ICEYE
REPORTS

FLOODING FROM STORM LINFA IN QUANG TRI, VIETNAM

FLOOD BRIEFING #1
WITH ICEYE SAR SATELLITE CONSTELLATION DATA

Release Date: October 21st, 2020
Event Type: Tropical Storm / Riverine / Monsoon

ICEYE FLOOD MONITORING BRIEF OCTOBER 21ST, 2020

REPORT SUMMARY

ICEYE's flood monitoring solution can provide near-real-time flood event impact analysis globally.

The availability of radar data from all over the world ensured by a constellation of ICEYE SAR satellites, together with information on global elevation, land use, and infrastructure footprint make consistent, democratized flood analysis possible. This report was built to provide an example of a precise assessment of flood hazard from a long duration, high impact flood event in Central Vietnam.

EVENT OVERVIEW

Many provinces in Central Vietnam have been devastated by the seasonal monsoon which started around October 5[1] and caused deadly floods killing 9 people[2]. The floods were enhanced by Tropical Storm Linfa that hit Central Vietnam on October 11 and left 105 people dead and 27 missing in Vietnam[3].

Within 2 weeks, more than 178,000 houses have been flooded in the central region of the country and over 90,000 people have been forced to evacuate their homes[4]. The regions that faced the most severe rainfalls are the provinces of Quang Tri and Thua Thien Hue. They recorded 1,520 mm and 1,888 mm of rain between October 5th and October 11th, respectively[1].

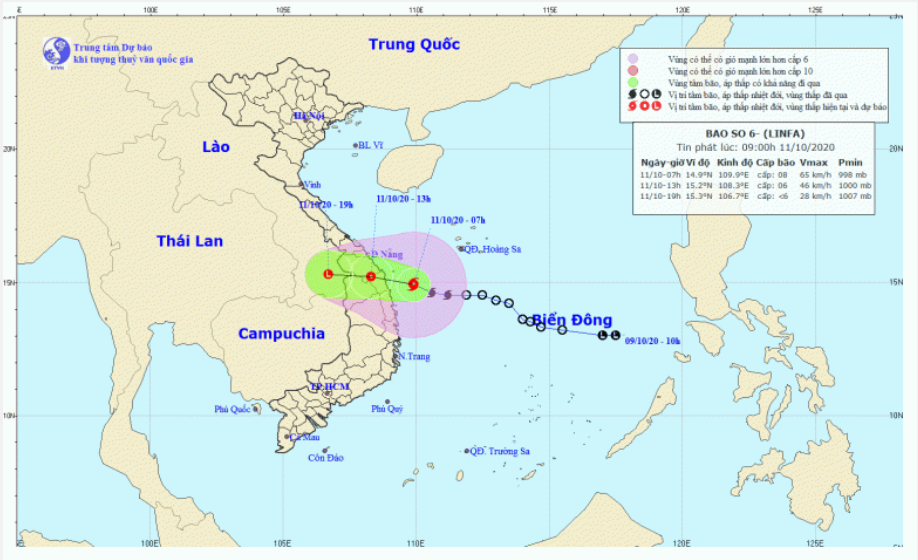
The image below shows the progression and track of Tropical Storm Linfa. The storm originated west of the Philippines on the 9th of October and moved west. The storm progressed westward and weakened before making landfall in Central Vietnam, but it nonetheless brought heavy rains.

[1] *FloodList News (12 October 2020), Vietnam – Floods Worsens as Tropical Storm Linfa Makes Landfall*

[2] *Tuoi Tre (11 October 2020), Đến chiều 11-10 đã thiệt mạng 9 người do lũ lụt miền Trung*

[3] *Vietnam Disaster Management Authority (20 October 2020) , Báo cáo nhanh công tác trực ban PCTT ngày 19/10/2020*

[4] *FloodList News (20 October 2020), Vietnam – More Than 100 Lives Lost in Central Region Floods and Landslides*

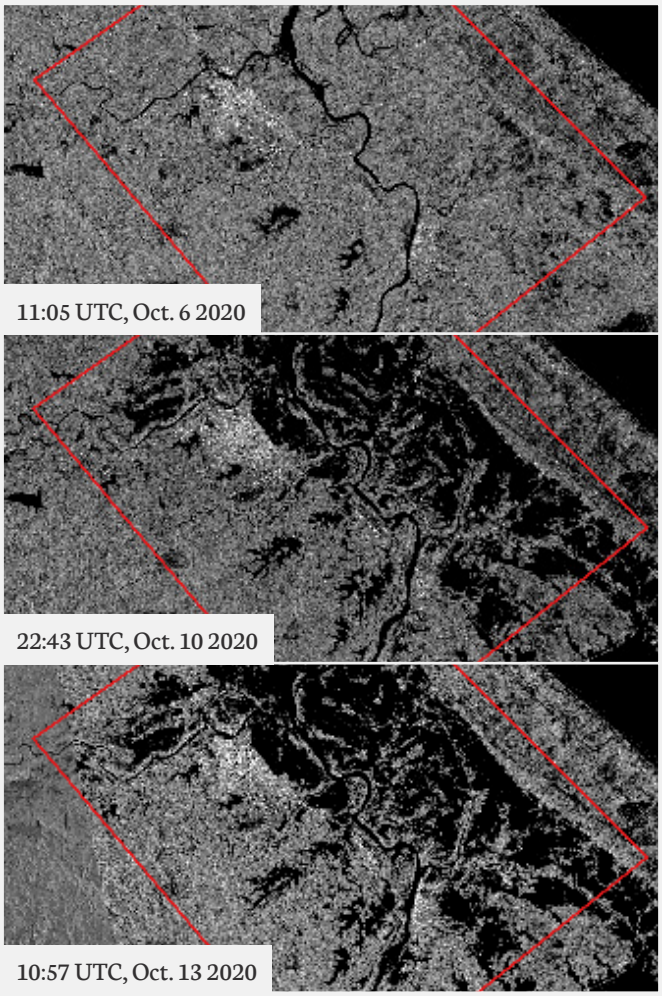


Forecasted progression and track of Tropical Storm Linfa in Vietnam, updated on 11th October 2020 at 9:00 AM local time. Source: Vietnam National Centre for Hydro-Meteorological Forecasting

ICEYE FLOOD MONITORING BRIEF OCTOBER 21ST, 2020

COURSE OF ACTION

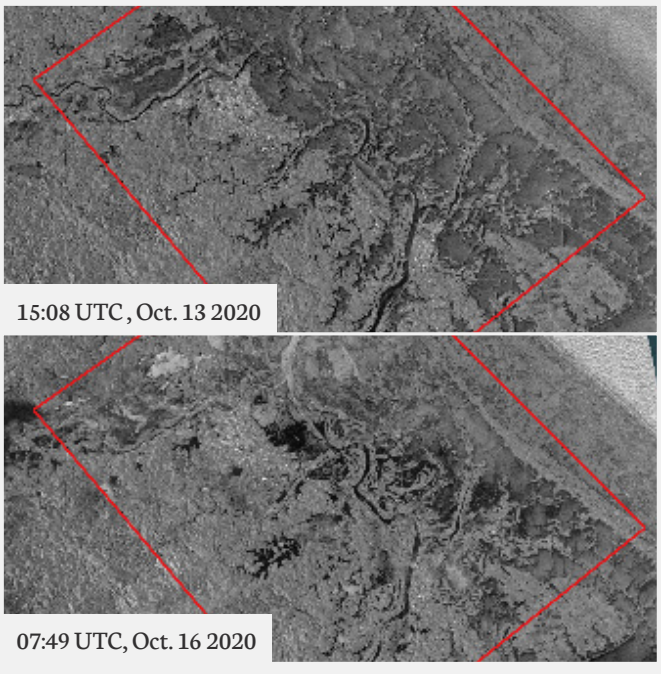
ICEYE closely monitored the flood situation in the area of the city of Dong Ha, the capital of Quang Tri Province, and generated a multi-temporal SAR satellite imagery time series using multiple sensors - an approach newly possible with the emergence of ICEYE's commercial SAR constellation. This was possible due to the unique capability of SAR satellites to take images of the land surface regardless of cloud cover and time of day.



11:05 UTC, Oct. 6 2020

22:43 UTC, Oct. 10 2020

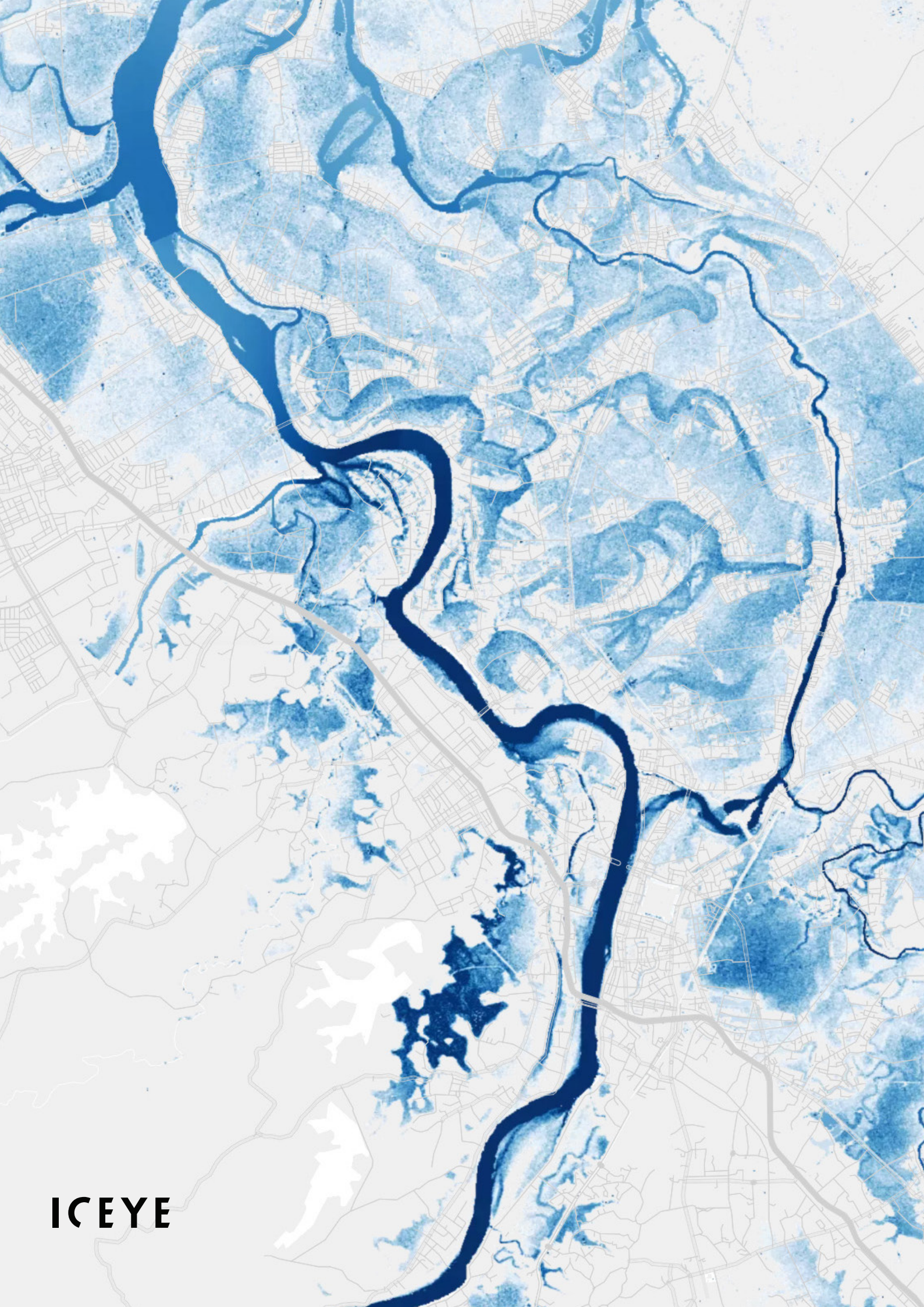
10:57 UTC, Oct. 13 2020



15:08 UTC , Oct. 13 2020

07:49 UTC, Oct. 16 2020

The time series includes 5 SAR satellite images acquired with ICEYE (right) and Sentinel (left) satellites over 11 days. One image was taken during the night - another unique strength of radar technology.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EARLY FLOOD WARNING, IMAGE ACQUISITION

OCTOBER 6TH ONWARDS

TROPICAL STORM LINFA LANDFALL

OCTOBER 11TH

FLOOD IMAGE ACQUISITION

UP TO OCTOBER 16TH

ICEYE FLOOD ANALYSIS

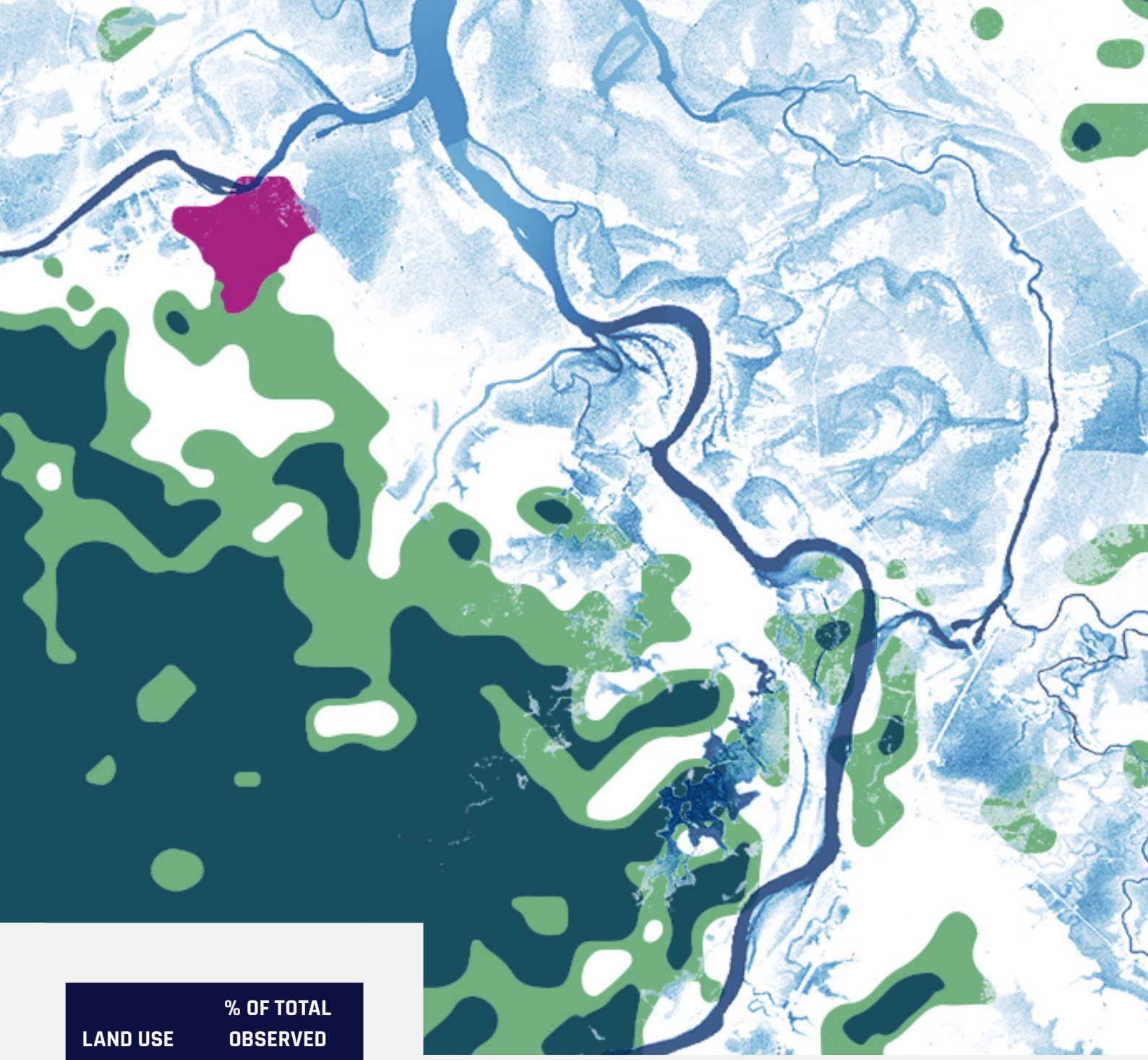
WITHIN 24 HOURS FROM LAST ACQUISITION

Timeline of Tropical Storm Linfa and ICEYE flood workflow.

ICEYE ANALYSIS

This flood report shows the situation in Dong Ha, the capital of Quang Tri Province, Vietnam, between the 6th and 16th of October 2020. The SAR satellite image time series allowed the analysis of a long-duration flood progression.

The analysis of the flood extent over populated and agricultural areas was quantified by utilizing population density and land use data. Large parts of the flooded areas are the patty fields around Dong Ha.



LAND USE TYPE	% OF TOTAL OBSERVED FLOOD EXTENT
Paddy	85%
Other Crops	10%
Built-up (Dong Ha)	4%
Forest	1%
River + Flooding	

Assessed flood extent covering multiple different land use classes in the area of Dong Ha, Quang Tri Province, Vietnam, between the 6th and 16th of October 2020. The Land use/land cover raster is published by OpenDevelopment Vietnam, WMS server, the flood extent was extracted from ICEYE SAR satellite imagery.

DONG HA, QUANG TRI PROVINCE, VIETNAM

The multi-day SAR imagery analysis shows heavy flooding progressing during the week of October 12. For deriving flood depth information, a well-suited digital Elevation Model was utilized. The flood depth analysis suggested that most water coverage was between 0.1 and 1 meter. However, some agricultural areas have been assessed with >1 m of water depth.

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MONITORING FLOOD DISASTERS WITH ICEYE SAR SATELLITE DATA

ICEYE's flood analysis based on SAR imagery can be performed anywhere in the world given global access to digital elevation data, population data, land use data, or building footprint data. The possibility of working with a time series of SAR images of multiple days enables long duration flood analysis which presents the opportunity to quantify progression. Multi-sensor analysis is useful to achieve insights at different geographic and temporal levels.

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WWW.ICEYE.COM/FLOOD