第22回 環境リモートセンシングシンポジウム

AUTOMATIC LANDSLIDE MAPPING USING PEAK GROUND VELOCITY AND SENTINEL-1 IMAGERY
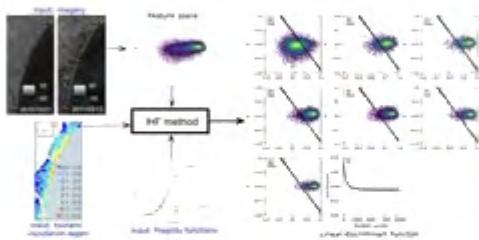
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February 20, 2020
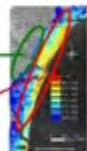
BACKGROUND
第20回 環境リモートセンシングシンポジウム

Previously, we proposed a method for damage mapping by the fusion of remote sensing, disaster demand intensity, and fragility functions

remote sensing

Novel Unsupervised Classification of Collapsed Buildings Using Satellite Imagery, Hazard Scenarios and Fragility Functions

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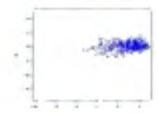
CURRENT PROBLEM: THERE ARE NOT FRAGILITY FUNCTIONS
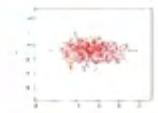
We can extract building samples from this area and assume with high certainty that those are non-collapsed buildings
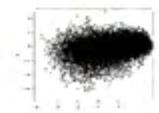
In this area we have both non-collapsed and collapsed buildings. We need to identify collapsed buildings

known database composed of only one class (498 buildings).
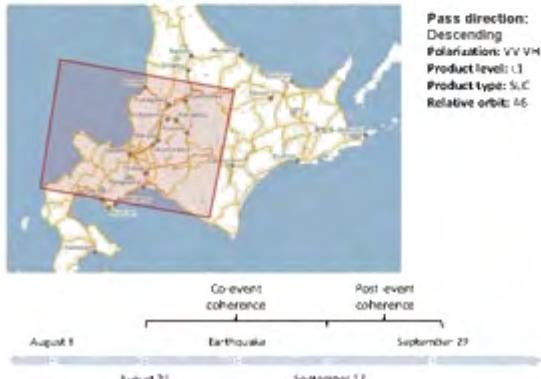
*Unlabeled dataset, but we know it is composed of 2 classes.*
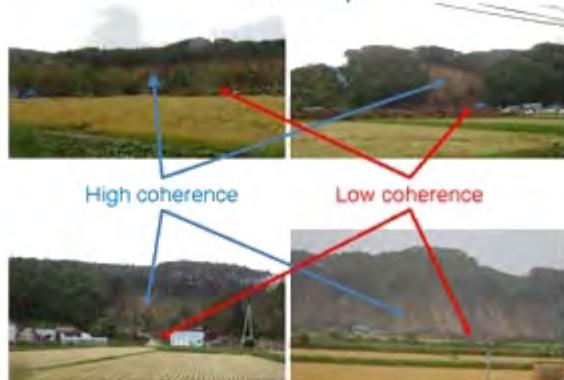
Complete sample space. About 30,000 samples. We need to classify.


STUDY AREA AND DATA SET

Pass direction: Descending
Polarization: VV VH
Product level: L1
Product type: SLC
Relative orbit: 46

Co-event coherence — Post-event coherence

August 8 — Earthquake — September 29
August 31 — September 17

Field Survey

High coherence — Low coherence
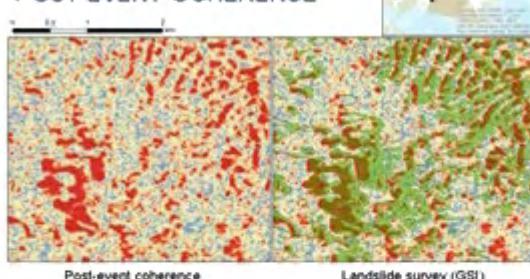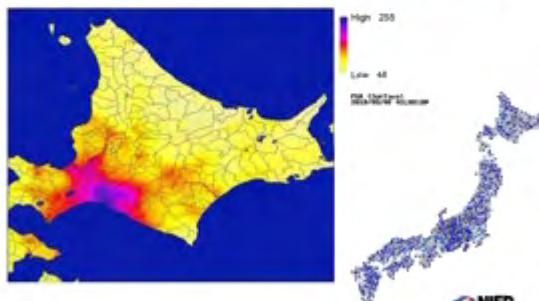
LANDSLIDE EXHIBIT LARGE POST-EVENT COHERENCE

Post-event coherence — Landslide survey (GSI)
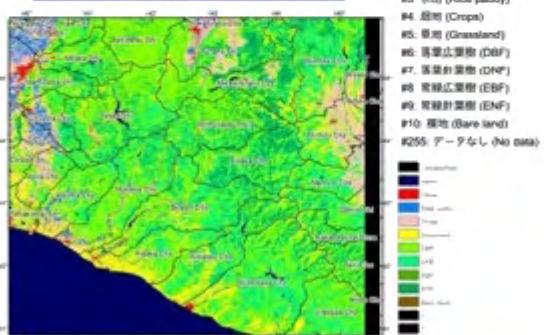
DEMAND: PEAK GROUND VELOCITY (PGV)

High 255
Low 48

NIED

LAND USE MAP

https://www.eorc.jaxa.jp/ALOS/en/lulc/lulc_index.htm

#0: 未分類 (Unclassified)
#1: 水域 (Water)
#2: 都市 (Urban and built-up)
#3: 水田 (Rice paddy)
#4: 畑地 (Crops)
#5: 草地 (Grassland)
#6: 落葉広葉樹 (DBF)
#7: 落葉針葉樹 (DNF)
#8: 常緑広葉樹 (EBF)
#9: 常緑針葉樹 (ENF)
#10: 裸地 (Bare land)
#255: データなし (No Data)
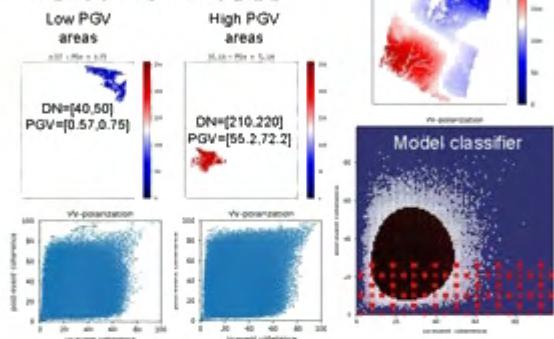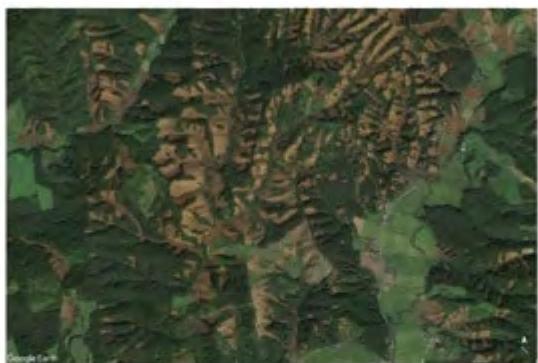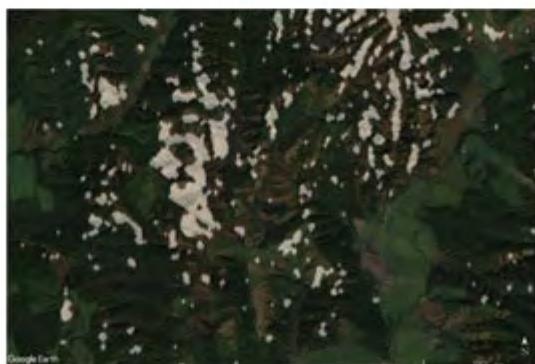
FEATURE SPACE AND CLASSIFIER MODEL

Low PGV areas — High PGV areas

DN=[40,50]
PGV=[0.57,0.75]

DN=[210,220]
PGV=[55.2,72.2]

Model classifier
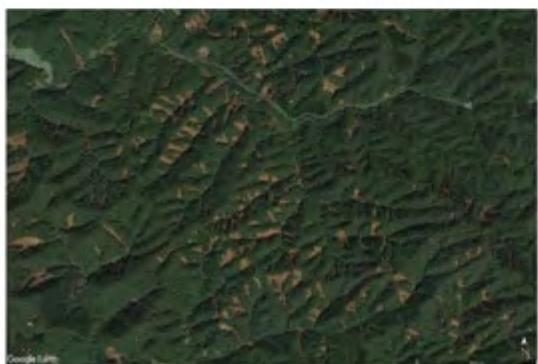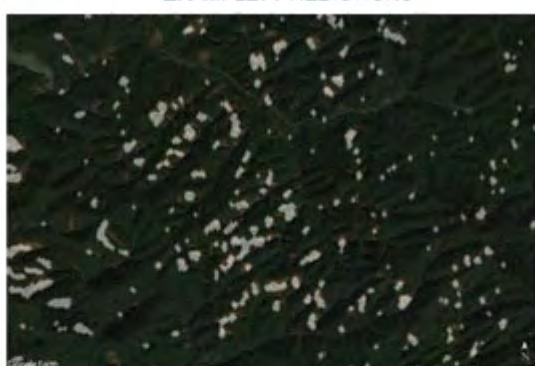
EXAMPLE: STUDY AREA

EXAMPLE: PREDICTIONS

EXAMPLE: STUDY AREA
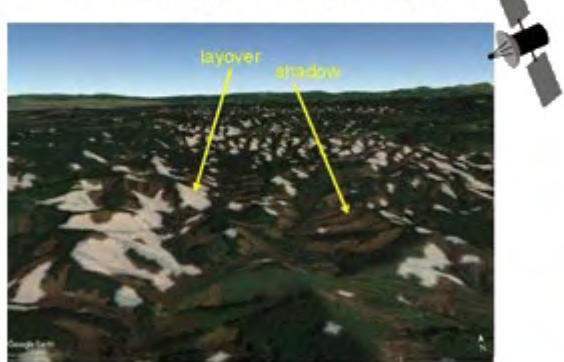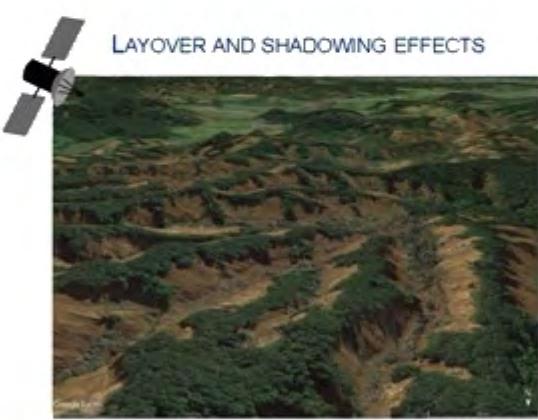
EXAMPLE: PREDICTIONS

LAYOVER AND SHADOWING EFFECTS

LAYOVER AND SHADOWING EFFECTS

layover   shadow

LAYOVER AND SHADOWING EFFECTS

LAYOVER AND SHADOWING EFFECTS

CONCLUSIONS

- The post-event coherence identifies bare land induced by landslide.
- The post-event coherence cannot be used to identify the landslide extent.
- The peak ground velocity can be used to train a classifier model in near real time.
- Landslides located in the layover areas can be identified.
- Landslides located in radar-shadow areas cannot be identified.
- Both, ascending and descending SAR images are necessary to perform a complete landslide mapping (**Future work**).

THANK YOU

Post-event coherence   Predictions   Landslide survey