Workshop on "Renovation of Observation of Natural Disasters using High Resolution Satellite Remote Sensing"

PASCO
Measure the Earth, Here and Beyond

Disaster mapping by TerraSAR-X data

Takashi Nonaka

PASCO Corporation

Contents

Few examples of the information extracted by TerraSAR-X for;

— Mud flood in Hofu region（Yamaguchi）

— Cyclone Aila in Bangladesh

— Overflow of Kosi River in Nepal

Study Area


©PASCO/Include material (c)JAXA
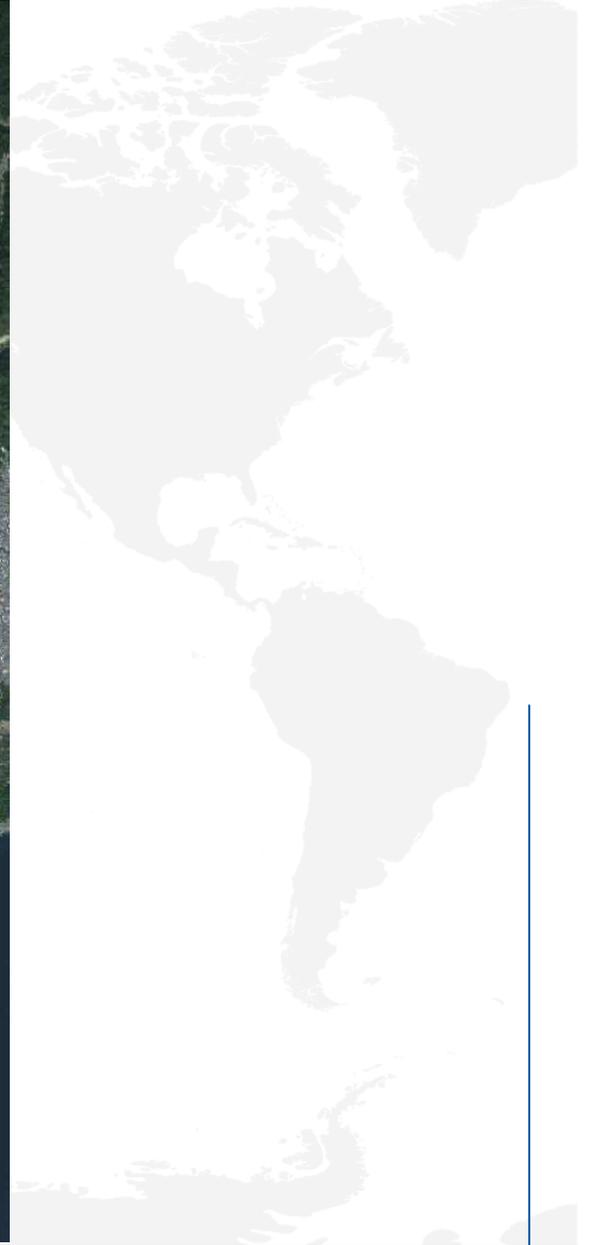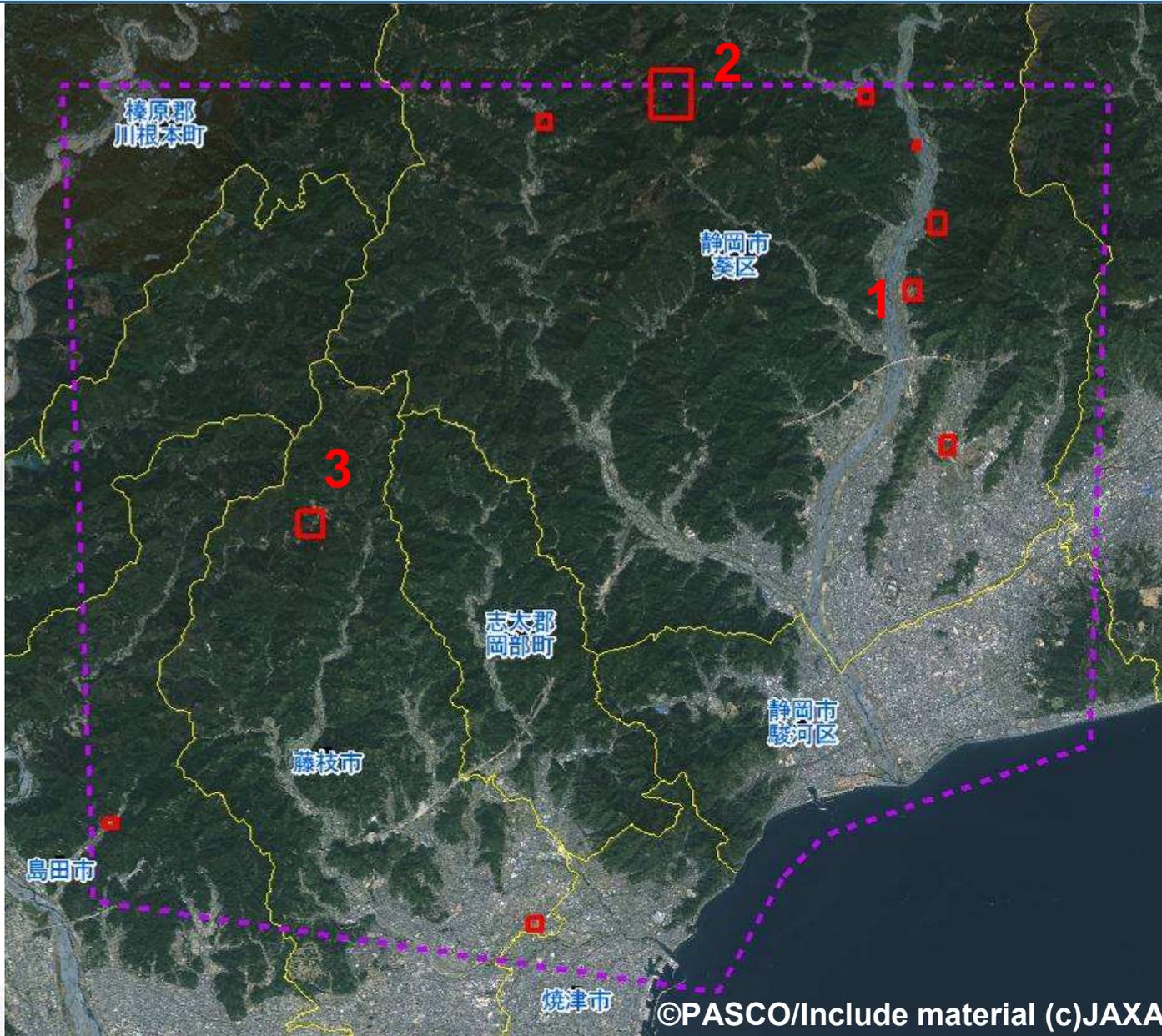
Area 1
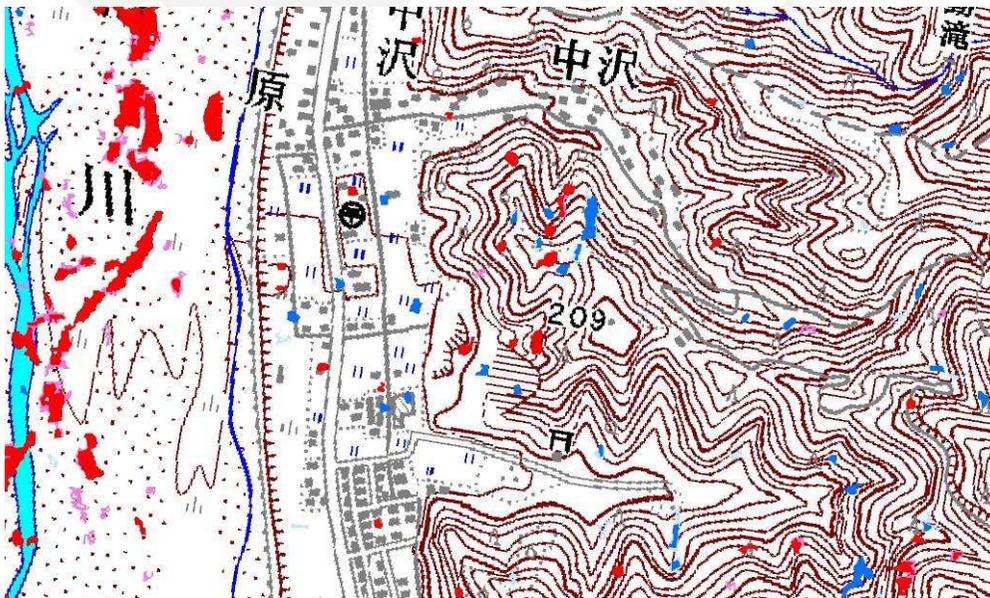
- Changes of the shapes of the slopes may affect the changes of σ_0.

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# Area 2

©PASCO/Include material (c)JAXA
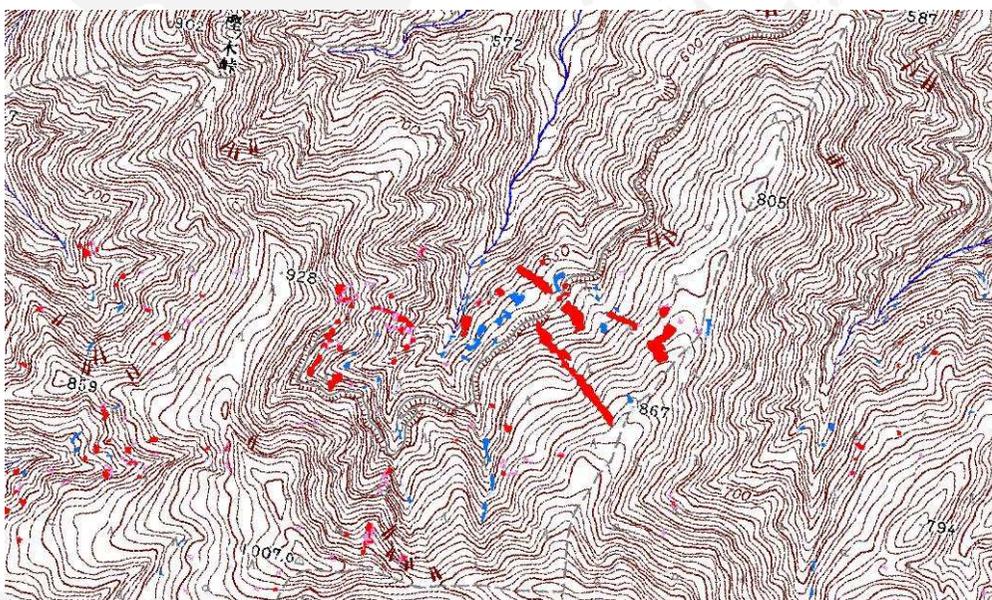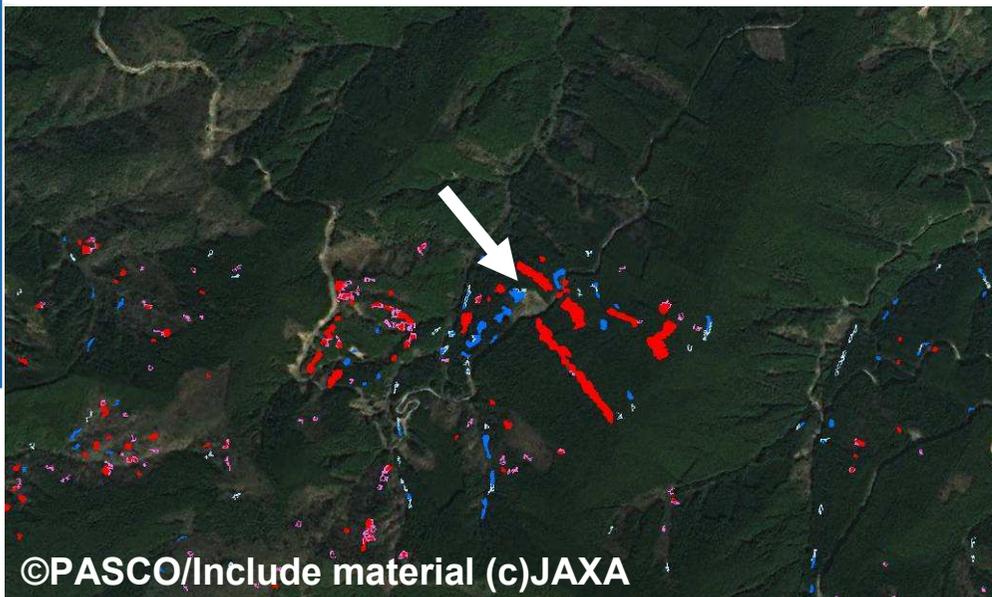
- Deforested area is extracted as a changed area.

Area 3
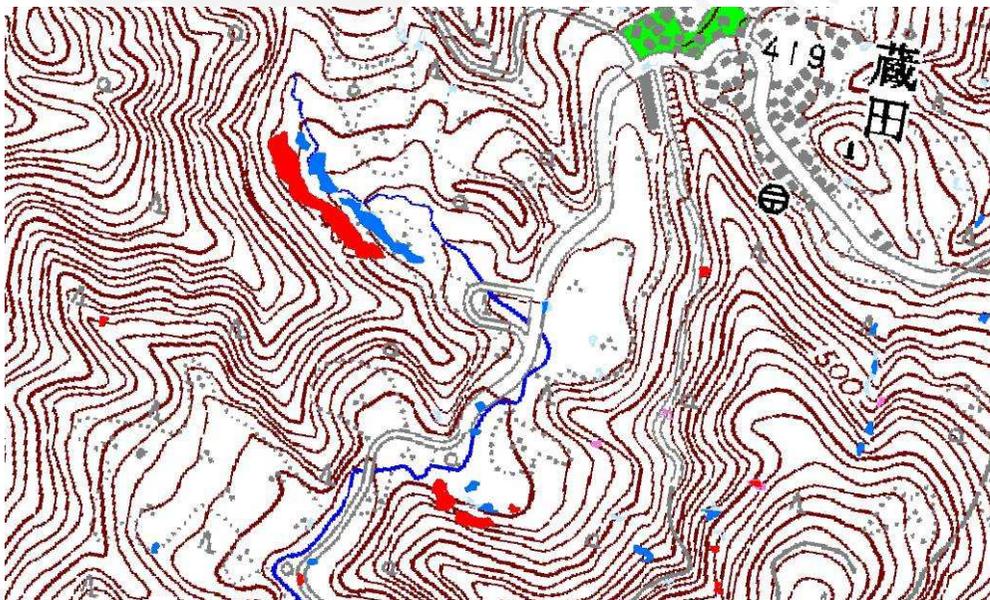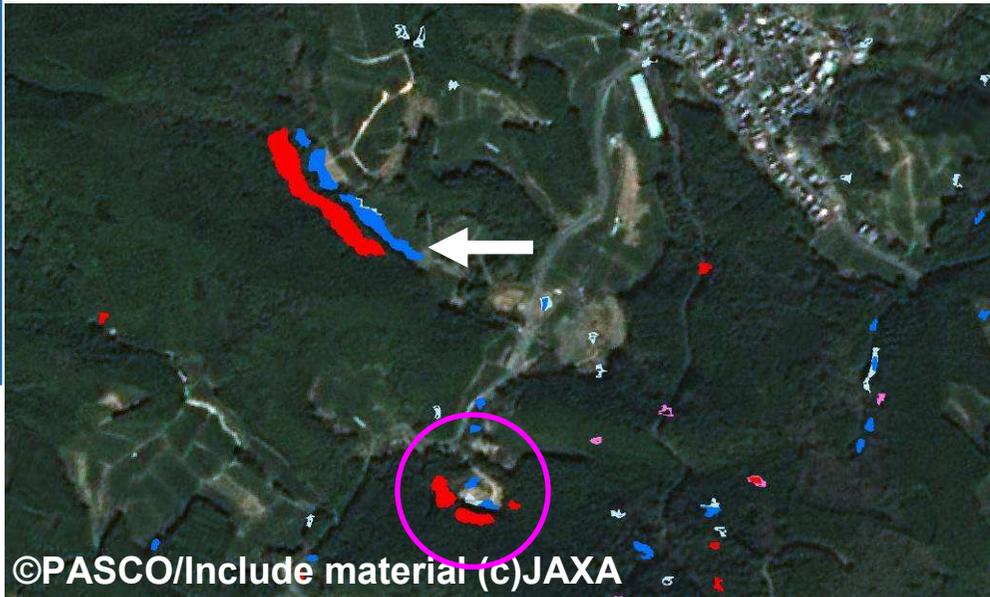
•Deforested area and construction from Feb. 10, 2008 to Aug. 13, 2009 affected σ_0.

Makinohara SA

© Infoterra GmbH, Distribution [PASCO]
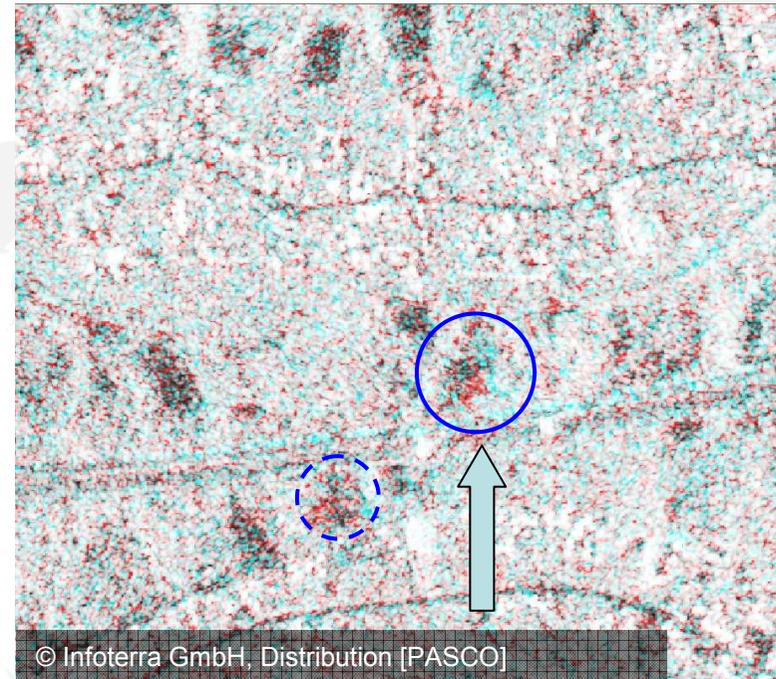
Estimated changed areas are the collapsed sides of roads around Makinohara SA and changed forest area.

Red decreasing σ0
Blue increasing σ0

Omaezaki-Bay
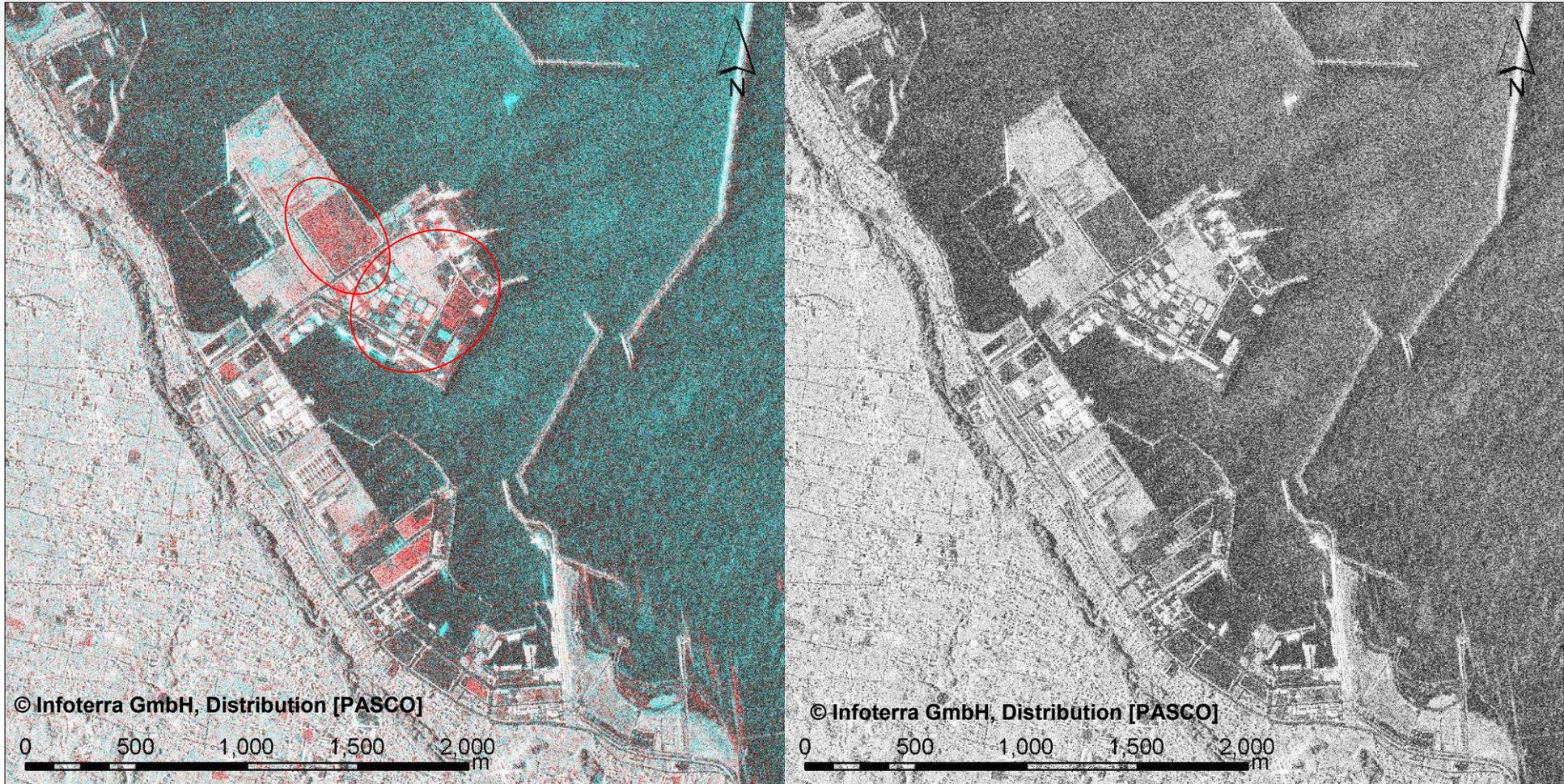
Composite image created from two TerraSAR-X images   **TerraSAR-X image**

■ Decreasing Feb. 08＞ Aug. 09
■ Increasing：Feb. 08＜ Aug. 09

Disaster mapping example from 2008 to 2009

Disaster	Date	Classification	Acquisition or observation
Great earthquake in Sichuan, China	2008/05/12	Earthquake	TerraSAR-X EROS-B Interpretation
Overflow of Kosi River in Nepal	2008/08/18	Flood	TerraSAR-X Flooded area estimation
Flood in northern Brazil	2009/05/05	Flood	TerraSAR-X Flooded area estimation
Cyclone AILA in Bangladesh	2009/05/25	Flood	TerraSAR-X Flooded area estimation
Iwate-Miyagi Nairiku Earthquake	2008/06/14	Earthquake	TerraSAR-X EROS-B Interpretation In-situ observation
Torrential Rain in Aichi Prefecture	2008/08/29	Flood	TerraSAR-X Flooded area estimation In-situ Observation
Mt. Asama Eruption	2009/02/06	Volcano	TerraSAR-X EROS-B
Sakurajima Eruption	2009/02/02〜	Volcano	TerraSAR-X Change Detection
Mud flood in Hofu region （Yamagchi）	2009/07/23	Landslide	TerraSAR-X In-situ observation
Earthquake around Suruga-bay （Shizuoka）	2009/08/11	Earthquake	TerraSAR-X In-situ observation

Mud flood in Hofu region

<TerraSAR-X>

■Acquisition Date

After the disaster　Jul. 25, 2009

After the disaster　Jul. 26, 2009

■Acquisition Mode

High-resolution SpotLight（5km×10km）Descending

High-resolution SpotLight（5km×10km）Ascending

■Product　EEC

■Incidence Angle

37.04 degree

39.98 degree

■Spatial Resolution

Range1.98m　Azimuth1.68m

Range1.86m　Azimuth1.59m

■Pixel Spacing

0.75m

Acquisition from both direction

TerraSAR-X image interpretation （1）

Ortho

TSX Ascending

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Ortho

TSX Descending

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beam
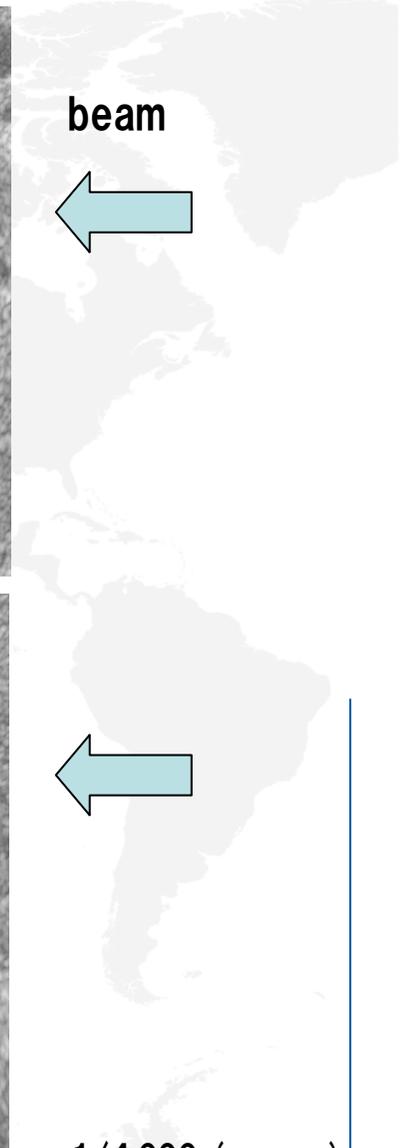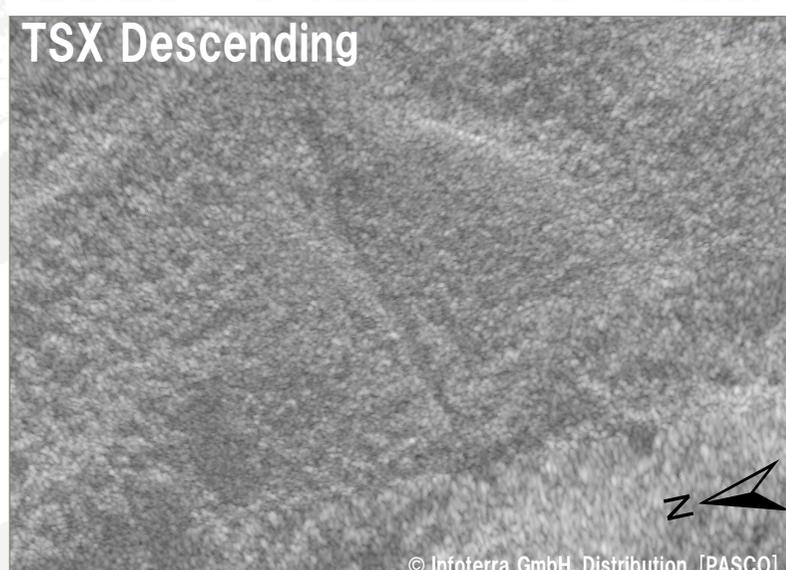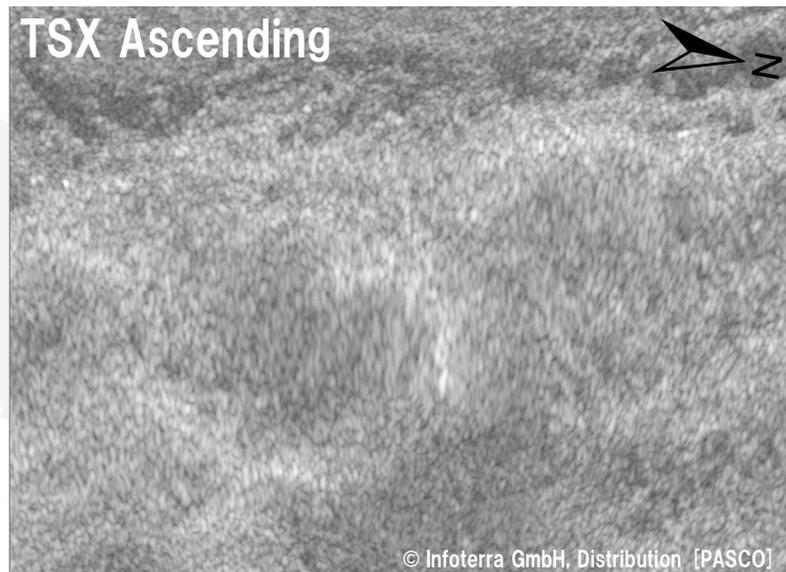
1/4,000 （approx.）

Katsusaka region

TerraSAR-X image interpretation （2）

Optical image

Ortho

TSX Descending

beam
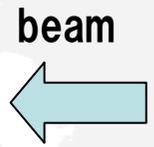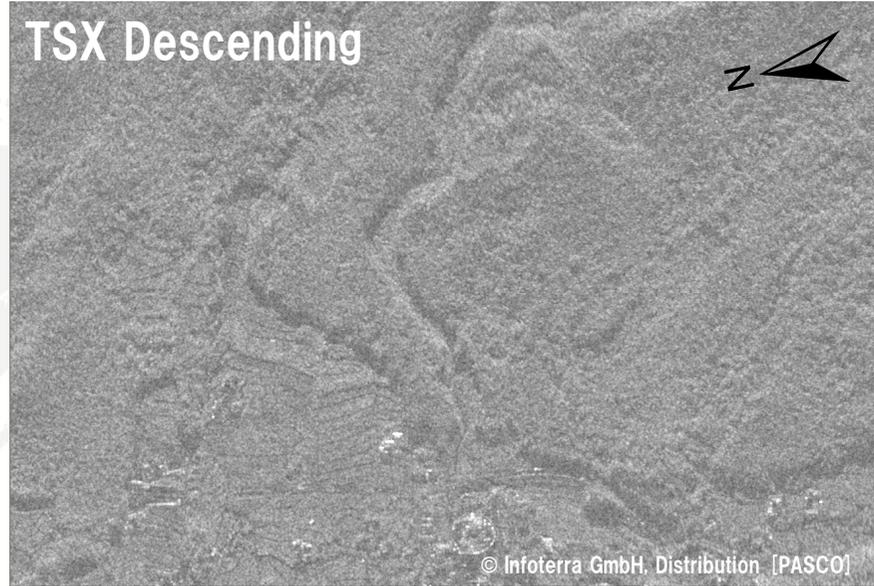
TSX Ascending

1/9,000
（approx）

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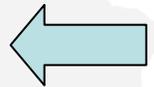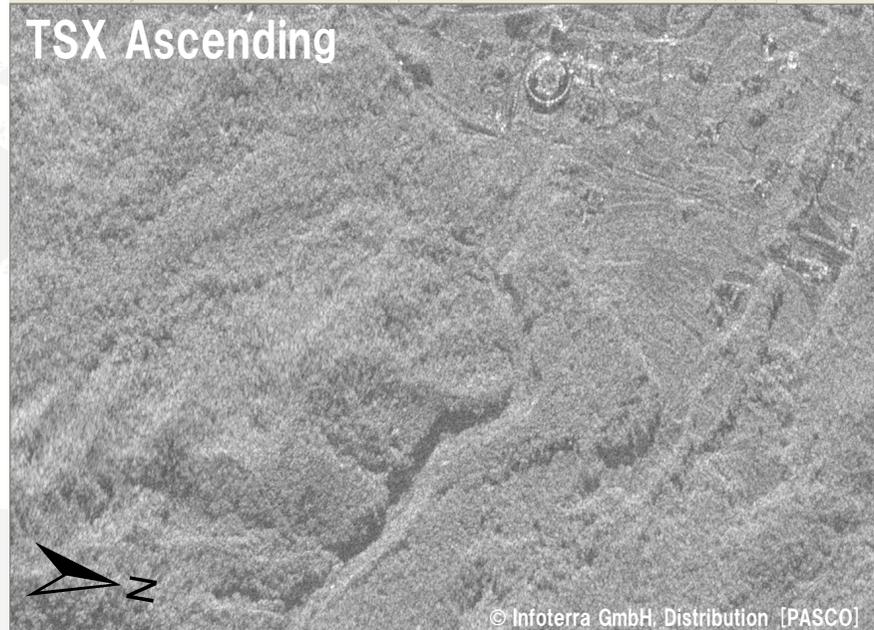
# Interpretation of flooded area in agricultural field

- At first, agricultural field area was derived using optical airborne sensor, then flooded areas were estimated from the TerraSAR-X image.
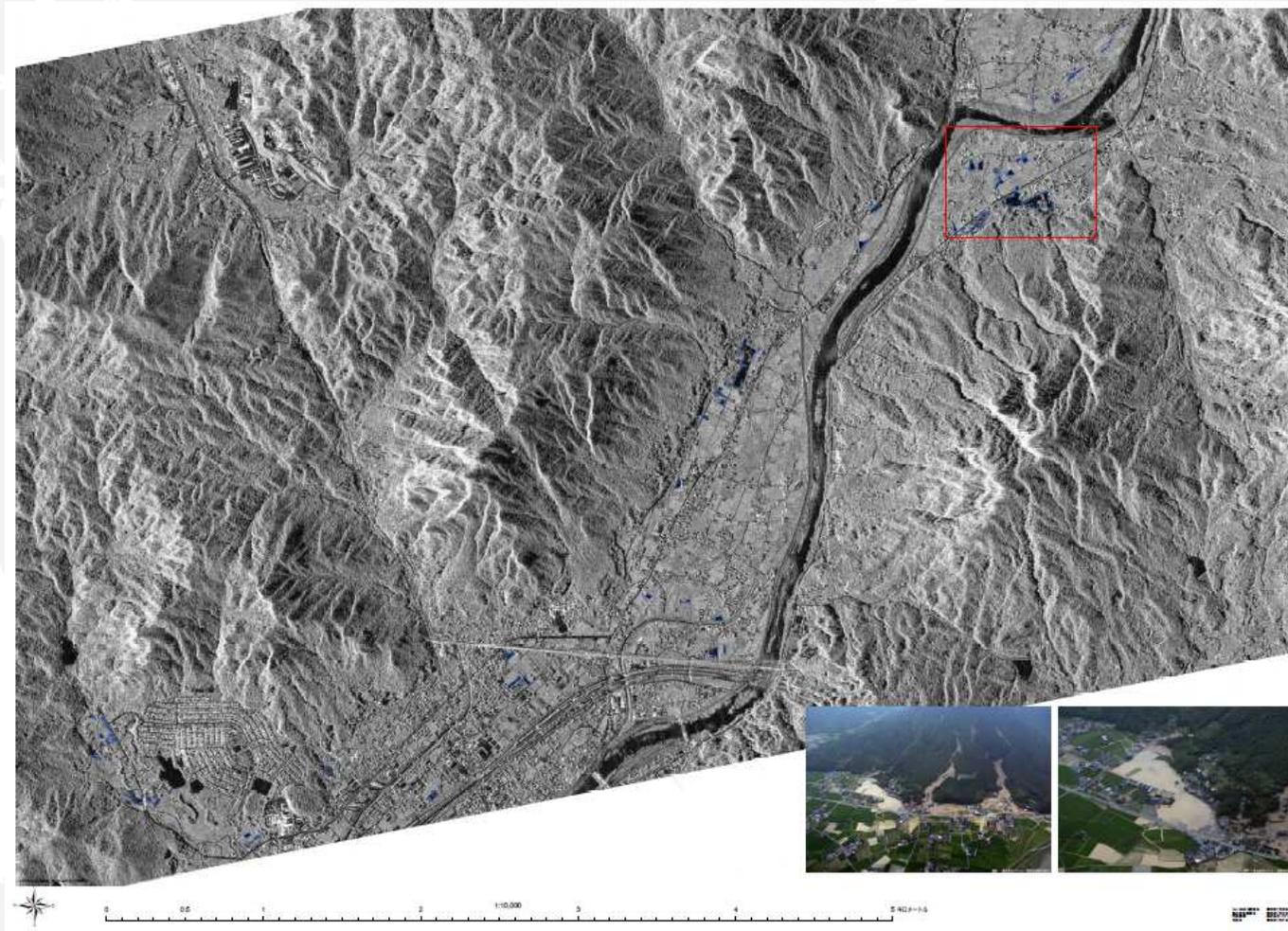
Interpreted flooded area
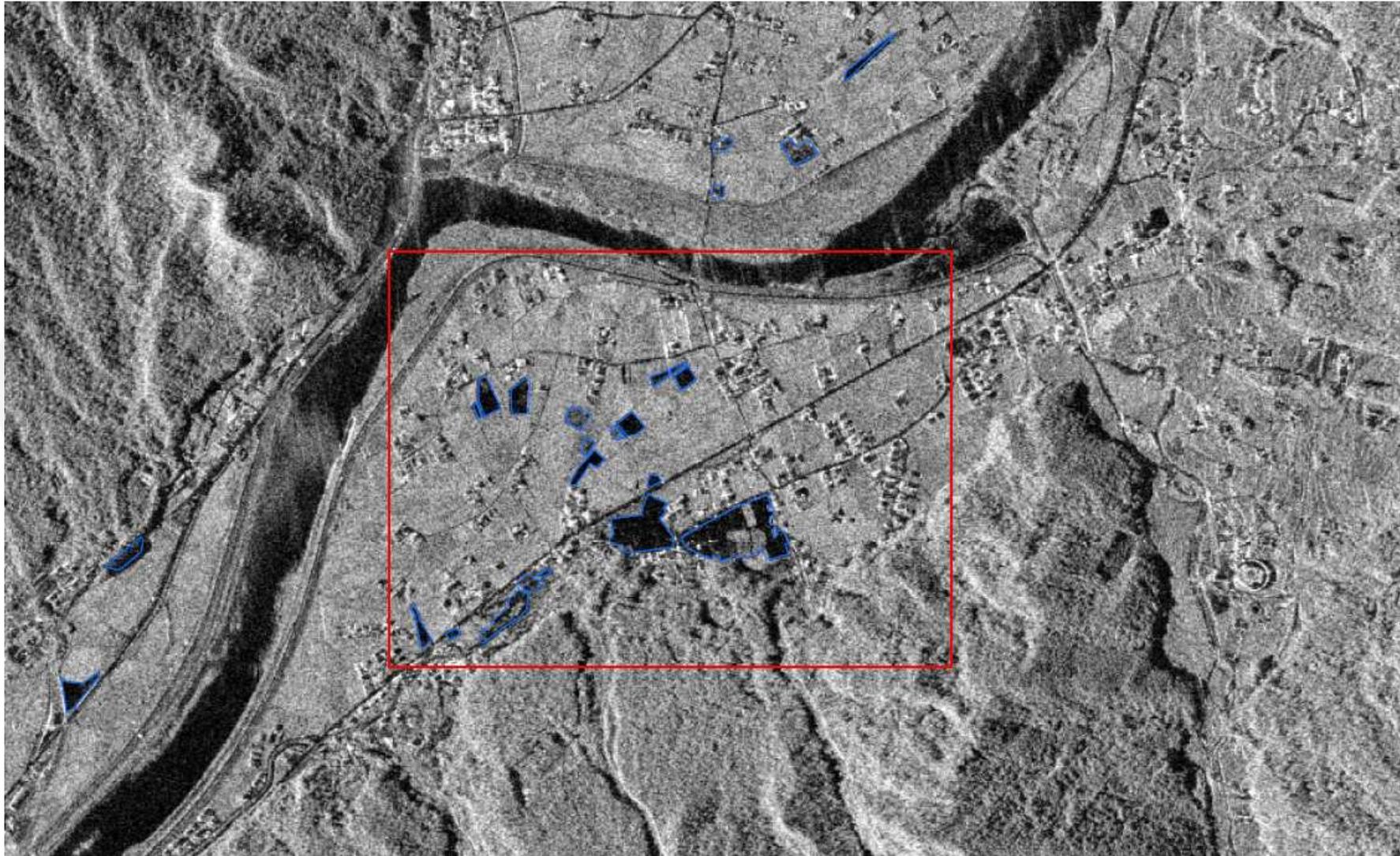
Track of Cyclone Aila （May 2009）

Tropical Cyclone Aila

Most affected area

NEPAL   BHUTAN

INDIA   BANGLADESH

26 May

⭐ Dhaka

Aila track

MYANMAR

25 May   Bay of Bengal

24 May

100 km   ReliefWeb
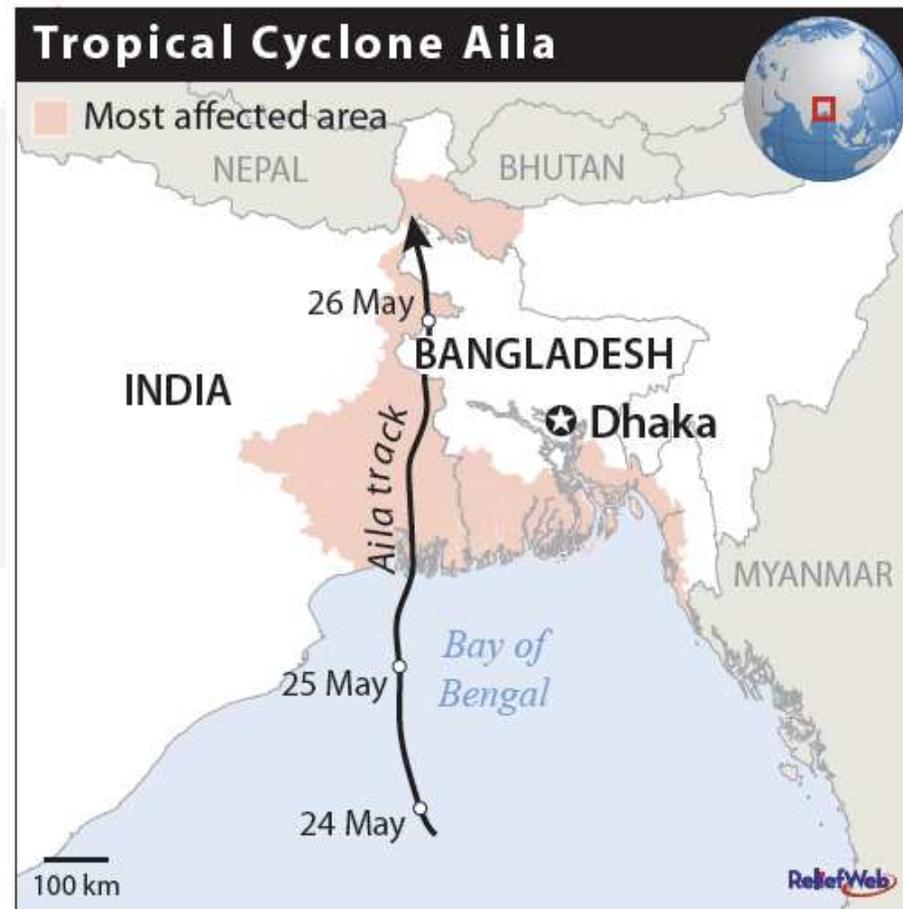
26 May 2009 - Tropical Cyclone Aila left 23 dead in India and 38 dead in Bangladesh.

Map Sources: FAO, SWERA, UNCS.
References: NIRAPAD. Bangladesh: Cyclone Aila - Sit. report no. 70. 26 May 2009.
Govt. Bangladesh. Bangladesh: Disaster Management Information Centre situation report. 26 May 2009
The boundaries and names shown and the designations used on this map do not imply official
endorsement or acceptance by the United Nations. Map created on 26 May 2009 –
www.reliefweb.int.

ReliefWeb HPより

Flooded village

A flooded village is seen in this aerial view taken from an Indian Air Force（IAF）helicopter in the Cyclone-hit area of Patharpatima Island in the Sundarbans delta, about 100 km（62 miles）south of Kolkata, India on May 27, 2009.（REUTERS／Jayanta Shaw）

Flood water flows back to the sea as villagers rebuild an embankment at Protap Nagar in Shatkhira, Bangladesh on Sunday, May 31, 2009.（AP Photo／Pavel Rahman）

boston.com HP

# Comparison of two images

New acquisition
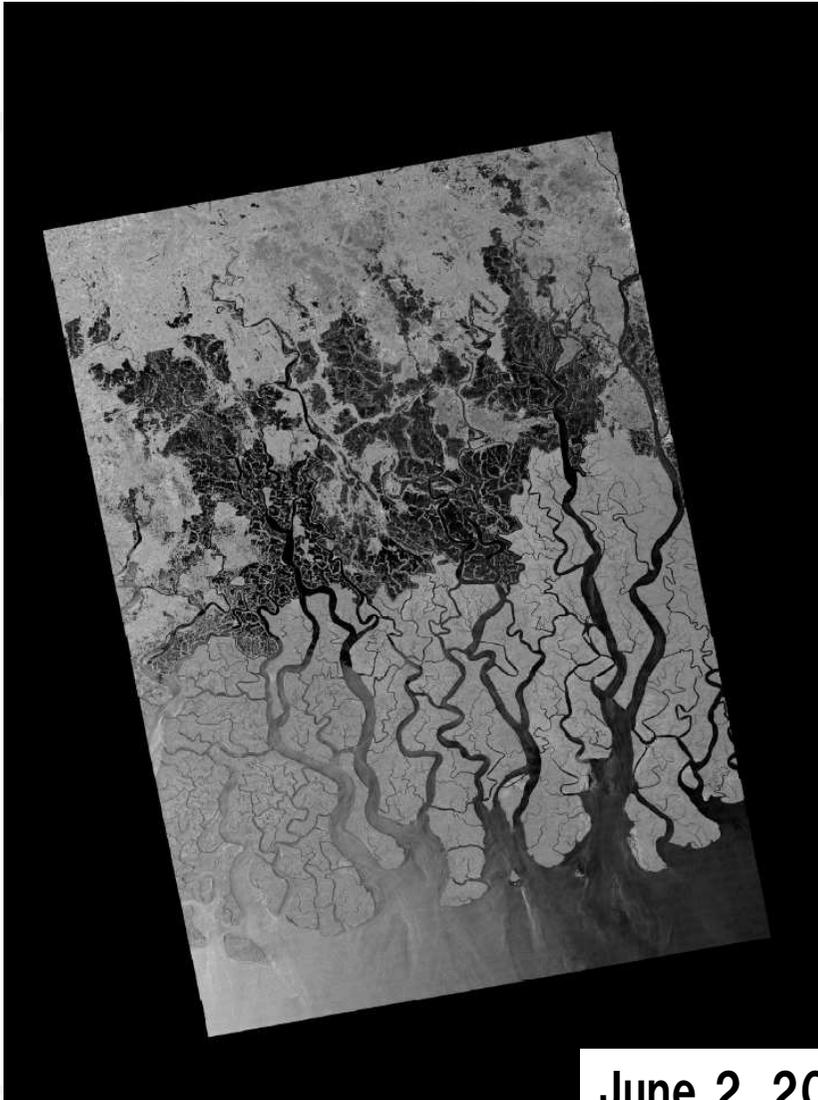
June 2, 2009

Archive

November 19, 2007

Flooded area estimation
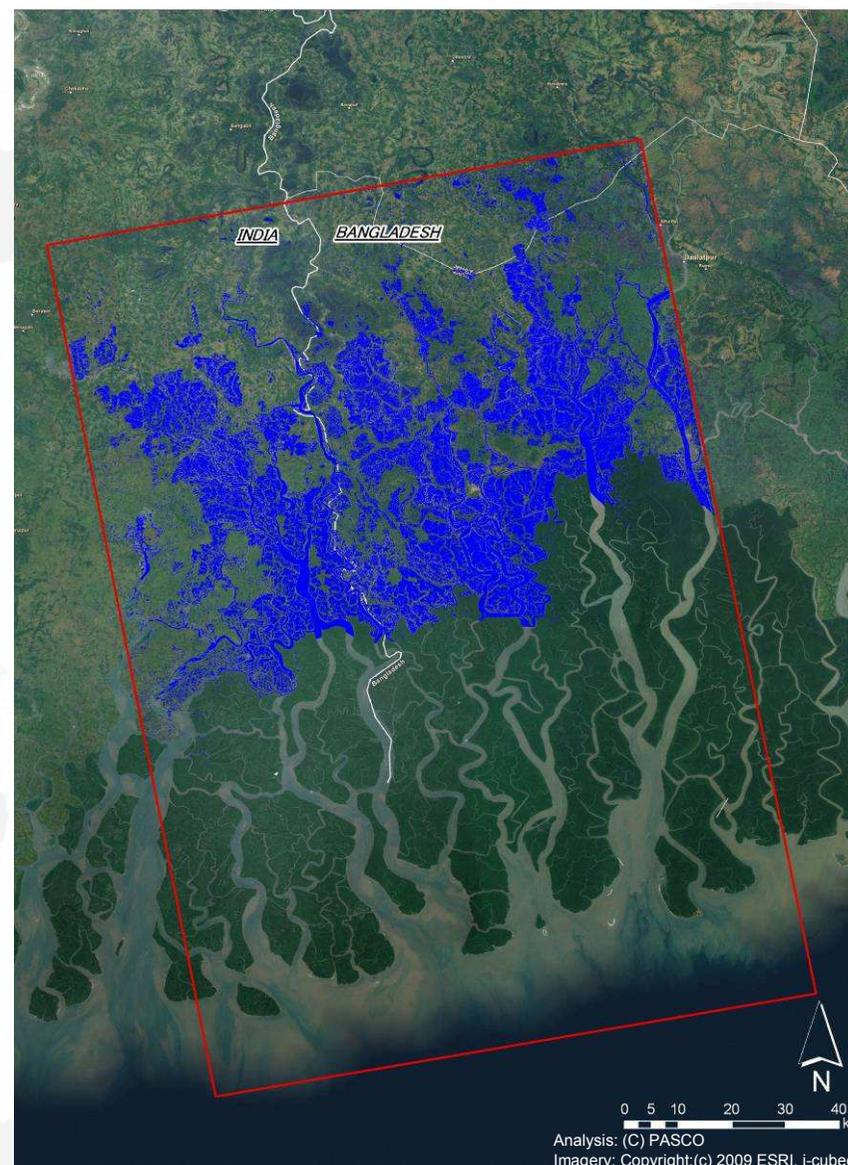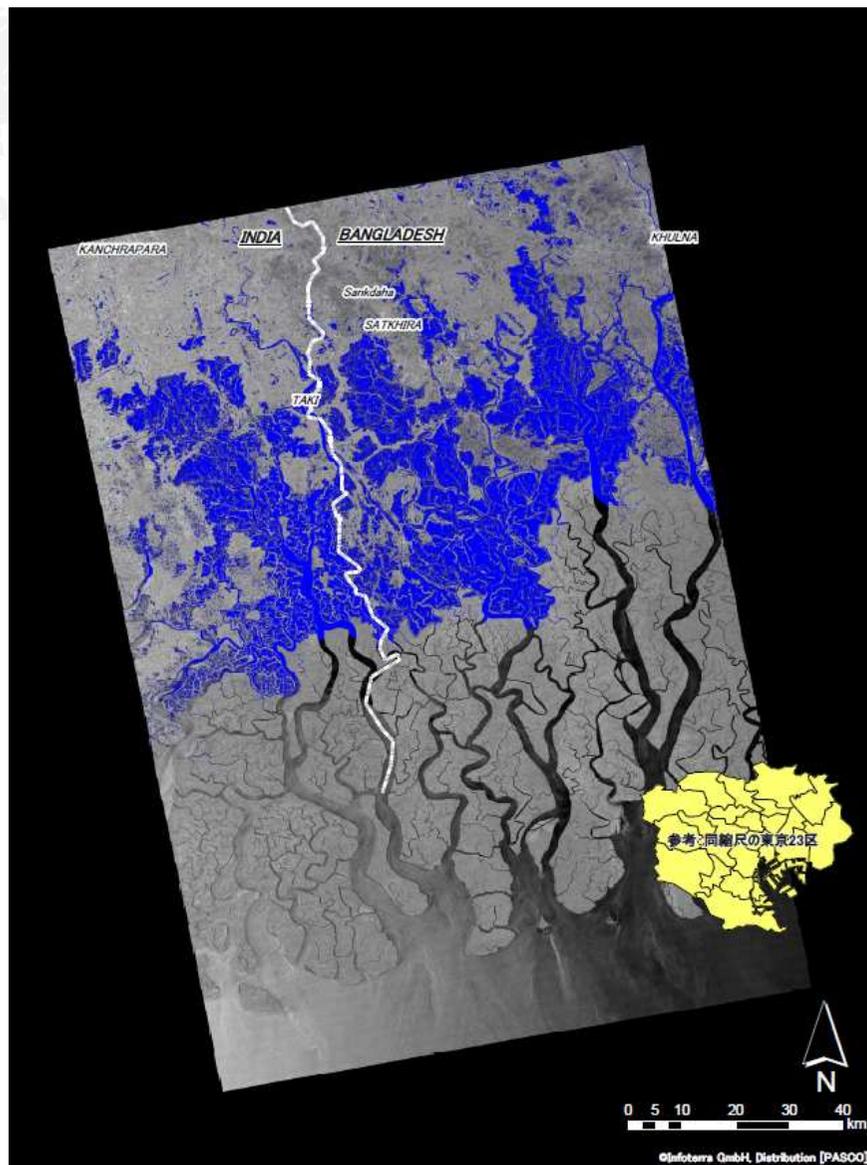
Overflow in Kosi River in Nepal Aug. 2008

Imja Lake

Kosi River
（Flooded area）

Cyclone Aila

Flooded area estimation in Kosi River
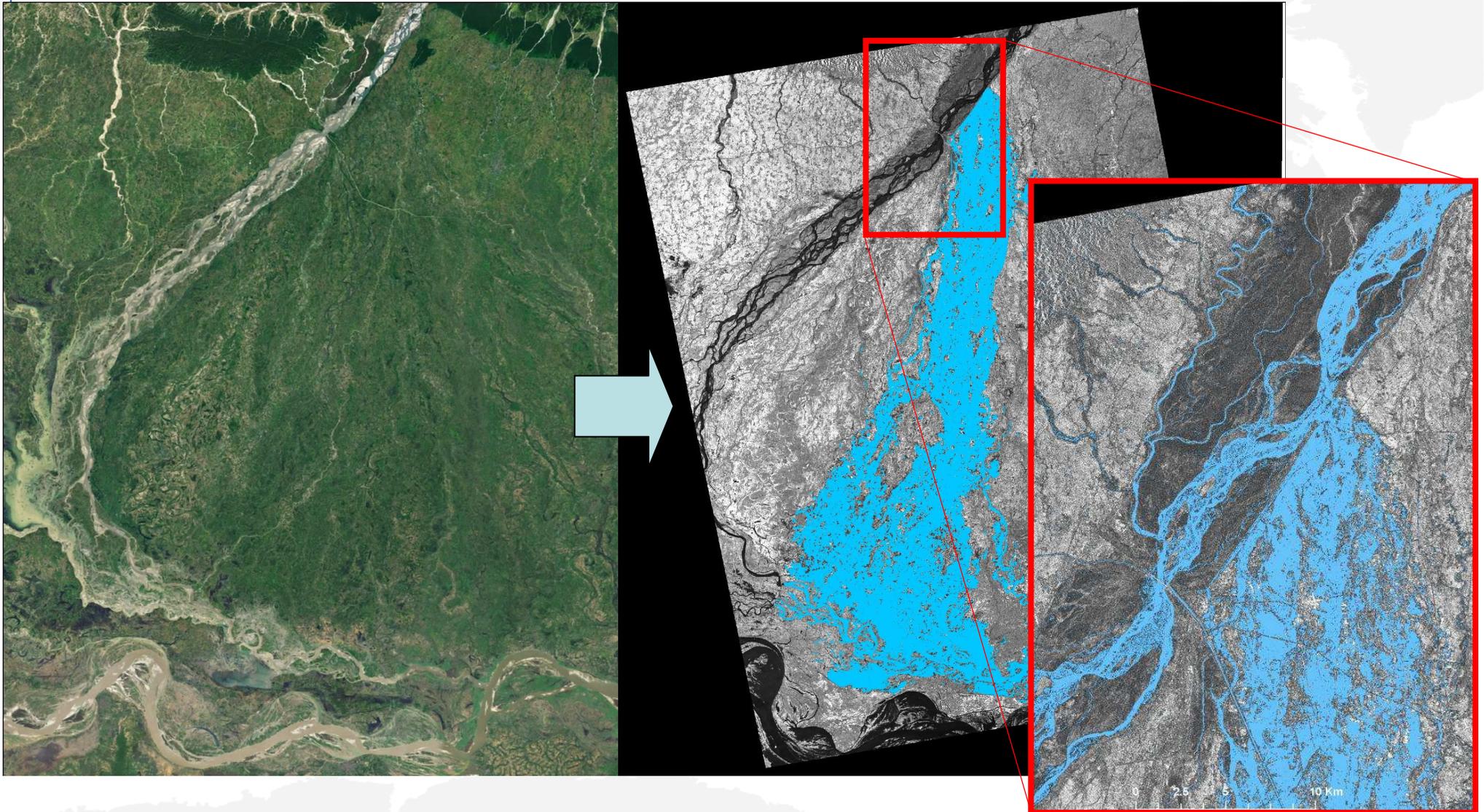
Summary

- TerraSAR-X can acquire several images soon after the occurrence of a big disaster, and the damaged areas can be extracted to provide the information of rescue operation, and reconstruction works etc.

- Changed detection using the pair of SAR images showed that the deforested area was also mis-extracted.

- Methodology to utilize single image after the disaster is necessary for practical uses.

"Addressing National Land"

語りかける国土
Addressing National Land

大自然の脅威
Threat of the Nature

2000-2009

災害緊急撮影事例集
Disaster Mapping for Emergency use

- Overviews of the disaster monitoring using optical airborne data and TerraSAR–X data

- Japanese case: 9
  International case: 6

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