Consideration of FNF algorithm

Takuya Itoh, Kazufumi Kobayashi and RESTEC mosaic team
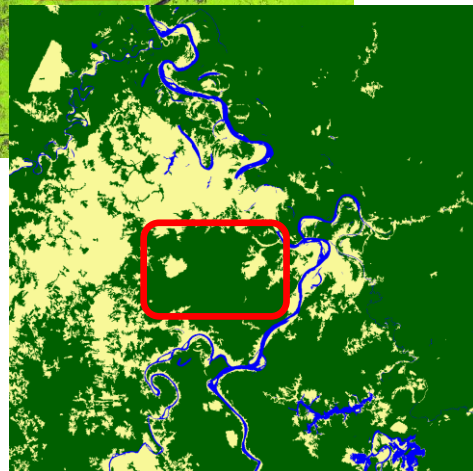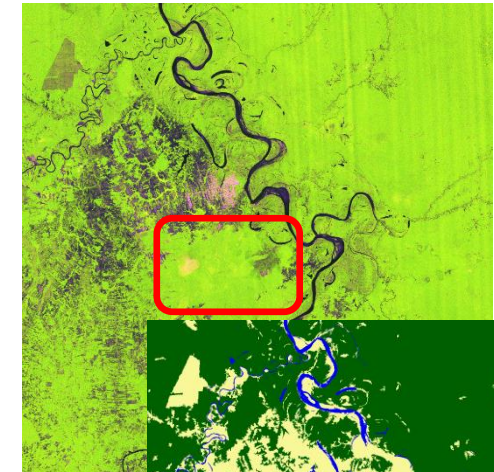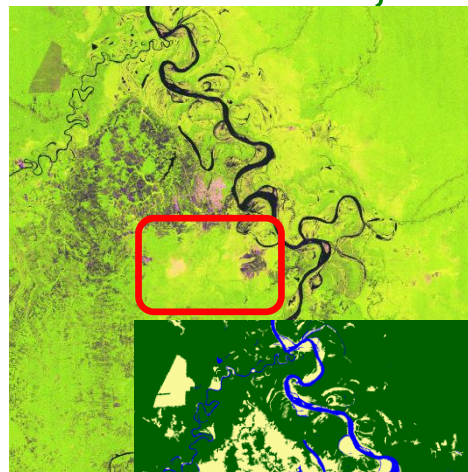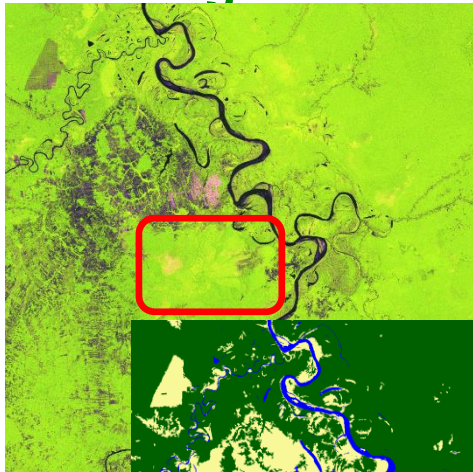*Takeo Tadono, Masato Hayashi (JAXA)*
Masanobu Shimada (TDU)

FNF algorithm

☐ **Now using threshold method with HV data, but…**
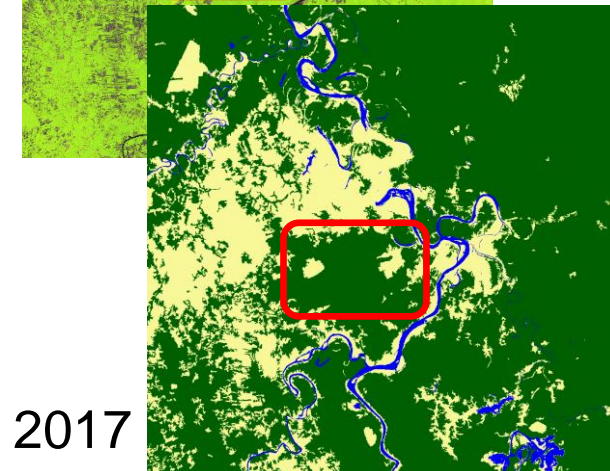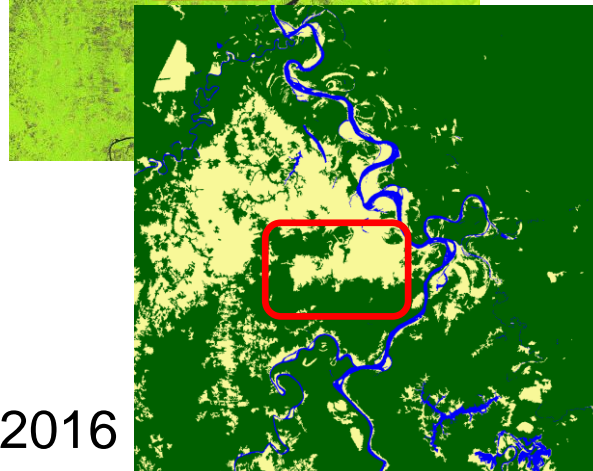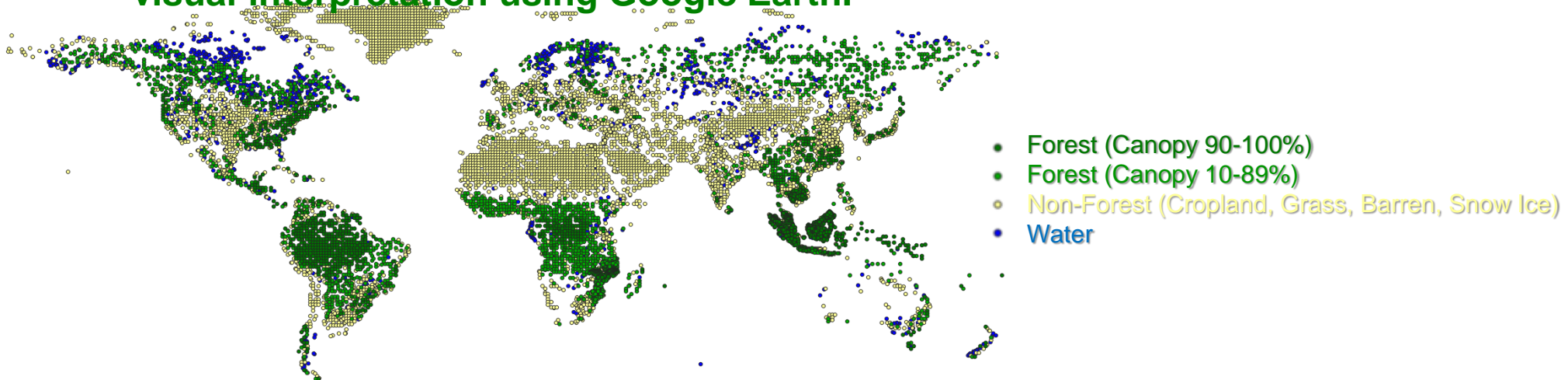

2015   2016   2017

☐ **Looking at the details in FNF map, there is a inconsistency problem between time series.**

☐ **It is caused by seasonal change, weather condition, etc.**

FNF needs Time Series Dataset?

☐ **Change the methodology of FNF: Threshold and Single season data**

⇒ **Time series dataset and Training data for classification processing**

☐ **ScanSAR time series mosaic.**

⬇ **Maximum 9 cycles time series dataset for a year**

⬇ **Calculate statistics of these dataset (mean, STD, max, min)**

☐ **Using Random Forest Classification method with training data**

⬇ **JAXA collects training data for globally (Total over 10 thousand points) by visual interpretation using Google Earth.**
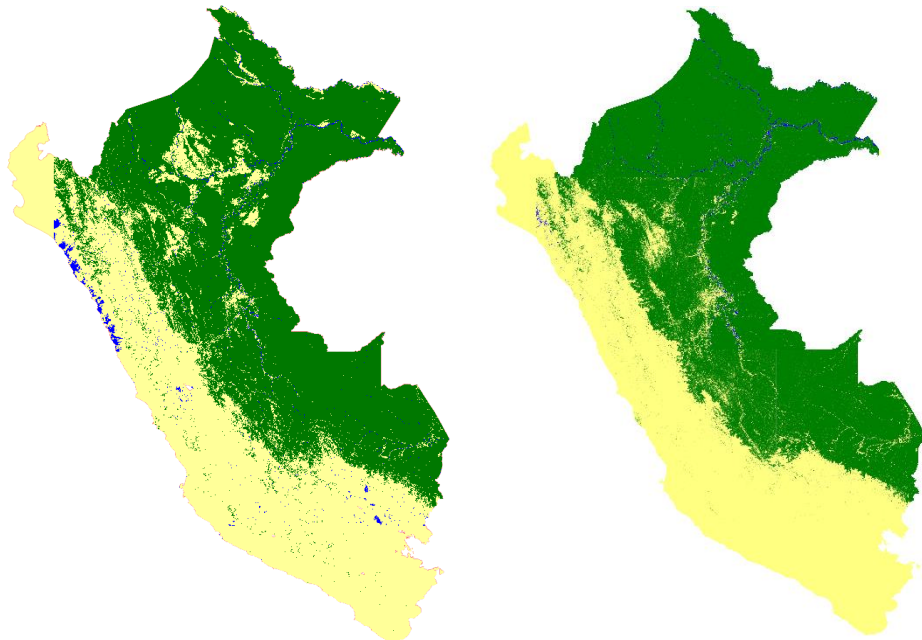

- Forest (Canopy 90-100%)
- Forest (Canopy 10-89%)
- Non-Forest (Cropland, Grass, Barren, Snow Ice)
- Water

FNF by time series dataset using Random Forest

☐ **Peru**

JAXA FNF 2015
(threshold with HV)
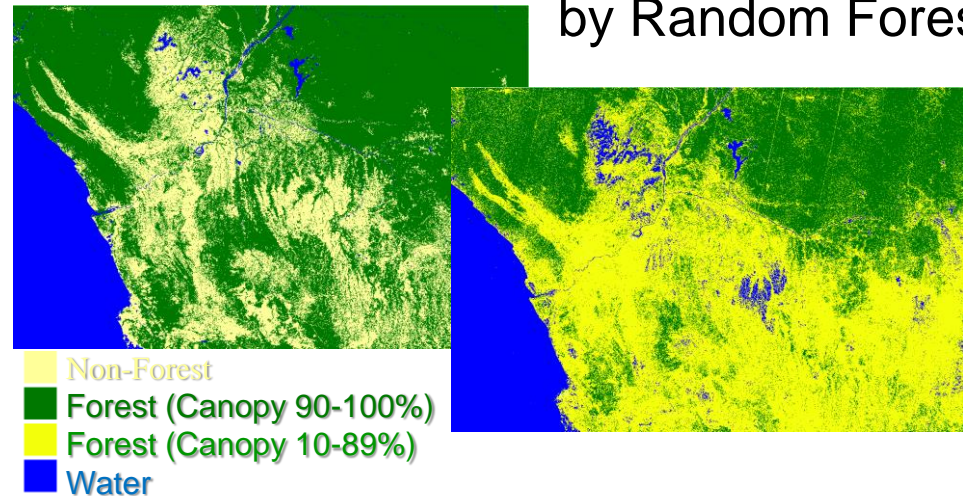
FNF 2015
using Scan SAR
Time Series
by Random Forest

☐ **DR Congo**

JAXA FNF 2015
(threshold with HV)

FNF 2015
using Scan SAR
Time Series
by Random Forest

Non-Forest
Forest (Canopy 90-100%)
Forest (Canopy 10-89%)
Water

Overall Accuracy: 77.9% ⇒ 94.0%
25m FNF is not separated into dense forest and sparse forest, but ScanSAR time series can be separate.

Overall Accuracy: 87.2% ⇒ 94.2%

New Methodology for FNF

☐ **Accuracy using ScanSAR time series dataset and Random Forest classification is higher than single season Mosaic data.**

☐ **But resolution of ScanSAR dataset is 50m. It is lower than 25m global mosaic. And observation area of ScanSAR time series data is limited in tropical rain forest region, not include boreal forest.**

  ⬇ **It is useful for JJ-FAST base map.**

  ⬇ **But boreal forest needs another methodology: using threshold or random forest with single seasonal dataset (25m global mosaic)**

☐ **Hybrid methodology:**

  ⬇ **Tropical rain forest: ScanSAR time series and Random Forest**

  ⬇ **Boreal forest: 25m single seasonal data**