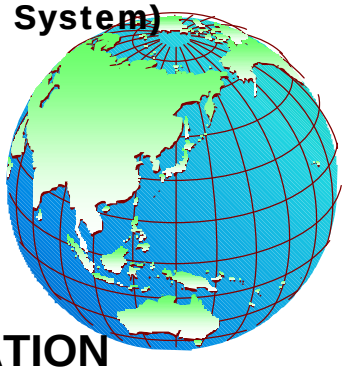
Development for Middle Scale CAMS used ALOS imagery

(Computer Assisted Mapping System)

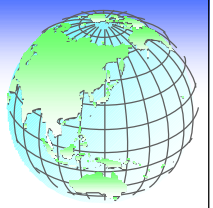


March 27 2001
AERO ASAHI CORPORATION
TSURU Kosuke, GOTO Naoki

Background

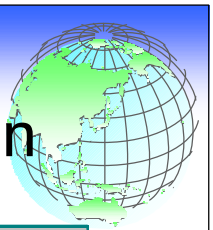
- **Circumstances**
  - **human activation by population explosion**
  - **pollution, global environment, food self sufficiency, , , ,**
- **Solution for the serious problems**
  - **Spatial analysis by GIS**
  - **spatial information (middle scale maps)**
- **Rate of map preparation**
  - **very low**
  - **very old**

Purpose



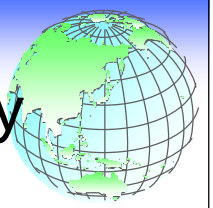
- **Mapping by ALOS imagery (PRISM)**
  - **Method improvement**
    - **more easy**
    - **more rapid**
  - **Study for possibility**
    - **proper map scale**

PRISM specification



Items	*specification*
bands	1（panchromatic）
spectral	0．52～0．77micron
Instrument field of view	3way（nadir, forward, backward）
B/H ratio	1．0（forward, backward）
Ground resolution	2．5m
nadir viewing	70km（nadir）／35km（3way viewing）
Number of pixel pre line	28000／band（nadir viewing 70km） 14000／band（nadir viewing 35km）
Pointing angle	±1．5°（3way viewing、cross truck direction）
Number of quantization bit	8bit

Mapping possibility



- **Views of three direction**
  - **DEM extraction by triplet matching**
  - **Ortho rectification by DEM**
- **Ground resolution 2.5m**
  - **1/25,000 or less**

Operation specification of 1/25,000 map by GSI

Item		Standard deviation	備考
Horizontal accuracy		Less than0.7mm on map	17.5m on ground
Vertical accuracy	Spot height	Less than 1/3 of intermediate interval	intermediate interval 10m
	contour	Less than 1/2 of intermediate interval	Intermediate interval 10m

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Mapping method

- **select according to map scale**
  - **very large scale (～1/250)**
    - **field survey**
  - **large scale (～1/5,000)**
    - **photogrammetry**
  - **middle scale(～1/200,000)**
    - **photogrammetry、compilation**
  - **small scale (1/200,000～)**
    - **compilation**

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Characteristics of Photogrammetry

- **Strong points**
  - **high accuracy**
  - **homogeneity**
- **Weak points**
  - **high skill**
  - **long working term**
  - **special & expensive facility**

plotting

scribing

How to improve

- **Digital Photogrammetry**
- **High resolution satellite**

Digital Photogrammetry

- **Image understanding**
  - **building**
    - **efficient at urban**
  - **road network**
    - **good for suburbs**
  - **vegetation, river**
    - **no solution**
- **Image correlation**
  - **inner orientation**
  - **relative orientation**
  - **DTM generation**

Ortho image
automatic procedure

High resolution satellite (Advancing resolution)

- **SPOT**
  - **10.0m**
- **ADEOS**
  - **8.0m**
- **IRS**
  - **5.8m**
- **ALOS**
  - **2.5m**
- **IKONOS**
  - **0.8m**

Mono plotting

(Digitizing from mono images)

- **Strong points**
  - **easy to work**
  - **reasonable instrument**
- **Weak points**
  - **decrease accuracy**
  - **lower interpretation**

Generalization not request high accuracy

assist by field survey

Experiment

ALOS simulation image
Around Maebashi Sta. (Gunma pref.)

Mono plotting result
(Without any reference)

Experiment (interpretation ability)

- **Independent building (middle & high)**
- **Generalized building**
- **Middle & high building block**
- **Real wide road**
- **Wide road (13.0m～25.0m)**
- **River**
- **Railway**

Enlarged image(part)

Problem and Subject

- **Interpretation ability**
- **Vertical accuracy**
- **Horizontal accuracy**
- **Portrayal**

Solution for interpretation

- **Field survey**
  - **must process**
  - **digitization**
- **Aerial photo as interpretation**
  - **decrease field survey**

Solution for portrayal

- **GIS data**
  - **usage**
    - **spatial analysis**
    - **facility management**
  - **characteristic**
    - **structure to be easy by computer control**
- **Paper map**
  - **usage**
    - **reading by human**
  - **characteristic**
    - **expression to be easy human understanding**

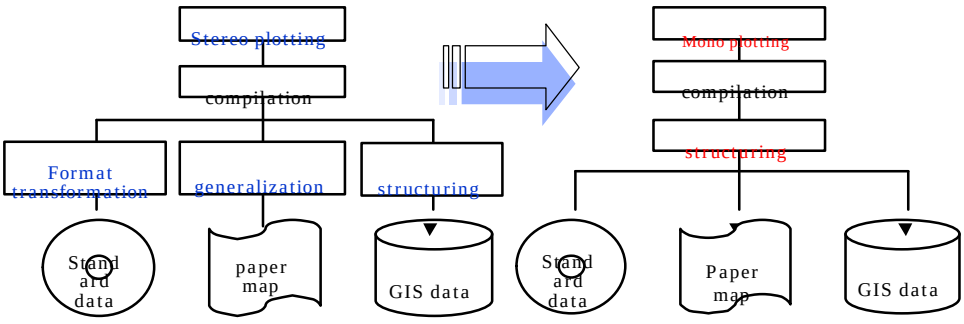
GIS data or Paper map

Existing system

- GIS
  - Arc/Info
  - MapInfo
  - SIS
  - ATOM
- Remote Sensing
  - ERDAS
  - Ortho Engine
  - ER Mapper
- CAD
  - MicroStation
  - AutoCAD
- Map publication
  - VRC
  - Illustrator
  - ACE
  - Module Publisher

No sufficient system for GIS data and paper map either

Mapping method

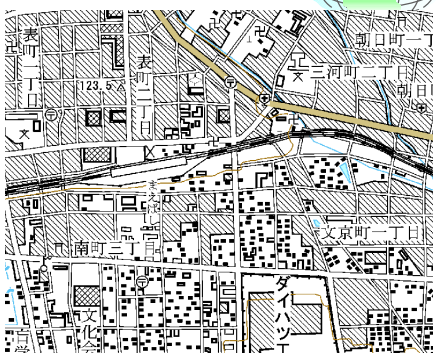


Ordinal mapping method

Suggested mapping method

Symbolization of map data

Map image by GSI

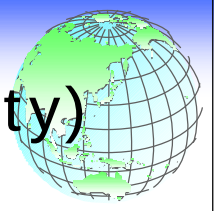


Map image by our system

Conclusion (method)

Photographing triplet satellite imagery
Ground control point survey
Photographing aerial photos
Image orientation
DEM extraction
Ortho rectification
Field survey
Mono plotting
Compilation
Structuring
GIS data and/or Paper maps

Conclusion(possibility)



- **Subject for mono plotting**
  - **improvement of field survey**
  - **unified production of GIS data and paper map (structuring, expression)**
- **Future estimation for ALOS**
  - **vertical accuracy**
  - **horizontal accuracy**