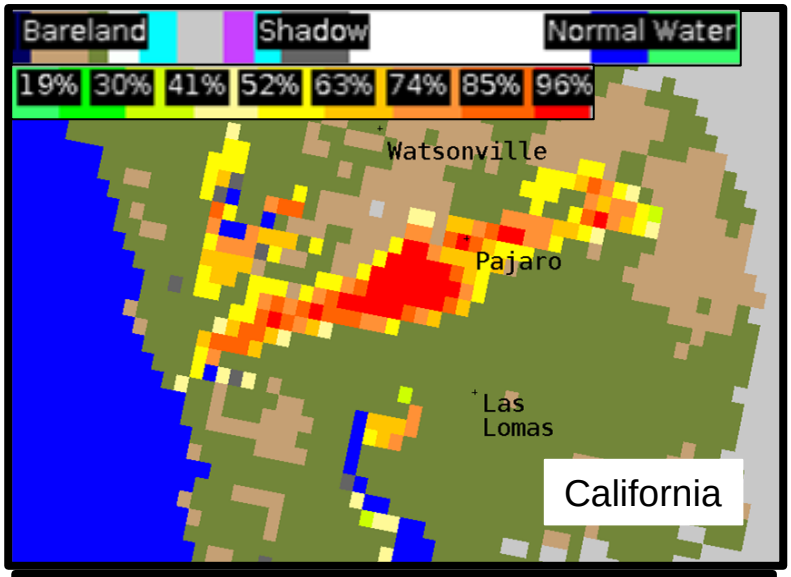
VIIRS Flood Map

Quick Guide

Why is the VIIRS Flood Map Important?

The Visible Infrared Imaging Radiometer Suite (VIIRS) Flood Map is a flood extent product derived from polar-orbiting satellite daytime imagery. Flooding occurs when water accumulates faster than can be absorbed or transported by the underlying surface and is most commonly caused by prolonged or heavy rainfall. The effects of flooding can be devastating, including damage to property and infrastructure, environmental impacts, and public health hazards. With this product the extent of flooding is calculated and displayed as a percentage, indicating the amount of water within each 375-m pixel that exceeds what is typically there. Knowledge of the spatial distribution of floodwater can aid in determining the severity of a flood event and guide mitigation efforts.

Also known as: VIIRS Flood Areal Extent



VIIRS Flood Map showing the inundation caused by a levee breach in Pajaro, CA, on 13 March 2023 at 2100 UTC.

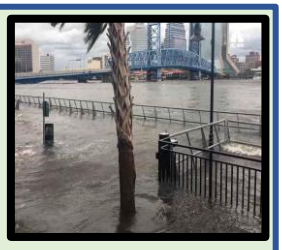
VIIRS Flood Map algorithm and specifications

Algorithm	Resolutions	Latency	AWIPS Sectors
The algorithm detects water, dryland, cloud and snow/ice cover, removes cloud and terrain shadows from water pixels, and retrieves floodwater fractions using VIIRS Imagery bands. Floodwater is determined by comparing the detected water against a water reference map (derived from MODIS global 250-m water mask and water layer in the 30-m National Land Cover Dataset).	**Temporal:** ~1330 local time for CONUS. More frequent coverage over Alaska. **Spatial:** 375-m	**CONUS** Direct Broadcast (DB): 1-h LDM: ~90-180 min **Alaska:** 30-min via DB. *Latency includes data processing and distribution.*	• 7 CONUS Regions • 1 Alaska Region

Impact on Operations

Primary Application

Flood mapping: Detects floodwater over land and snow/ice surfaces. Flooding may occur during heavy rainfall, rapid snowmelt, ice jams on rivers, storm surge, or structural failures (e.g. dams). The "floodwater fraction" is calculated and displayed as a percentage of each 375-m pixel, ranging from 0-100% (green to red colors).



Ice Jams: Helps to locate ice jams, observe ice movement, and monitor the extent of flooding.

Snowmelt: Observation of the water flow and accumulation from snowmelt can assist in flood forecasting.

Limitations

Daytime only application: The product uses VIIRS Imagery bands that detect reflected visible solar radiation.

Cloud Cover, Cloud and Terrain Shadows, and Floodwater: Cloud cover can obscure floodwater at the surface and make spatial analysis more difficult. Floodwater can also be hard to distinguish from cloud and terrain shadows due to their similar spectral properties.

Regions vs Swaths: Polar-orbiting swaths do not align with the eight U.S. regions, so flood map images may only be available for a portion of a region.

Contributors: CSU/CIRA, CIMSS, and George Mason University (GMU)

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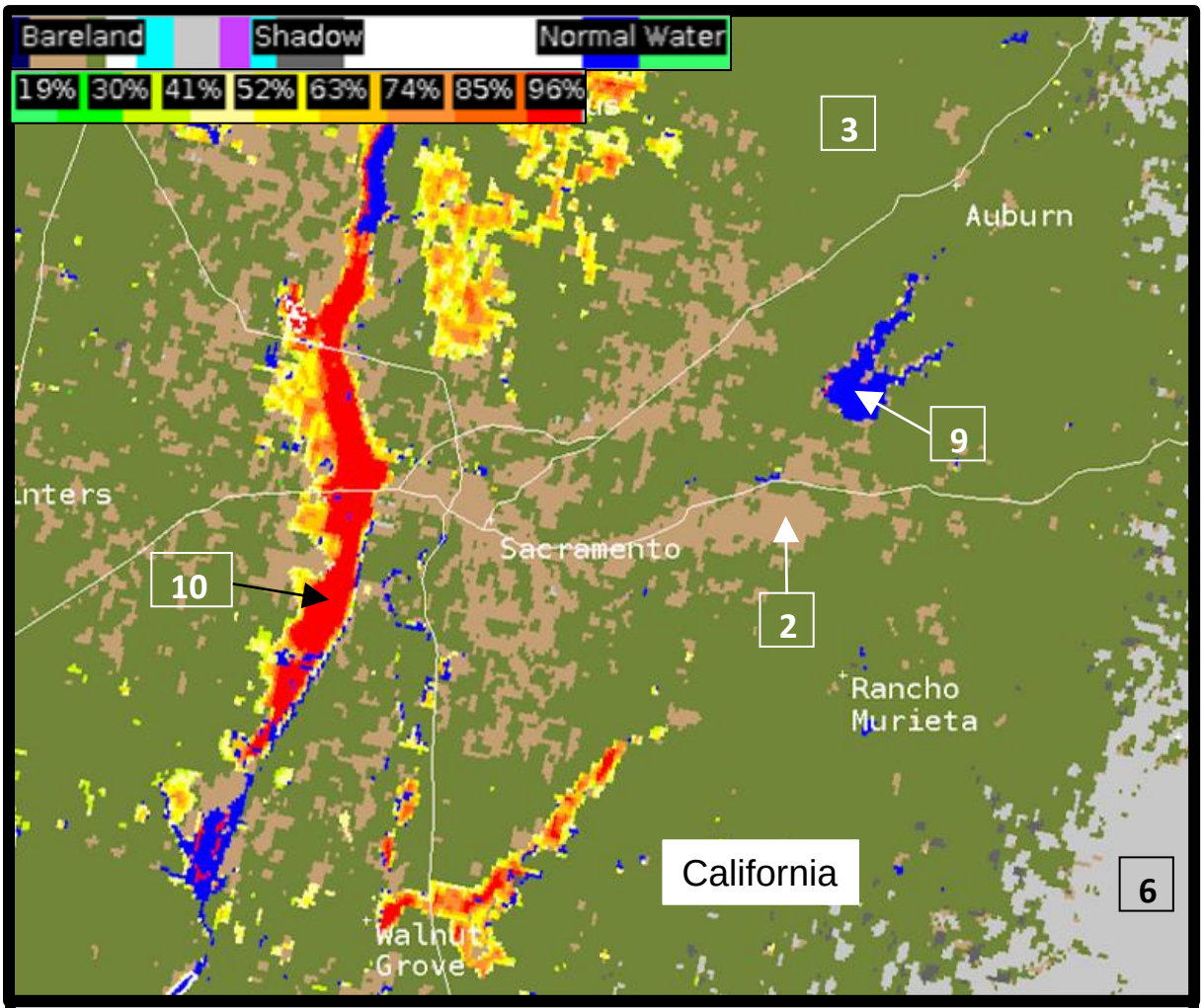
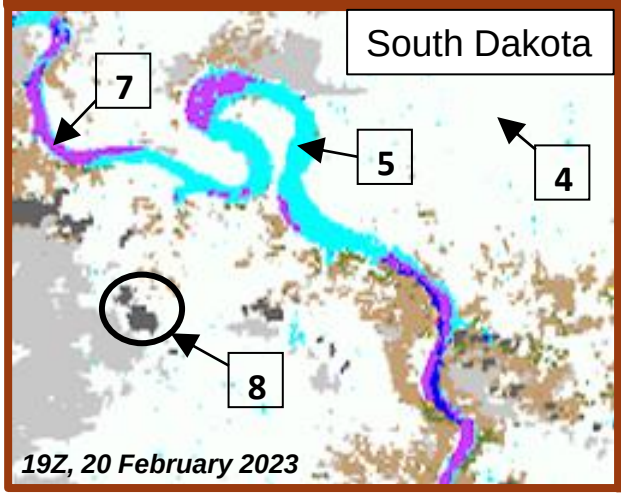
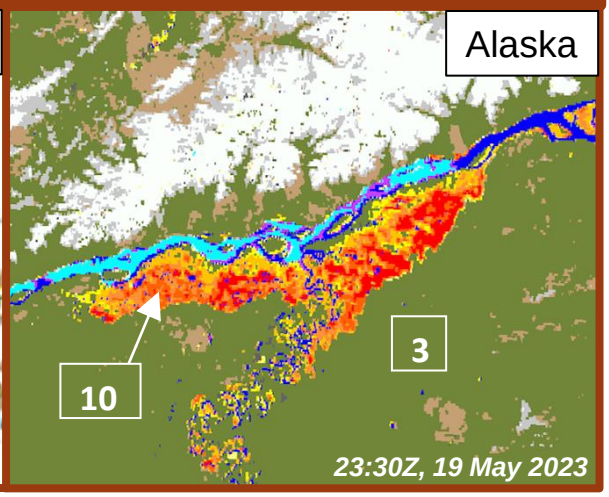
1	**No Retrieval** *(black)*
2	**Bare Land** *(brown)*
3	**Vegetation** *(dark green)*
4	**Snow Cover** *(white)*
5	**River and Lake Ice Cover** *(cyan)*
6	**Cloud Cover** *(grey)*
7	**Supra-snow/ice water or mixed ice and water** *(purple)*
8	**Cloud and Terrain Shadows** *(dark grey)*
9	**Water** *(blue)*
10	**Floodwater Fraction (0-100%)** *(green to red)*



VIIRS Flood Map observations over northern California at 2200 UTC, 15 March 2023.

River Ice and Flood Monitoring: At 375-m spatial resolution, the flood product can monitor river ice breakup and ice jams during the springtime. Ice jams can lead to significant flooding along the river banks and impact nearby communities. Two product examples are shown below: remnant river ice along the Missouri River (bottom left) and floodwater produced from an ice jam on the Yukon River (bottom right).





Resources

George Mason University
NOAA Global Flood Product Archive

RealEarth
U.S. - VIIRS Flood Product (Direct Broadcast)

NOAA Satellite Proving Ground Global Flood Website
Quick Guide for VIIRS/ABI Flood Products for Non-NWS U.S. Stakeholders

Hyperlinks not available when viewing material in AIR Tool