The Pacific GIS&RS User Conference

Suva, 27th to 30th November 2017

FLASH FLOODS IMPACT MAPPING IN PACIFIC ISLAND URBAN ENVIRONMENT USING 30CM SATELLITE IMAGERY

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Government of French Polynesia GIS team



FLASH FLOODS



Flash flood

- Rapid flooding (few hours)
- Caused by heavy rain, cyclones, tropical strorms or the collapse of debris dam or manmade dam
- Flows characterized by muds and debris (mudslides)

Impacts on tropical islands

- High islands
- Destructive damages on buildings and infrastructures
- Deaths





French Polynesia



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TAHITI ISLAND



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THE 21ST JANUARY 2017 RAIN EVENT



- Heavy rains during the night between the 21 – 22 January 2017
 - Tropical depression during the rain season
 - Several days of heavy rains
 - 130 mm in 3 hours and 190 mm in 6 hours
 - Centennial rain event
 - Flows characterized by muds and debris (mudslides and tree logs)

THE 21ST JANUARY 2017 RAIN EVENT – FLASSH FLOODS IMPACT

- Flash flood impact
 - 4 000 people directly affected
 - More than 800 destroyed or flooded houses
 - 5 bridges destroyed
 - 3 million € of damage
- Population
 - Many injured but no death (miraculously)
 - Dozens of people evacuated





> video report from the national TV news

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BLUECHAM SAS Emergency Service

- Dedicated team for
 - · Fast acquisition of EO data
 - Rapid analysis of EO data
 - Fast delivery of turn-key information
- 365/7/24
- Natural / industrial disasters

Operator of the New Caledonia's Civil Defense





SERVICE

D'ANALYSE

URGENCE



Emergency mode

- Emergency acquisition
- First Derived information in 6 hours
- Impact analysis in 12 hours
- Web services infrastructure

Rush mode

- Data analysis within few days
- General impact assessment
- Web services infrastructure

Detailled Impact analysis

- Analysis in priority
- Detailled impact









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TAHITI: RUSH SATELLITE ACQUISITION

Area of Interest: 300 sqkm

- Steep mountains
- Urban areas and valleys
- Flash floods => Collect evidence of flows and identify impacts
- →Optical data with 30 cm resolution required



Pirae City Center, 30cm January 2017. WorldView-3 image © DigitalGlobe 2017, processing BLUECHAM SAS

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- DigitalGlobe Worldview-3 tasking
- Very high constellation reactivity
 - First collection the 22/01/2017 11:00am (too cloudy)
 - 23/01/2017
 - 24/01/2017
 - 27/01/2017 => less cloudy + viewing angle
 - 28/01/2017
 - 29/01/2017 => cloud patching
 - 30/01/2017
 - 31/01/2017





RUSH SATELLITE ACQUISITION



Papeete, January 2017. WorldView-3 image © DigitalGlobe 2017, processing BLUECHAM SAS

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IMPACT ANALYSIS



Pirae City Center, May 2015. WorldView-3 image © DigitalGlobe 2015, processing BLUECHAM SAS

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IMPACT ANALYSIS



Pirae City Center, January 2017. WorldView-3 image © DigitalGlobe 2017, processing BLUECHAM SAS

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DETAILED IMPACT ANALYSIS



Pirae City Center, May 2015. WorldView-3 image © DigitalGlobe 2015, processing BLUECHAM SAS

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DETAILED FLASH FLOOD IMPACTS ANALYSIS



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DETAILED FLASH FLOOD IMPACTS ANALYSIS

FAA'A INT. AIRPORT

Flooded Airport

Flooded Public schools

46 RIVER CROSSING HEAVILY IMPACTED

PAPEETE

LANDSLIDES: 62ha (more than 500 landslides) 64 LOG JAMS REPORTED

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LOG JAMS



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ROAD NETWORK

14

Objet n° 148



		1
Degré de confience :		Avéré
COMMUNE :		PUNAAUIA
Localisation :		
LAT : -17.60	40	LONG : -149.6130
X : 22268	5.20	Y : 8051710.8
Objet :		pont
Impact estimé :	Potentiellement detruit	
Commentaires :		
Travee basculee		

Date observation : 29/01/2017





Image du 29/01/2017









→443 bridges and river crossing analysed

- → 150 Potentially damaged
- → 46 Potentially heavily damaged
- → > 350km of flooded roads
- → 104km of damaged roads
- → 47km of destroyed roads

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- Use by services of the government
 - Update (modify) maps of the natural risks
 - Verify valleys upstream before the next rainy season → Log jam
 - Quantify the damages
 - Check of the analysis with the technicians of the urban area.
 - Not yet completed !

Work using these information is still ongoing