFO Birmingham AL	Most Recent: 52 seconds ago
Baxter County, Arkansas	Country: USA	NWS WFO Little Rock AR	Most Recent: 2 hours, 40 minutes ago



FV3 Smoke Integrated Smoke forecasts



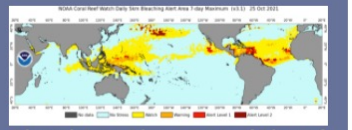


Coral Reef Watch Home

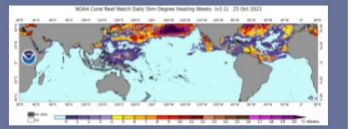
About Us

Products List

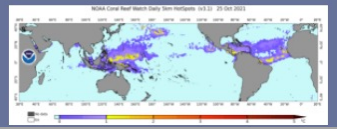
Near-Real-Time Data
(5km Resolution)



Bleaching Alert Area (Alerts)



Degree Heating Week (DHW)



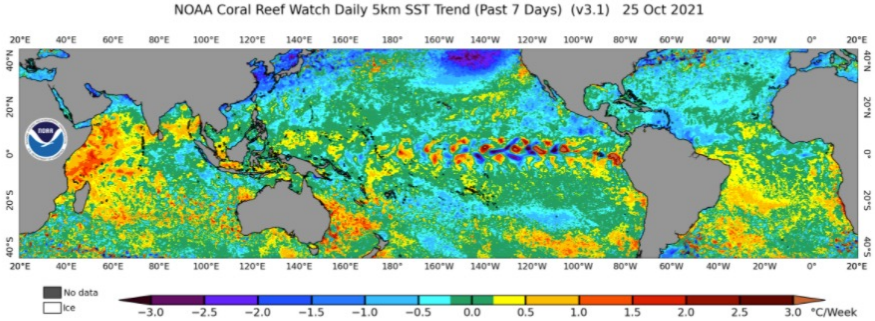
Coral Reef Watch Satellite Monitoring and Modeled Outlooks

Hover over buttons below image to change product; then click on button or image to navigate to product's page.

5km data

5km composite products

Outlook



Atmospheric CO_2 Now

Alerts | DHW | HotSpot | SST (CoralTemp) | Anomaly | SST Trend | Virtual Stations

Complete Products List

Current ENSO Conditions and Forecasts

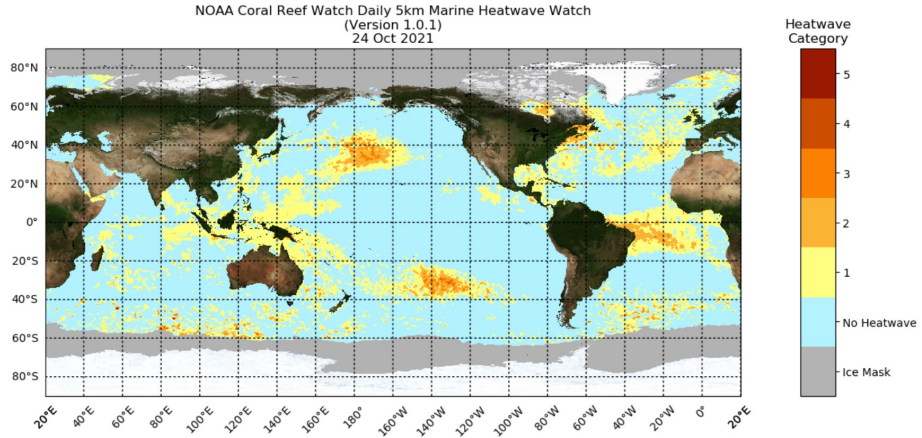
Report Field Data & Observations of Coral Bleaching/No Bleaching

Ocean and Coasts monitoring

Daily Global 5km Satellite Monitoring

Marine Heatwave Watch

(Version 1.0.1, released September 21, 2021)



Data Access via FTP Server:

Marine Heatwave Category: NetCDF files | Browse Images

Climatology: NetCDF files

Four-Month Coral Bleaching Outlook

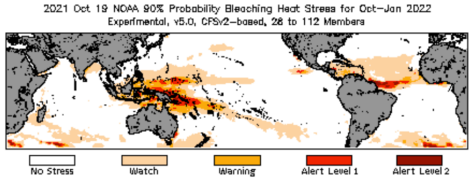
(Version 5, released on 27 March 2018, updated weekly)

Current Maps: 45ns | Global | East | West | Pacific | Caribbean | Coral Triangle | GBR **Archive**

Outlook of Coral Bleaching Heat Stress: (Click on the images below to see them in full-size.)

90% Chance:

(Stress level predicted by 90% of ensemble members)

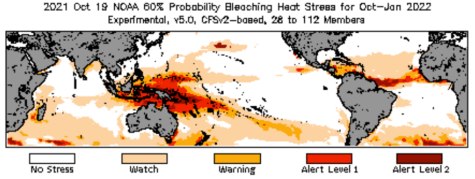


Weekly Outlook

Weekly Animation

60% Chance:

(Stress level predicted by 60% of ensemble members)



Weekly Outlook

Weekly Animation

Monitoring Sea Level Rise

NOAA / NESDIS / STAR
Laboratory for Satellite Altimetry

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Laboratory for Satellite Altimetry

Sea level rise
- Project background
- Radar Altimeter Database System
- Tide gauge comparison
- Jason radiometer stability monitoring
- Team members & contact

Products
- Sea level trend map >>
- Sea level data and plots
  - Global mean sea level
  - Regional mean sea level
- Sea level budget assessment
- Data use policy

Data and images displayed on STAR sites are provided for experimental use only and are not official operational NOAA products. More information>>

Laboratory for Satellite Altimetry / Sea Level Rise

Products / Sea level rise maps

The following maps provide estimates of sea level rise based on measurements from satellite radar altimeters. The local trends were estiamted using data from TOPEX/Poseidon (T/P), Jason-1, Jason-2, and Jason-3, which have monitored the same ground track since 1992.

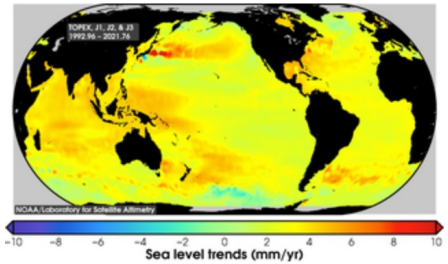
An inverted barometer has been applied. The estimates of sea level rise do not include glacial isostatic adjustment effects on the geoid, which are modeled to be +0.2 to +0.5 mm/year when globally averaged.

Map of sea level rise from TOPEX and Jason-1,-2,-3

Download local sea level trends as a COADS-compliant NetCDF file (448 kB).
Download local sea level trends as an ASCII file (6 mB).

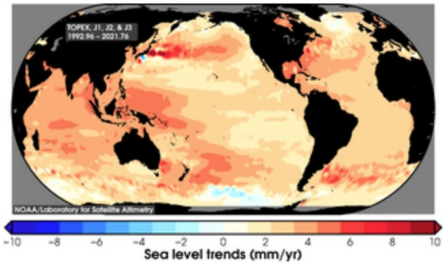
Color table: sst

A 617 kB pdf opens in a new window.
A 258 kB png opens in a new window.



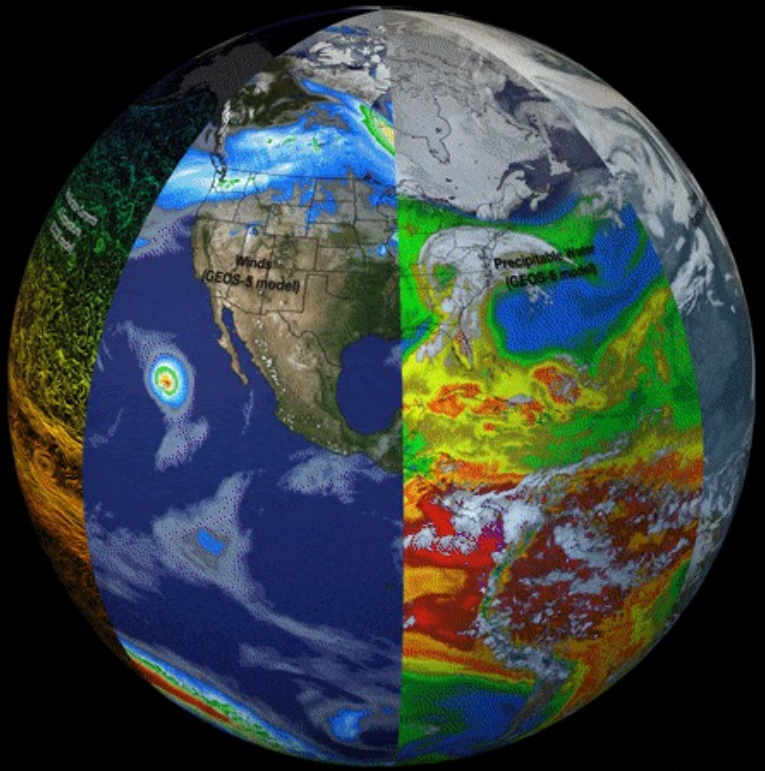
Color table: blue2red

A 539 kB pdf opens in a new window.
A 146 kB png opens in a new window.



NESDIS Aspiration

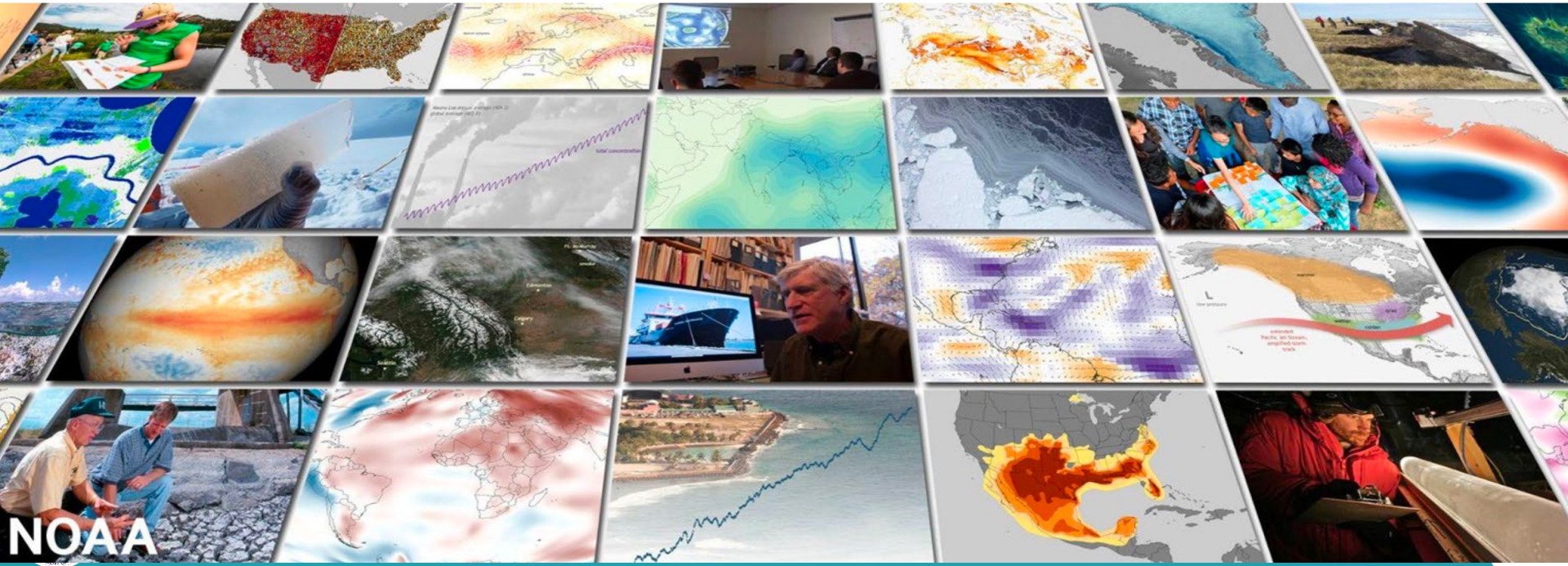
Provide a truly integrated digital understanding of our earth environment that can evolve quickly to meet changing user expectations by leveraging our own capabilities and partnerships



EXTRA

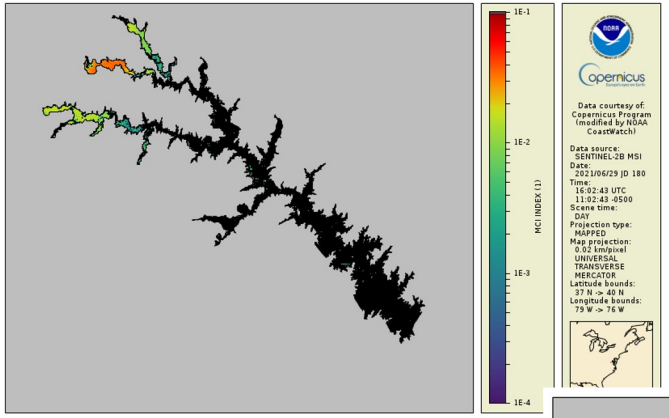
The Vision for a New Blue Economy

A sustainable and equitable ocean and coastal economy that optimizes advances in science and technology to create value-added, data-driven economic opportunities and solutions to pressing societal needs.

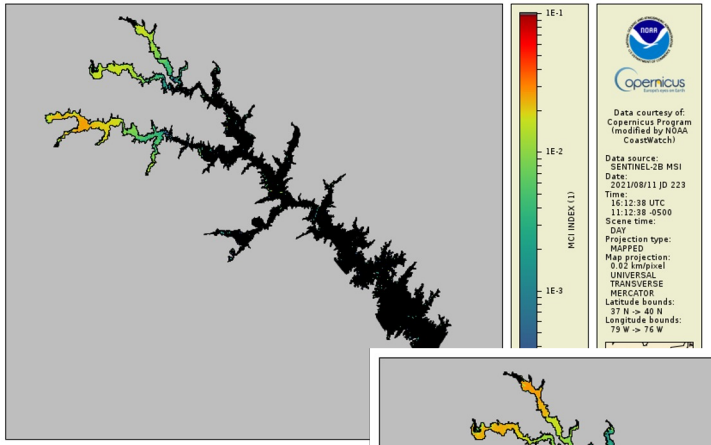


2021 Virginia Lake Anna *Microcystis* bloom

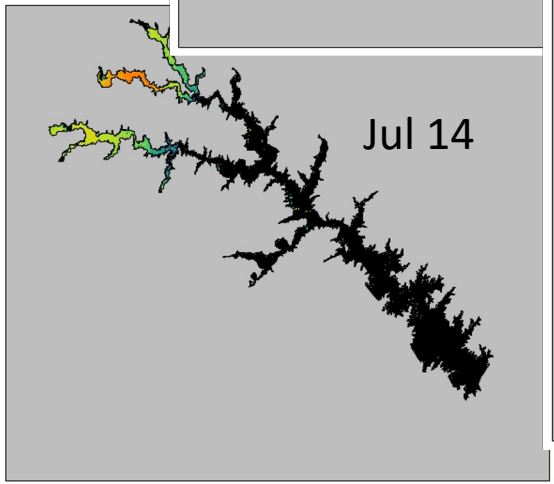
Jun 29



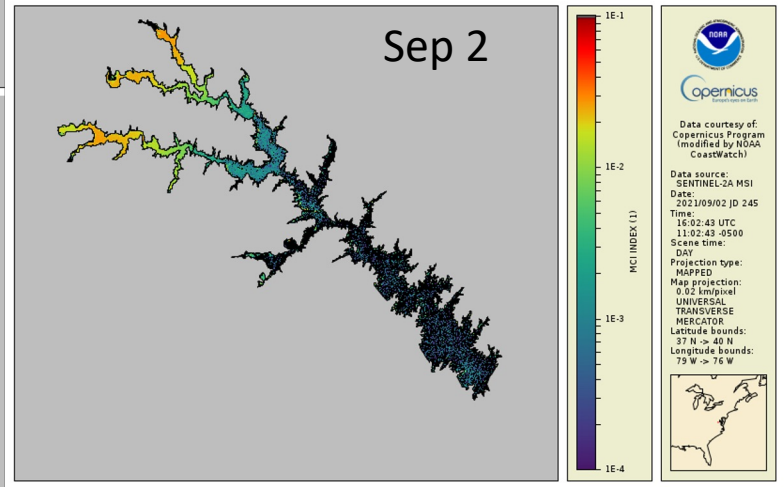
Aug 11



Jul 14



Sep 2



"We actively used the Sentinel-2 MCI images to inform our water sampling activities this year…

LACA is developing a Cyanobacteria Mitigation, Remediation, & Prevention Plan…and the Sentinel-2 data is being used to inform this plan"
Harry Looney, LACA Water Quality Project Officer