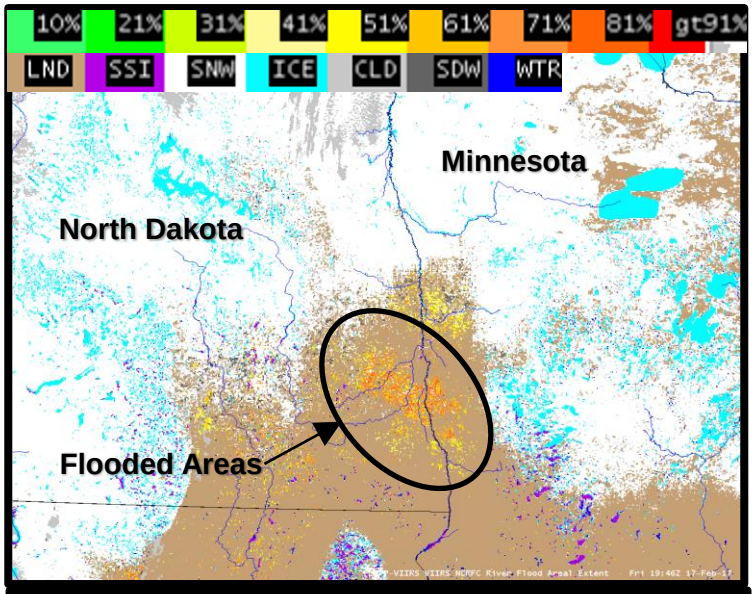
VIIRS Flood Areal Extent

Quick Guide

Why is the VIIRS Flood Areal Extent Important?

The Visible Infrared Imaging Radiometer Suite (VIIRS) Flood Areal Extent, is a satellite-based flood extent product, derived from daytime Suomi-National Polar-orbiting Partnership (Suomi-NPP) and NOAA-20 satellite imagery. In this product, flood extent is represented in floodwater fractions, where 'water fraction' indicates percentage of open water extent in a VIIRS 375-m pixel. VIIRS Flood Areal Extent provides the spatial distribution of floodwater, that is valuable for National Weather Service (NWS) and River Forecast Center (RFC) forecasters with respect to flood forecasting applications. Government decision-makers also benefit from the product by determining the severity of flooding in relation to disaster mitigation efforts.



VIIRS Flood Areal Extent, from Suomi-NPP, at 1946 UTC, 17 February 2017.

VIIRS Flood Areal Extent algorithms and specifications

Algorithm (s)	Temporal Resolution	Spatial Resolution	Latency
Water, cloud and terrain shadow, and floodwater fraction detection algorithms, 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).	• ~1330 local time for CONUS. • More frequent coverage over Alaska.	• 375-m	• ~1-hour • Includes data processing and data distribution.

Impact on Operations

Primary Application

Flood mapping: Product detects floods in areal extent caused by rainfall, ice jams, snow-melt and other hydraulic projects or failures over lands and snow/ice surface. The areal flood extent is calculated in 'floodwater fractions' or percentages of each 375-m pixel, ranging from 0-100%, (green to red colors).

Ice Jams: Help locate ice jams and indicate the dynamic change of ice-jam floods by observing ice movement and floodwater evolution.

Snowmelt: Assists in snowmelt runoff analyses and flood forecasting by observing snow-melt water flow and accumulation.

Limitations

Daytime only application: Product utilizes VIIRS 'reflectance' imagery bands that depend on sunlight. Product not applicable during the nighttime.

Cloud Cover, Cloud and Terrain Shadows and Floodwater: Clouds prevent viewing of the surface, and assessing the degree of flooding. Clear-sky environments are optimal. Cloud and terrain shadows also pose a problem, due to their similar spectral properties to floodwater.

Contributor: Jorel Torres, Erin Dagg, and Bernie Connell, CSU/CIRA https://www.cira.colostate.edu/

VIIRS Flood Areal Extent

Quick Guide

1 **Floodwater Fraction (0-100%)** *(green to red)*

2 **Water** *(WTR, blue)*

3 **Cloud Cover** *(CLD, grey)*

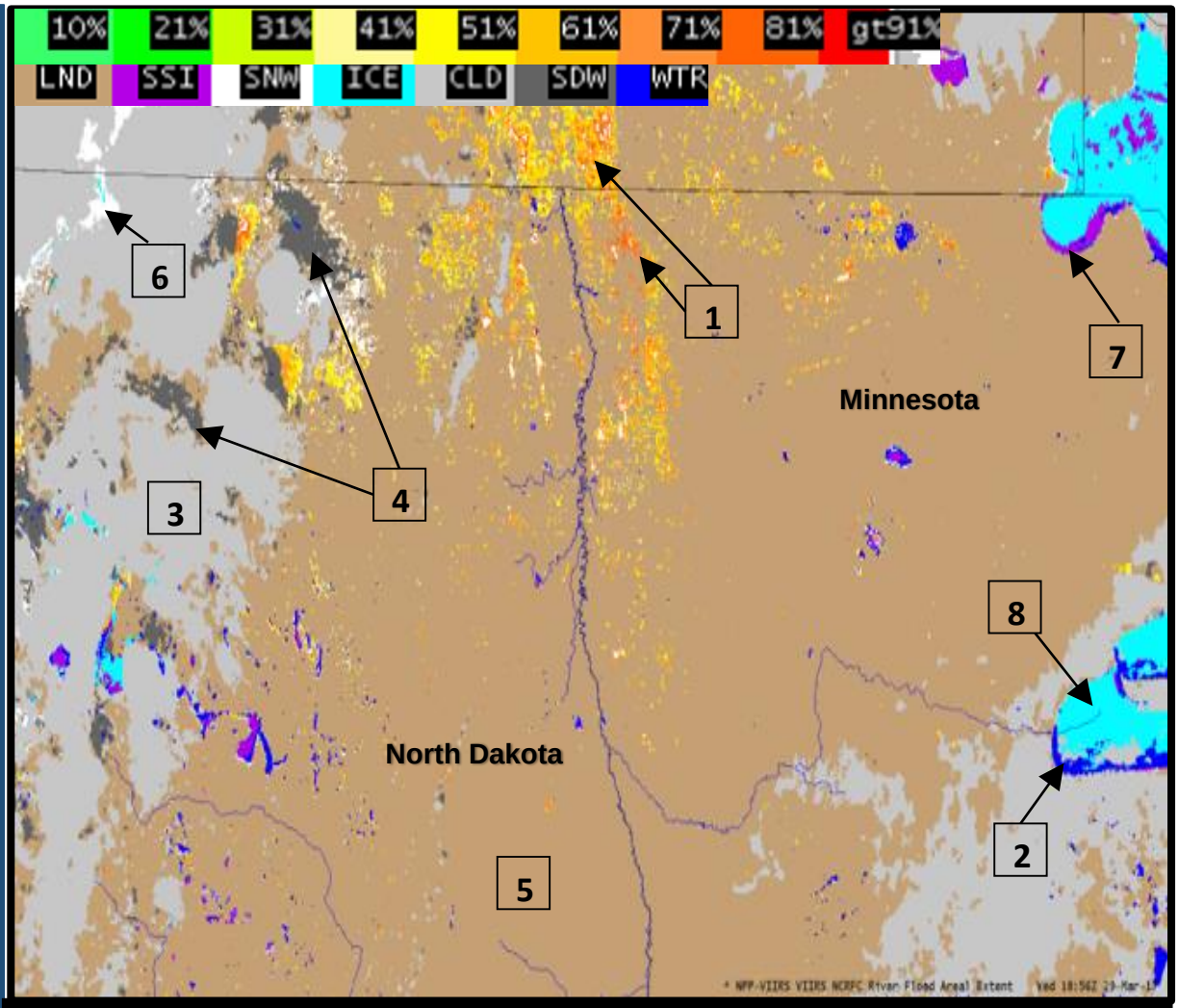
4 **Cloud and Terrain Shadows** *(SDW, dark grey)*

5 **Land** *(LND, brown)*

6 **Snow Cover** *(SNW, white)*

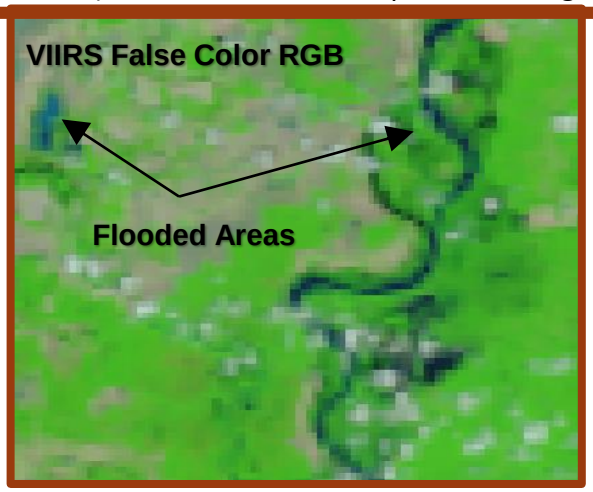
7 **Supra-snow/ice water or mixed ice and water** *(SSI, purple)*

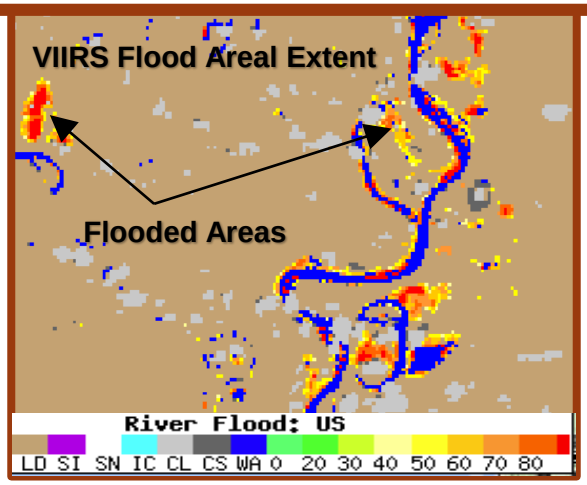
8 **River and Lake Ice Cover** *(ICE, cyan)*



VIIRS Flood Areal Extent from Suomi-NPP at 1856 UTC, 29 March 2017.

Flood Detection: On 18 May 2018 at 0042 UTC, VIIRS False Color shows bodies of water within the Lower Mississippi River Valley, but does not differentiate clearly between water and floodwater. In complement to the VIIRS False Color imagery, the VIIRS Flood Areal Extent identifies the areas of inundation (yellow to red colors, see arrows) after a line of storms passed through the area. Imagery from RealEarth website.





Resources

NASA Goddard - Science Seminar Presentation
Flood Mapping Using Suomi-NPP VIIRS

2018 – JPSS Arctic Summit Meeting Presentation
River Flood events
Product value in past

Hyperlinks not available when viewing material in AIR Tool