

24 October 2018, GEOSS AP symposium

*Relationship among phenology,
ecosystem process, and biodiversity*

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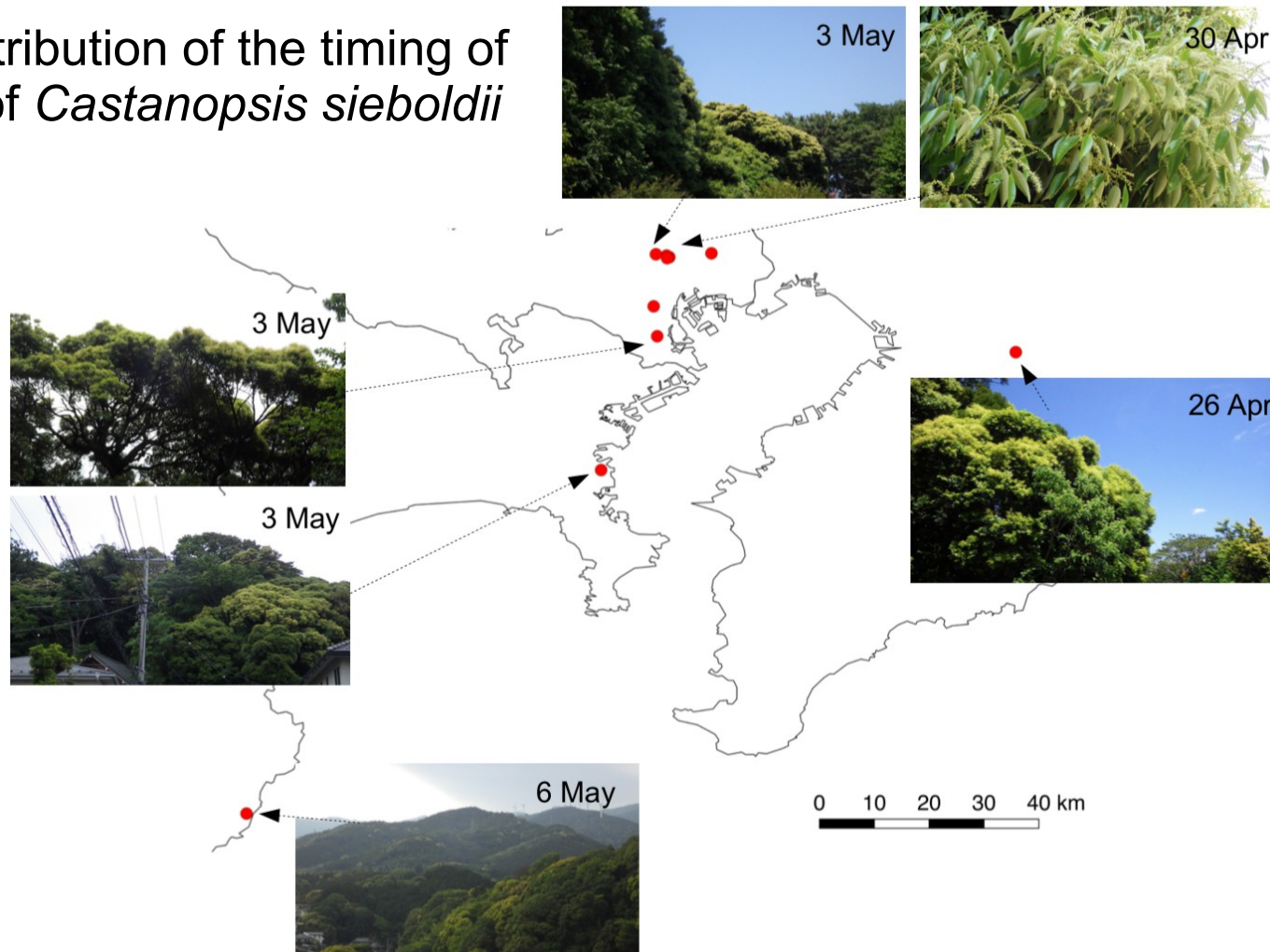
Very simple data collection (networking of networks) in each country and region will develop phenological studies!!

Collection of

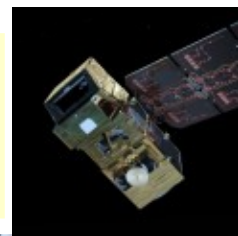
- 1: phenological information for discrimination of tree species*
- 2: in situ phenological observation data*
- 3: phenology images taken by time-lapse digital cameras*
- 4: ground-truth for land use and land cover change*

1: Collection of phenological information for discrimination of tree species

Spatial distribution of the timing of blooming of *Castanopsis sieboldii*



*Seasonal RGB images observed by SENTINEL-2
at Koishikawa Botanical Garden in Tokyo (10m res.)*



19 December 2017

28 April 2018

0 100 200 300 400 m

0 100 200 300 400 m

13 April 2018

26 August 2018

0 100 200 300 400 m

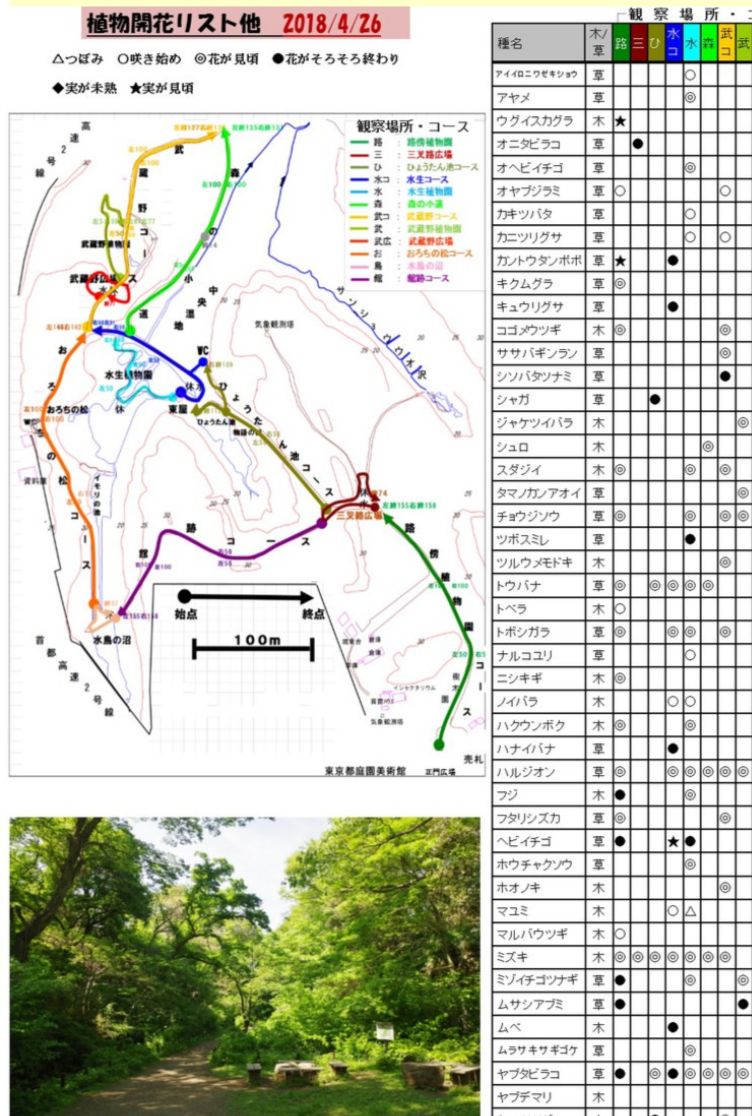
0 100 200 300 400 m

Discrimination of tree species by analysing seasonal change of canopy surface caused by blooming and leaf-flush

28 April 2018



2: Collection of in situ phenological observation data



□ □ Weekly flowering phenology information published on the web site of Institute for Nature Study, National Museum of Nature and Science in Shirokanedai, Tokyo

国立科学博物館 National Museum of Nature and Science 標本・資料統合データベース

大 中 小

標本・資料統合データベース > 詳細検索(生物季節観測データ)

生物季節観測データの詳細検索・フリーワード検索を実行します。

詳細検索(生物季節観測データ)

種和名(全角カナ) 部分一致 ▼ 項目内AND検索 ▼

別名・総称名・その他(全角カナ) 部分一致 ▼ 項目内AND検索 ▼

科和名(全角カナ) 部分一致 ▼ 項目内AND検索 ▼

科名(学名) 部分一致 ▼ 項目内AND検索 ▼

属名(学名) 部分一致 ▼ 項目内AND検索 ▼

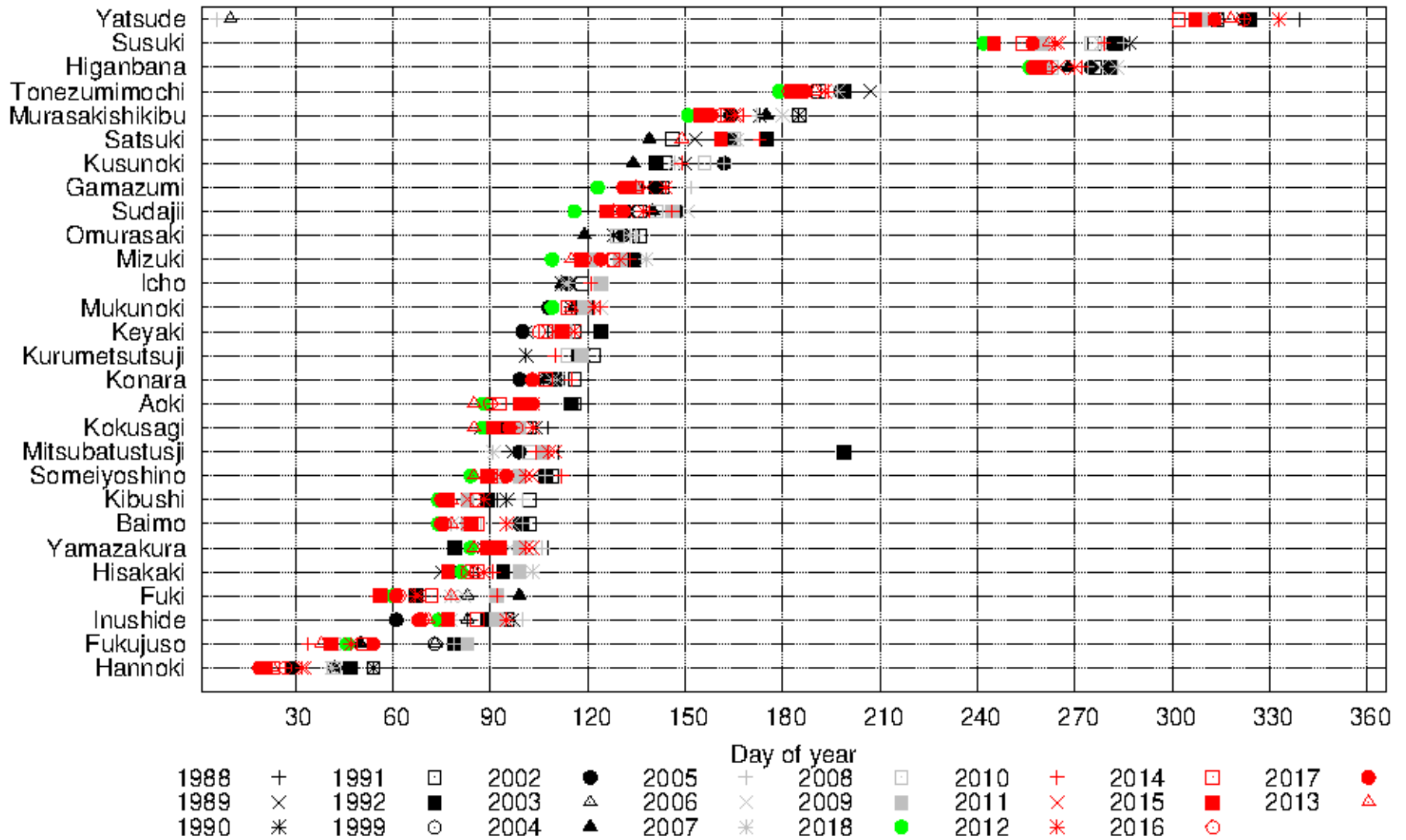
種小名(学名) 部分一致 ▼ 項目内AND検索 ▼

種命名者名 部分一致 ▼ 項目内AND検索 ▼

[<http://db.kahaku.go.jp/webmuseum/>]

▲ Collection Database of Specimens and Materials published by Institute for Nature Study, National Museum of Nature and Science

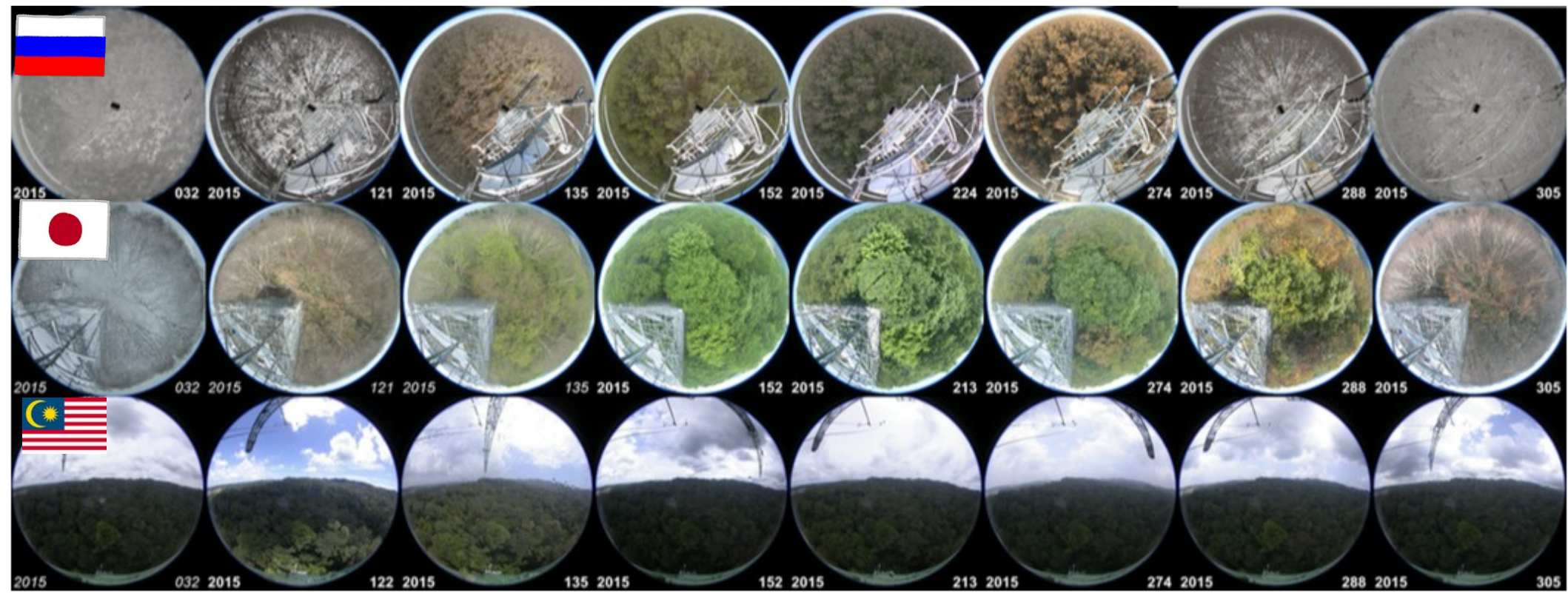
Year-to-year variability of the timing of full blooming at Institute for Nature Study, National Museum of Nature and Science in Shirokanedai, Tokyo



[<http://db.kahaku.go.jp/webmuseum/>]

[<http://www.ins.kahaku.go.jp/index.php>]

3: Collection of phenology images taken by time-lapse digital cameras



Global phenology observation networks by using time-lapse cameras

Web Camera Images of National Parks and Wildlife in Japan

<http://www.sizenken.biodic.go.jp/index.php>
<http://www.pheno-eye.org>

European Phenology Camera Network
(<http://european-webcam-network.net/>)



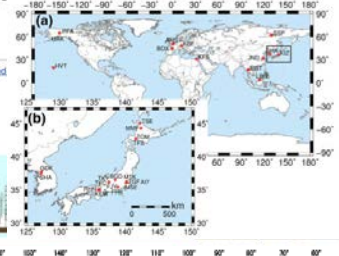
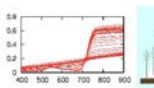
Phenological Eyes Network (PEN)

フェノロジカル・アイズ・ネットワーク
Connecting Satellite Remote Sensing to the Ground-Level E

pen-m@ax.jp

What does PEN stand for?

English / MPEG animation / gallery / open documents / closed presentation list / Leaflet / PDF / PPT / JPEG (page1, page2, page3, page5) / Review article in AsiaFlux Newsletter (2007)



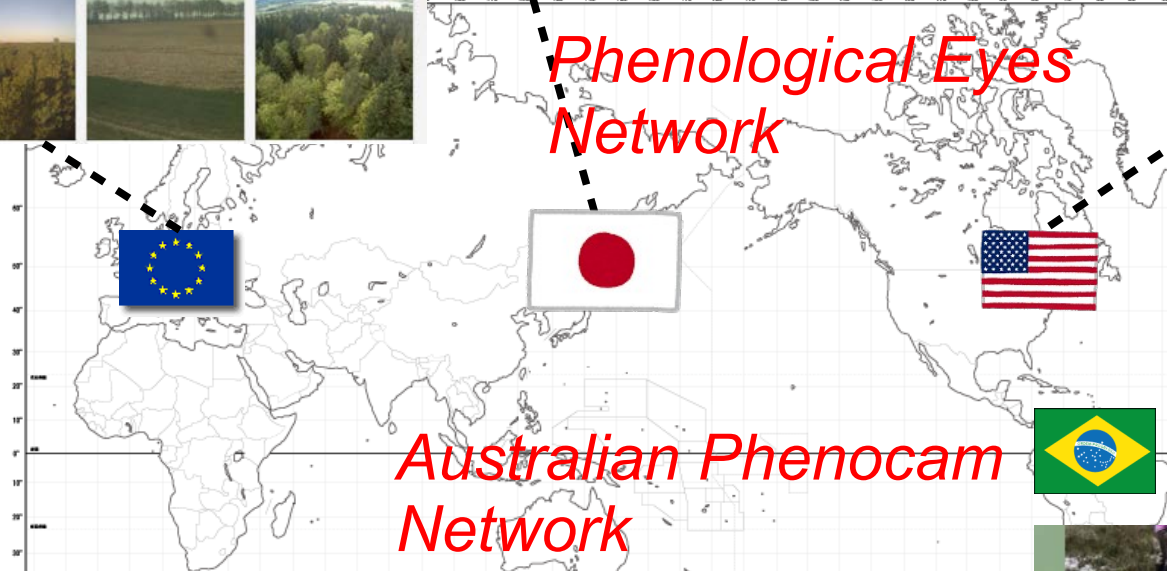
Phenological Eyes Network

<https://phenocam.sr.unh.edu/webcam/>

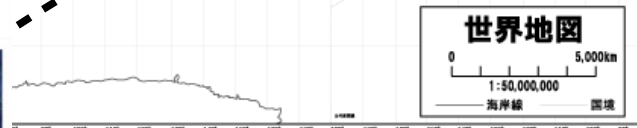
PhenoCam

Australian Phenocam Network

e-phenology



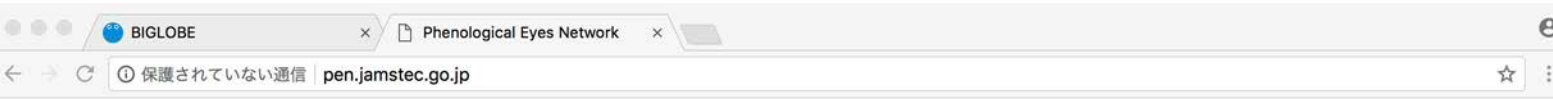
Phenocam images from the Calceperum Mallee SuperSite just prior to and just after the fire, Jan 2014



← <https://phenocam.org.au/>
→ <http://www.recod.ic.unicamp.br/e-phenology/client/index.html#/>



8 million phenological and sky images from 29 ecosystems from the Arctic to the tropics: the Phenological Eyes Network



Phenological Eyes Network (PEN)

--- Connecting Satellite Remote Sensing to the Ground-Level Ecosystems ---



Not enough in Asia!

ACCESSIBILITY

License: This data set is provided under a Creative Commons license. <https://creativecommons.org/>

REFERENCES

Nagai S, Akitsu T, Saitoh TM, et al. 8 million phenological and sky images from the Phenological Eyes Network. *Ecological Research*, <https://doi.org/10.1007/s13354-018-0090-0>

Data of PEN

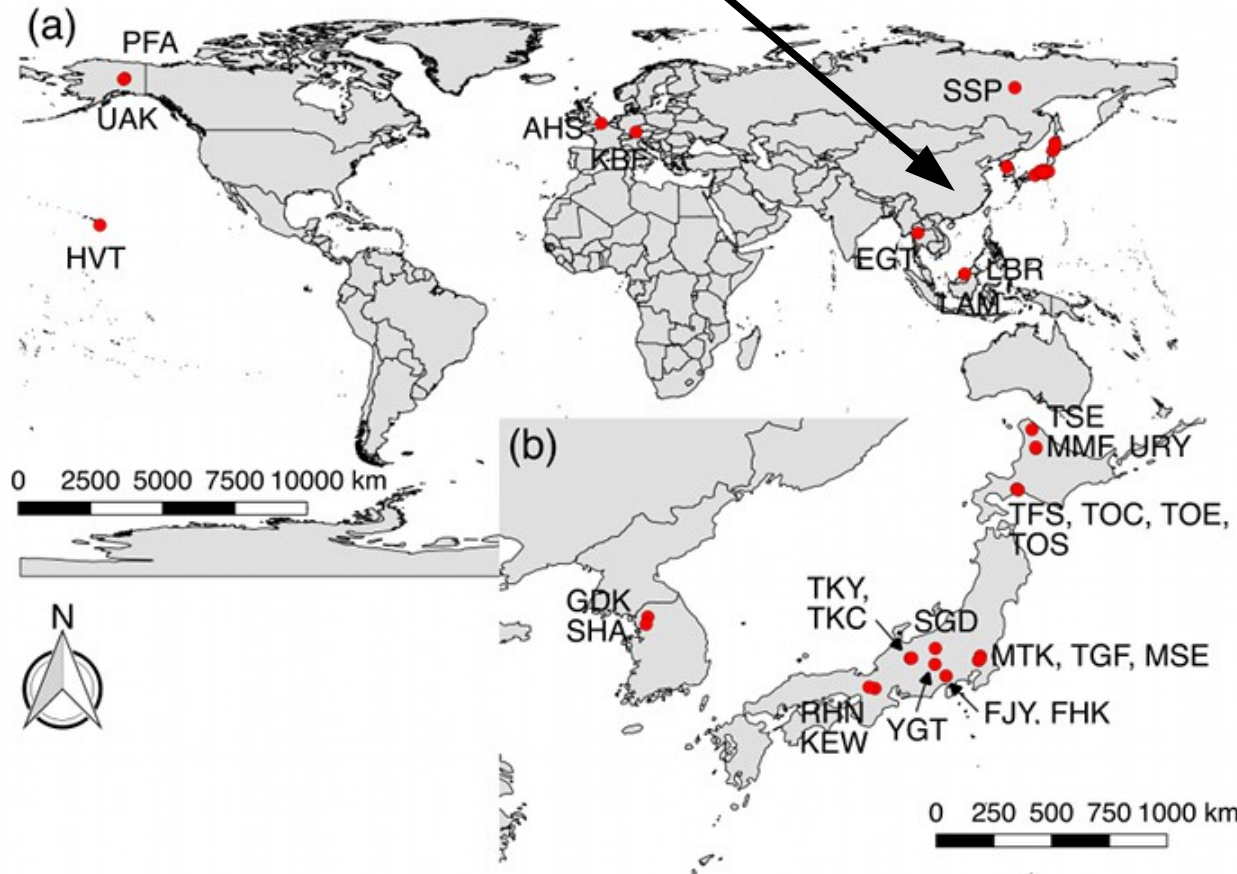
dc_2017_244_1200+....jpg 2018survey-201809....zip

Data paper:

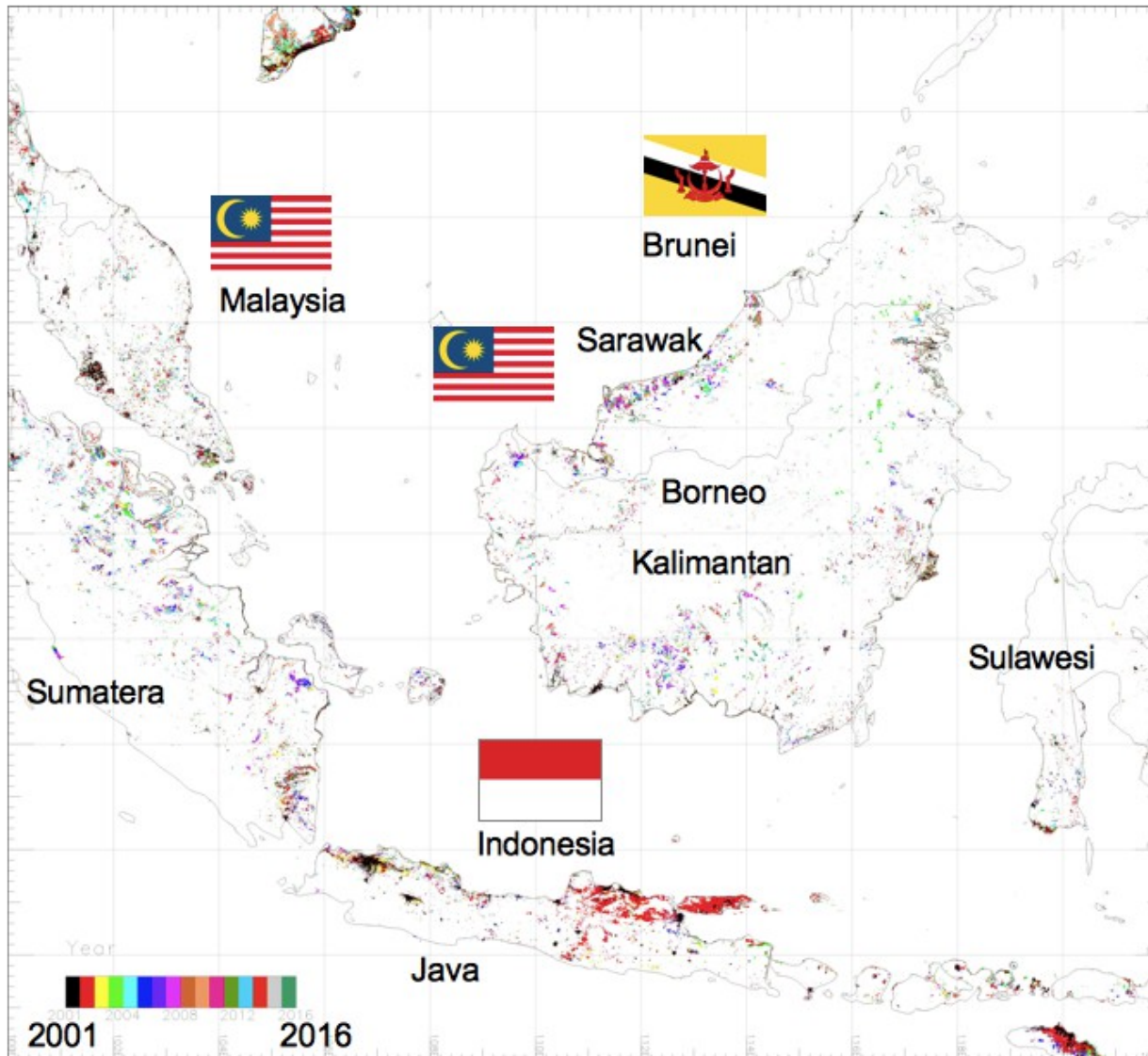
Nagai et al. (in press, *Ecological Research*)

Get data: я я я я я я

<http://pen.jamstec.go.jp>



4: Collection of ground-truth for land use and land cover change



- □ Year-to-year variability of deforestation detected by daily Terra/Aqua MODIS satellite-observed vegetation index (500m res.)



*Spatial resolution is very coarse.
We cannot evaluate land cover type after deforestation.*

Collection of field survey images published on "Mapillary"

[<https://www.mapillary.com/>]



Lotus paddy

Land uses and land cover well link plant phenology.

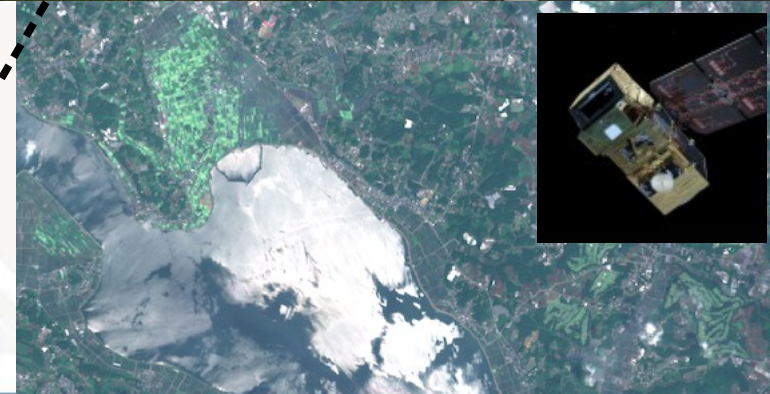
Map data at scale from street-level imagery

Images from all over the world processed with computer vision.

Create account

Explore imagery and data

381.4 million images, 5.7 million kilometers



Rice paddy

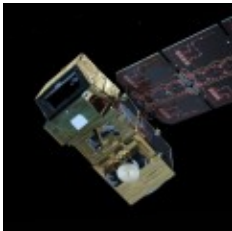
Lotus paddy

RGB image observed by SENTINEL-2 satellite (10m res.) on 7 June 2018

Discrimination of the type of secondary forest is very important in the southeast Asia!!

Not sufficient to collect ground-truth!!

▼ RGB image observed by SENTINEL-2 satellite (10m res.) on 9 May 2018



Primary tropical rainforest



Oil palm plantation

