Cadastre2014 Japan to Osaka- ALKIS type Cadastre (9390)

Hiroyuki HASEGAWA and Marie SATO, Japan
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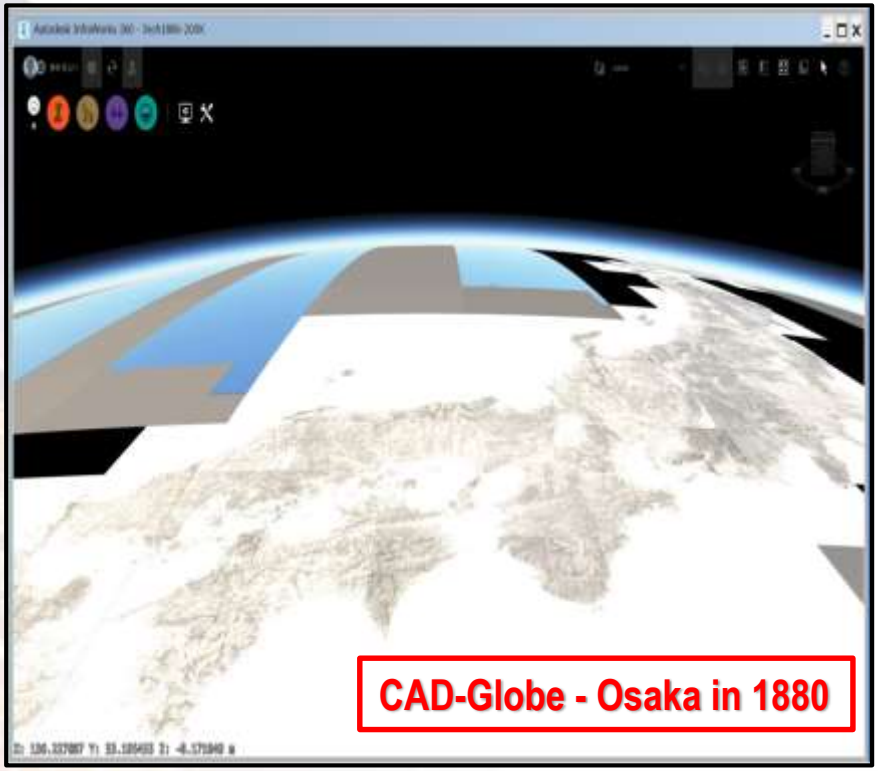
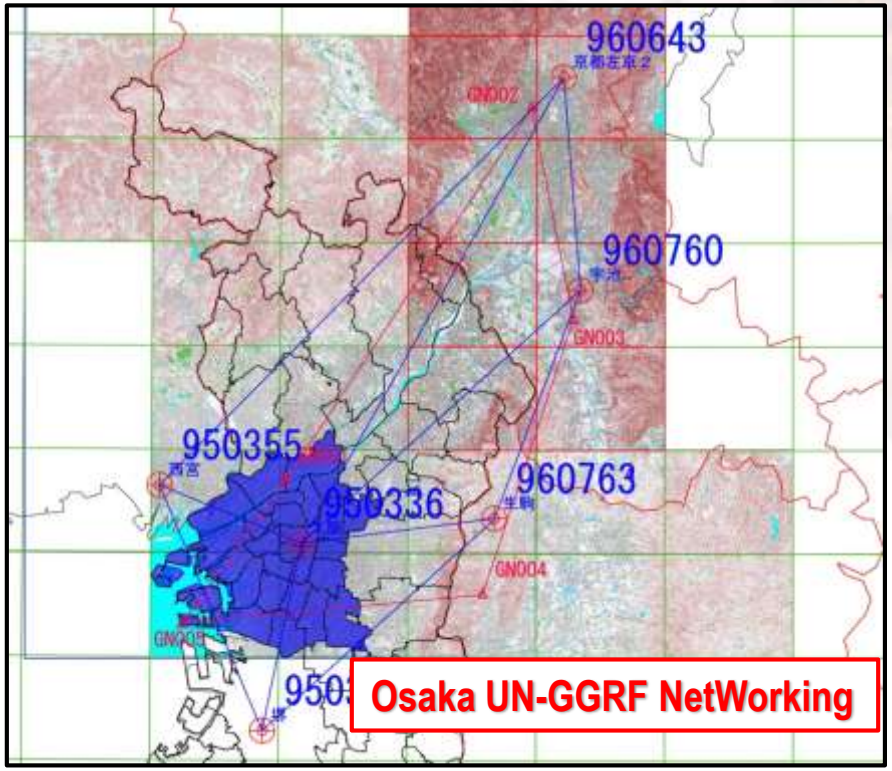
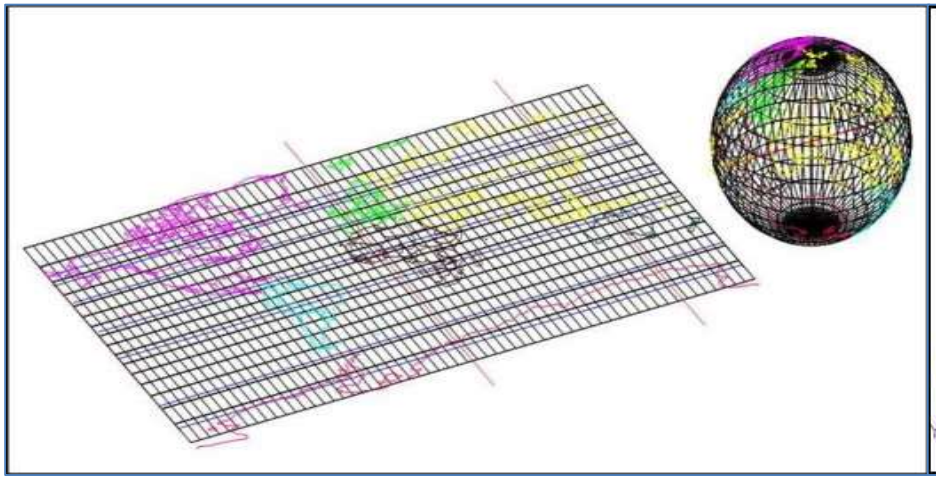


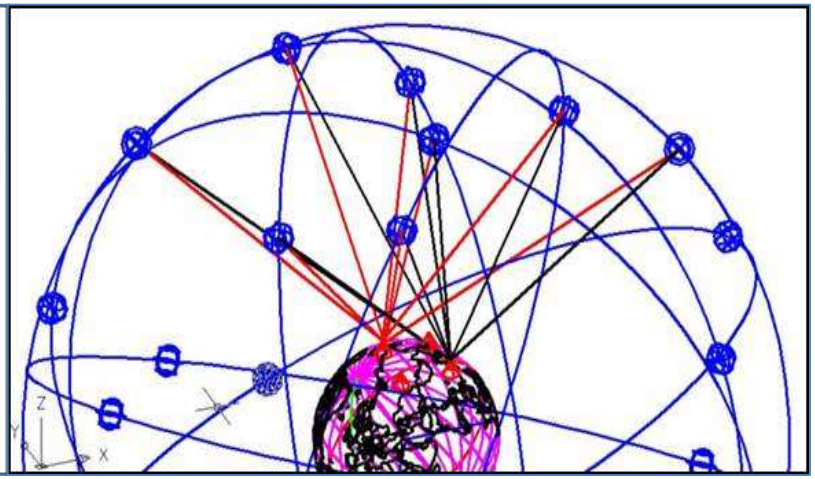


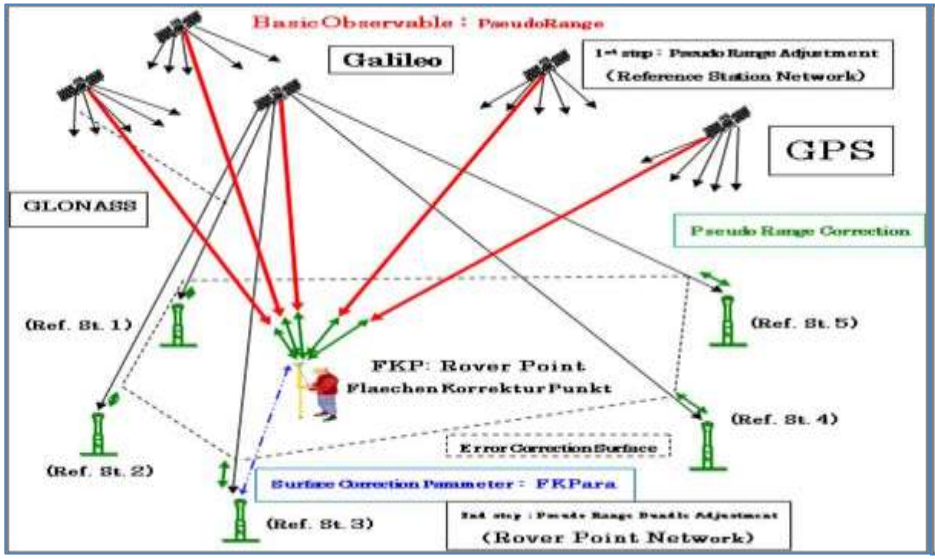
Cadastre2014 Japan to Osaka- ALKIS type Cadastre

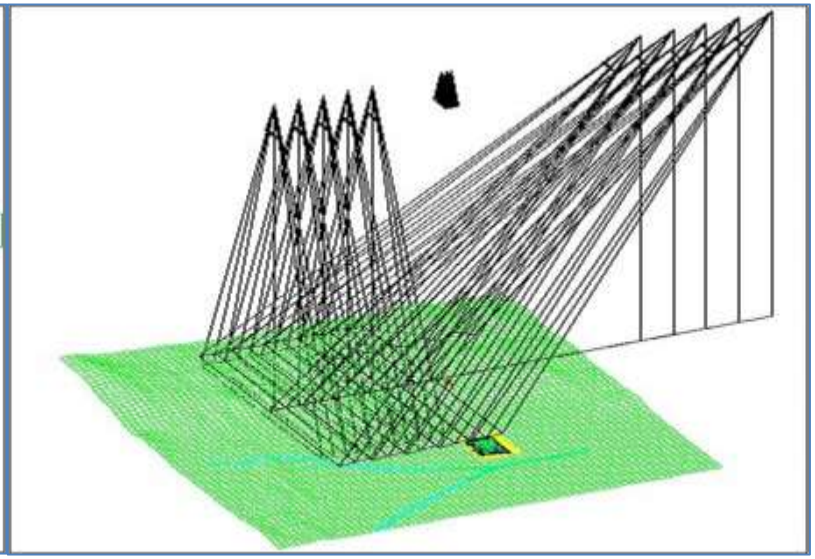
: Map and CAD-Globe : Satellite Geodesy-Parameter Estimation

: FKP GNSS surveying : Satellite Photogrammetry









1. Japanese cadastral survey and modern mapping

1.1 Heian Capital and Jyori- rectangular cadastral system

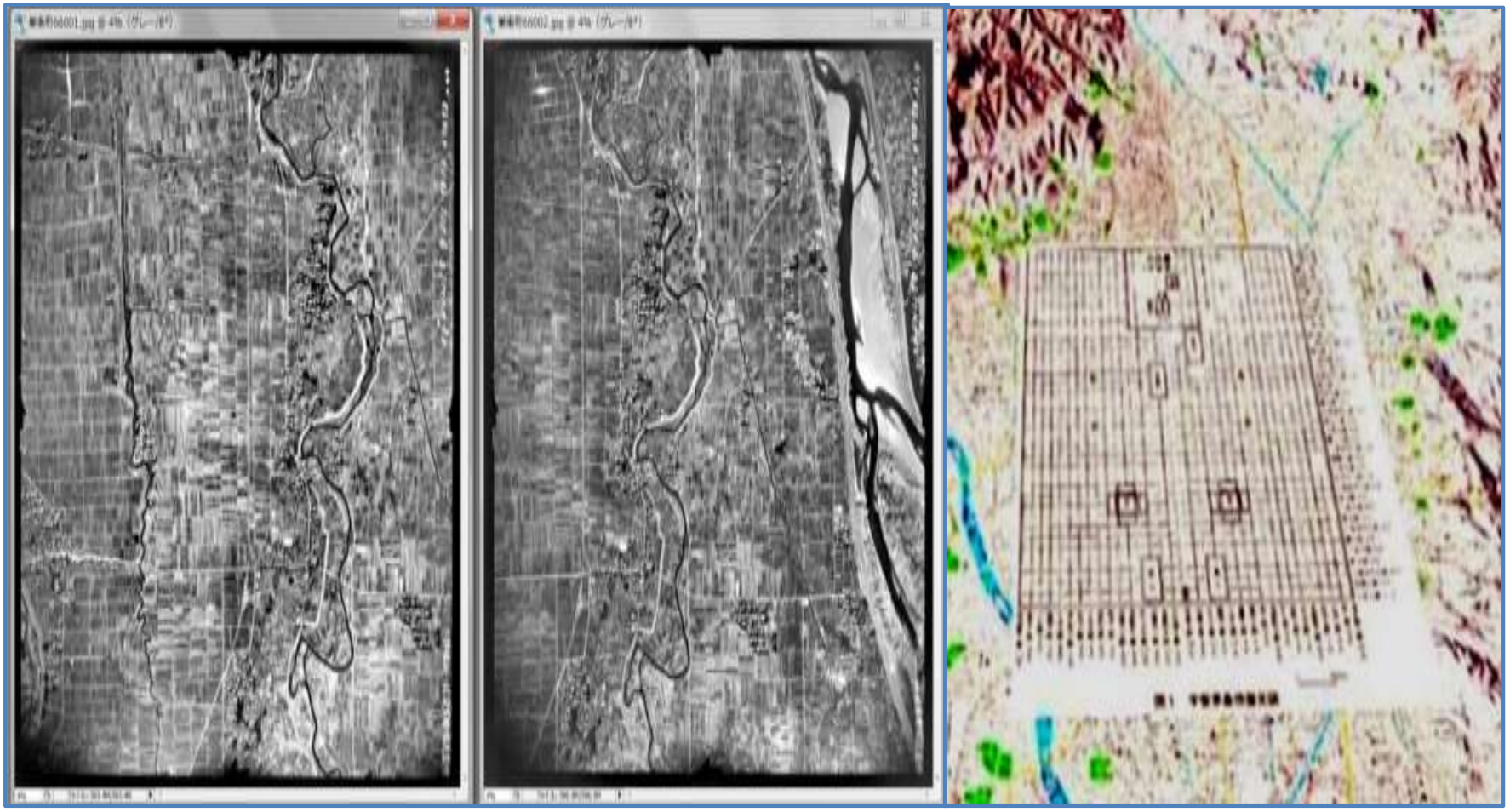


Fig.1 Johri rectangular cadastral system and Heian-capital: 8th century

CADASTRE2014 JAPAN to OSAKA- ALKIS TYPE CADASTRE

1.2 Taiko (Feudal Prime-minister) cadastre(16ce.) and Feudal-Shogun era country mappings (17-18-19 ce.)

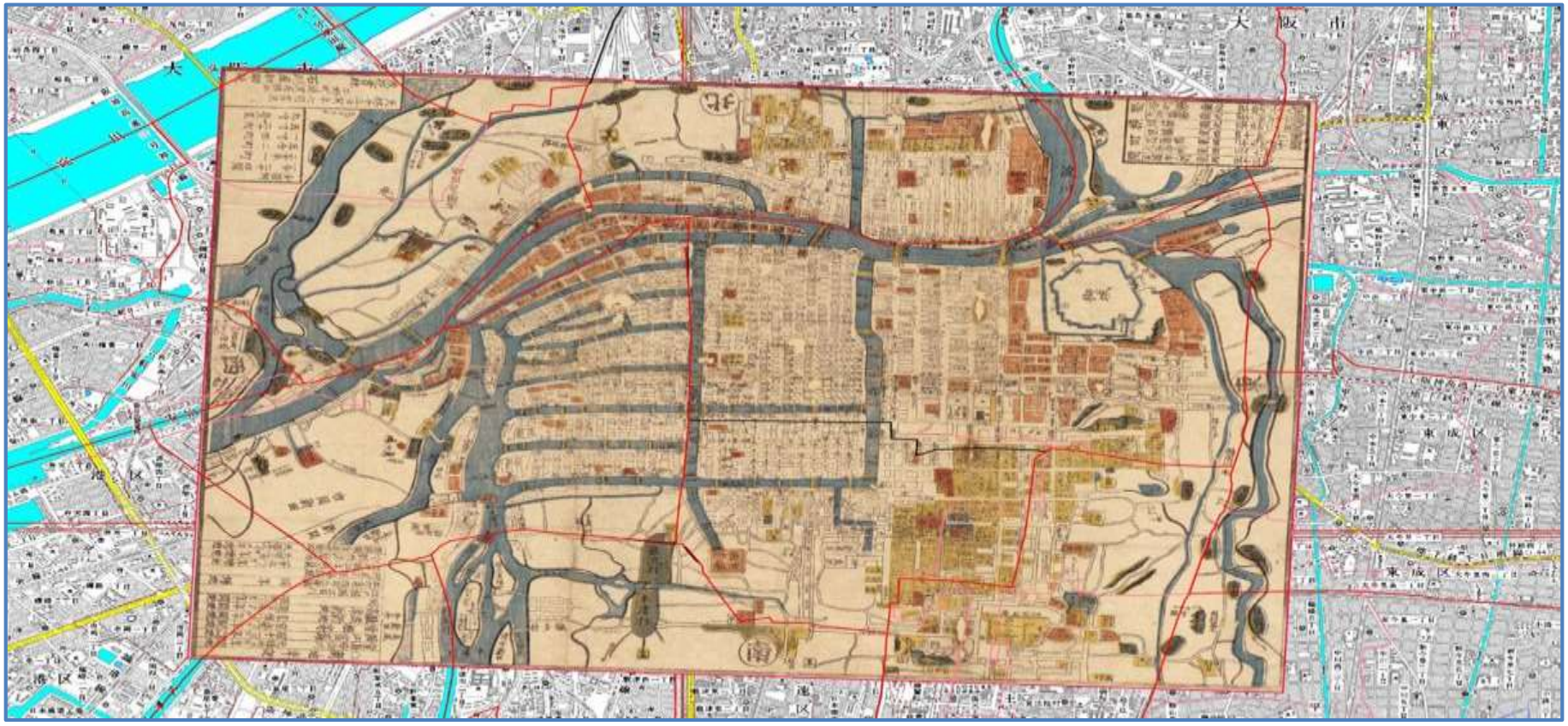
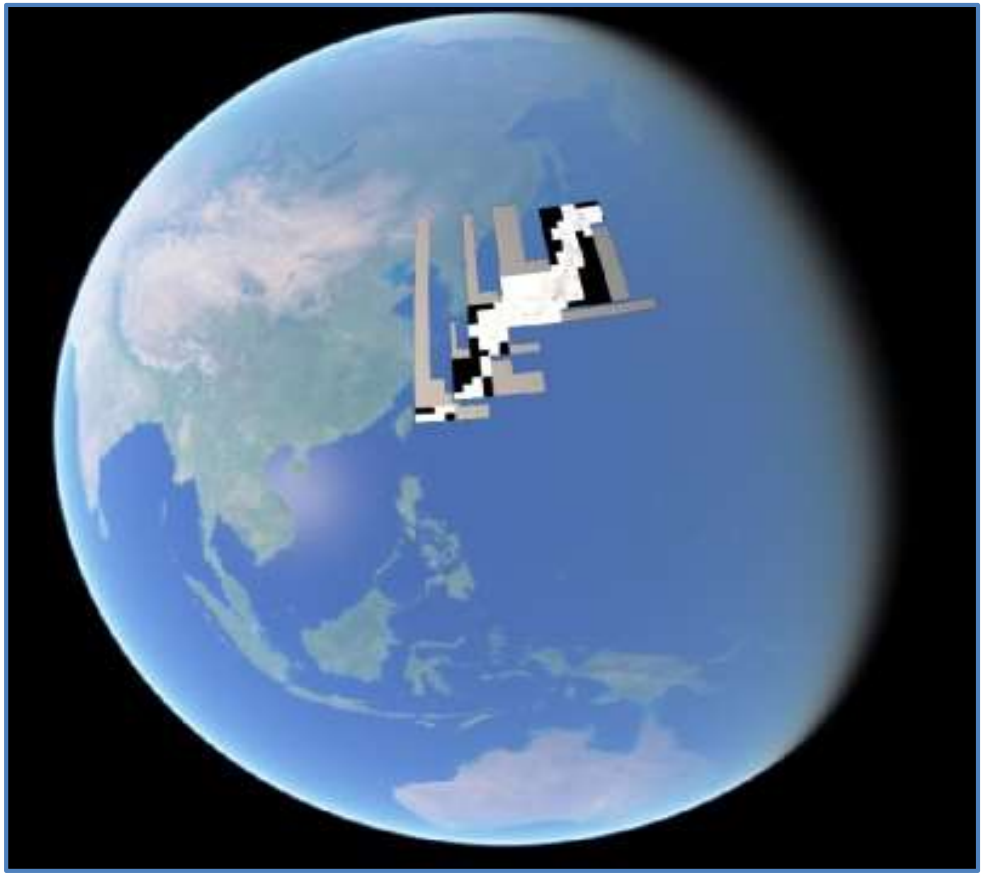


Fig.2 Osaka - Feudal Shogun era mapping (1840)

1.3 Taxation cadastral mapping in 1870-1910

, Japan-Okinawa-Taiwan-Korea; to 4D Image Map Archive



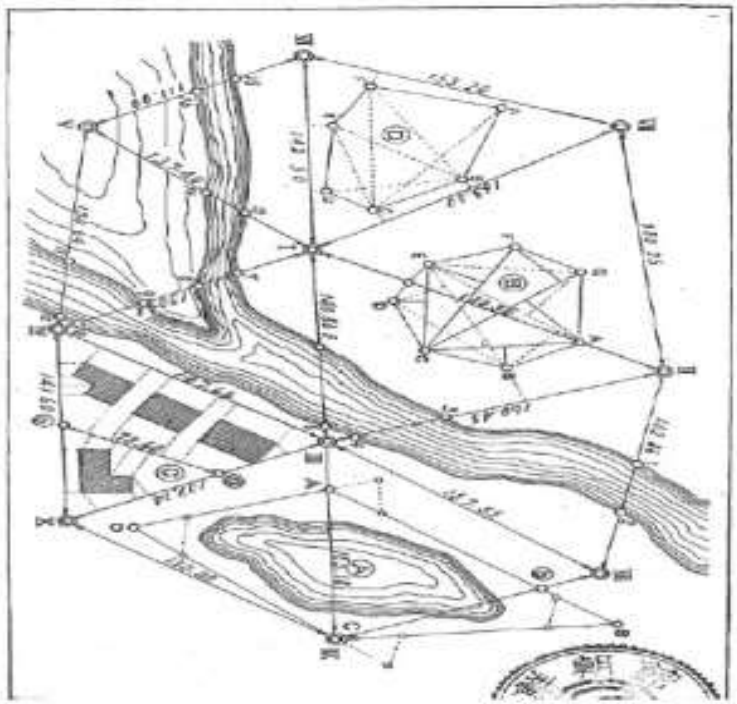


Figure 3. A visualization of a typical triangulation net. Note the multiple scales and systems of measurements. Source: Hayashi (1938, 95). Courtesy of The National Library of Korea Digital Archive.

Fig.3 Japan 200K maps in 1880s on CAD-Globe and Korean cadastral triangulation net

1.4 Osaka Cadastral Survey as 3D mapping
: 5 approaches for 1cm accuracy 3D mapping

1. GeoReferencing for UN-GGRF: IGS global geodetic networking for
   „One step parcel cadastral mapping"; Japanese cadastral survey
   " 1sec 1cm accuracy PEGASUS – FKP "; on UN-GGRF initiative

2. Historical aerial photo bundle triangulation : 3D image modeling
   „ 4D – Image Map Archive Designed Aerial Survey"

3. UAV / Helicopter photogrammetry : 1cm accuracy 3D image modeling
   „ Precise (1cm accuracy) 3D city modeling as Historical Reality"

4. Satellite photogrammetry : wide area 10cm accuracy 3D image modeling
   „ 3D remote sensing for forestry and landscape applications"

5. LIDAR – TS ground 3D mapping : 3D city model for cadastral survey
   „ complete 3D city model to be measured and registered"

1.5 Proposals for Cadastral Survey Japan

4D Image Map Archive

Fukui city 4D Image Map Archive : 1948 Fukui earthquake

4D-IMA means 4D- now in Japanese expression !!!

1.6 Proposals for Cadastral Survey Japan
One step parcel cadastral mapping
LIDAR – underground/ facility 3D mapping

LIDAR mapping, TS and GNSS – 3D CAD system

2. Cadastral system as 3D GeoInformationsSysteme: German style GIS : ALKIS

2.1 Geodetic networking as the basis of cadastre

Geodetic networking (σ=1cm) is required both for earthquake prediction and cadastral survey. Especially land price; more than US$ 10,000/㎡ and restoration/reconstruction projects after East Japan earthquake in 2011 push our government to reestablish precise cadastral system like in Germany.

German report in 2016 on geodetic network adjustment of 400 prime Electronic Control Points reached to the accuracy level of 2mm , after integrated ECP- Leveling-Gravimetric geodetic network adjustment.

GeoInfoDok of AdV has organized ALKIS cadastral survey system based on world standard GIS and CAD systems.

Parallel with documentary translations, we planned and tried nationwide and regional geodetic network adjustments , using German standard GEONAP- parameter estimation geodetic approach.

2.2 GPS-GNSS Geodetic networking since 1995 Kobe earthquake to UN-GGRF initiative

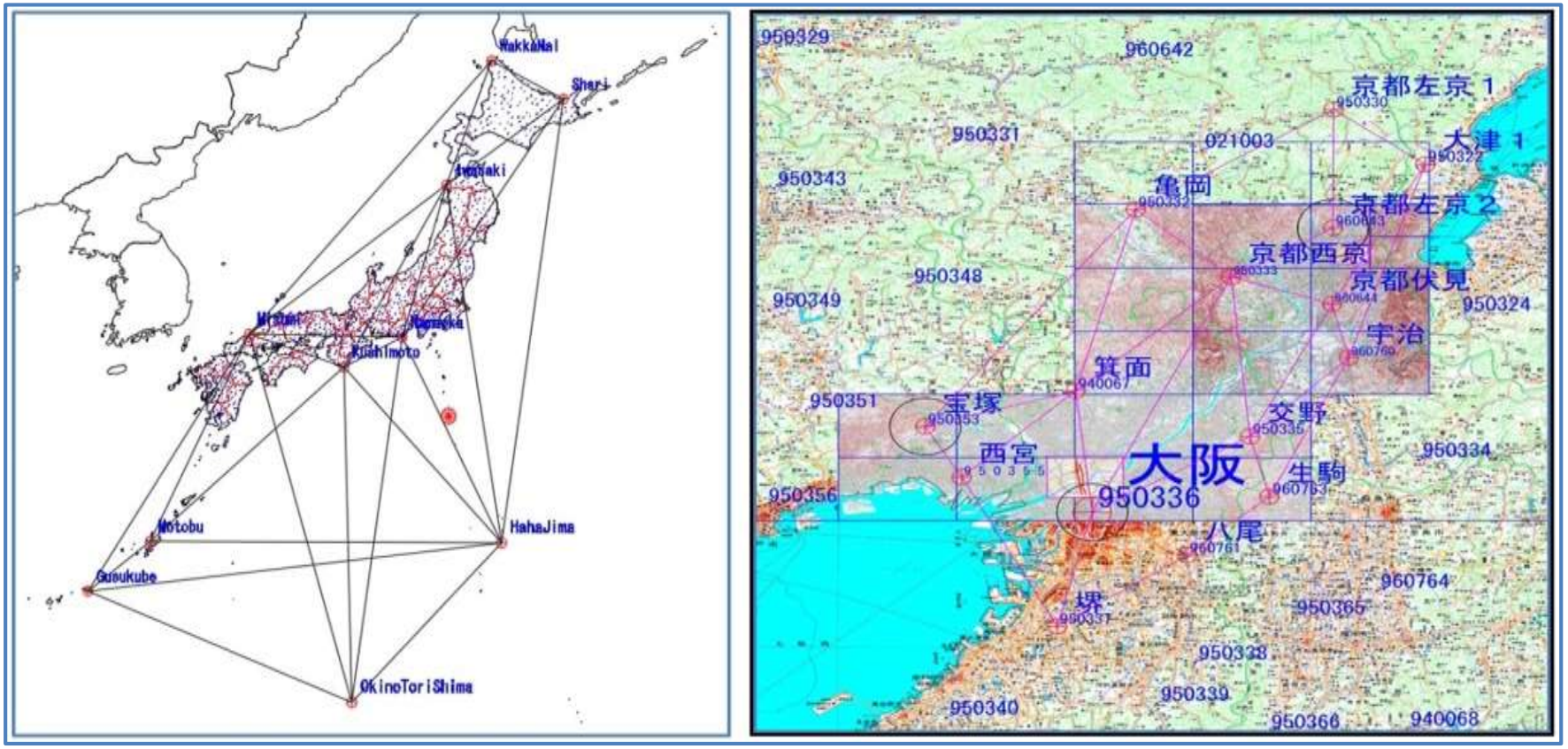


Fig. 4 Japan and Osaka area geodetic networking

2.3 PEGASUS-center Septentrio Antenna/Receiver

Fig. 5 PEGASUS-center reference station

3. Osaka Urban planning and cadastral system

3.1 the most ancient capital plan (7ce)

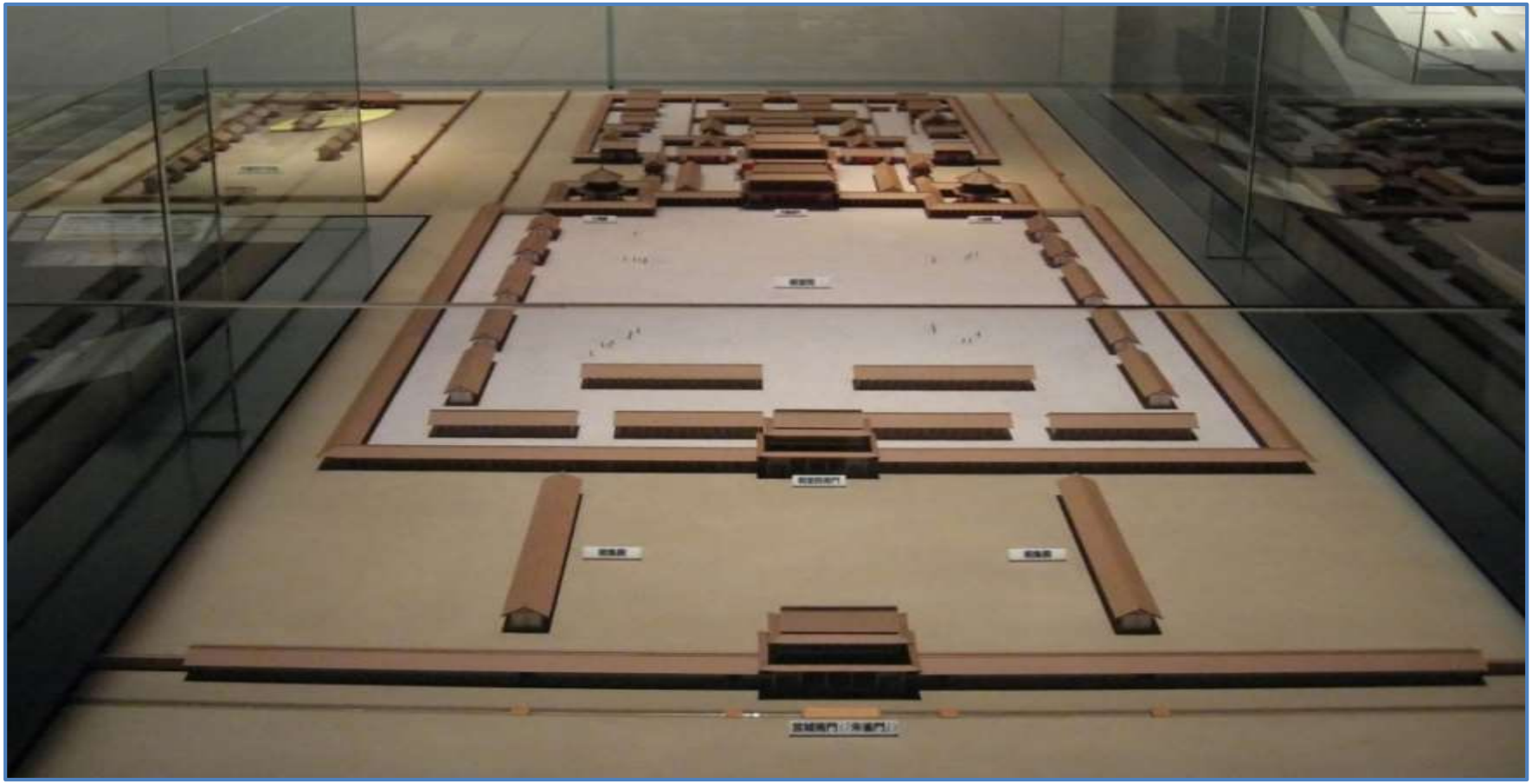


Fig. 6 Naniwa (Old name of Osaka) first capital planning (courtesy of Osaka city HP)

3.2 Nationwide aerial photos by USAF(1948) Osaka ancient capital area

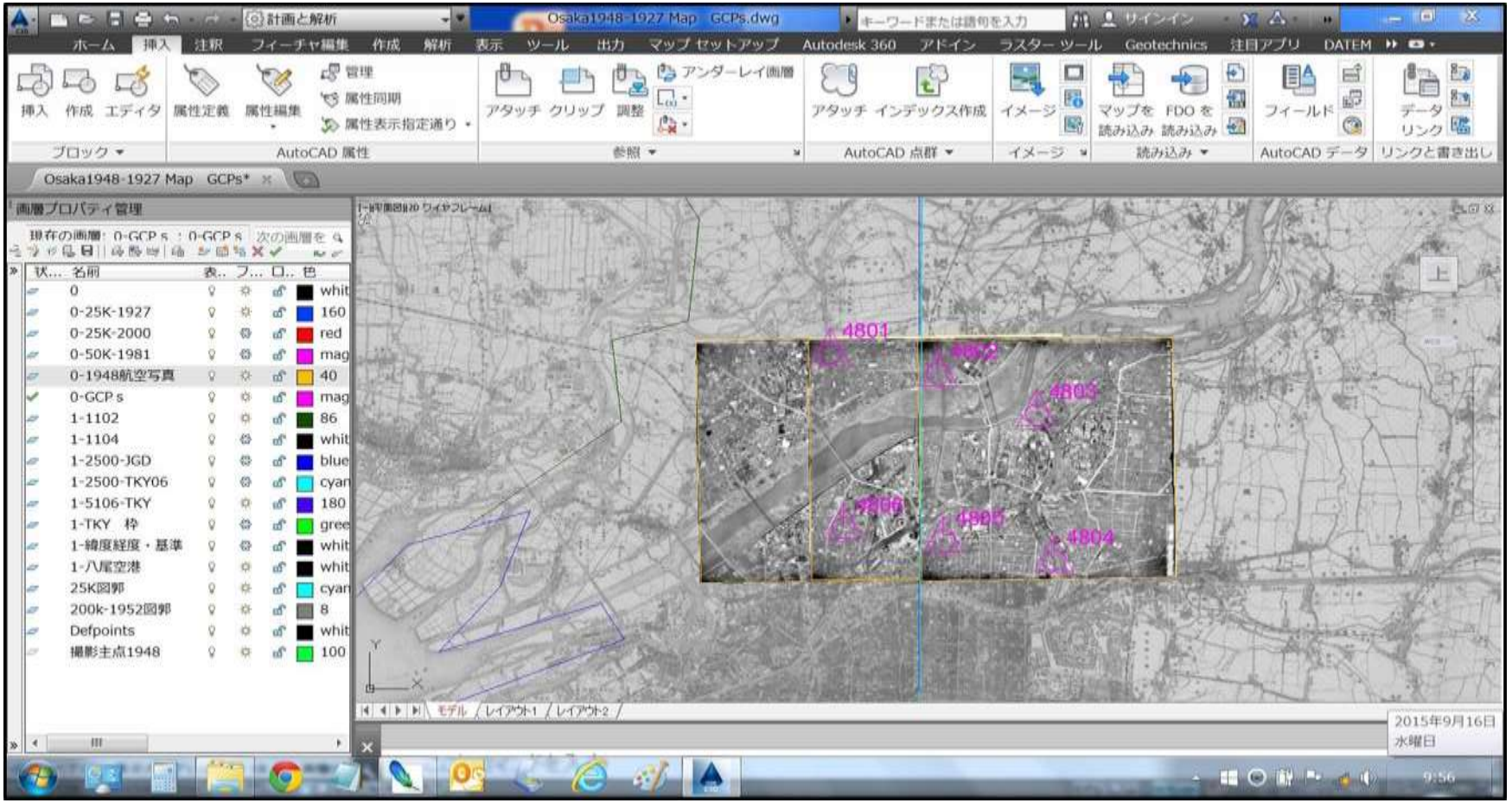
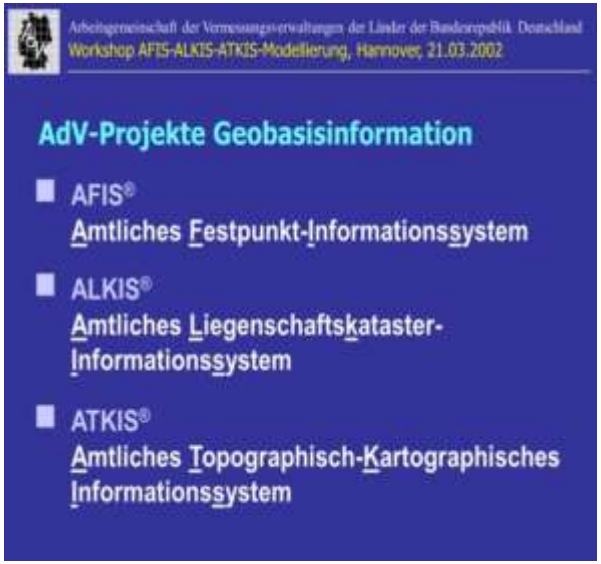


Fig. 7 4D Image Map Archive : 1927 Osaka maps and 1948 aerial photos

4. Osaka ALKIS type cadaster

4.0 GeoInfoDok : ALKIS : GeoInformationsSysteme

German GISe(GeoInformationsSysteme) is summarized in GeoInfoDok and cadastral system is regulated in ALKIS system.
Aiming at 3D GIS, based on WGS84/GRS80, Global Geodetic Reference Frame could be applied through Parameter Estimation Geodesy
and 4D-Image Map Archive Designed SUrveying System(IMADAS for short).
CAD-Globe concept was created on AutoCAD in 1992 by me.



4.1 Osaka GGRF: Global Geodetic Reference Frame

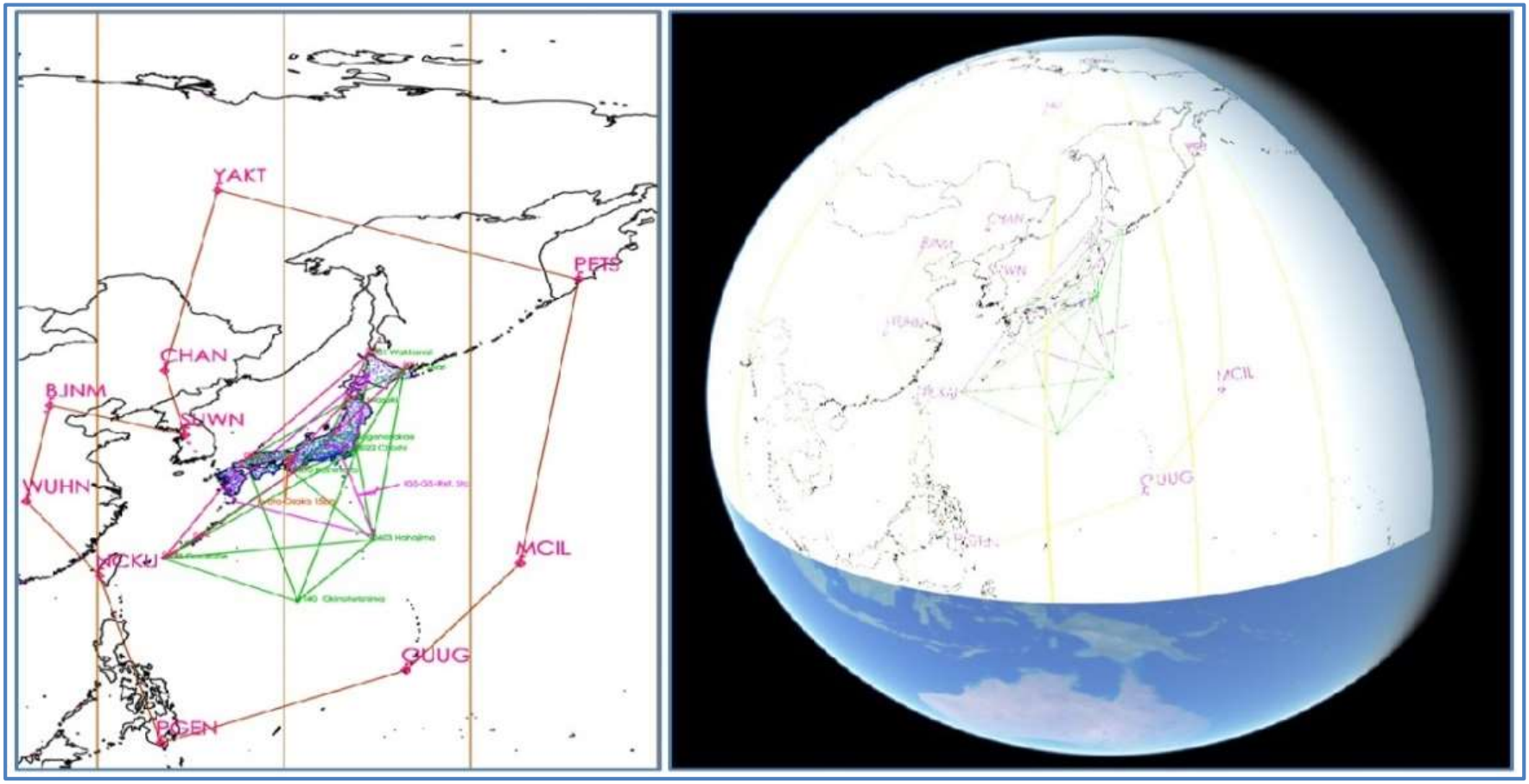


Fig.8 UN-GGRF- Osaka geodetic networking

4.2 Osaka Historical Reality : First photogrammetric mappings

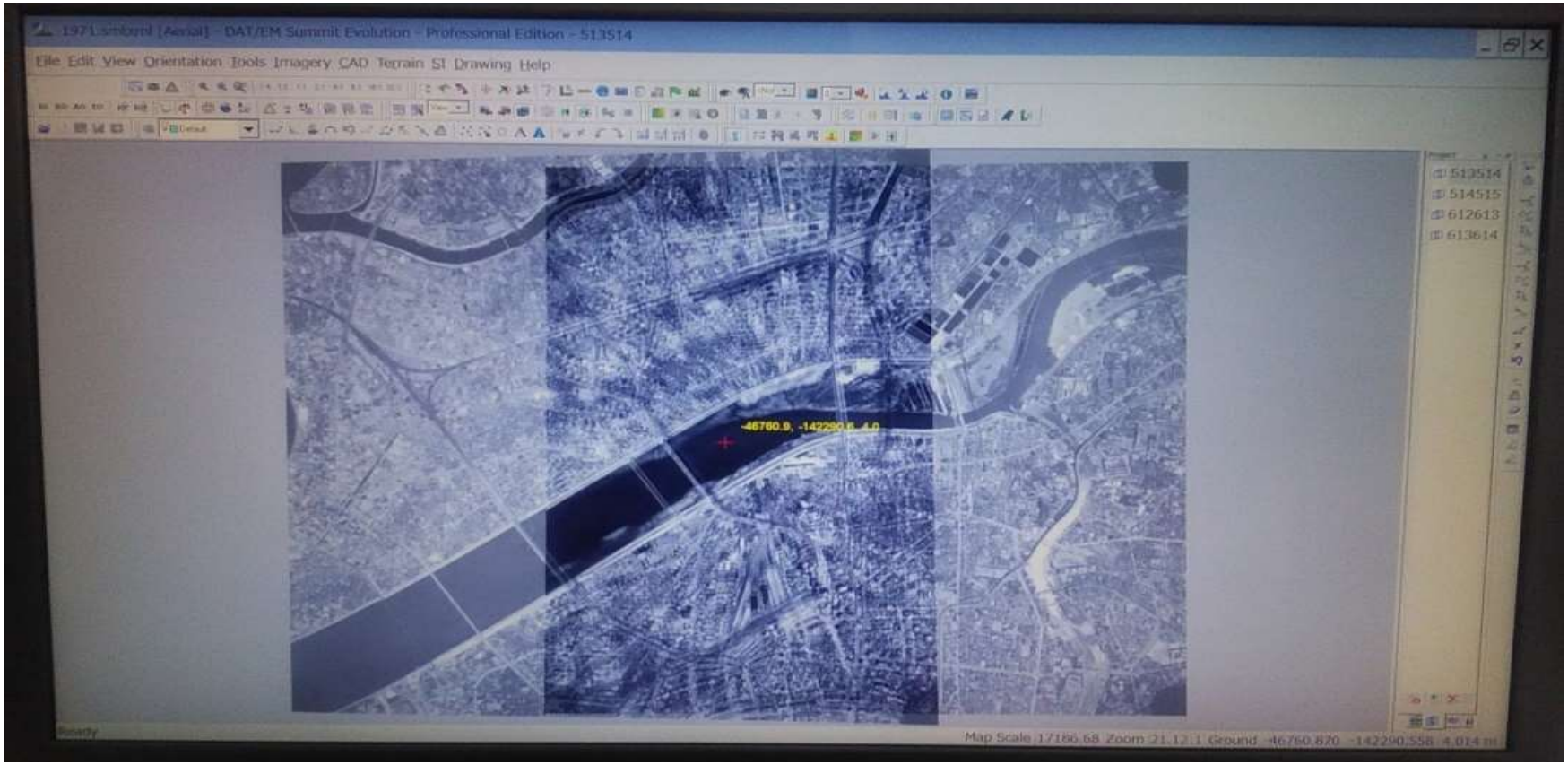


Fig. 9 Osaka 1971 stereo model after EXPO1970

4.3 Osaka σ=1cm 3D City modeling : Helicopter digital camera bundle triangulation

Fig.10 Author; Hasegawa at Kyoto Heliport and 3D diorama-Kyoto University

4.4 Osaka Satellite Photogrammetry : Satellite stereo 3D model mapping

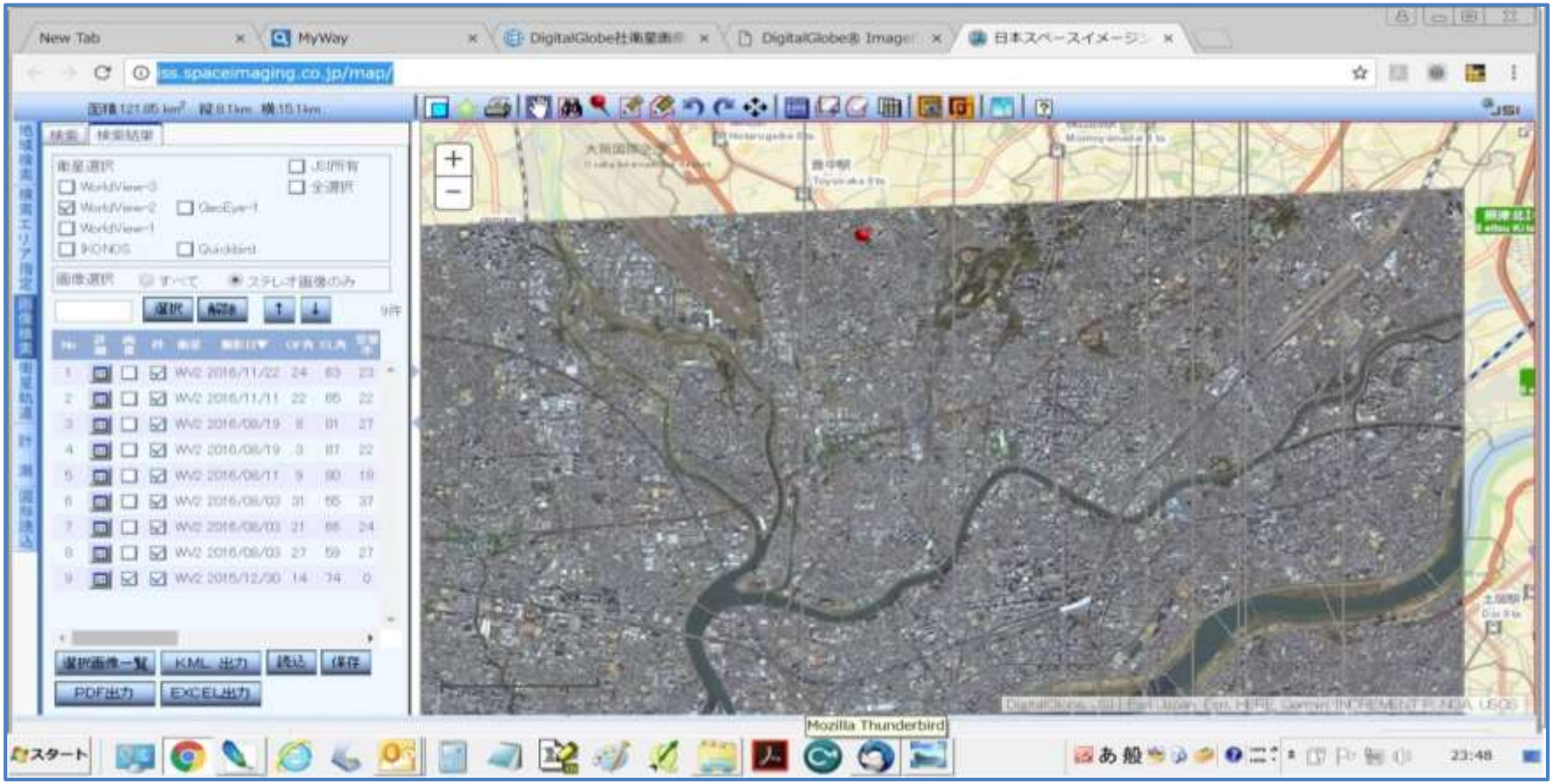


Fig. 11 Index map of World View2 - 20151230-stereo image area

4.5 Osaka 3D City modeling : Consensus making 3D display

Fig.12 3D city modeling with CityGML
Fig.13 3D-displays without and with Glasses for consensus meeting

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Thank you very much for your kind attention !!!

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