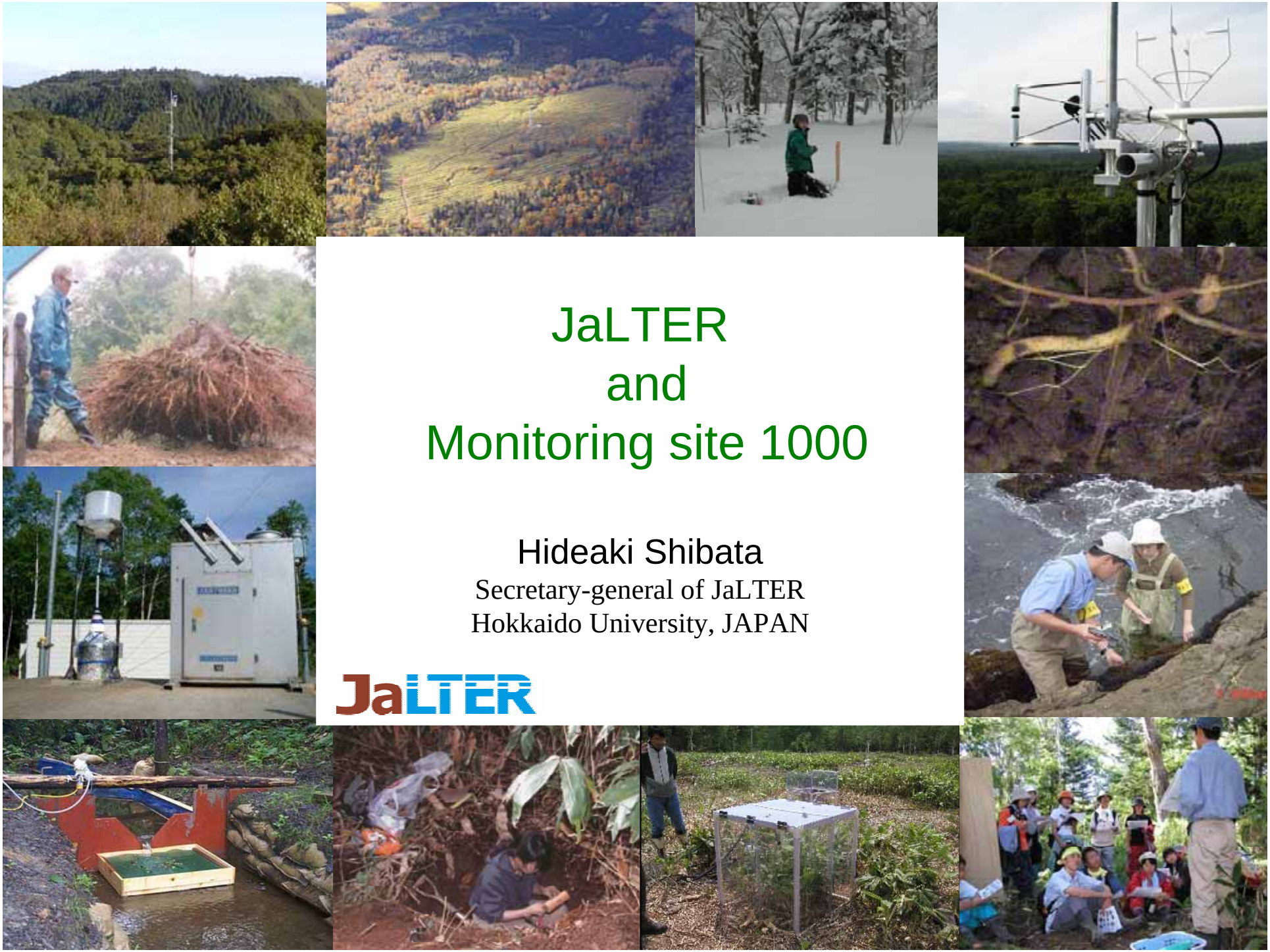


JaLTER and Monitoring site 1000

Hideaki Shibata
Secretary-general of JaLTER
Hokkaido University, JAPAN

JaLTER

(GEO Information Sheet 2008)

GROUP ON EARTH OBSERVATIONS

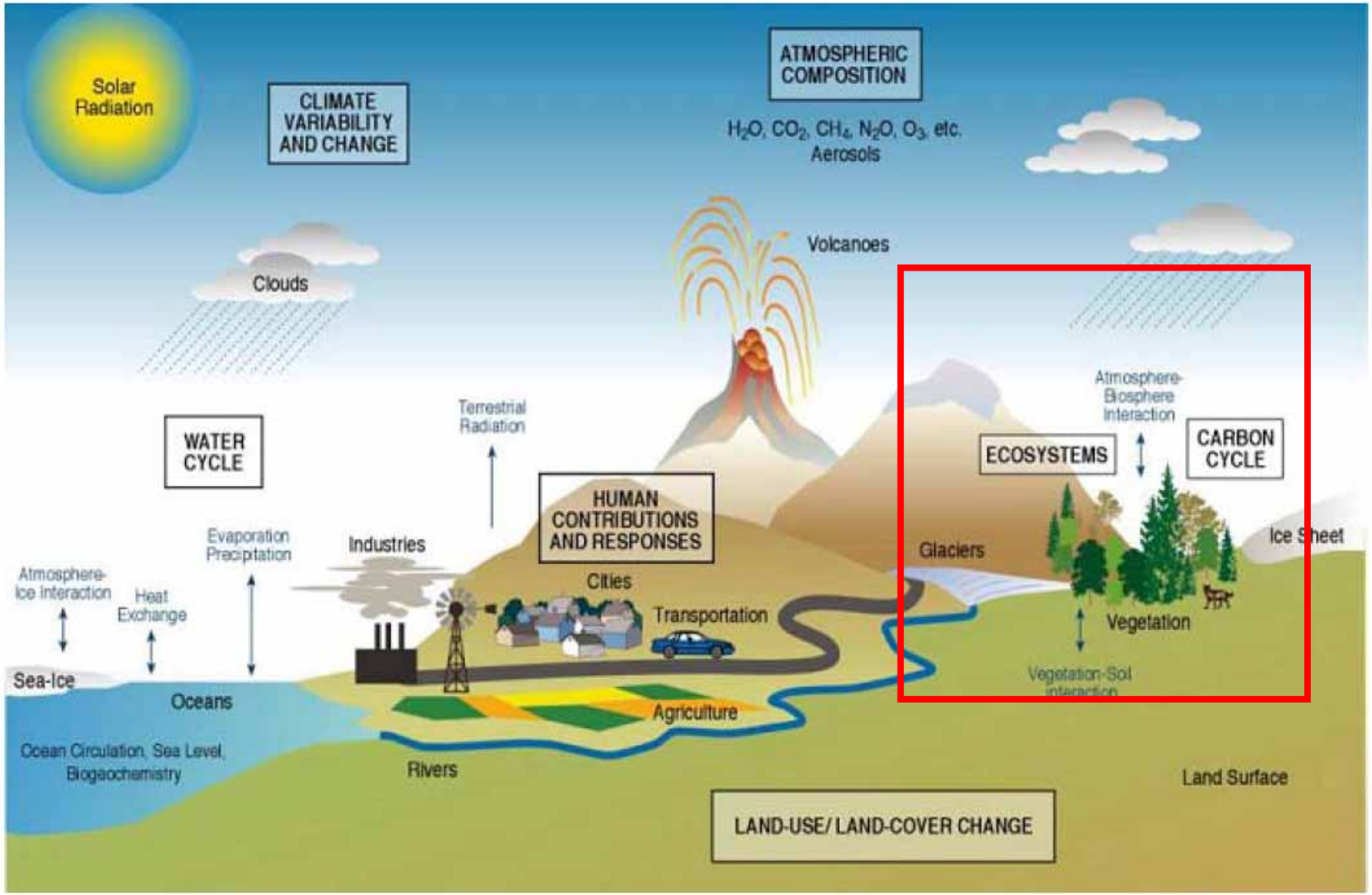


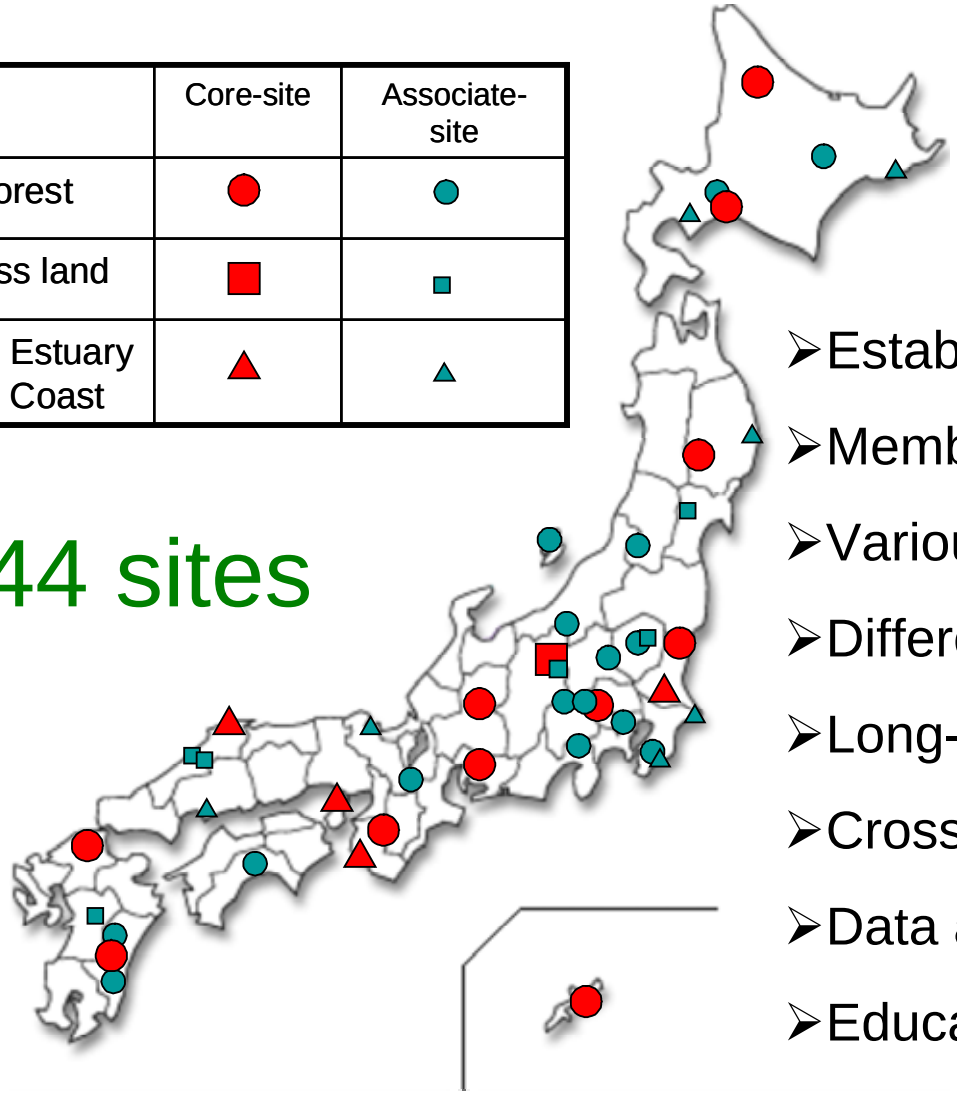
Diagram of the Earth System

Contents

- Brief introduction of JaLTER and Monitoring site 1000
- Current research program on ecosystem and biodiversity associated with carbon cycle
- Data-sharing and international collaboration

JaLTER; Japan Long-Term Ecological Research Network

	Core-site	Associate-site
Forest	●	●
Grass land	■	■
Lake, Estuary and Coast	▲	▲

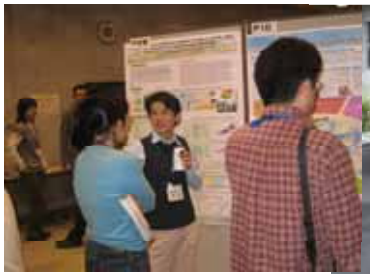


44 sites

- Established in 2006
- Membership of ILTER in 2007
- Various ecosystems and institutes
- Different environmental conditions
- Long-term and Large-scale study
- Cross-site analysis
- Data archive and sharing
- Education program
- Collaboration with JapanFlux

Long-term research

Scientific meeting



Field experiments

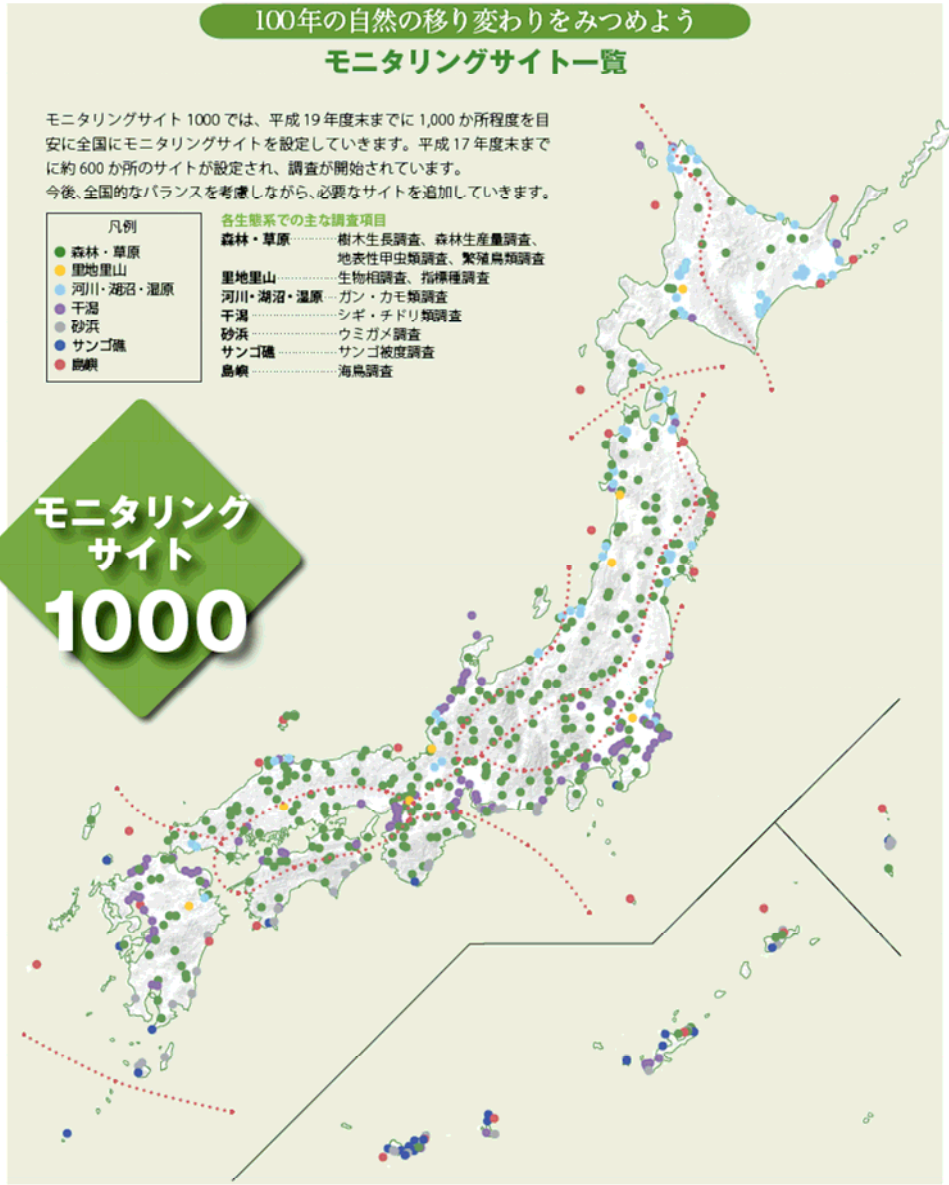
Nitrogen addition

Soil warming experiment

Clear-cut experiment

Database management

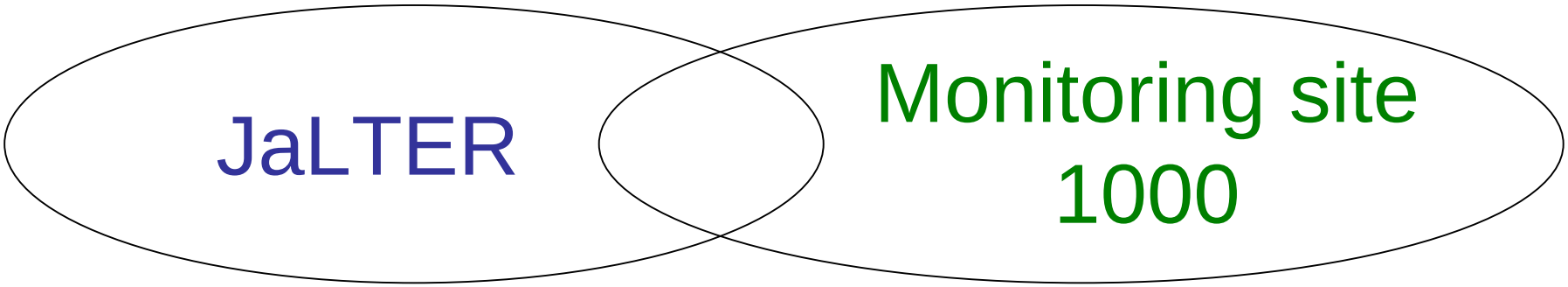
National-wide monitoring of ecosystem & biodiversity



--- Monitoring sites 1000 ---

Ministry of Environment, Japan

- ✓Biodiversity & Ecosystem
- ✓Tree growth
- ✓Litter-fall & Seed production
- ✓Forest-floor insects



- ✓Site-based network
- ✓Various studies
  - Biodiversity
  - Carbon flux and cycle
  - Community ecology
  - Ecosystem ecology
  - Climate & Hydrology
  - Biogeochemistry
  - Others
- ✓Diverse organization
- ✓Various funding sources

- ✓Monitoring program
  - National-wide network
- ✓Specific focus
  - Biodiversity
  - Ecosystem
- ✓Governmental program
  - Ministry of Environment, Japan
- ✓Standard protocol and data format

Research items and approaches

- Observation of tree phenology
  - Investigation of individual trees in forest stand scale
  - Image analysis using NDVI in canopy scale
- Tree census in plot scale
  - Long-term monitoring of ecosystem structure
  - National-wide comparison of plot monitoring
- Spatial assessment
  - Combination of airborne lidar observation and ground monitoring
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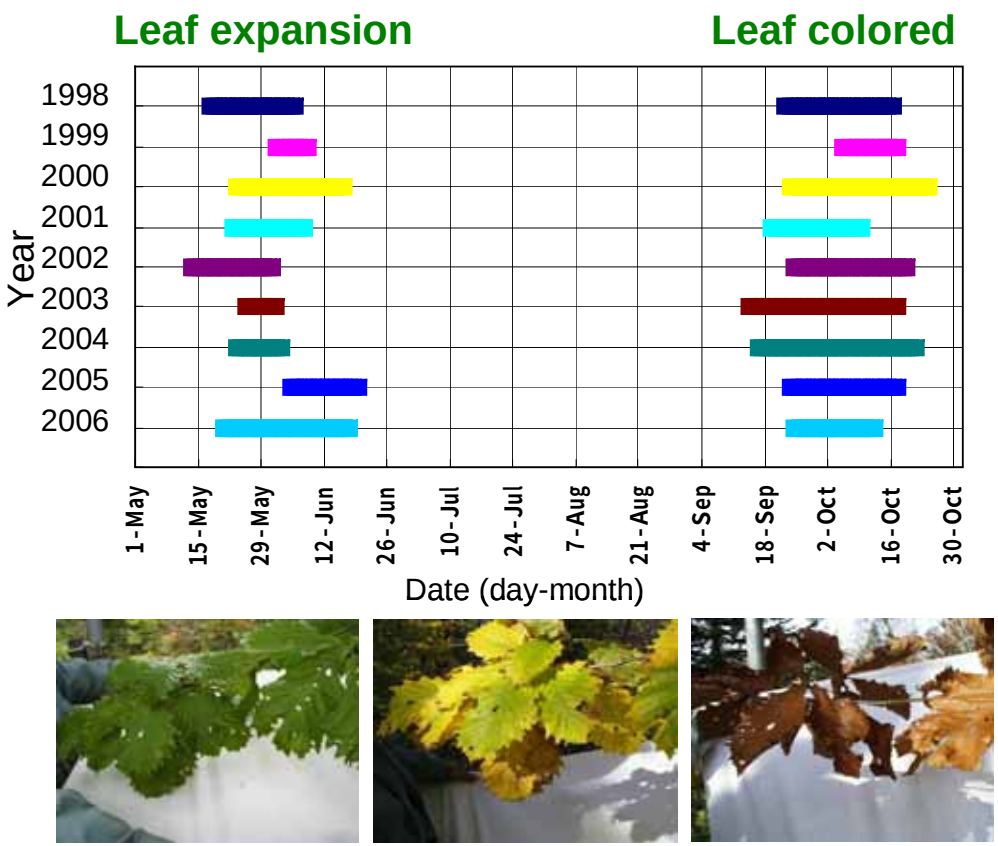
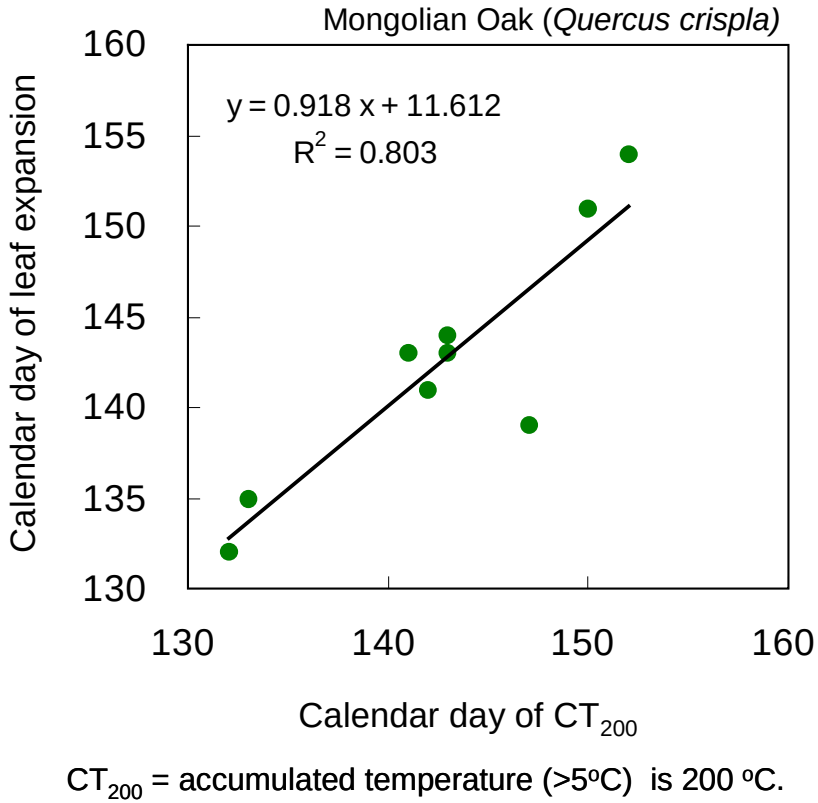
Long-term monitoring of tree phenology



Mongolian oak (*Quercus crispla*)



CT_{200} = accumulated temperature (>5°C) is 200 °C.

(modified from Nakajima et al. 2007)

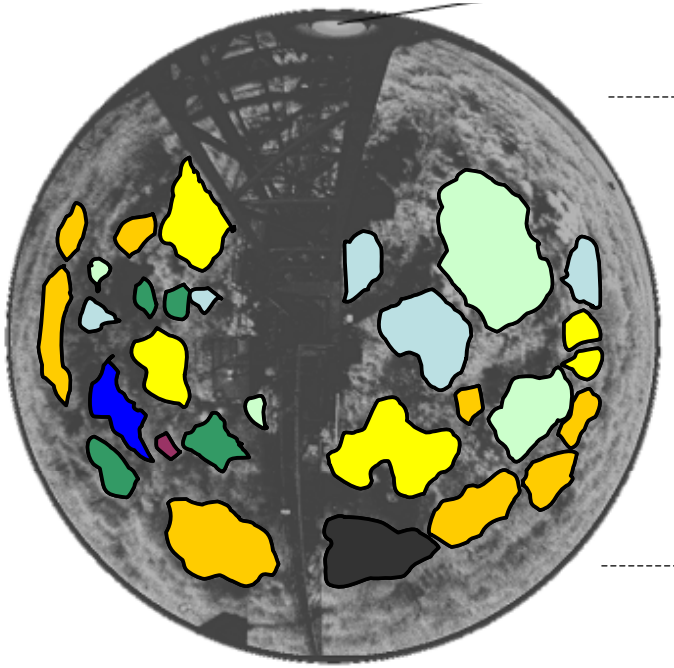
Phenology monitoring of forest canopy

(Tomakomai Experimental Forest, Hokkaido University)

35m Observation Crane

Photo image

Reference standard



Resolution

10～50cm

Angle 120 °

Distance 15 **m**

Diameter

About 60 m

Identification of tree species

- *Acer mono*
- *Acer palmatum*
- *Betula maximowicziana*
- *Cercidiphyllum japonicum*
- *Magnolia kobus*
- *Ostrya japonica*
- *Quercus mongolica*
- *Tilia maximowicziana*

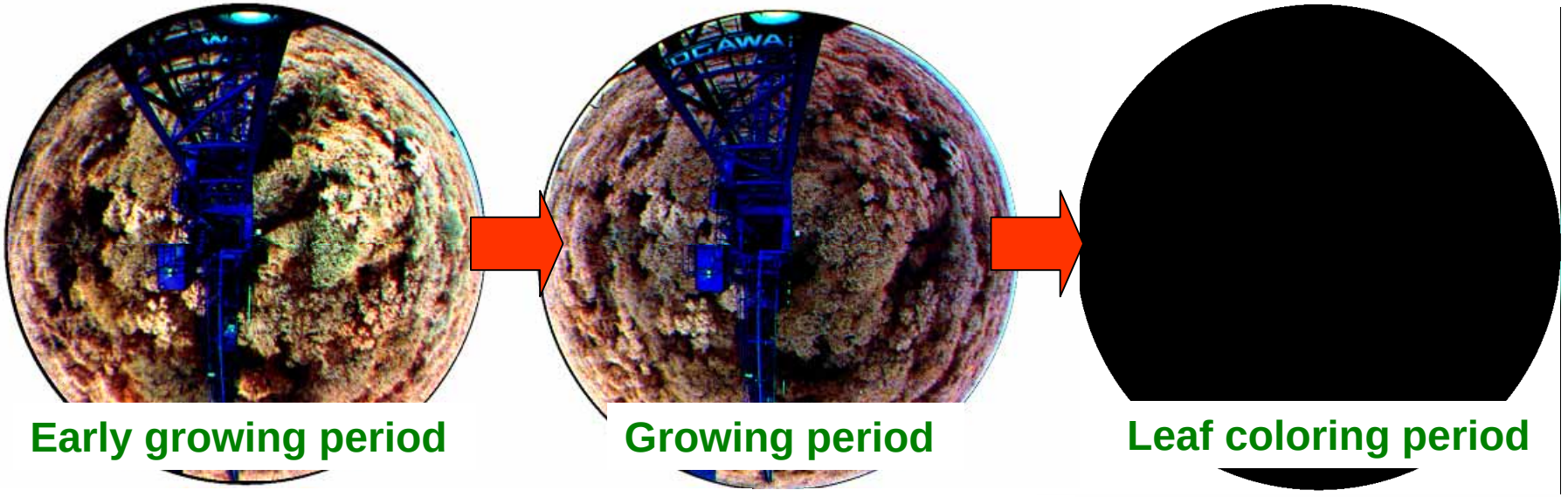
(Dr. Tatsuro Nakaji)

Analysis of seasonal phenological changes

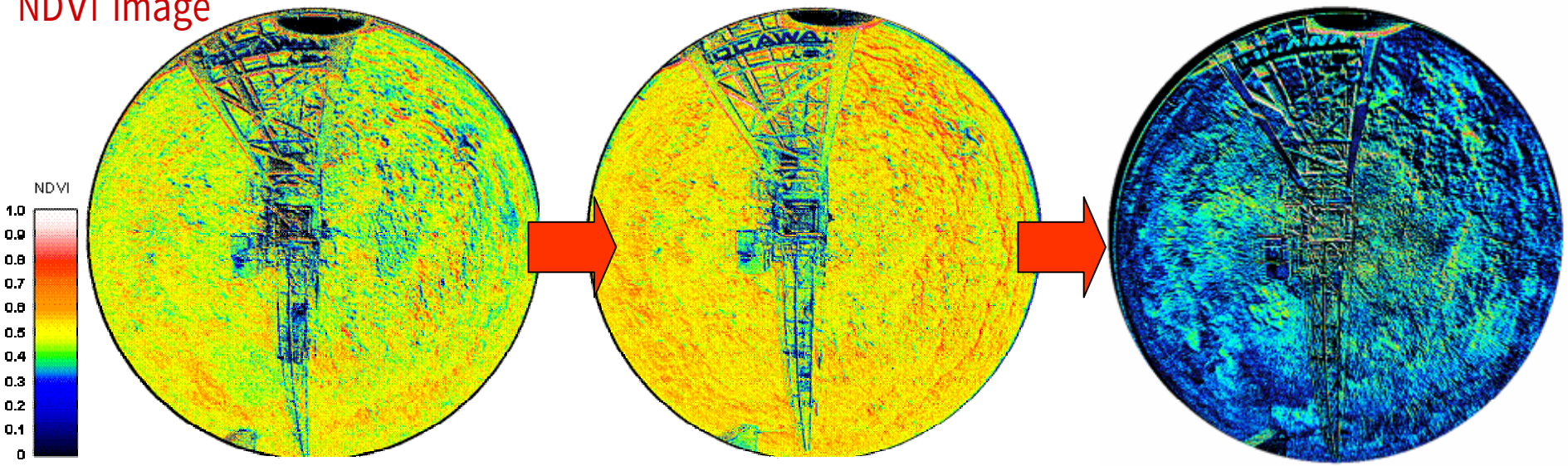
(Dr. Tatsuro Nakaji)

28 May 2008 9 July 2008 13 October 2008

Visible – Near infrared image



NDVI image



Research items and approaches

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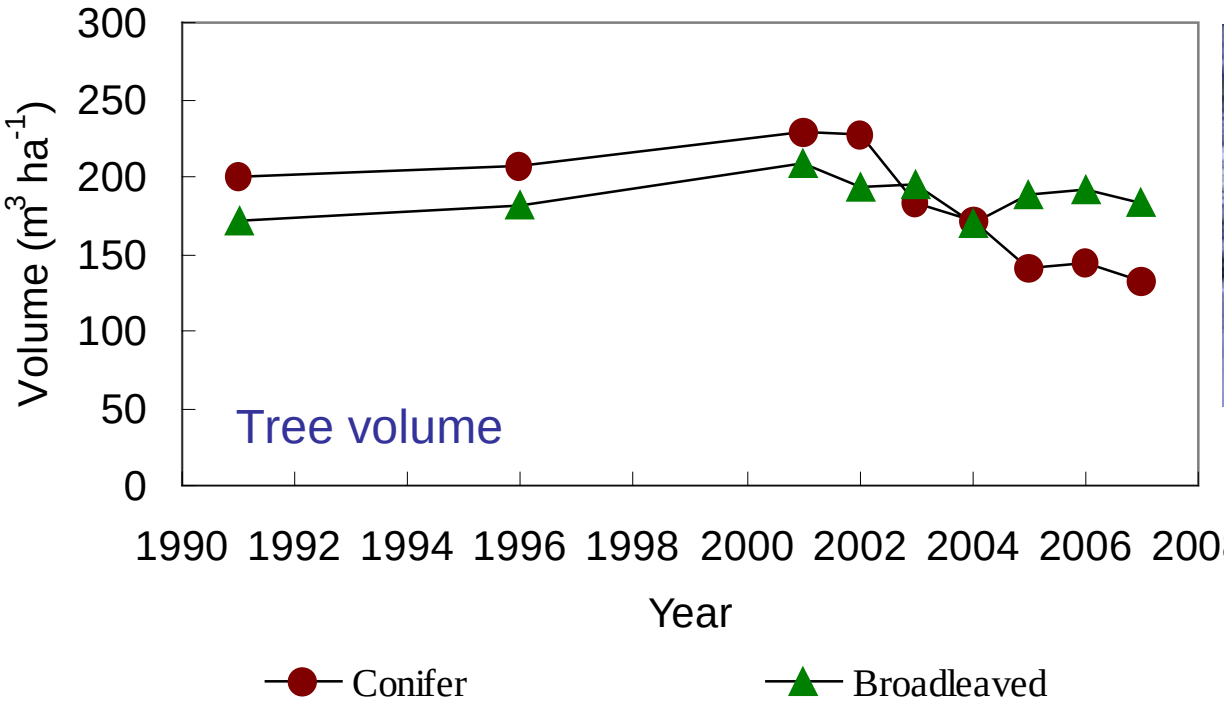
Long-Term monitoring of forest ecosystem structures



Natural mixed forest

Coniferous dominated → Broad leaved dominated forest

- ✓Natural succession with slow recovery
- ✓Episodic typhoon disturbances
- ✓Environmental changes

Provided by Toshiya Yoshida (Hokkaido Univ.), JaLTER core site; North Hokkaido

National-wide comparison of forest ecosystem structure and biodiversity

Monitoring site 1000

(Ministry of Environment, Japan)

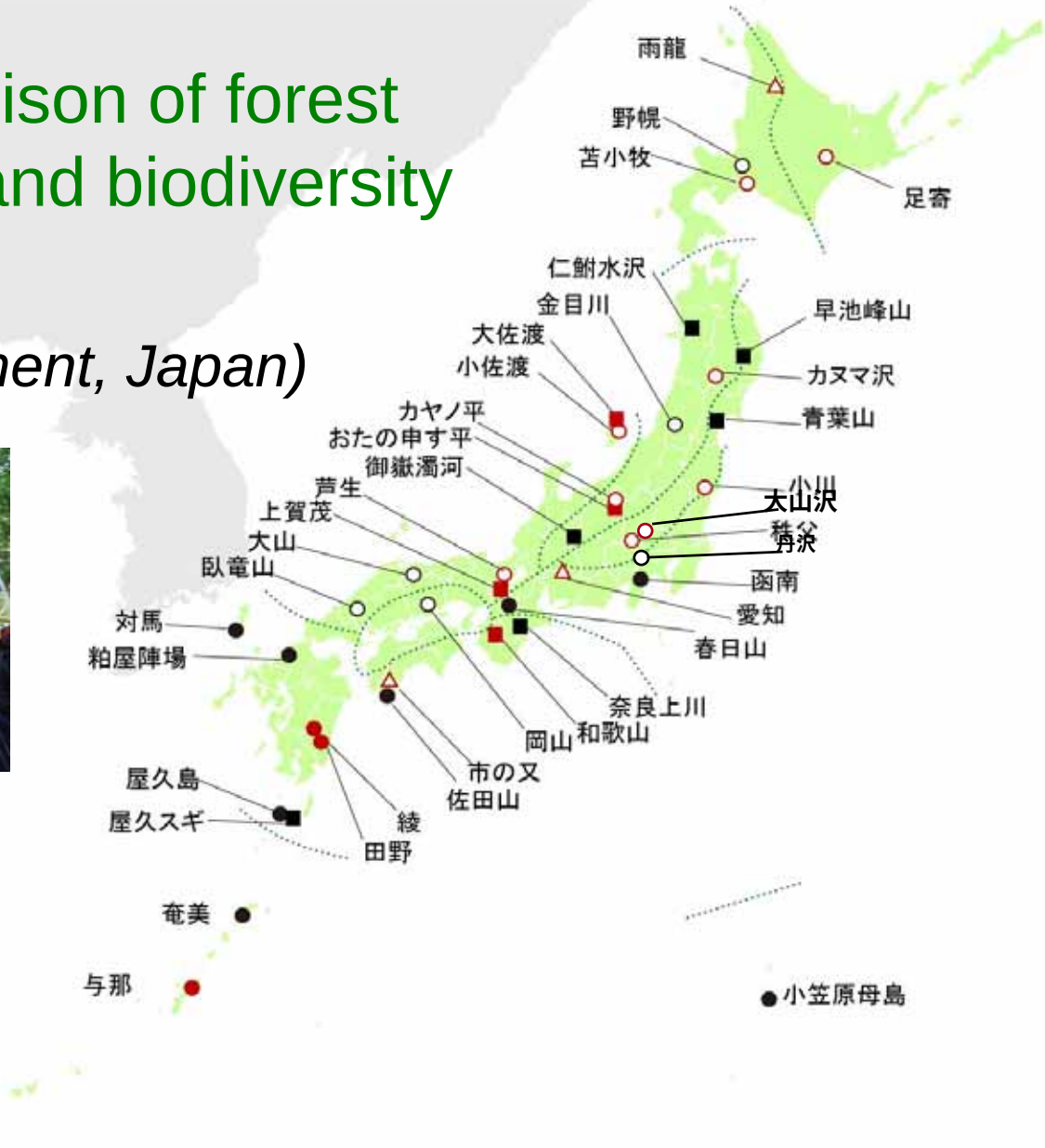


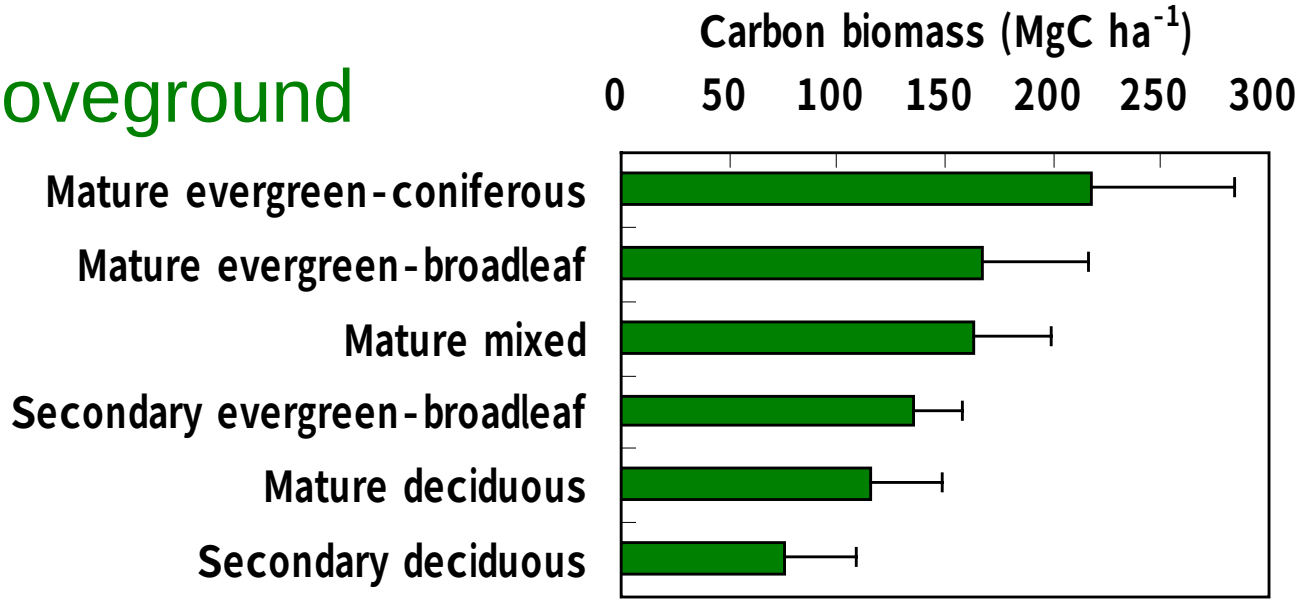
図1. モニタリングサイト1000森林調査のサイト（2007年10月時点）。△：針広混交林、■：常緑針葉樹林、○：落葉広葉樹林、●：常緑広葉樹林。赤字はコアサイト、黒字は準コアサイト。破線は日本の陸地における自然環境を気象や地形の違いにより10区分に区分した境界を示す。

(Prof. Hiura, T.)

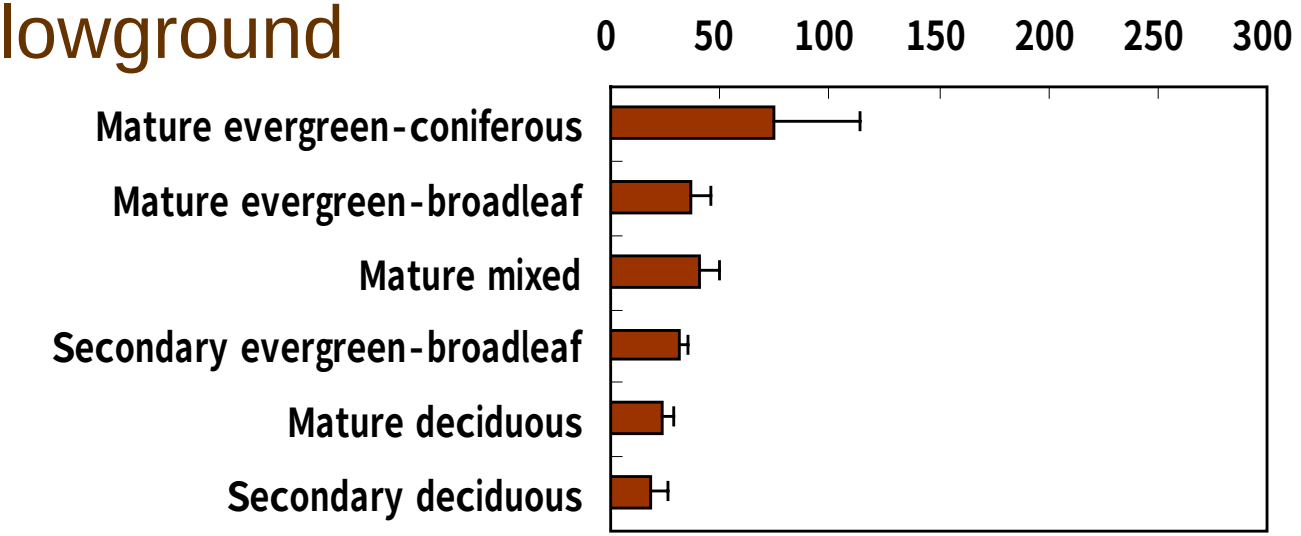
Observation of carbon biomass in tree by on-site tree census

(Monitoring site 1000, Ministry of Environment, Japan)

Aboveground



Belowground



Monitoring site 1000

(Ministry of Environment, Japan)

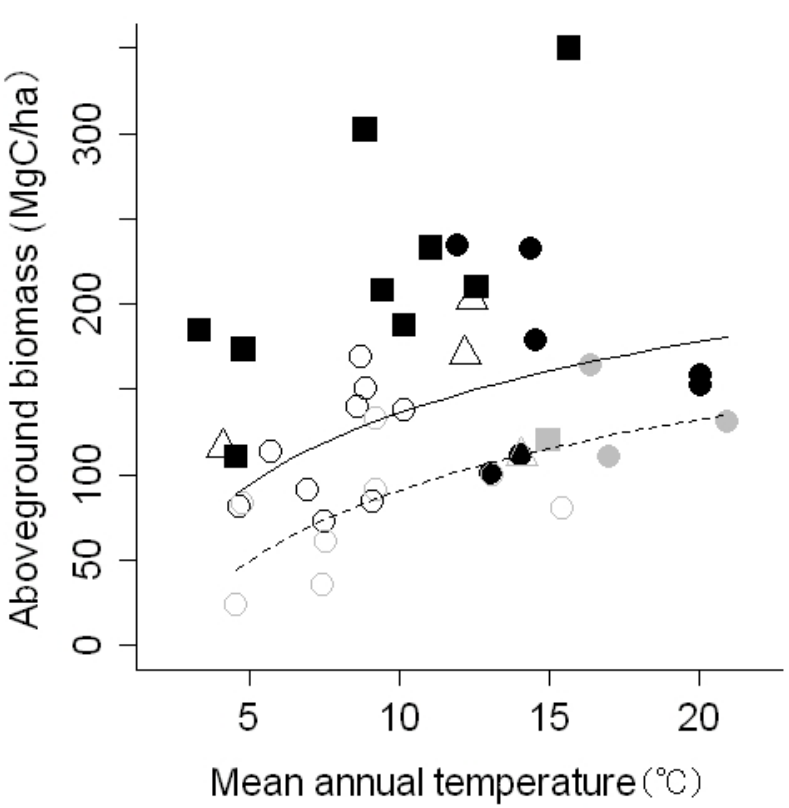
■ Coniferous forest

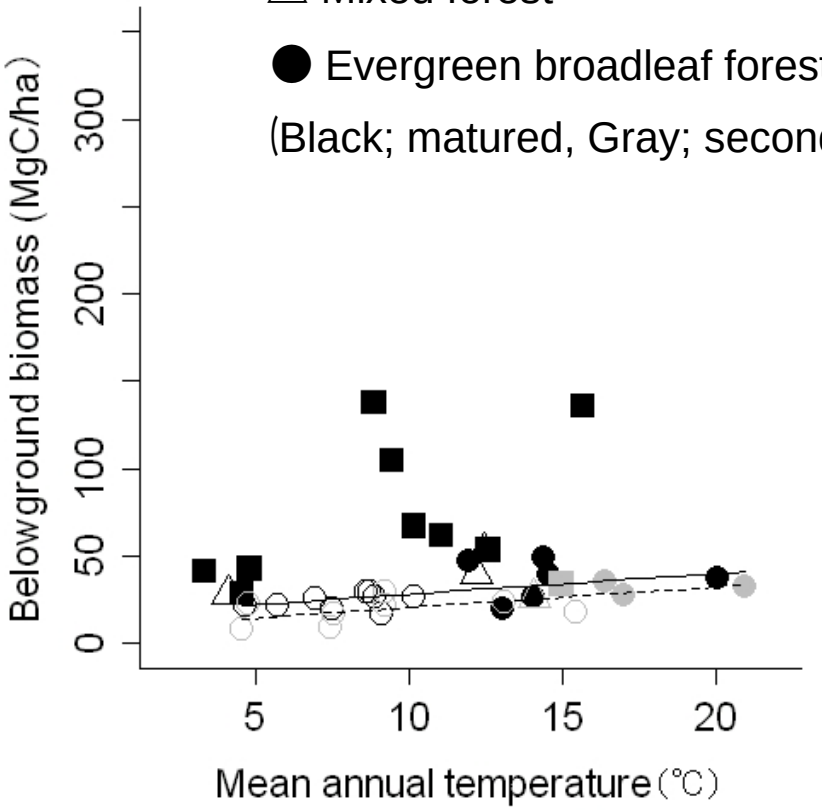
○ Deciduous broadleaf forest

△ Mixed forest

● Evergreen broadleaf forest

(Black; matured, Gray; secondary)





Relationship between annual temperature and carbon biomass in tree

(Provided by Hiura, T. and Ishihara, M.)

Research items and approaches

- Observation of tree phenology
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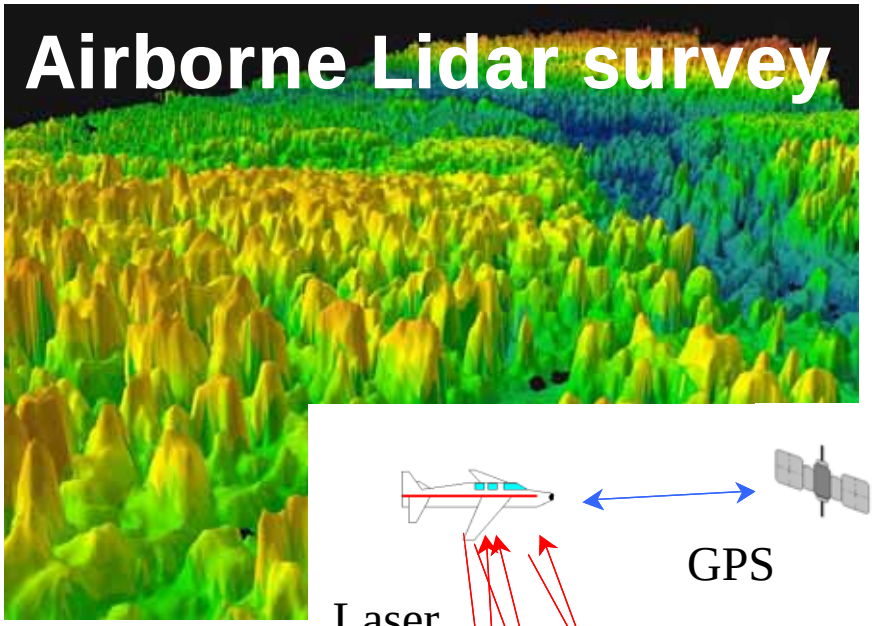
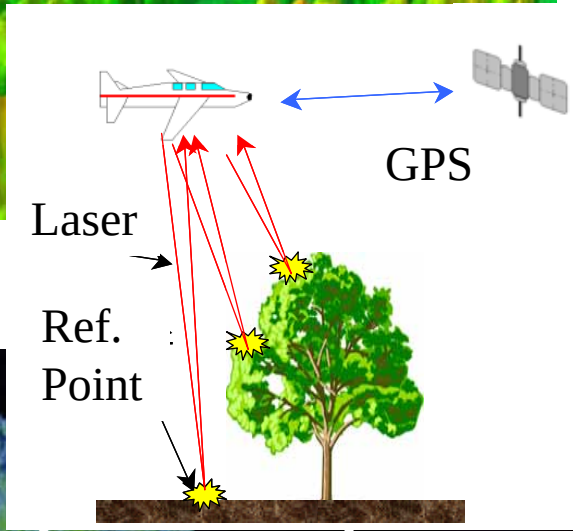
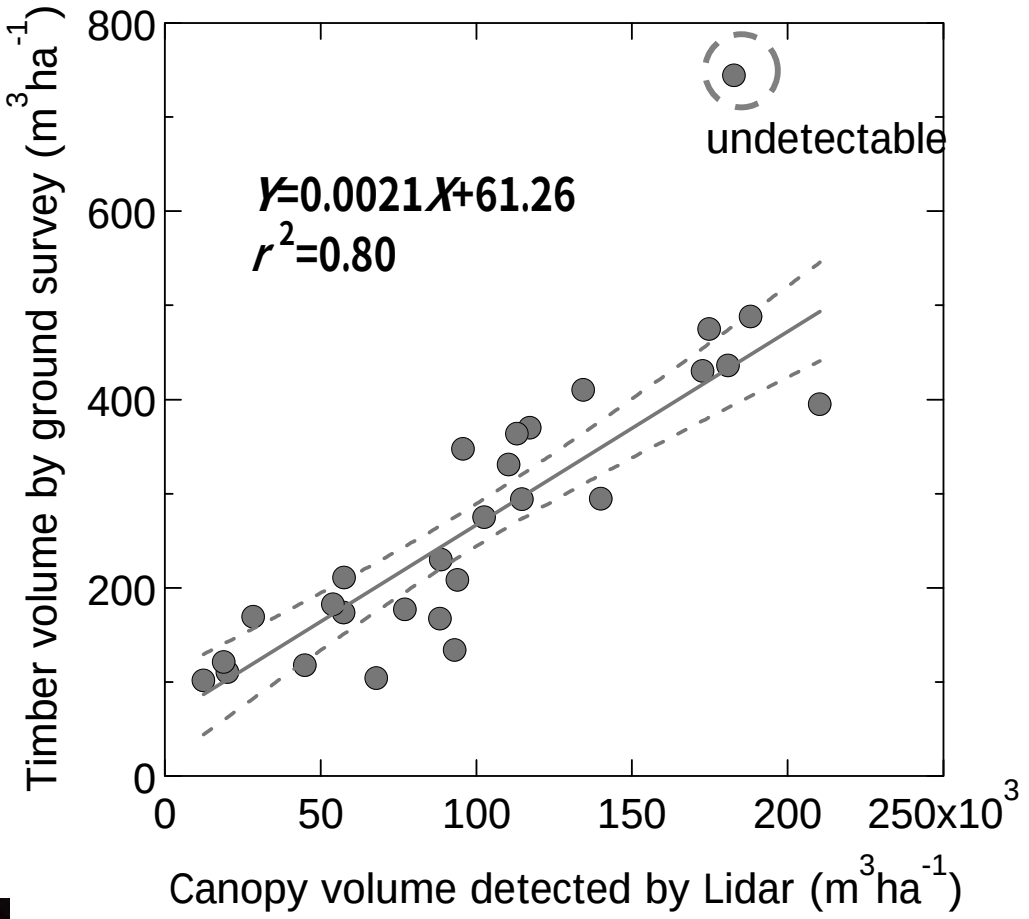
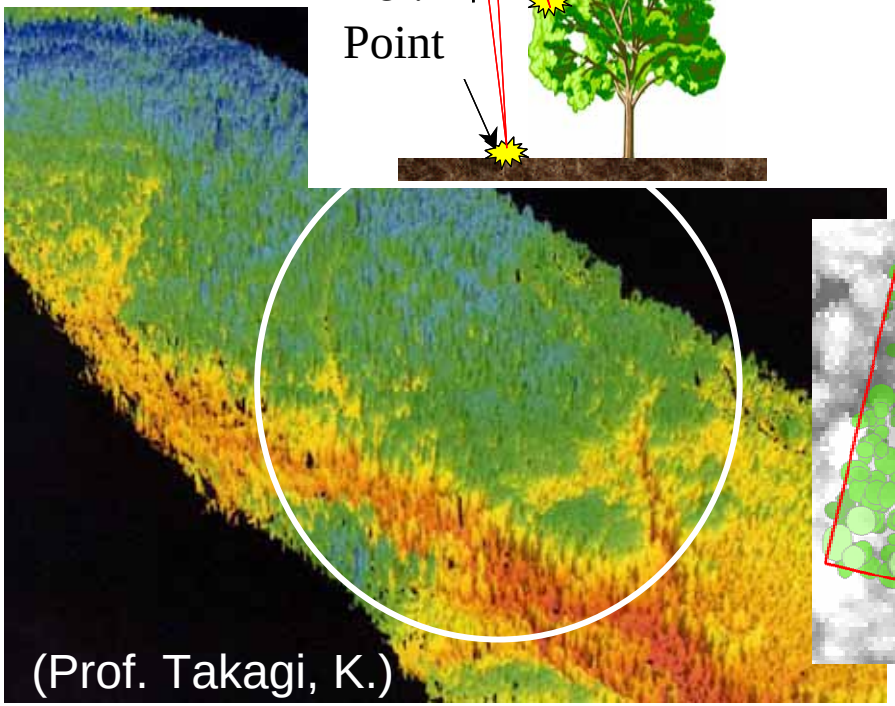
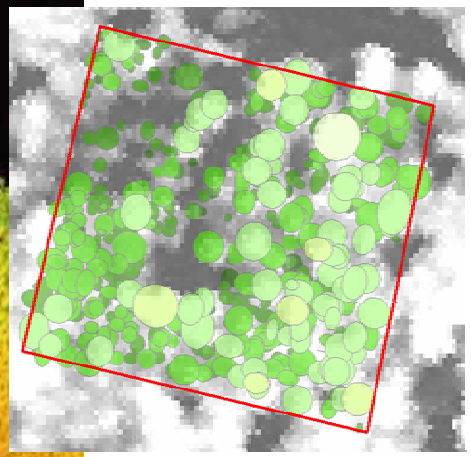

Airborne Lidar survey


GPS
Laser
Ref.
Point


Timber volume by ground survey (m3ha-1)
Canopy volume detected by Lidar (m3ha-1)
undetectable
Y=0.0021X+61.26
r2=0.80
0
200
400
600
800
0
50
100
150
200
250x103

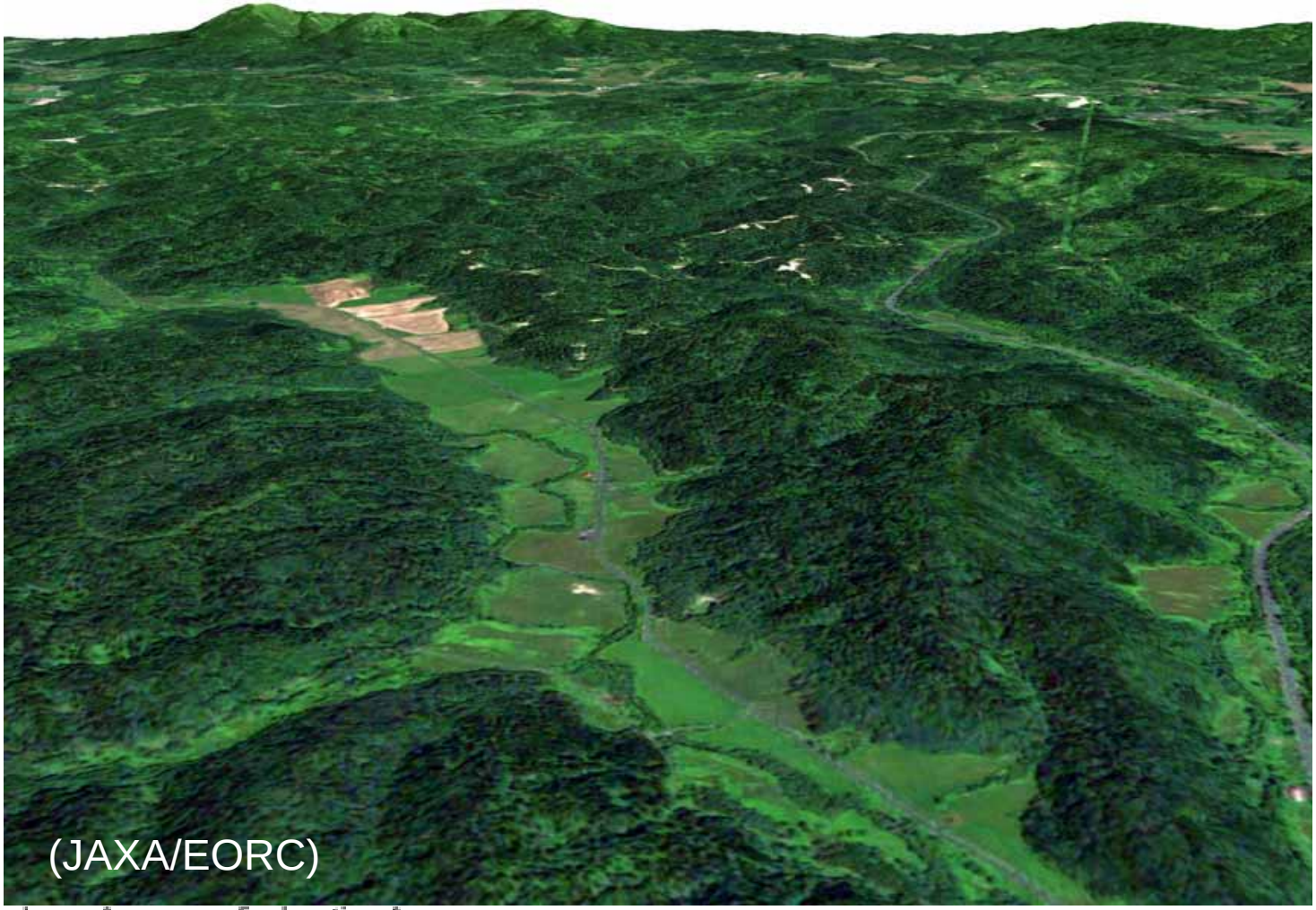

(Prof. Takagi, K.)



Collaboration with satellite remote sensing

JaLTER

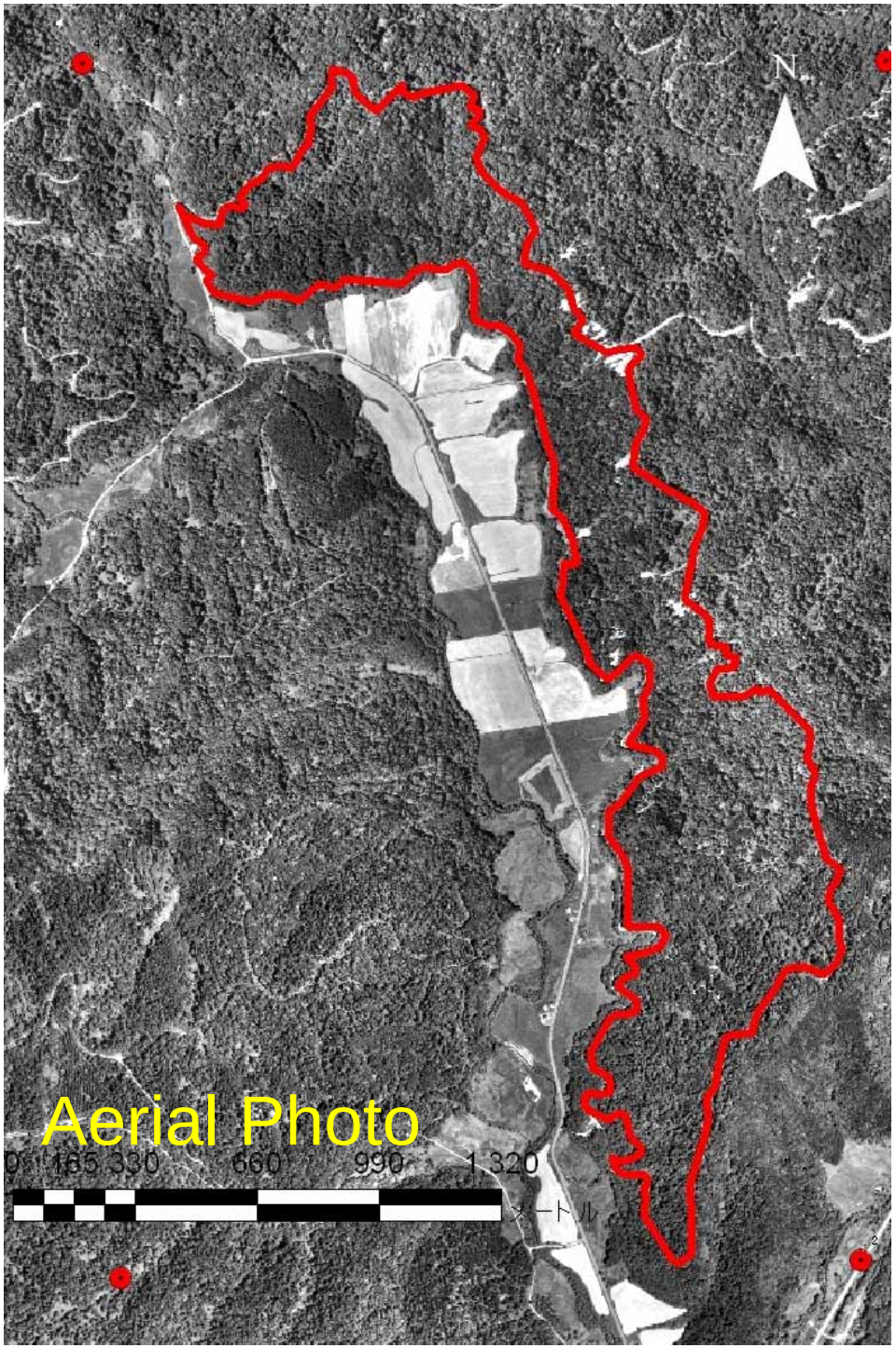
Nakagawa experimental forest (Aug. 5, 2008)

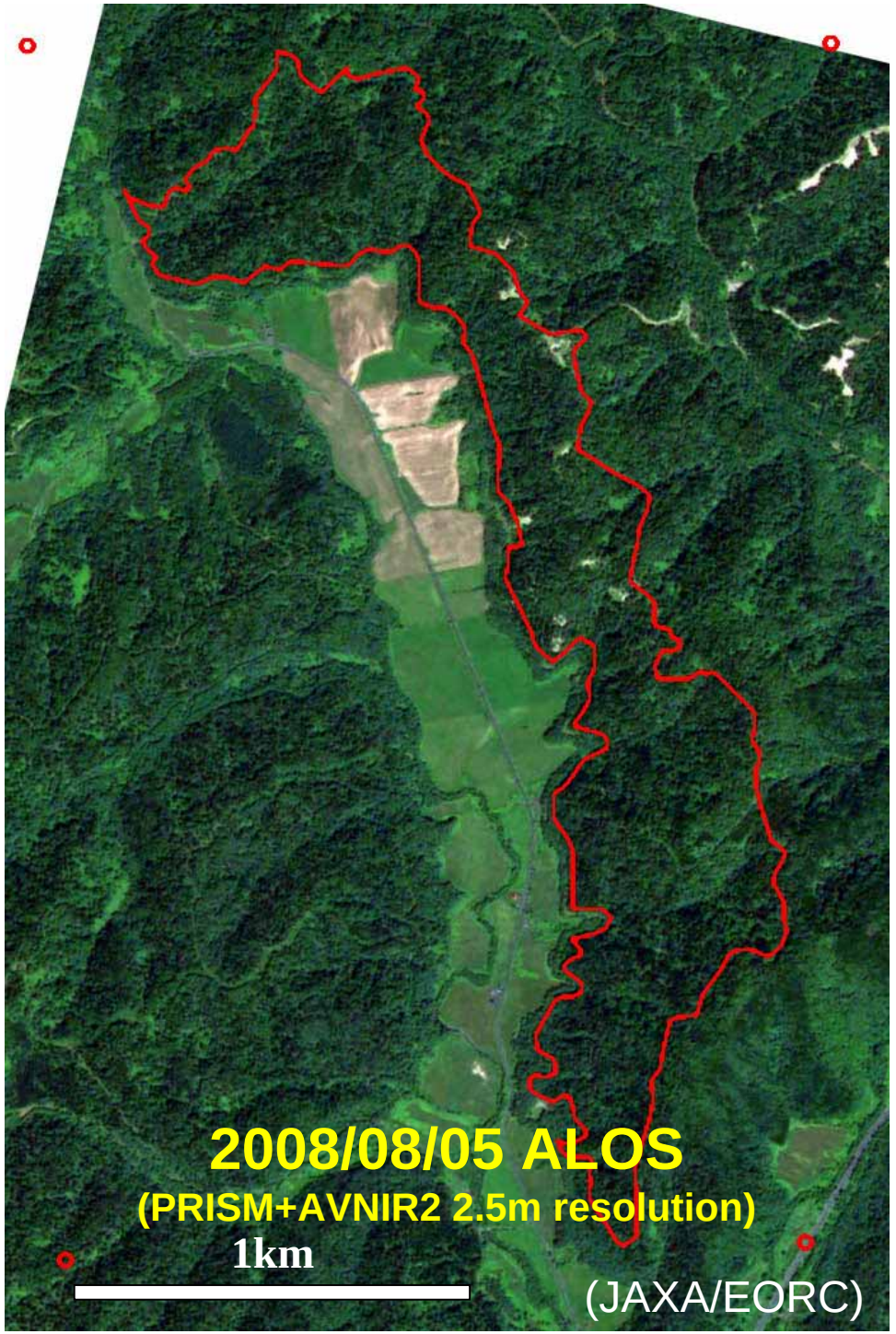


(JAXA/EORC)

JAXA Japan Aerospace Exploration Agency

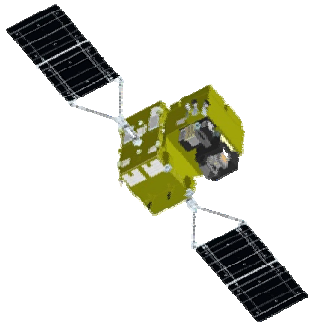
PRISM/DSM & PRISM/AVNIR-2


N
Aerial Photo
0 165 330 660 990 1,320
メートル


2008/08/05 ALOS
(PRISM+AVNIR2 2.5m resolution)
1km
(JAXA/EORC)

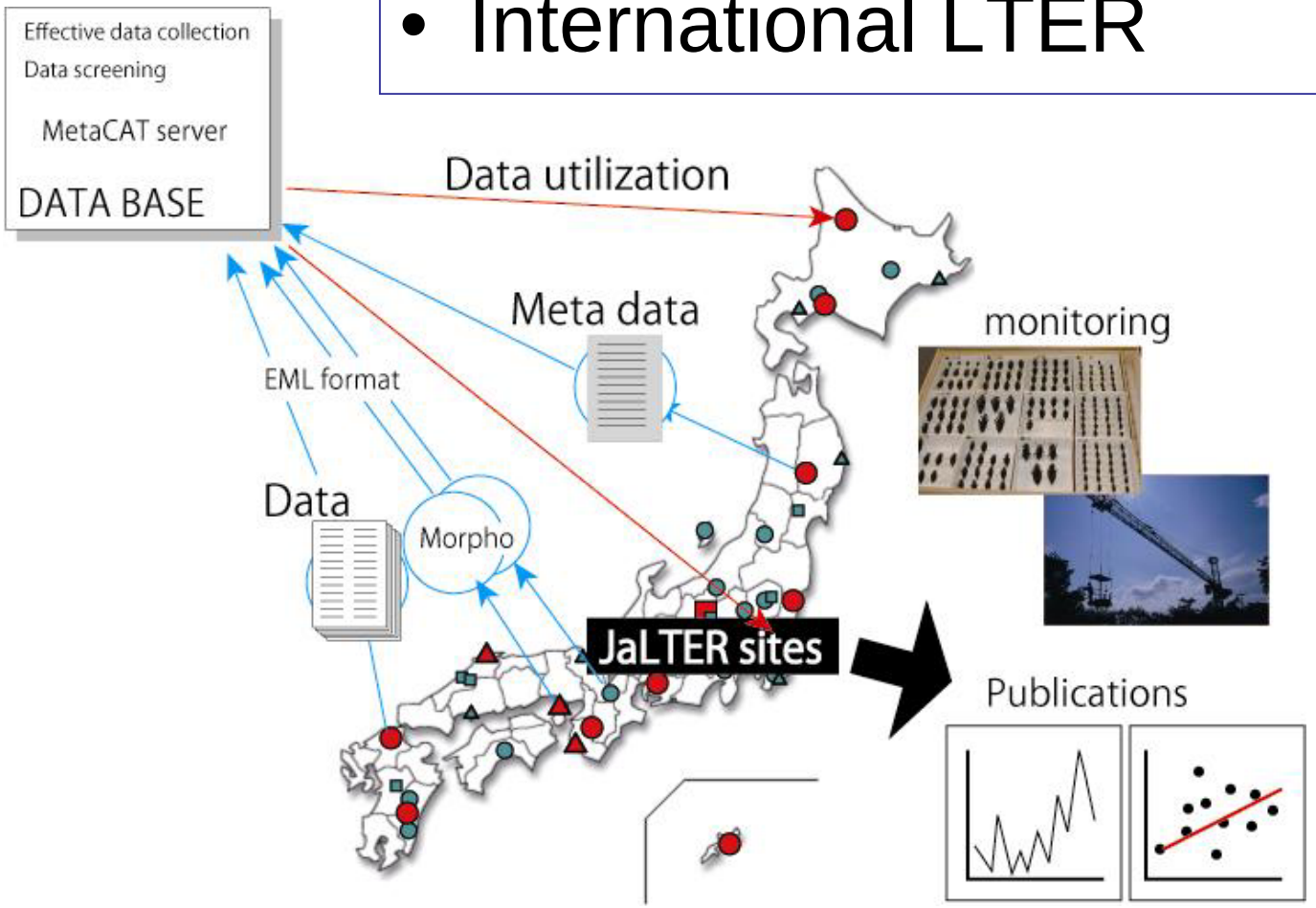
➢Combination of ground monitoring and satellite remote sensing is strong tool for regional and global observation of ecosystem and biodiversity.

➢Under the collaboration with JaLTER, Japan Flux, JAMSTEC and JAXA, the research proposal are currently under preparation to develop the integrated algorisms using upcoming new satellite, GCOM-C (Global Change Observation Mission – Climate from 2013) for ecosystem monitoring under global climate changes



Data-sharing and international collaboration

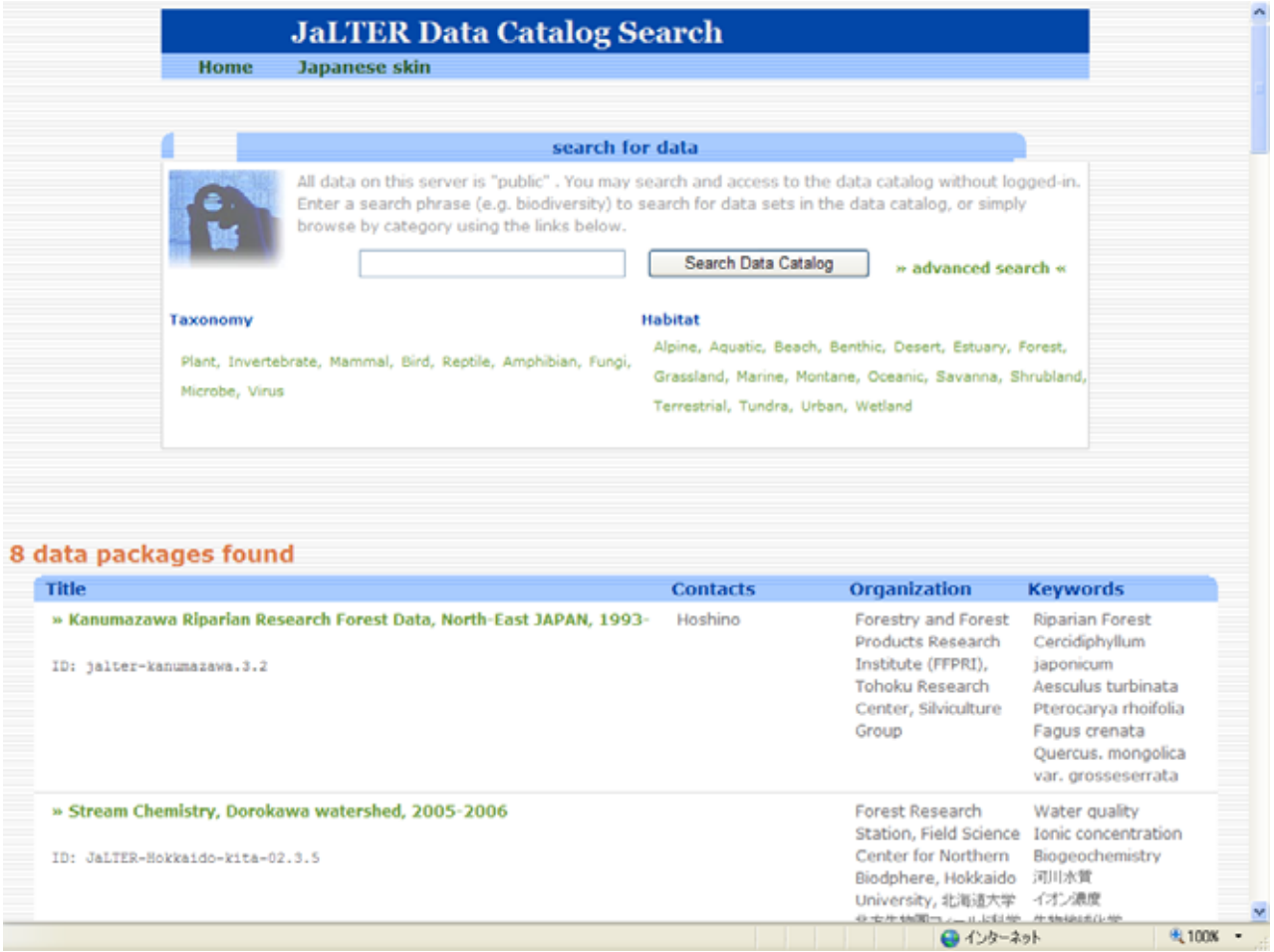
- EML for ecological database
- International LTER



Data archiving and sharing

EML; Ecological Metadata Language

- Metadata (location, period, method, instruments, investigator…..)
- Date entity (rare data)



ILTER; International Long-Term Ecological Research Network

The current key issues

i. Climate change

ii. Sustainable development

iii. Biodiversity and its sustainable use

iv. Sustainable use of resources and ecosystem management (including water resource management)

v. Environmental hazards and disasters

The goal of ILTER

- foster collaboration and coordination among ecological research networks at local, regional and global scales;
- improve comparability of long-term ecological data from sites around the world, and facilitate exchange and presentation of these data;
- deliver scientific information to scientists, policymakers and the public to me the needs of decision makers at multiple levels
- facilitate education of the next generation of long-term scientists.

ILTER East Asia and Pacific Network

ILTER's GEO-related activities

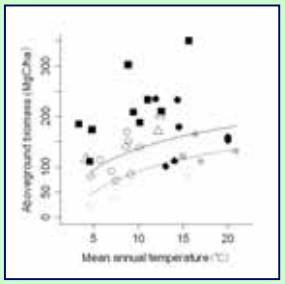
- Partnership with GEO
  - ILTER is applying to become a participating organization in GEO.
- Ecosystem SBA
  - ILTER is planning to lead the “EC-07-01d: In situ Measurements and Systems” as a part of GEO Work Plan (2009-2011)
- Biodiversity SBA
  - ILTER Chair (Terry Parr, UK) is involved in the Steering Committee of GEO-BON
  - ILTER is relating with GEO-BON work plan such as “Ecosystem and Biodiversity Monitoring” and “Dataset Sharing and Archiving”.

(Provided by ILTER Chair, Terry Parr)

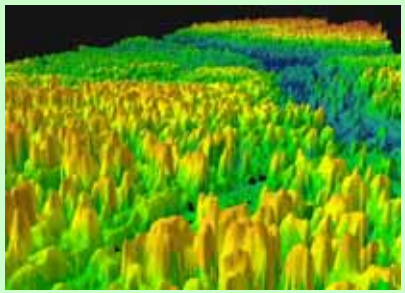
Current activities on Ecosystem and Biodiversity

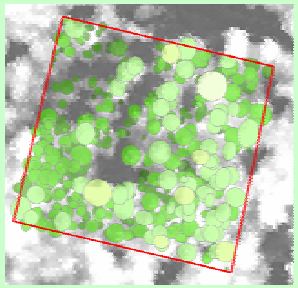
JaLTER

Monitoring site 1000



Long-term monitoring





Spatial assessment

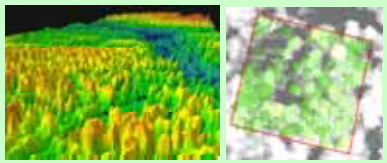
Data archiving and sharing

On-going and future challenges for GEOSS

JaLTER

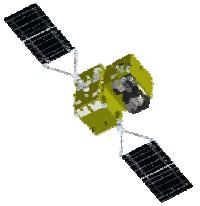
Monitoring site 1000

Long-term monitoring



Spatial assessment

Data archiving and sharing



JAMSTEC

- ✓Establishment of “good practice” for integrated observation on ecosystem and biodiversity toward GEOSS Asia-Pacific and global collaboration.
- ✓Integration and sharing of database on ecosystem and biodiversity

Collaborators

Nakashizuka, T. (Tohoku Univ.), Muraoka, K. (Gifu Univ.), Saigusa, N. (NIES), Nasahara, K. (Tsukuba Univ. & JAXA), Tadono, T. (JAXA/EORC), Terry Parr (ILTER), Takagi, K., Yoshida, T., Hiura, T., Nakaji, T., Ishihara, M., Hasegawa, J., Satoh, F., Sasa, K., Nomura, M., Miya, H. (Hokkaido University)

Organization and research group

- JaLTER
- ILTER
- JapanFlux
- JAXA/EORC
- JAMSTEC
- Biodiversity Center of Japan
- Hokkaido University Forests

Uryu experimental forest

(provided by Prof. Hiura, T.)

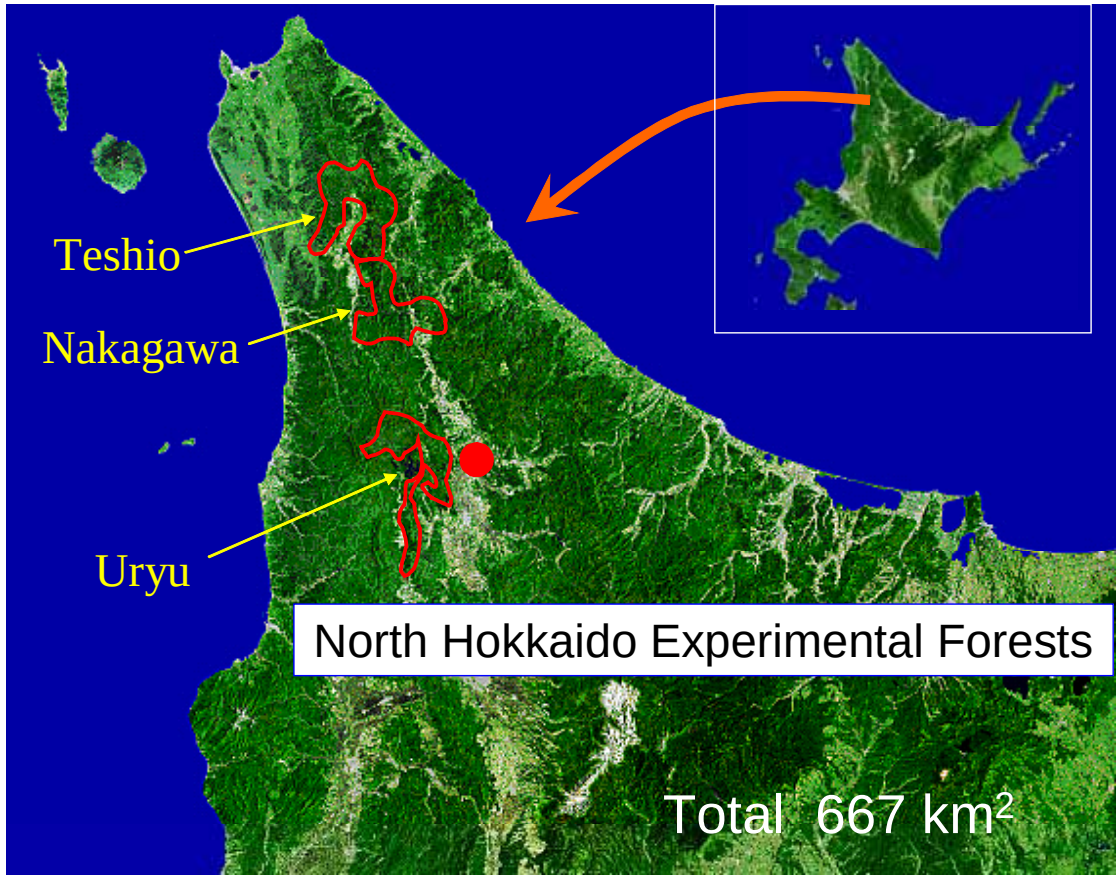
Monitoring site 1000 (Forest)

(Ministry of Environment, Japan)

On-going research program on ecosystem and biodiversity in JaLTER site

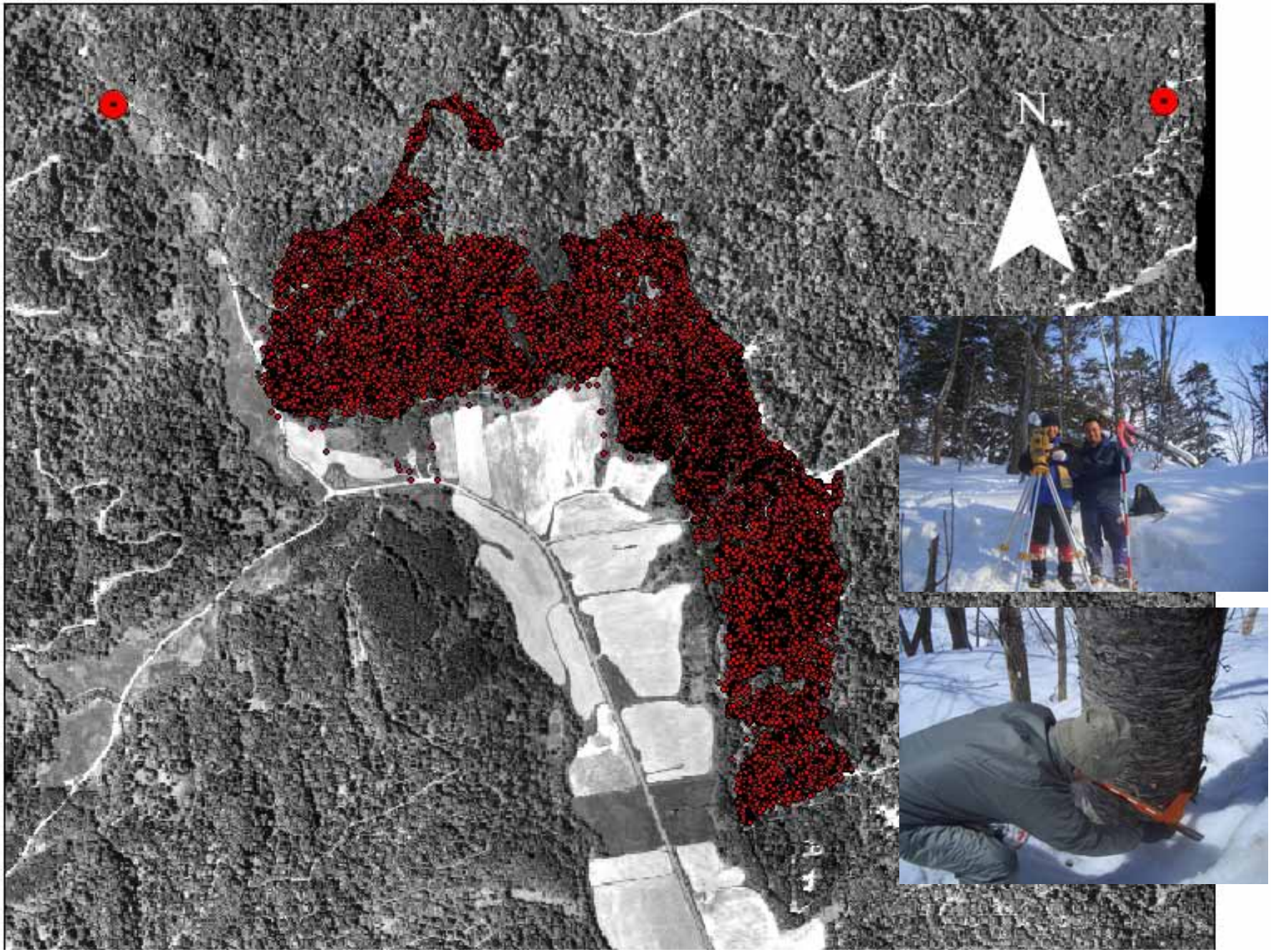
✓Long-term monitoring of ecosystem structure, function and services with climate and environment observation

✓Large-scale studies of phenology, tree biomass and ecosystem structure by collaborating with remote sensing

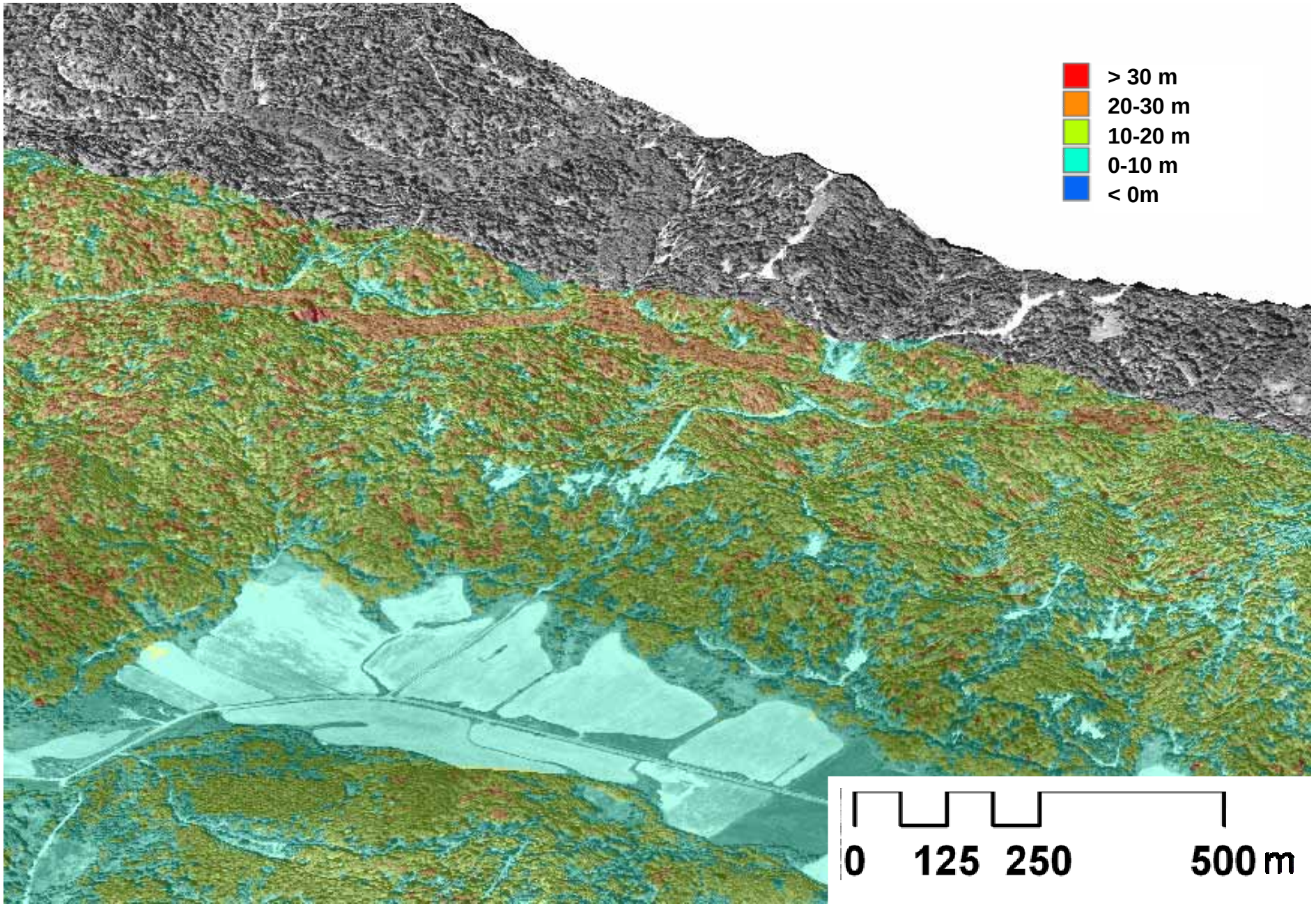


Large-scale tree census

(Hisafumi Miya, unpublished data)



Spatial distribution of tree height using aerial photo analysis (2006, Miya, H., unpublished)



Long-term monitoring of tree phenology since 1998

Uryu experimental forest (PI: Toshiya Yoshida)

Conclusive remarks

- LTER has great potential to provide the research platform for the linkage between ground observation and remote sensing on ecosystem and biodiversity studies.
- Monitoring site 1000 closely over-lapped with JaLTER could provide useful information on carbon biomass and net primary production for new satellite remote sensing (GCOM-C, JAXA)
- Using our current activities, it would be possible to establish the good practice for integrated observation on ecosystem and biodiversity toward GEOSS Asia-Pacific and global collaboration.