

GPM PRECIPITATION DATA AS INPUT FOR A REAL TIME EXTREME RAINFALL DETECTION SYSTEM

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4 days ago - Fiji – Four Dead as Cyclone Josie Causes Major Floods

17 FEBRUARY, 2016 BY JENNIE JACOBS IN EUROPE, FLOOD PROTECTION

The European Environment Agency recently published a report on flood risk management. The report, titled "Floodplain management: reducing flood risks and restoring healthy floodplains", examined data on floods dating from 1980 to 2010, and found that the number of people affected by flooding has increased significantly. The report also found that the economic damage caused by flooding has increased, and that the environmental damage caused by flooding is also increasing. The report concludes that flood risk management measures are needed to reduce the number of people affected by flooding, to reduce the economic damage caused by flooding, and to reduce the environmental damage caused by flooding. The report also recommends that flood risk management measures should be based on a holistic approach, taking into account the social, economic, and environmental aspects of flood risk.

The study assessed the data, researchers have predicted that by 20 increased fivefold. The fivefold increase in occurrence was attributed increasing value of land around the floodplains, and urban developm

The study also revealed that between 1980 and 2010, 37 European countries experienced a total of 3,563 floods. The highest number of floods was reported for 27 countries were affected. This number is associated with the 'Central European Flood' which occurred across several Central European countries during May and June 2010.



2 days ago - Fiji – PM Warns of Constant Threat of Extreme Weather Events as Storm Josie Death Toll Rises

25 APRIL 2017 BY FLOODLIST NEWS IN CLIMATE NEWS

f t g+ @ in

After an unusually intense heatwave, downpour or drought, Noah Diffenbaugh and his research group inevitably receive phone calls and emails asking whether human-caused climate change played a role.

"The question is being asked by the general public and by people trying to make decisions



1 day ago - USA – Flood Rescues and Evacuations in Indiana and Illinois

NEWS IN FLOOD RISK · 0 COMMENT

f t g+ © in

the number of flood events across the world has doubled in the
adrupled since 1980.



TRIBUTE PROJECT



Co-Funded



Co - Funded by
European Union
Civil Protection
and Humanitarian Aid

TRIBUTE (TRigger BUffer zones for inundaTion Events)

TRIBUTE is a DG ECHO funded project (ECHO/SUB/2016/742480/PREV08)

tribute.eu-project-sites.com

SATELLITE DATA

NASA GPM (Global Precipitation Measurement)
IMERG (Integrated Multi-satellite Retrievals for GPM) products

TEMPORAL COVERAGE

from March 2014 to nowadays

SPATIAL COVERAGE

60° N – 60° S

TEMPORAL RESOLUTION

30 minutes

SPATIAL RESOLUTION

0,1° x 0,1°

SATELLITE DATA

NASA GPM (Global Precipitation Measurement)

IMERG (Integrated Multi-satellite Retrievals for GPM) products

THREE DIFFERENT VERSIONS OF HALF-HOURLY DATA

early run (6 hours latency)

late run (18 hours latency)

final run (4 months latency)

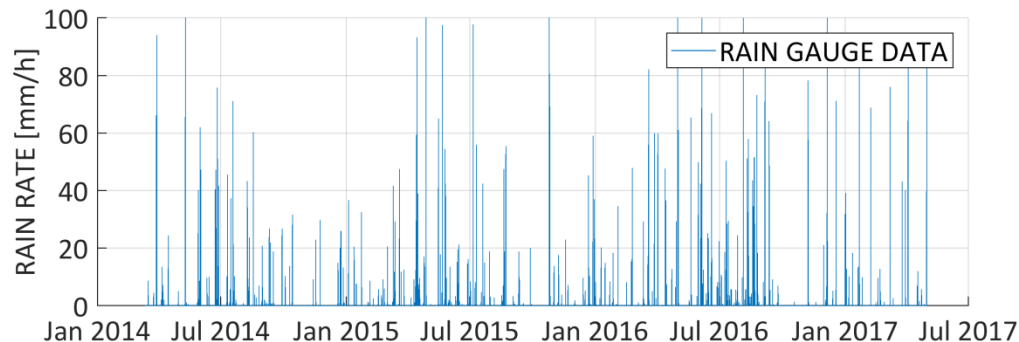
SATELLITE DATA

NASA GPM (Global Precipitation Measurement)
IMERG (Integrated Multi-satellite Retrievals for GPM) products

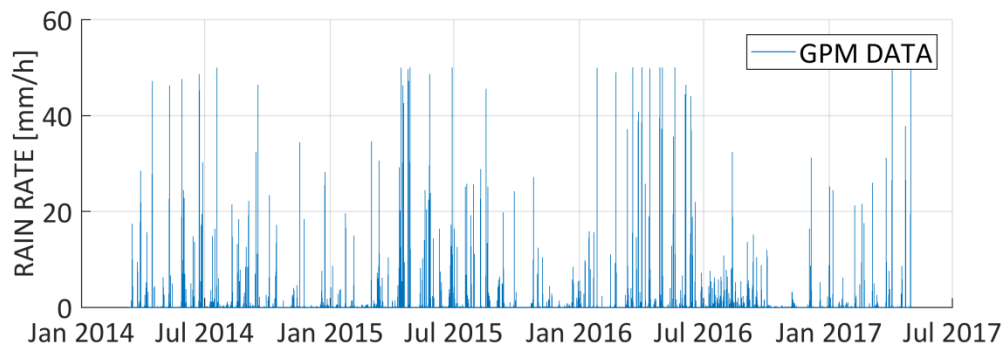
THREE DIFFERENT VERSIONS OF HALF-HOURLY DATA

{ early run (6 hours latency) late run (18 hours latency) }	near-real time flood risk monitoring applications
final run (4 months latency)	

SATELLITE DATA

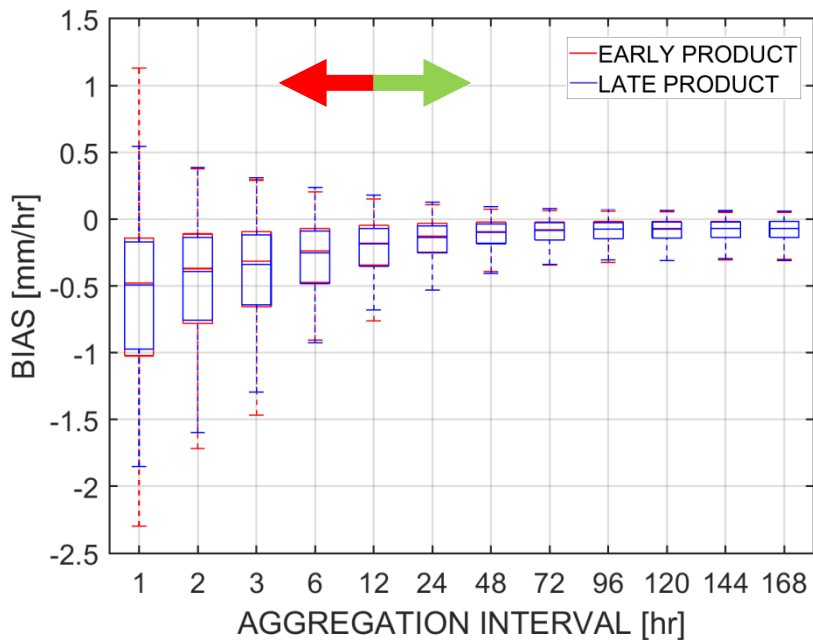


IMERG HALF-HOURLY
EARLY/LATE PRODUCTS
ARE COMPARED WITH
RAIN GAUGE DATA

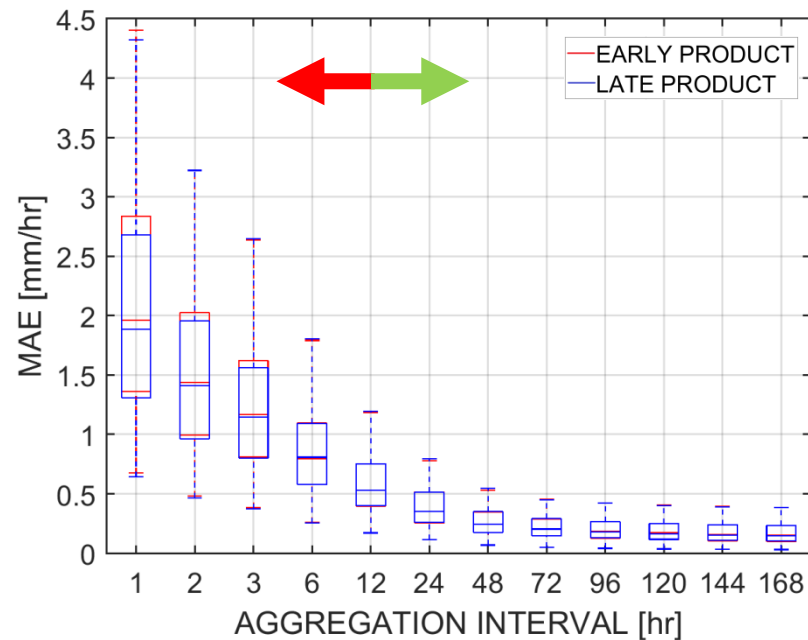


DIFFERENT CLIMATIC ZONES
(70 LOCATIONS)

12 March 2014 – 30 April 2017



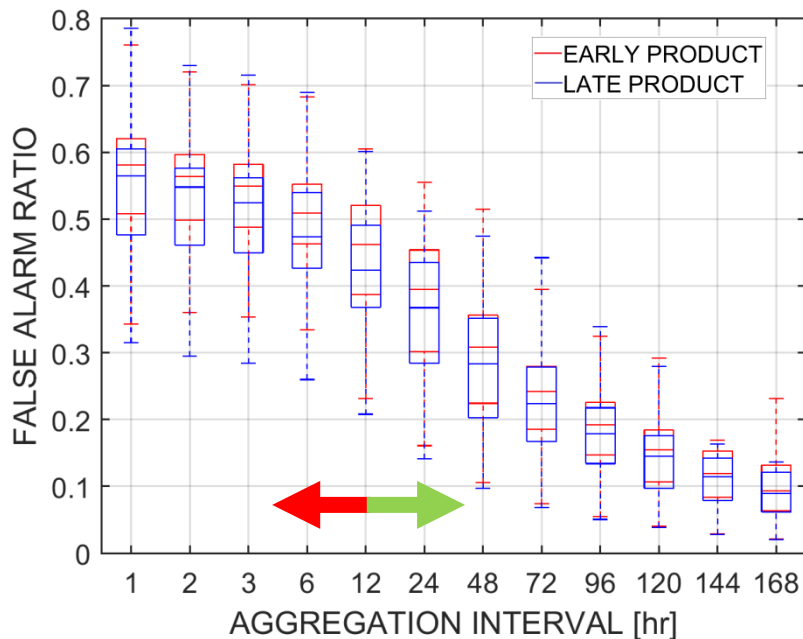
$$\text{BIAS} = \frac{1}{n} \sum_{t=1}^n [R_{\text{SAT}}(t) - R_{\text{GAUGE}}(t)] = \frac{1}{n} \sum_{t=1}^n [\text{CUM}_{\text{SAT}} - \text{CUM}_{\text{GAUGE}}]$$



$$\text{MAE} = \frac{1}{n} \sum_{t=1}^n |R_{\text{SAT}}(t) - R_{\text{GAUGE}}(t)|$$

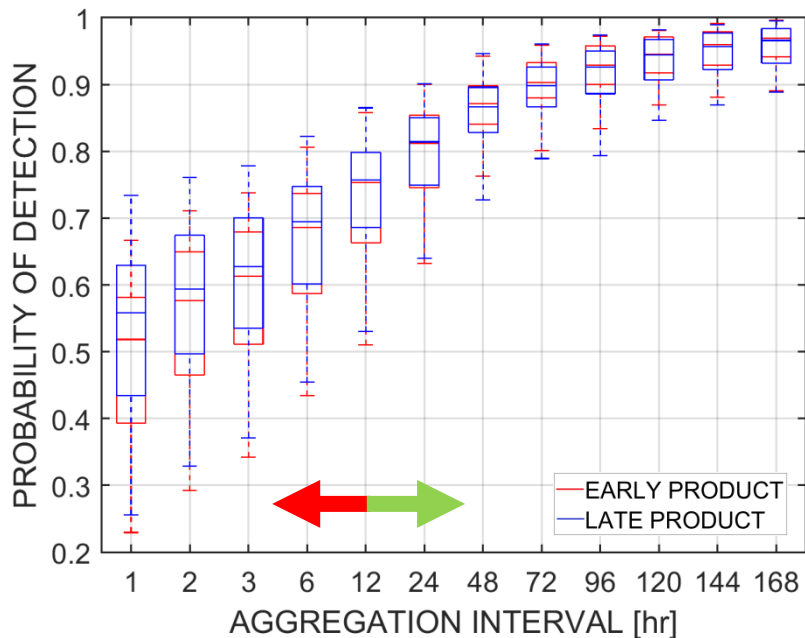
METHODOLOGY

		RAIN GAUGE		
		= 0 mm/h	> 0 mm/h	
SATELLITE	= 0 mm/h	CORRECT NEGATIVES (A)	MISSES (B)	ESTIMATED NON EVENTS
	> 0 mm/h	FALSE ALARMS (C)	HITS (D)	ESTIMATED EVENTS
		OBSERVED NON EVENTS	OBSERVED EVENTS	



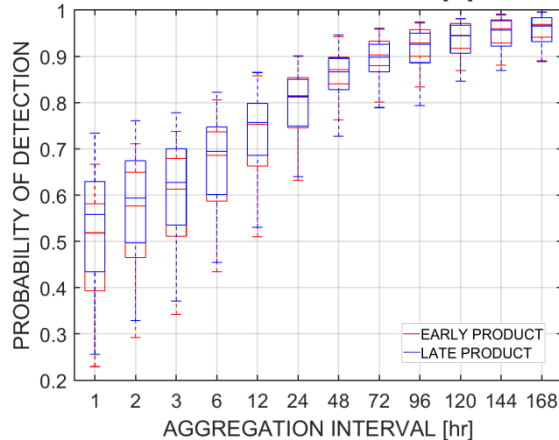
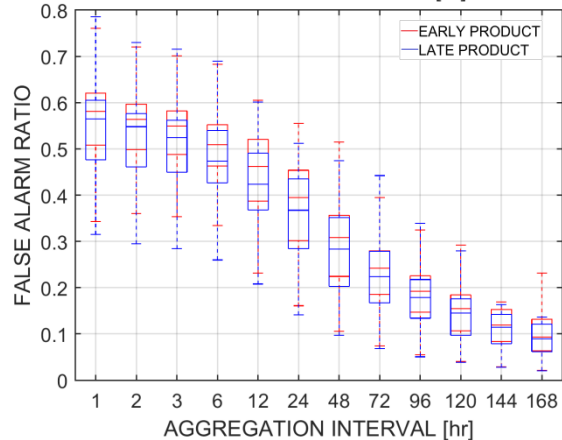
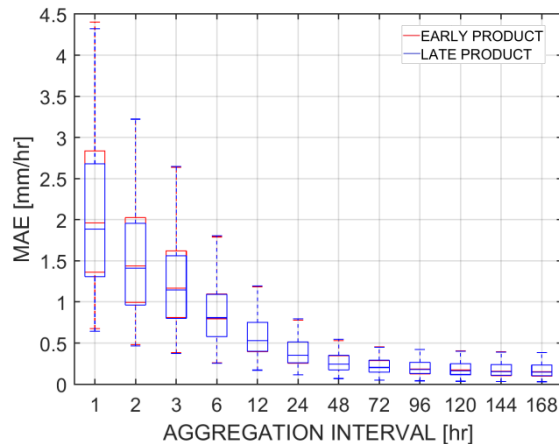
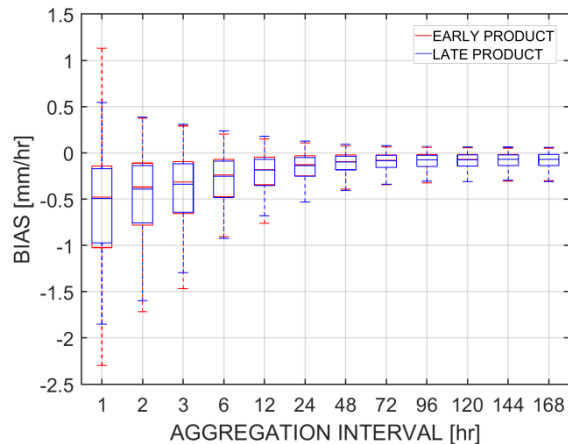
$$FAR = \frac{\text{FALSE ALARMS}}{\text{HITS} + \text{FALSE ALARMS}}$$

		RAIN GAUGE		
		= 0 mm/h	> 0 mm/h	
SATELLITE	= 0 mm/h	CORRECT NEGATIVES (A)	MISSES (B)	ESTIMATED NON EVENTS
	> 0 mm/h	FALSE ALARMS (C)	HITS (D)	ESTIMATED EVENTS
		OBSERVED NON EVENTS	OBSERVED EVENTS	



$$POD = \frac{HITS}{HITS + MISSES}$$

		RAIN GAUGE		
		= 0 mm/h	> 0 mm/h	
SATELLITE	= 0 mm/h	CORRECT NEGATIVES (A)	MISSES (B)	ESTIMATED NON EVENTS
	> 0 mm/h	FALSE ALARMS (C)	HITS (D)	ESTIMATED EVENTS
		OBSERVED NON EVENTS	OBSERVED EVENTS	

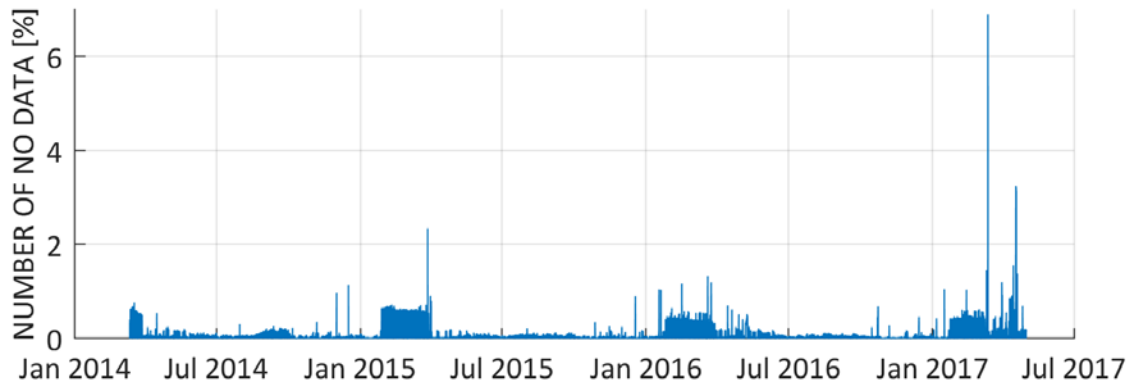


NO SIGNIFICANT
ACCURACY INCREASE
ASSOCIATED TO THE
USE OF LATE DATA

HIGH VALUE OF BIAS,
MAE, FAR

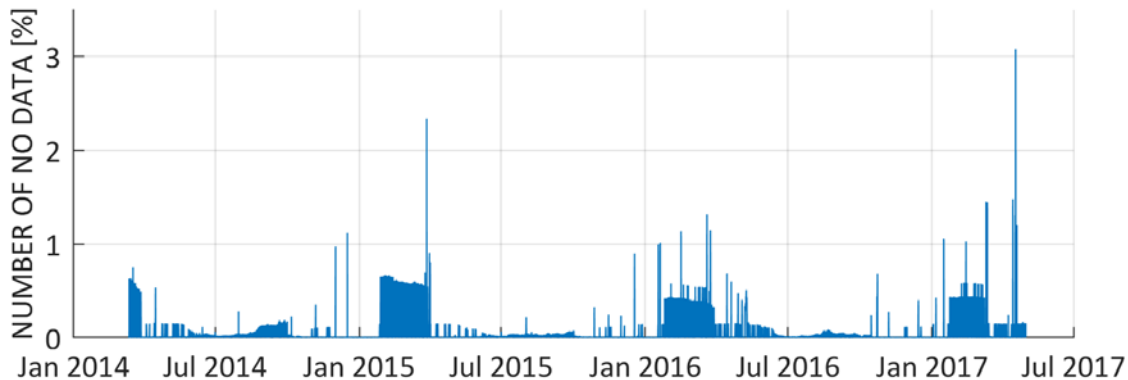
POD NON ACCEPTABLE

METHODOLOGY



EARLY PRODUCT
(0,026% of no data)

LATE PRODUCT
(0,019% of no data)



METHODOLOGY



SPATIAL ARRANGEMENT OF PIXEL
CHARACTERIZED BY ABSENCE OF
DATA

EARLY PRODUCT

REFERENCE SYSTEM: WGS 84

SPATIAL ARRANGEMENT OF PIXEL
CHARACTERIZED BY ABSENCE OF
DATA

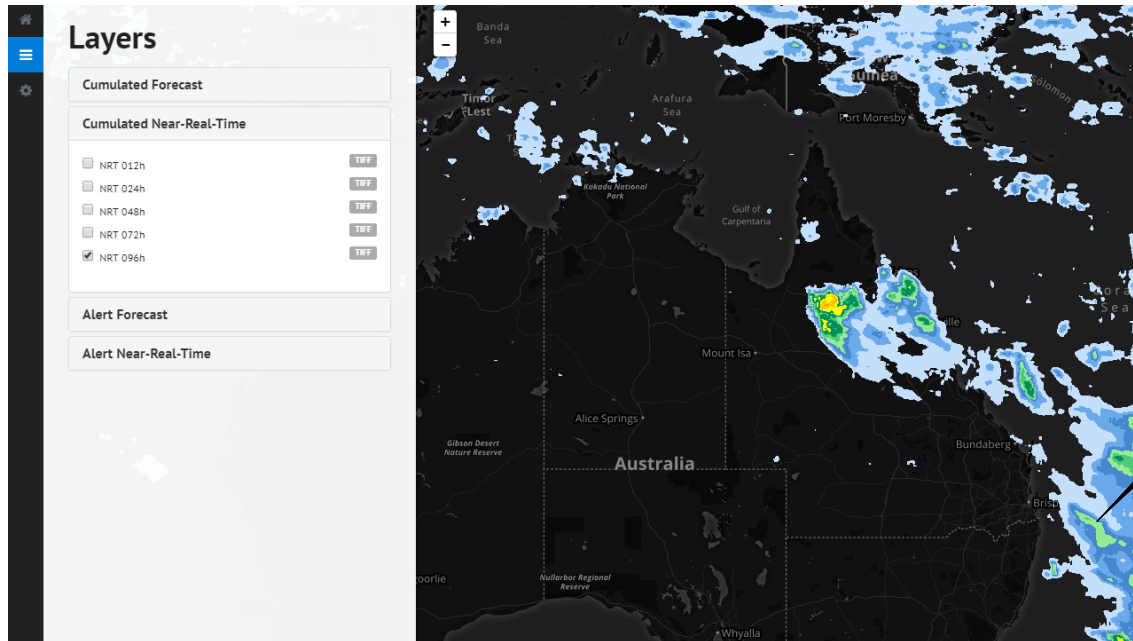
LATE PRODUCT



IMPLEMENTATION

THE OUTCOMES OF THIS ANALYSIS SUPPORTED THE DEVELOPMENT OF THE
UPDATED VERSION OF ITHACA EXTREME RAINFALL DETECTION SYSTEM (ERDS)

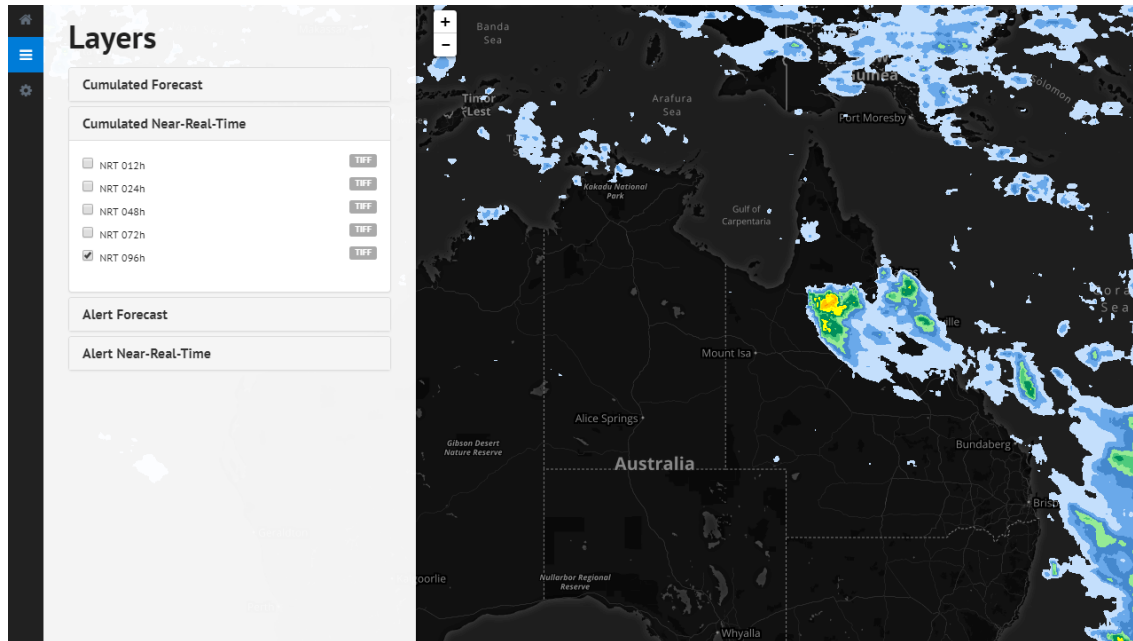
erds.ithacaweb.org



IMPLEMENTATION

EXTREME RAINFALL DETECTION SYSTEM - ERDS

erds.ithacaweb.org



HOURLY NEAR-REAL TIME ALERTS

IMMEDIATE AND INTUITIVE
INFORMATION ABOUT
POTENTIAL FLOOD EVENTS

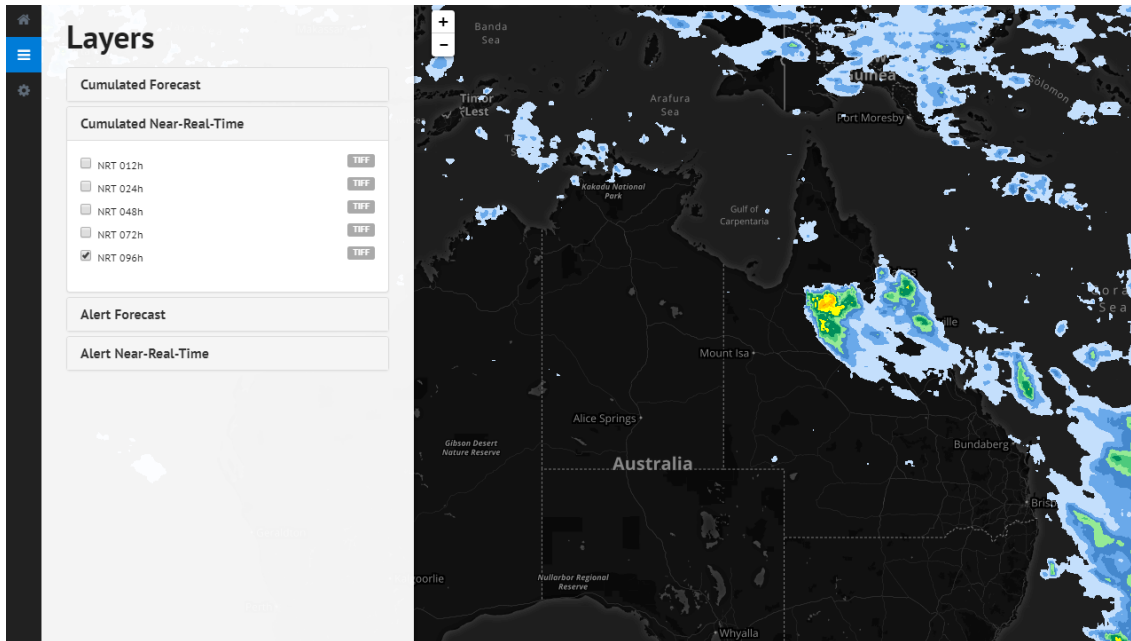
WEBGIS APPLICATION

OPEN SOURCE ENVIRONMENT

IMPLEMENTATION

EXTREME RAINFALL DETECTION SYSTEM - ERDS

erds.ithacaweb.org



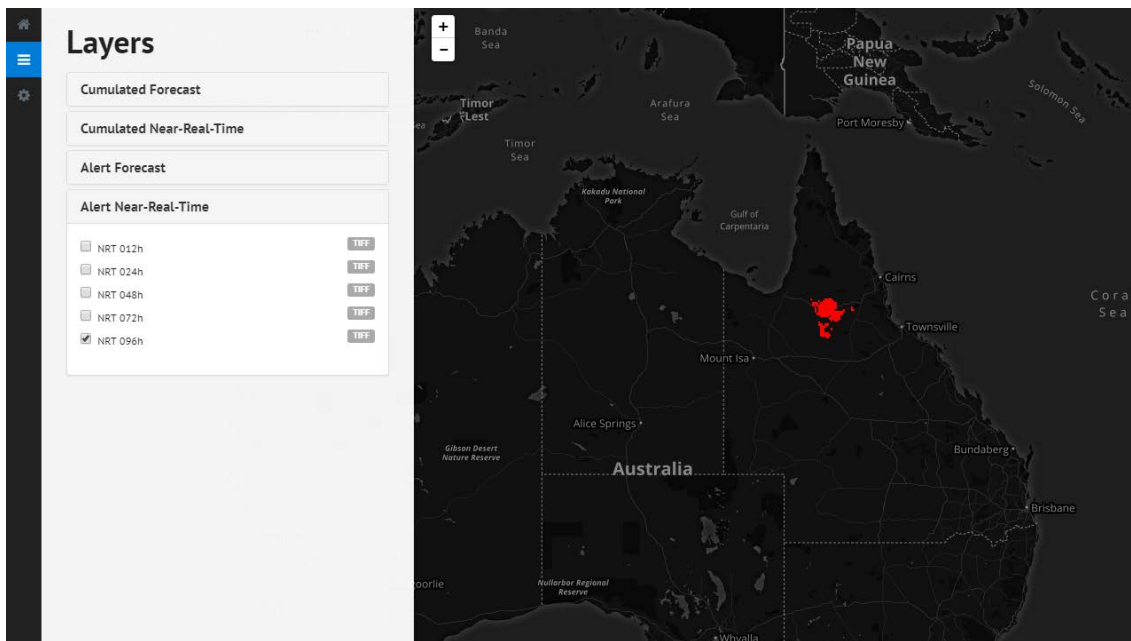
GPM IMERG EARLY RUN DATA

CUMULATED NEAR-REAL TIME
12 hr – 24 hr – 48 hr – 72 hr – 96 hr

IMPLEMENTATION

EXTREME RAINFALL DETECTION SYSTEM - ERDS

erds.ithacaweb.org



GPM IMERG EARLY RUN DATA

CUMULATED NEAR-REAL TIME

12 hr – 24 hr – 48 hr – 72 hr – 96 hr



ALERTS NEAR-REAL TIME

12 hr – 24 hr – 48 hr – 72 hr – 96 hr

EXTREME RAINFALL DETECTION SYSTEM - ERDS

erds.ithacaweb.org

HALL X5 – POSTER X5.41

MONDAY 09 APRIL, 17:30 – 19:00

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