

Cadastre2014 Japan – Initiative

for Restoring Original Boundaries by Using Past Aerial Photos

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Researchers : Japan Federation of Land and House Investigators' Associations



- 1) To stabilize the geodetic network as the basis of cadastral system
- 2) To revise official provisional cadastral maps into standardized digital maps
- 3) To utilize the advanced satellite surveying, photogrammetry on 3D CAD system

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June 2014

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1. Introduction

: 2011 Satellite Geodetic Network Adjustments

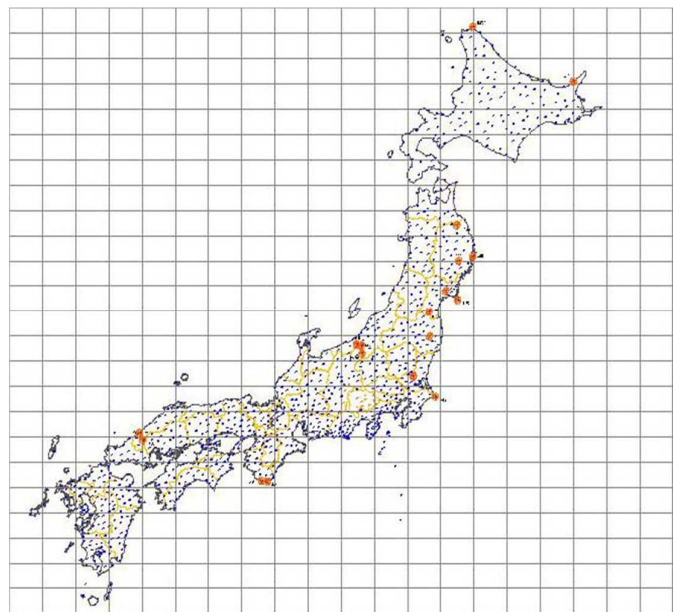
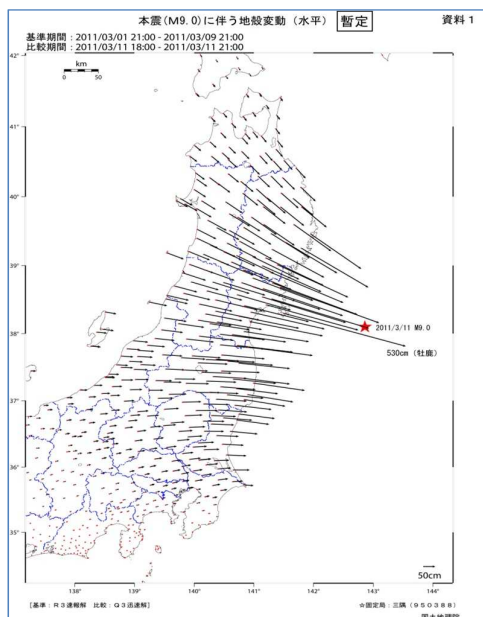


Fig.1. GSI report / Parameter Estimation adjustment on ECPs' coordinates

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1. Introduction

(1.1) Parameter Estimation GnsS Assisted SURveying System (PEGASUS)

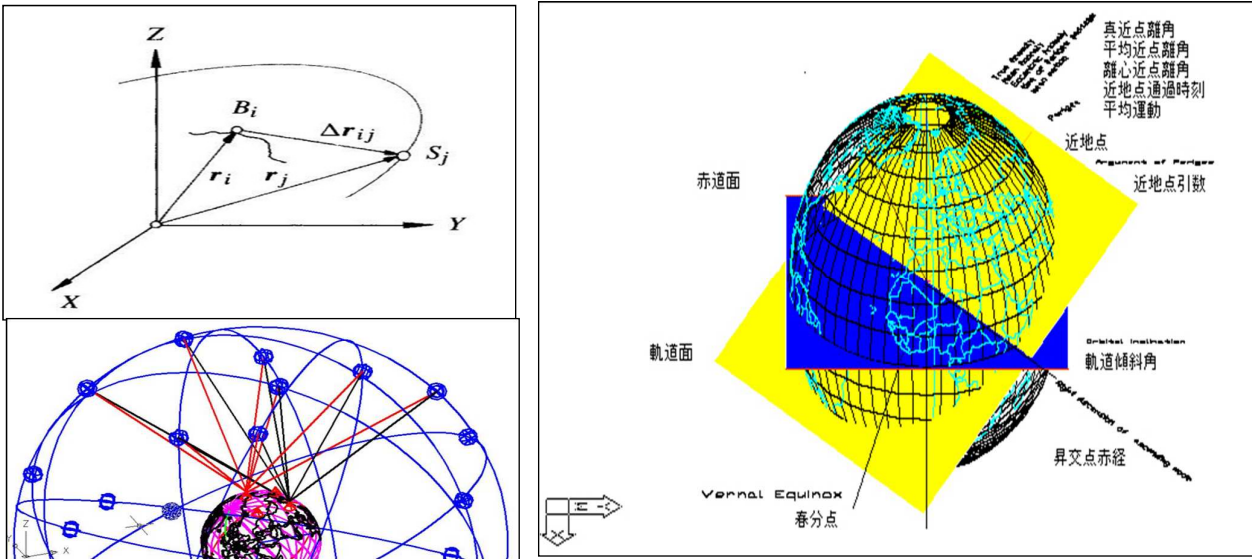


Fig. 2. PEGASUS – GNSS satellites as Global Control Points

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1. Introduction :

(1.2) Lessons from Kobe Earthquake (1995) and East Japan Earthquake (2011)

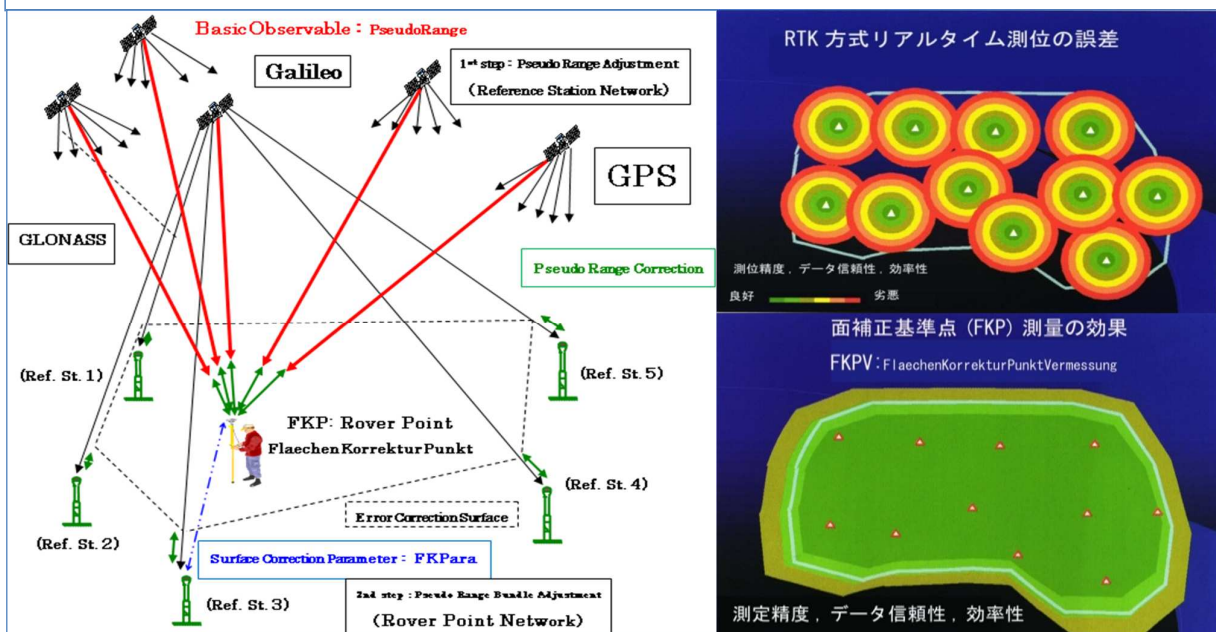


Fig. 3. PEGASUS – FKP satellite surveying approach

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1. Introduction :

(1.3) PEGASUS effects

(Parameter Estimation Gns Assisted SURveying System)



Fig.4 FKP satellite surveying in forest an urban areas

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1. Introduction :

(1.4) National Land Survey Act

(5) The cadastral map that is sent to a registry office pursuant to the provisions of Article 20 (1) of the National Land Survey Act shall be kept as a map after registration pursuant to the provisions of paragraph (2) or (3) of said Article is completed; provided, however, that this shall not apply in cases where there are special circumstances to find that it is inappropriate to keep it as a map.

5 国土調査法第二十条第一項の規定により登記所に送付された地籍図は、同条第二項又は第三項の規定による登記が完了した後に、地図として備え付けるものとする。ただし、地図として備え付けることを不相当とする特別の事情がある場合は、この限りでない。

1. Introduction :

(1.5) Japanese land administration system, cadastral survey and Historical Reality in 3D Image Map Archive



Fig. 5 Historical map (1910) and antique aerial photo (1946)

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1. Introduction :

(1.6) Japanese land administration system and cadastral survey

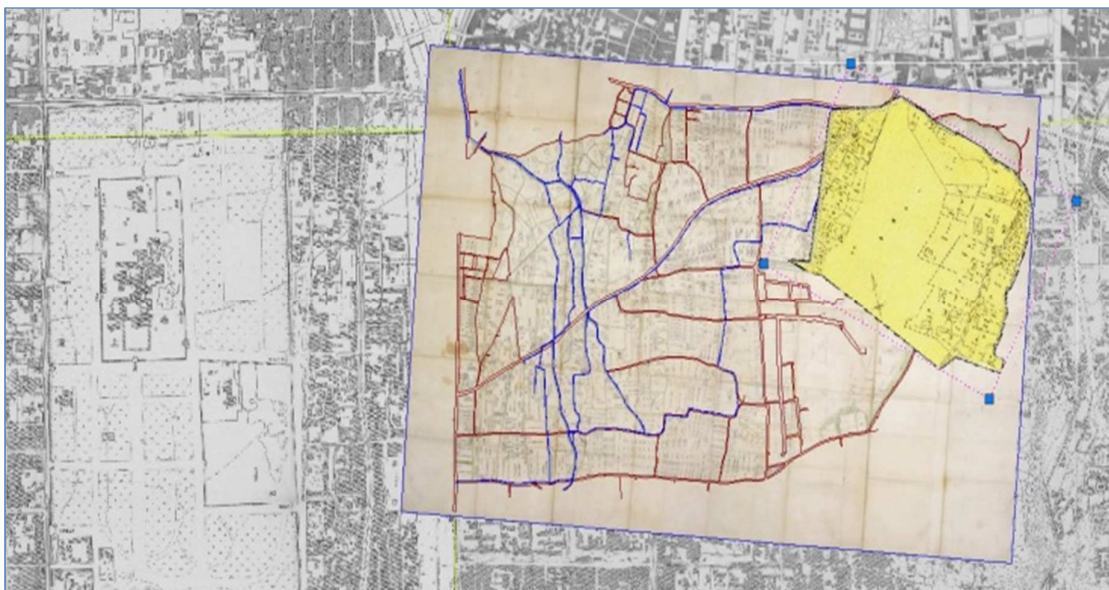


Fig.6. 3D image map (Kyoto Univ., 1936 / 1800)

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1. Introduction :

(1.7) Photogrammetry in Japan

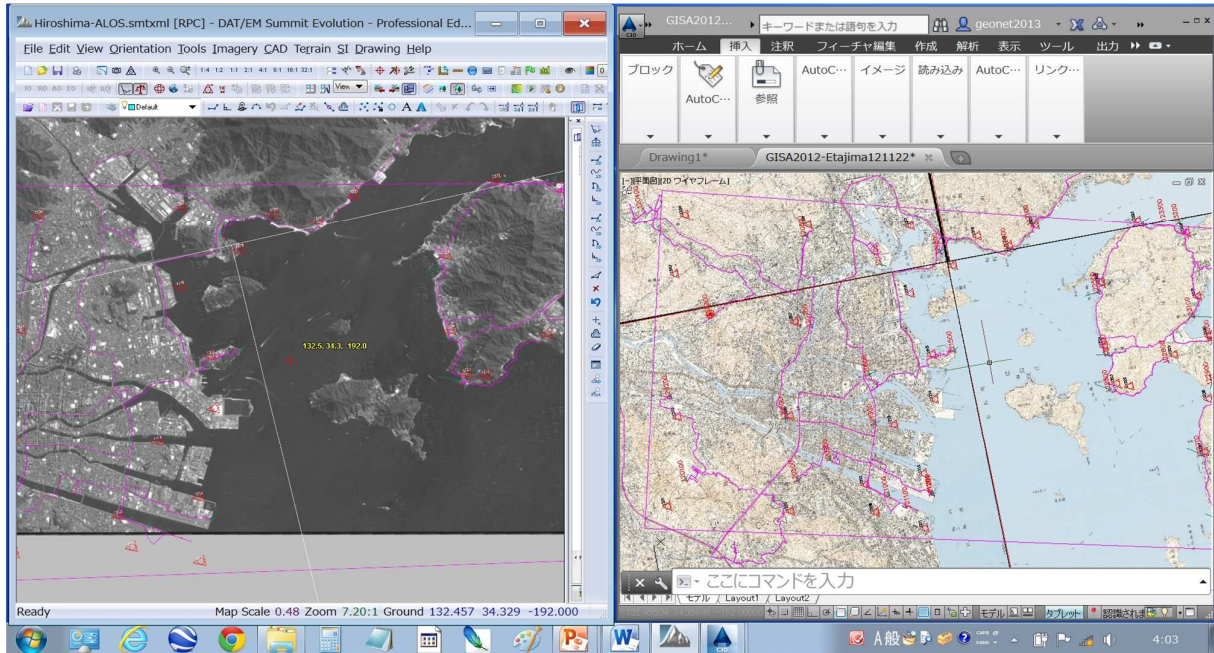
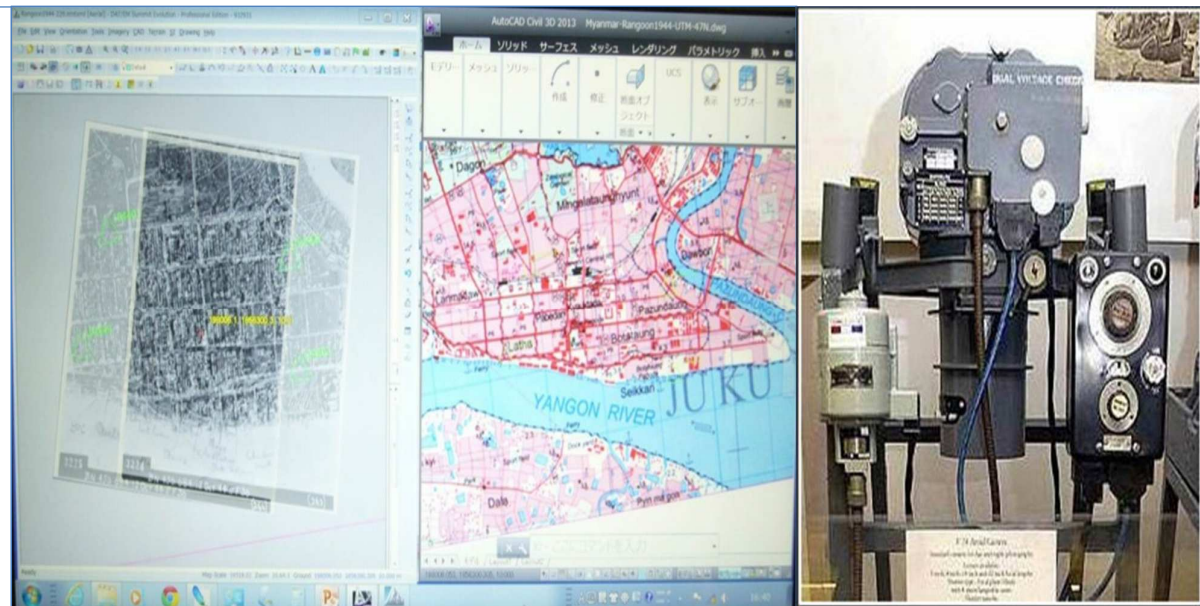


Fig.7 ALOS – Hiroshima satellite stereo model
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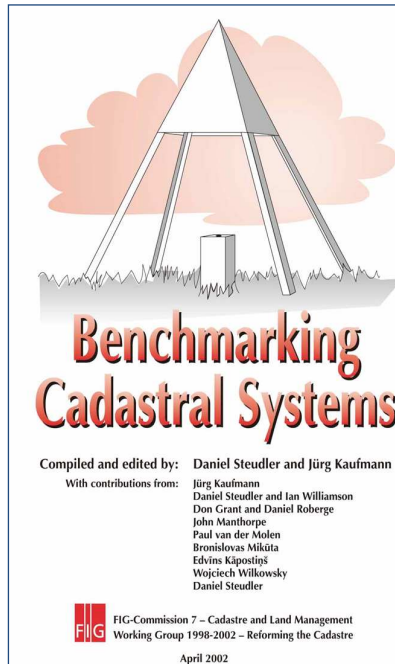
1. Introduction :

(1.8) Photogrammetry in Myanmar



**Fig. 8. Photogrammetric stereo model (1944) ,Image map (2005)
and RAF F24 camera(1944)**
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2. Worldwide status and agendas in cadastral survey



Documentation
on the Modelling of Geoinformation
of Official Surveying and Mapping
in Germany

ドイツ公共測量・地図作成業務
地球情報モデル形成仕様書

(GeoInfoDoc)

Main Document
基本文書

Version 5.1
バージョン5.1

July 31, 2006
2006年7月31日

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2. Worldwide status / agendas in cadastral survey (2.1) From Cadastre2014 to Land Administration Domain Model Standard

The Land Administration Domain Model Standard

Abstract: C. LEMMEN and P. van OOSTEROM, the Netherlands

1. LADM is an international standard

for the land administration domain.

2. LADM covers basic information-related components

of land administration

3. The standard provides an abstract, 3 conceptual models :

- ☑ parties (people and organizations);
- ☑ basic administrative units, rights, responsibilities and restrictions
- ☑ spatial units (parcels, and the legal space of buildings and utility networks)

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2. Worldwide status and agendas in cadastral survey (2.2) Land Administration Domain Model and Social Tenure Domain Model

Specialization of LADM developed by UN Habitat
, the International Federation of Surveyors (FIG) and the
University of Twente, Faculty ITC.

STDM broadens the scope of land administration. formal,
informal and customary land systems.

integrates administrative and spatial components, relationships
between people and land in an unconventional manner on social
tenure relationships in the continuum of the land rights concept
promoted by the Global Land Tool Network and by UN-Habitat
Background

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2. Worldwide status and agendas in cadastral survey (2.3) German AAA / SAPOS satellite data service

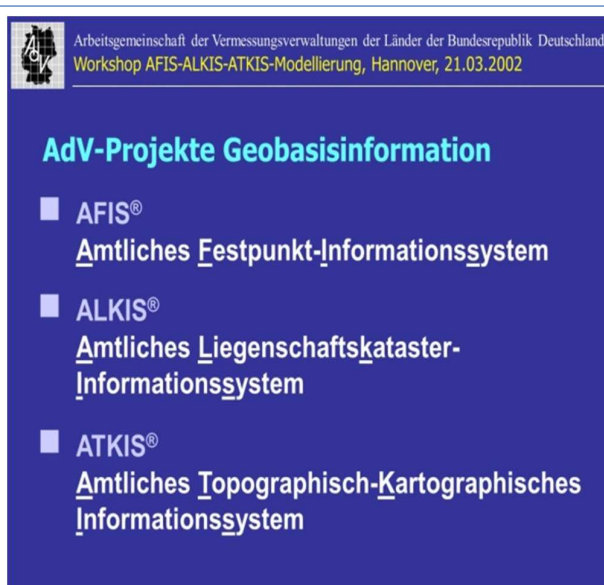
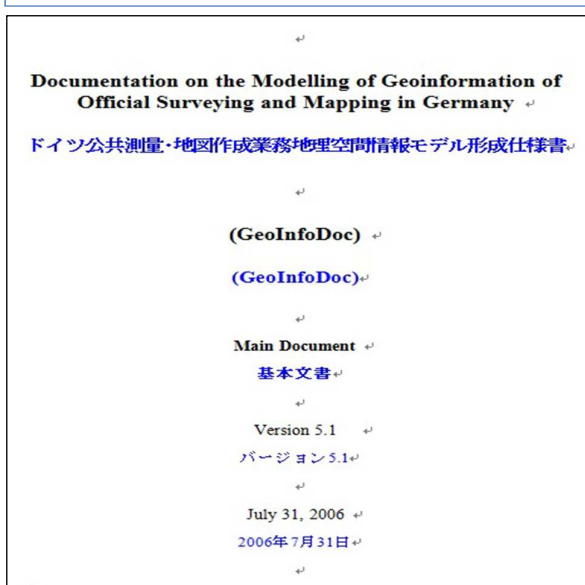


Fig. 9. AAA-document(in English/Japanese) and AFIS-ALKIS-ATKIS (in German)

3. Japanese Cadastre related acts

(3.4) National Land Survey Act

and (3.1) Japanese Basic Act on Land Resilience

大規模災害発生直後であっても、必要な行政、情報通信機能を確保するとともに、生活・経済活動を機能不全に陥らせない



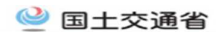
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3. Japanese Cadastre related acts

(3.5) Construction Information Infrastructure

Modeling of (MLITT) Ministry of Land, Infrastructure, Transport and Tourism

CIMの概念(案)



< CIMの目指すこと > ①情報の有効活用 ②設計の最適化 ③施工の効率化、高度化 ④維持管理の効率化、高度化

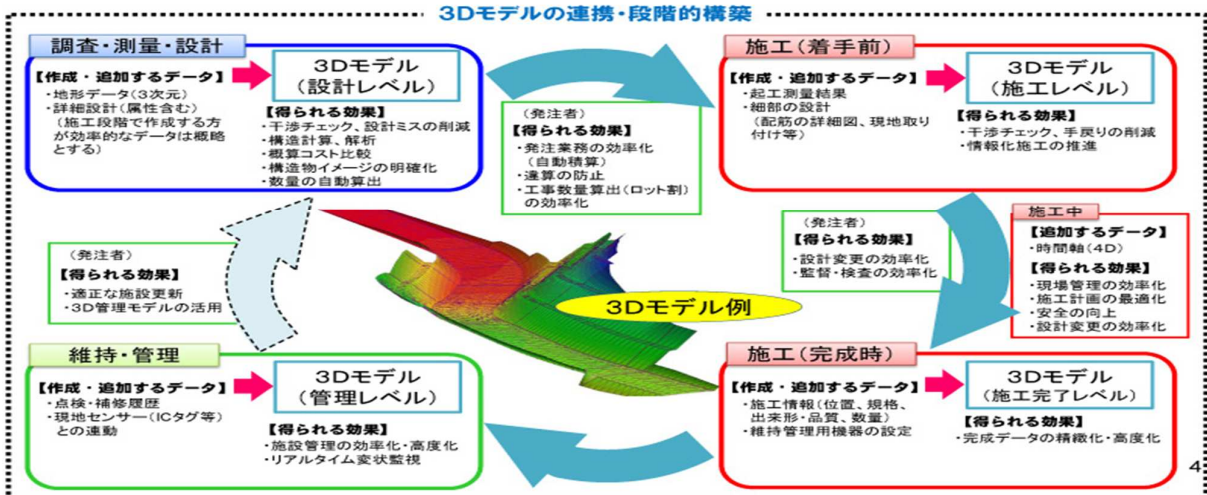


Fig. 7. MLITT's CIM (Construction Information Modeling) concept

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4. Proposals for Cadastral Survey Japan

3D Image Map Archive



Fukui city 3D Image Map Archive : 1948 Fukui earthquake

3D-IMA means 3D now in Japanese expression !!!

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(4.1) ASAFAS 3D Image Map Archive

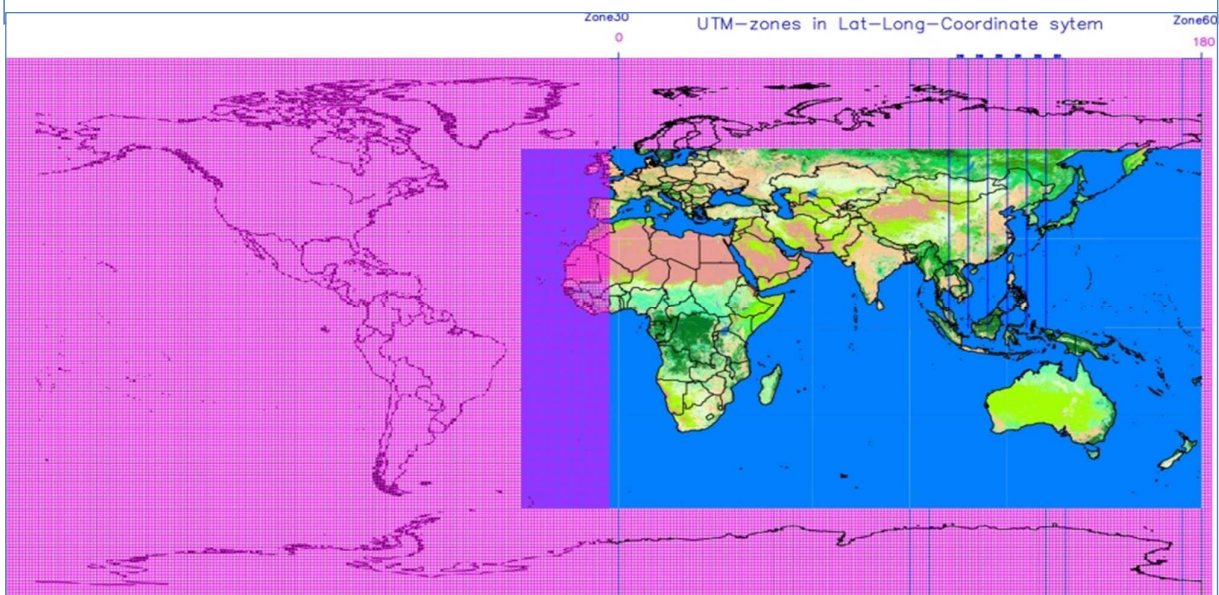


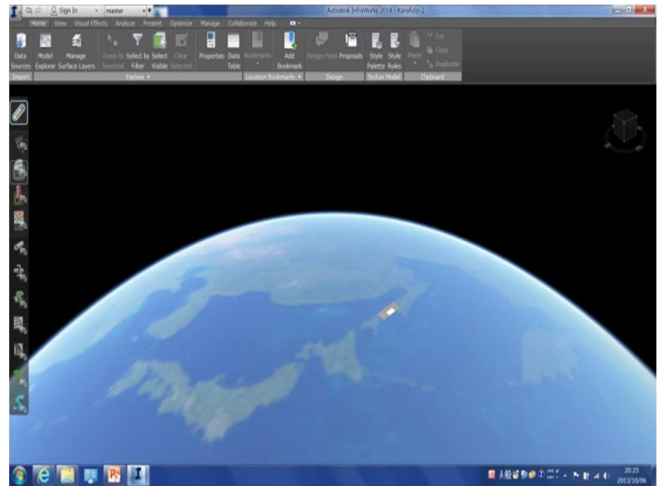
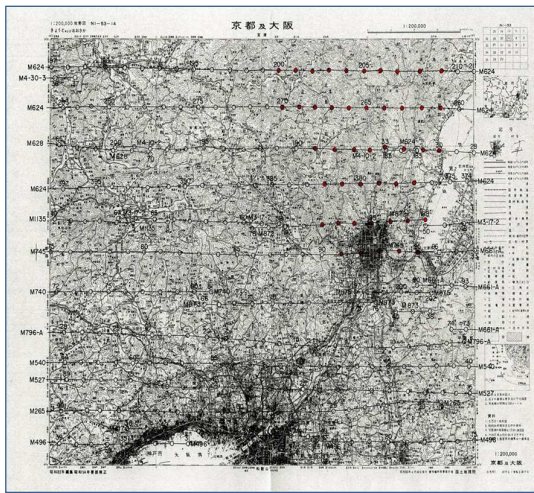
Fig. 11 ASAFAS Kyoto University : 3D Image Map Archive in 2013

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4. Proposals for Cadastral Survey Japan (4.2) 3D Image Map Archive

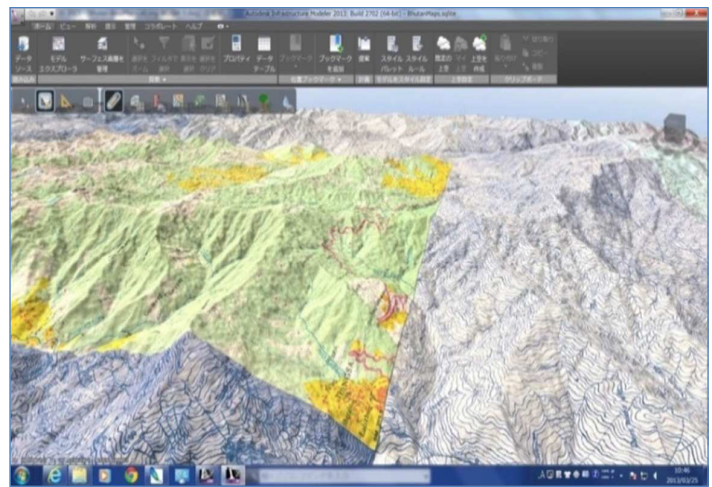
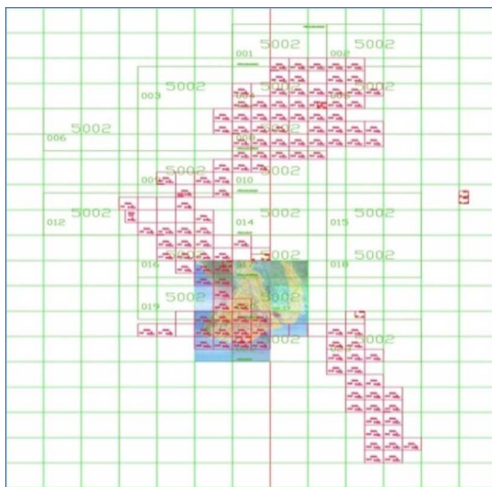


**Fig. 12. USAF Flight index map (1946)
and Global representation on 3D-CAD (Japan)**

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4. Proposals for Cadastral Survey Japan (4.3) 3D Image Map Archive

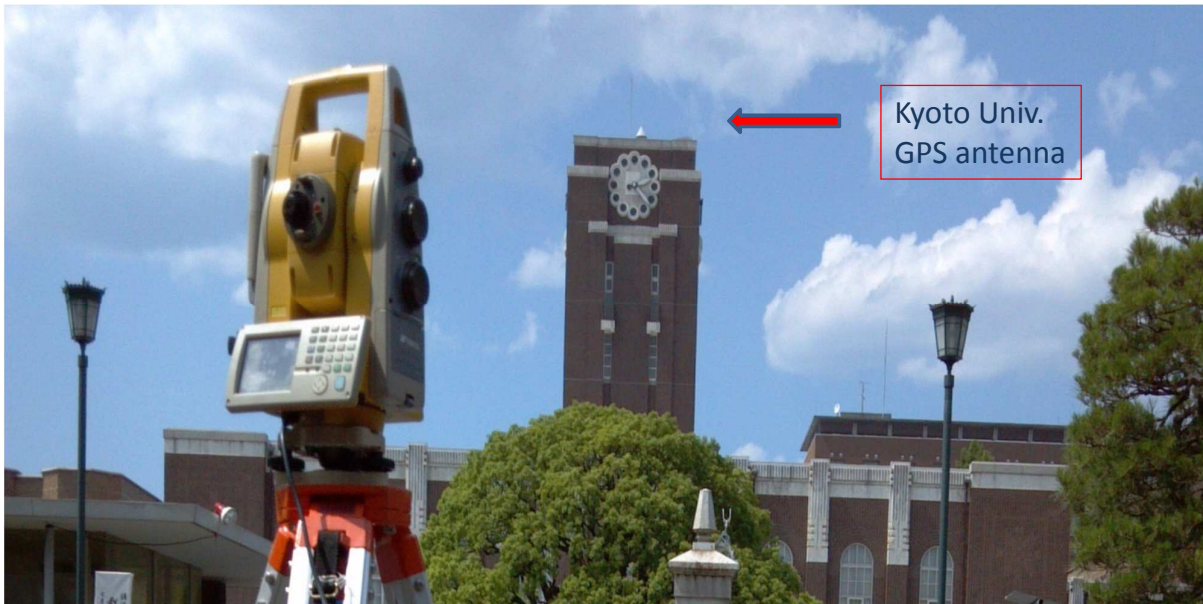


**Fig. 13. UTM map projection index map (Myanmar)
and 3D diorama (Bhutan)**

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(4.4) Precise(1cm) satellite TS surveying + 1 second geodetic network adjustment



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4. Proposals for Cadastral Survey Japan

(4.5) Quick Check on existing GCPs, even in the woods after the earthquakes



Fig. 14. PEGASUS satellite surveying on ground control points

4. Proposals for Cadastral Survey Japan

(4.6) 3D mapping

for Real Property Registration Act based Maps



Fig. 15. PEGASUS Meister (TS and GNSS – 3D CAD system)

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(4.7) 3D cadastral mapping

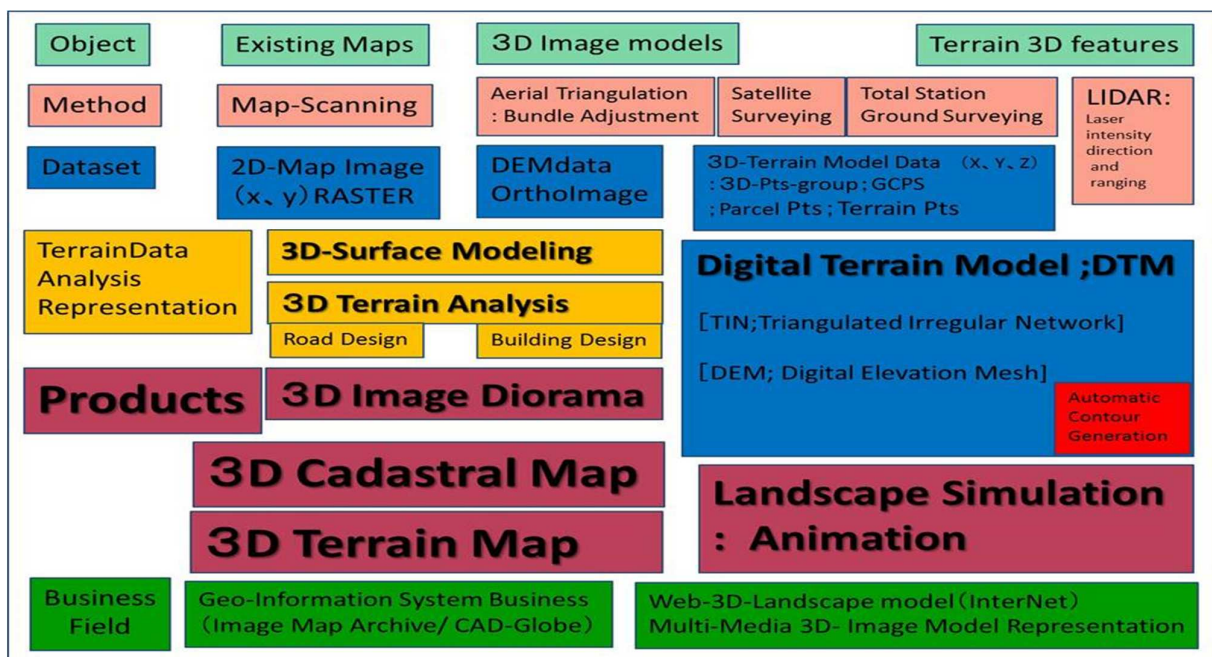


Fig. 16 3D cadastral mapping : perspective schema

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4. Proposals for Cadastral Survey Japan (4.8) 3D mapping : Satellite Surveying (PEGASUS)

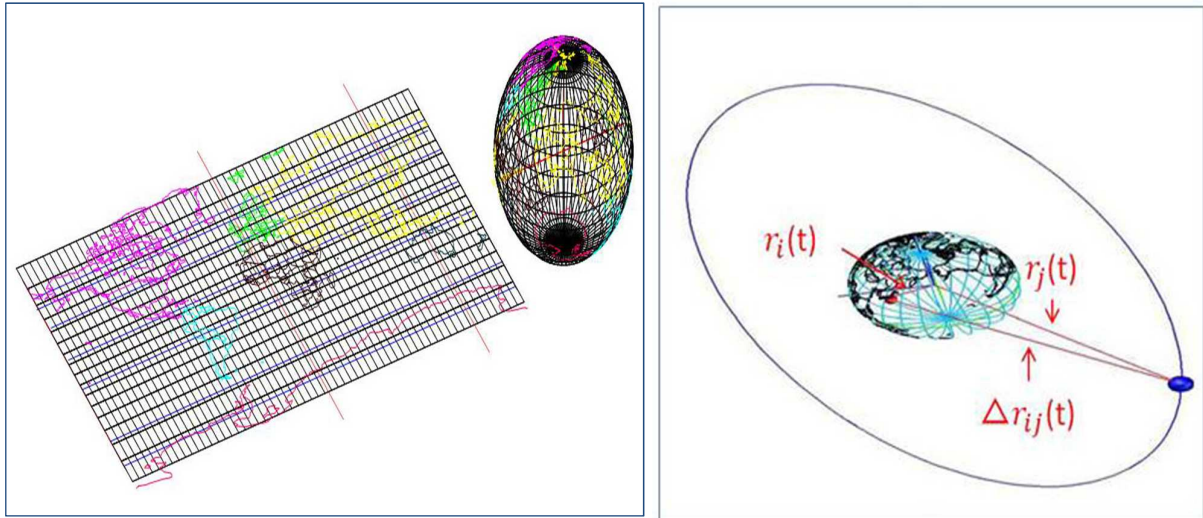


Fig. 17. Map projection and Satellite Surveying

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4. Proposals for Cadastral Survey Japan (4.9) 3D mapping : Boundary Survey on 3D diorama

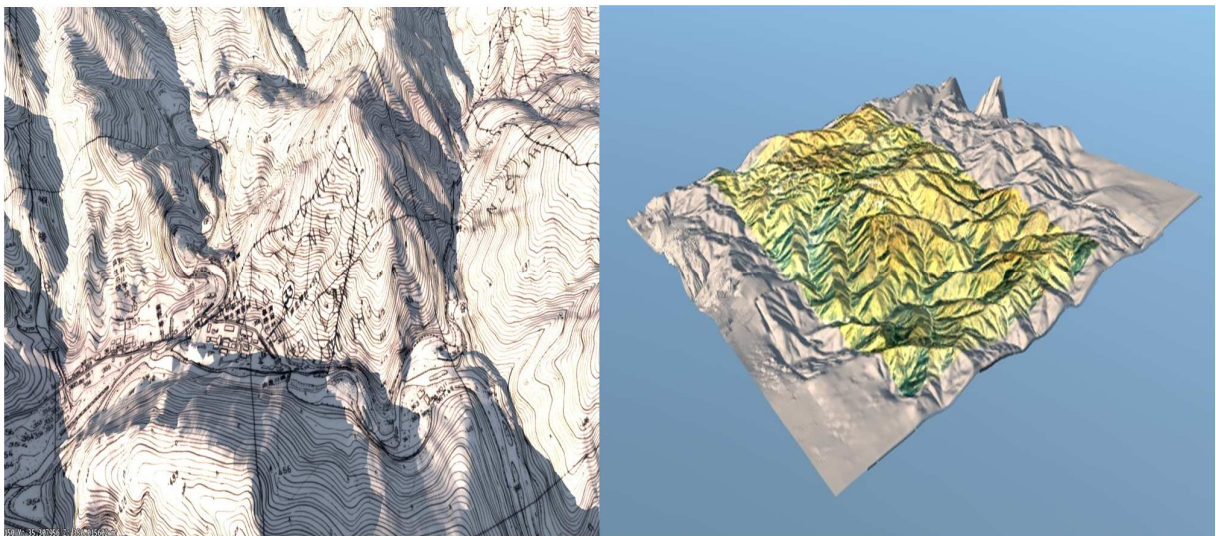


Fig. 18 3D diorama mensuration on 3D-CAD screen

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References

Bauer, Rainer et.al. (2010)

**, “Das deutsche Vermessungs- und Geoinformationswesen 2010”
; Wichmann**

Hasegawa, Hiroyuki (2013)

**, 3D Image Map Archive Designed Area Studies (3D-IMADAS)
Pacific Neighborhood Consortium :
Annual Conference and Joint Meetings 2013**

Kraus, Karl (2000)

, “Photogrammetrie” Band III; Duemmler

Luhmann, Thomas (2000)

, “NahbereichsPhotogrammetrie”, Herbert Wichmann Verlag

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References

Niemeier, Wolfgang (2008)

, “Ausgleichsrechnung”; Walter de Gruyter

Seeber, Guenter (2003)

, “Satellite Geodesy “; Walter de Gruyter

Samejima, Nobuyuki (2011)

“Japanese Cadastral System”, in Japanese ; Kokon Shoin

Snyder, John P. (1987)

, “Map Projections-A Working Manual “

U.S. Geological Survey Professional Paper 1395

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FIG Congress 2014; Kuala Lumpur, Malaysia,
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**Thank you very much for your kind
attention !!!**

**Hiroyuki HASEGAWA and Tsutomu IMASE, Japan
Researchers
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