ALOS Scientific and Utilization Research Promotion Program

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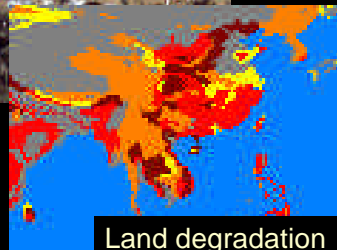

Global environmental issues

- Think globally, Act locally

Over grazing and over cultivation

deforestation

Sustainable development?

Land degradation

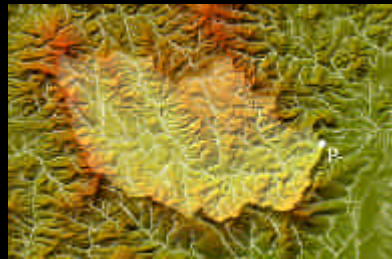(soil degradation map from UNEP)

Growing needs for GIS data
for supporting sustainable development

- DEM (Digital Elevation Model)
  - 10m resolution or so.
- Land cover/ Land use, Vegetation etc.

✦Soil conservation

✦Water resource management

Promoting research and development

- Establish links from raw data to applications
  - Calibration/validation
  - Mass data handling and distribution
  - Scientific/business uses of ALOS data
- Need to promote *diversified* research efforts
  - Not only for "science" but for "business"
    - Create market for ALOS data
    - Stimulate R&D activities in private sectors
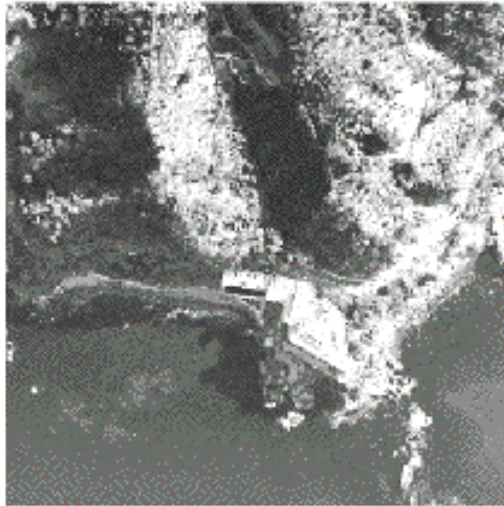
(Expected) Major research fields

- **Calibration and Validation of Each Sensor and Related Basic Studies**
- **Land Use and Land Cover Change**
- **Topography and Geology**
- **Terrestrial (Vegetation) Ecosystem , Agriculture and Forestry**
- **Climatic System, Hydrological Processes, and Water Resources**
- **Oceanography and Coastal Zone Related Research**
- **Disaster monitoring**
- **Resource Exploration**
- **Basic Studies on;**
  - **scattering and Interferometric characteristics**
  - **development of higher resolution optical sensors**
  - **very large size data handling**
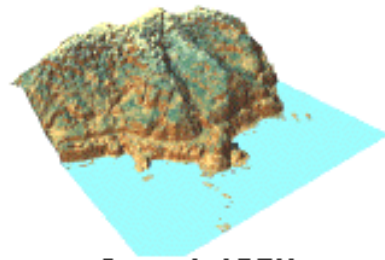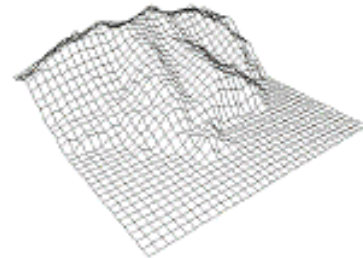
High resolution DEM generation without using GCP
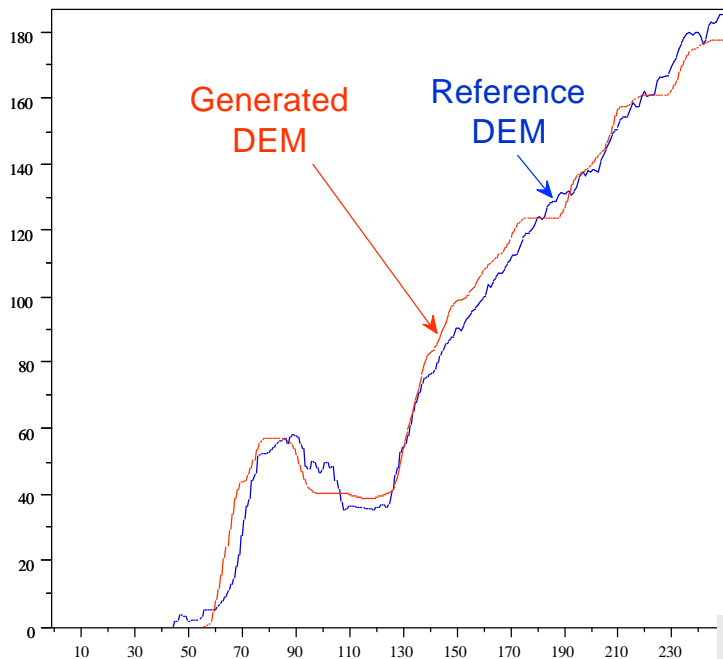

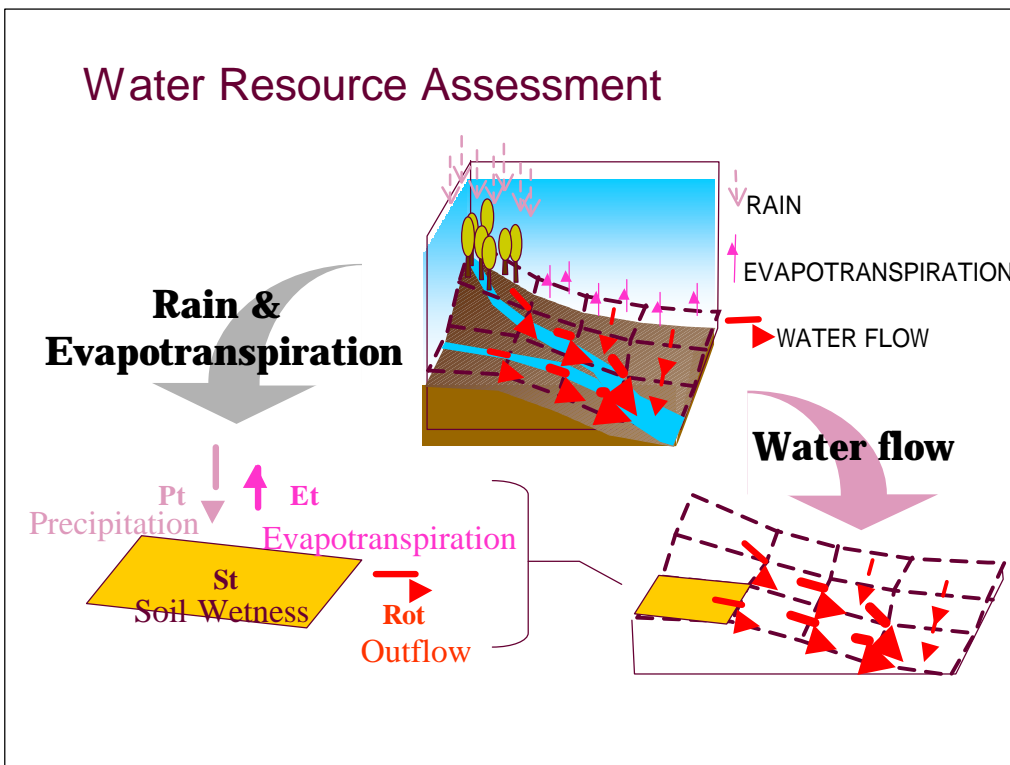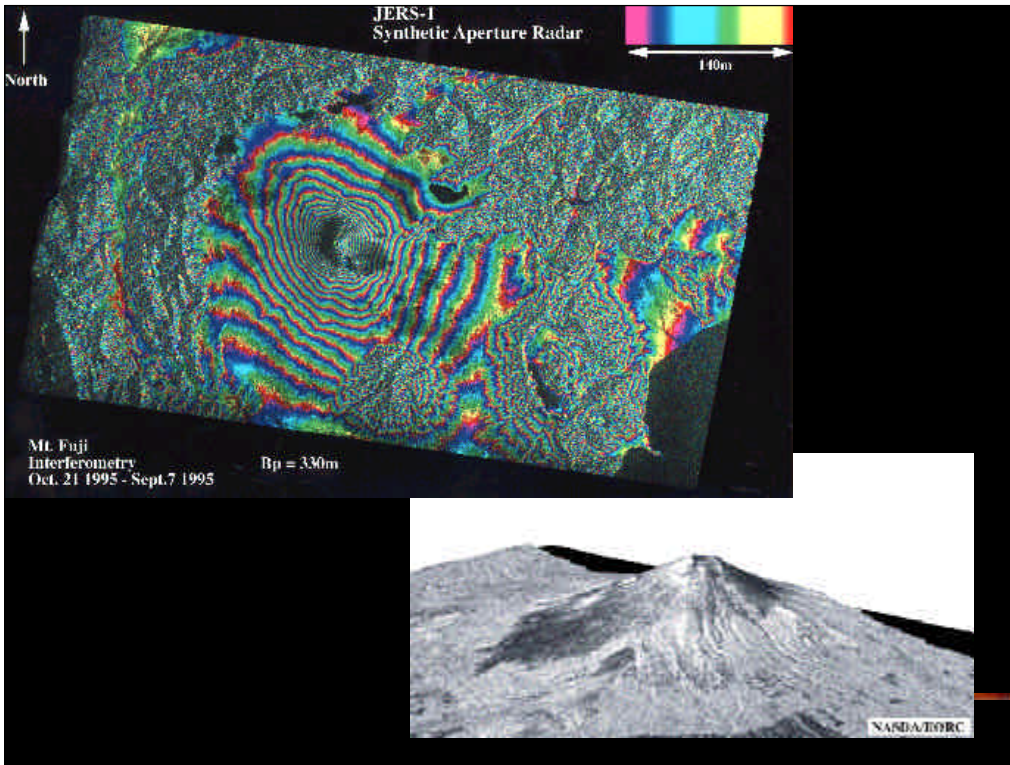(10 to 20m grid spacing and   z less than 5m)
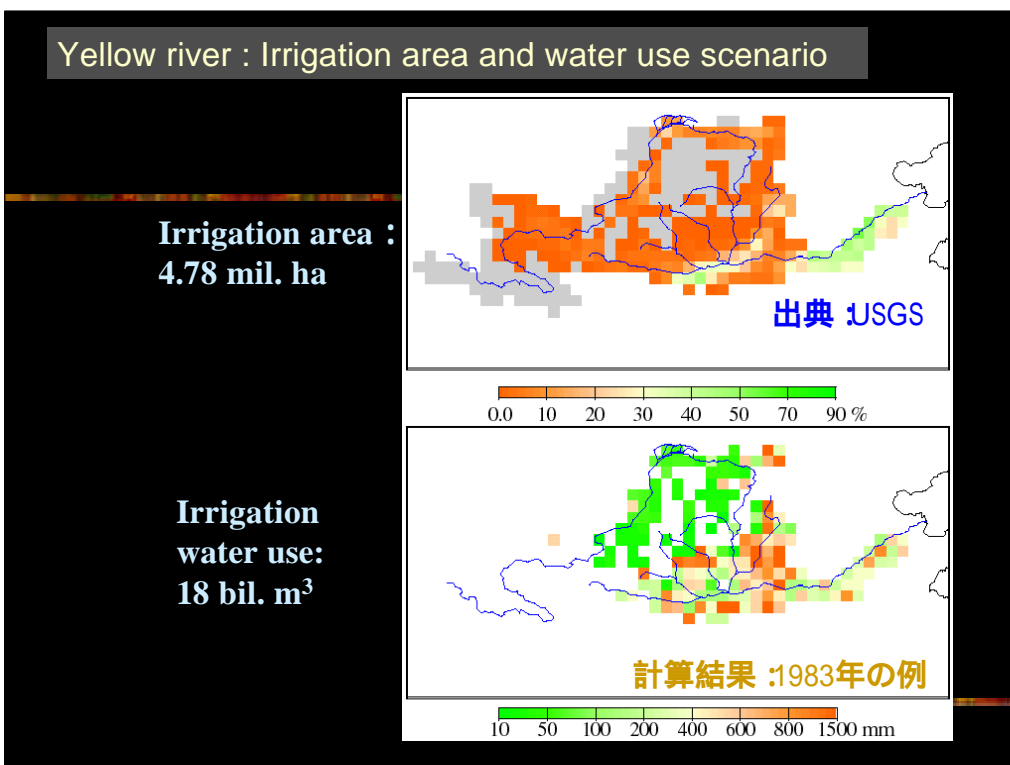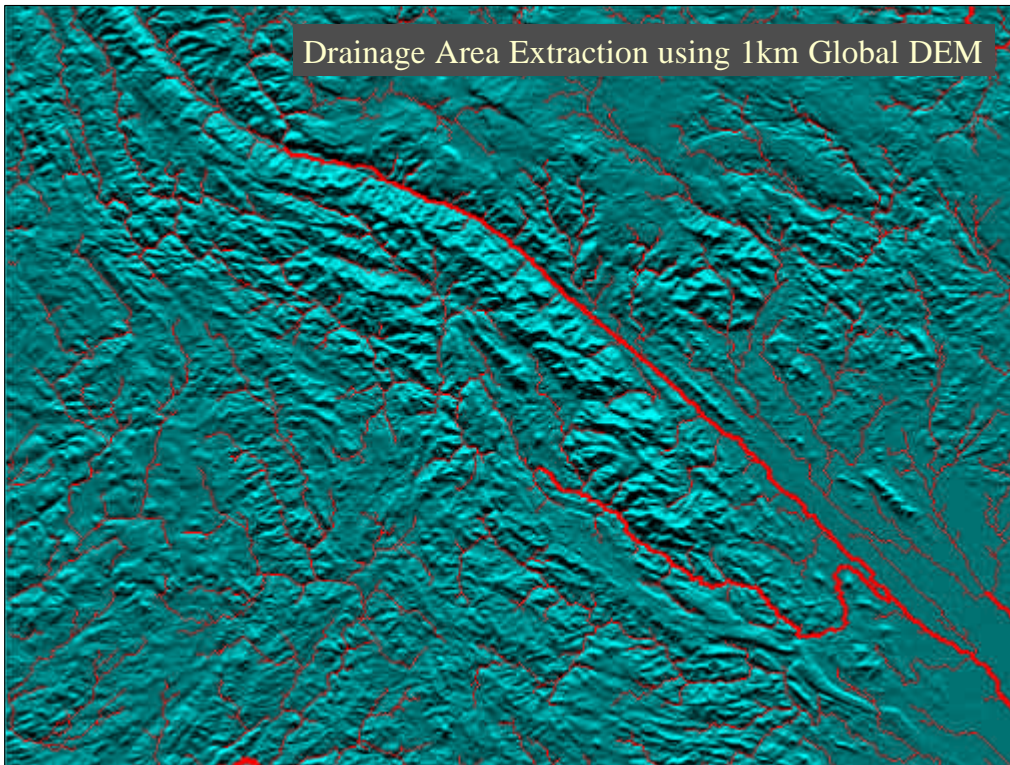
Preliminary Simulation Results

Simulated image of nadir-looking

Generated DEM

Elevation Errors

Generated DEM

Reference DEM

Unit: meter

JERS-1
Synthetic Aperture Radar

140m

North

Mt. Fuji
Interferometry
Oct. 21 1995 - Sept. 7 1995

Bp = 330m

NASDA/EORC

Water Resource Assessment

Rain & Evapotranspiration

RAIN

EVAPOTRANSPIRATION

WATER FLOW

Water flow

Pt
Precipitation

Et
Evapotranspiration

St
Soil Wetness

Rot
Outflow

5

Drainage Area Extraction using 1km Global DEM

Yellow river : Irrigation area and water use scenario

**Irrigation area
4.78 mil. ha**

USGS

0.0   10   20   30   40   50   70   90 %

**Irrigation
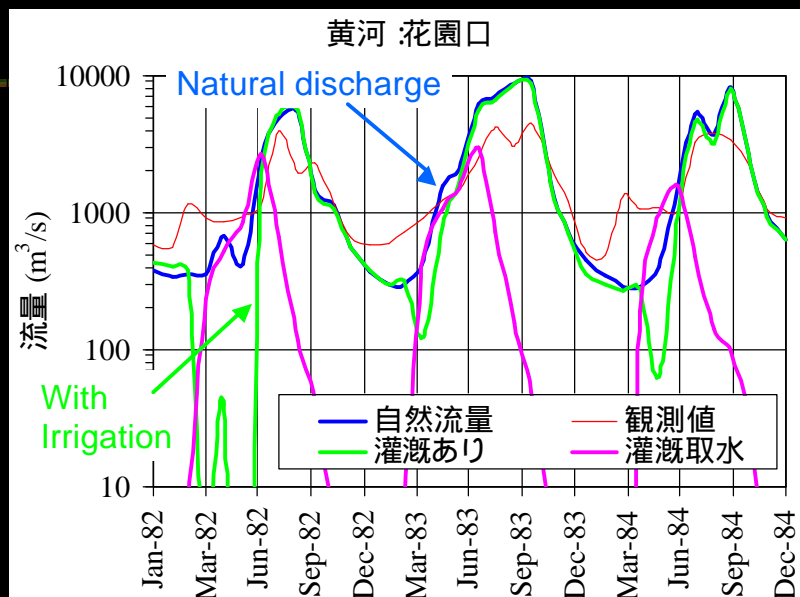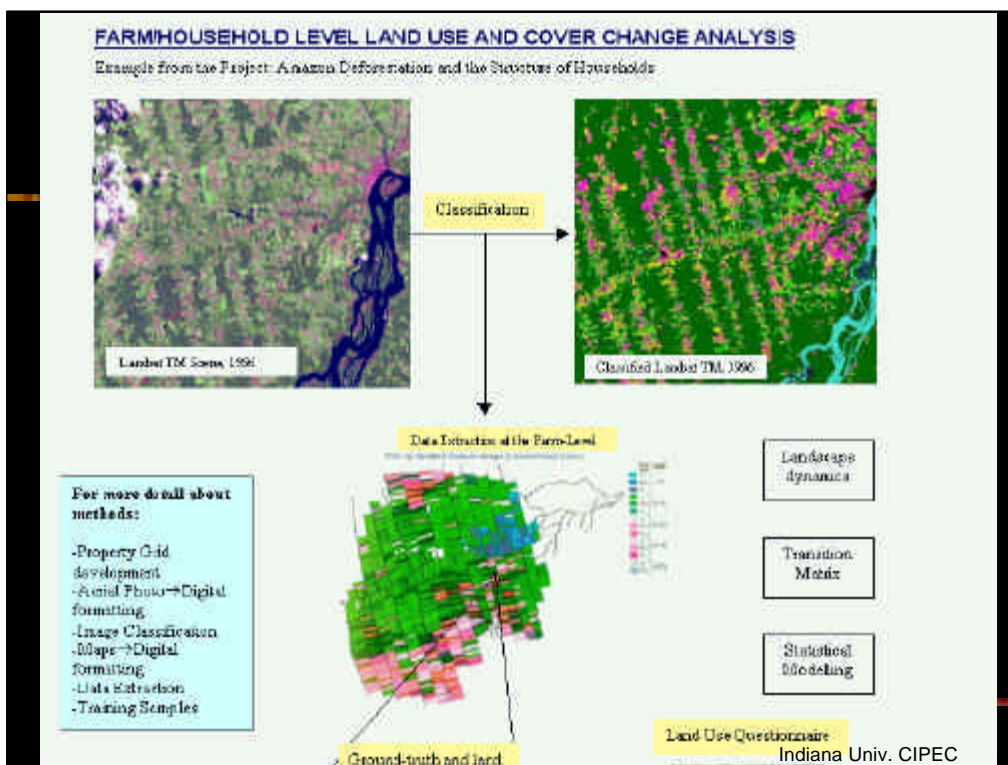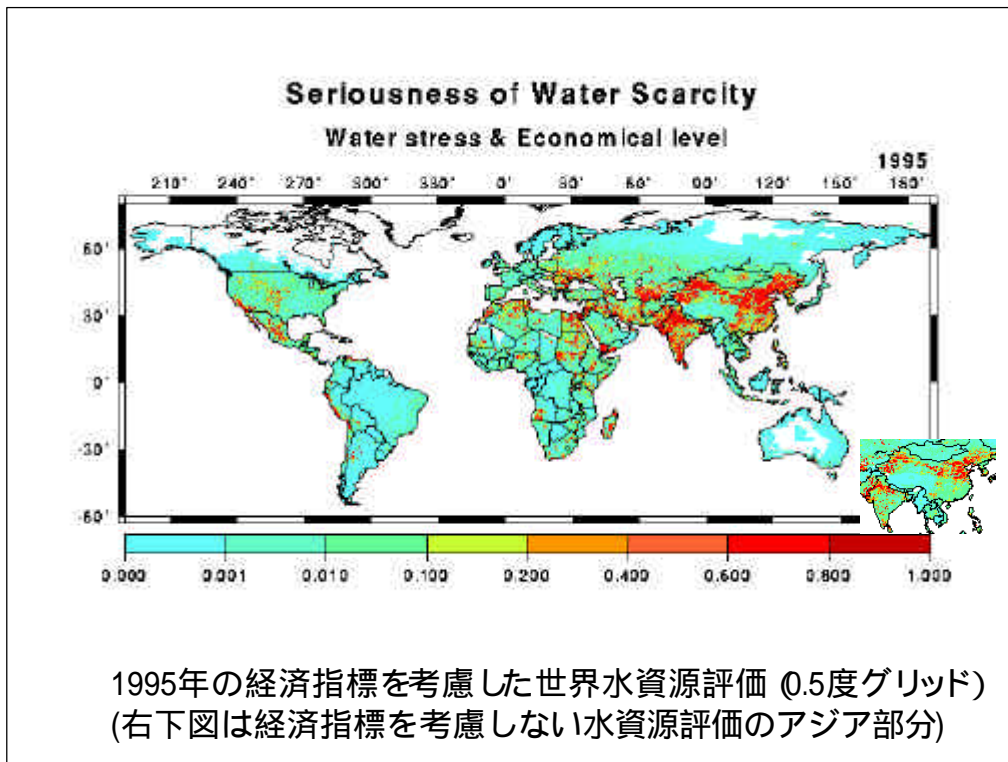water use:
18 bil. m^3**

1983

10   50   100   200   400   600   800   1500 mm

Irrigation impact on river water discharge

1995   0.5

Seriousness of Water Scarcity
Water stress & Economical level
1995

1995   0.5
(   )

FARM/HOUSEHOLD LEVEL LAND USE AND COVER CHANGE ANALYSIS

Example from the Project: Amazon Deforestation and the Structure of Households

Indiana Univ. CIPEC

JERS-1 SAR image of Rondonia, Brazil

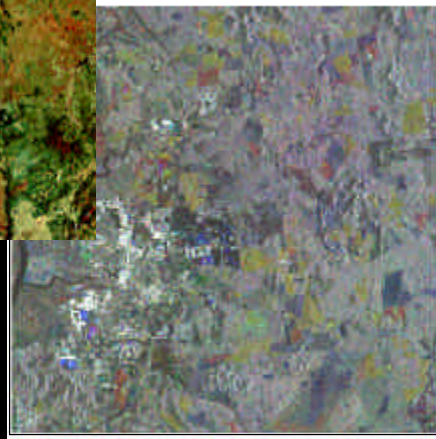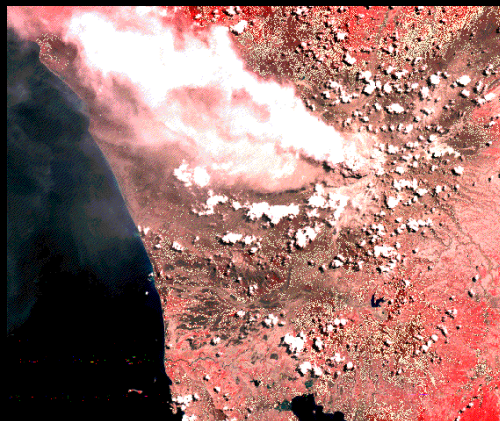Mosaic Image in New Guinea and Nothern Australia
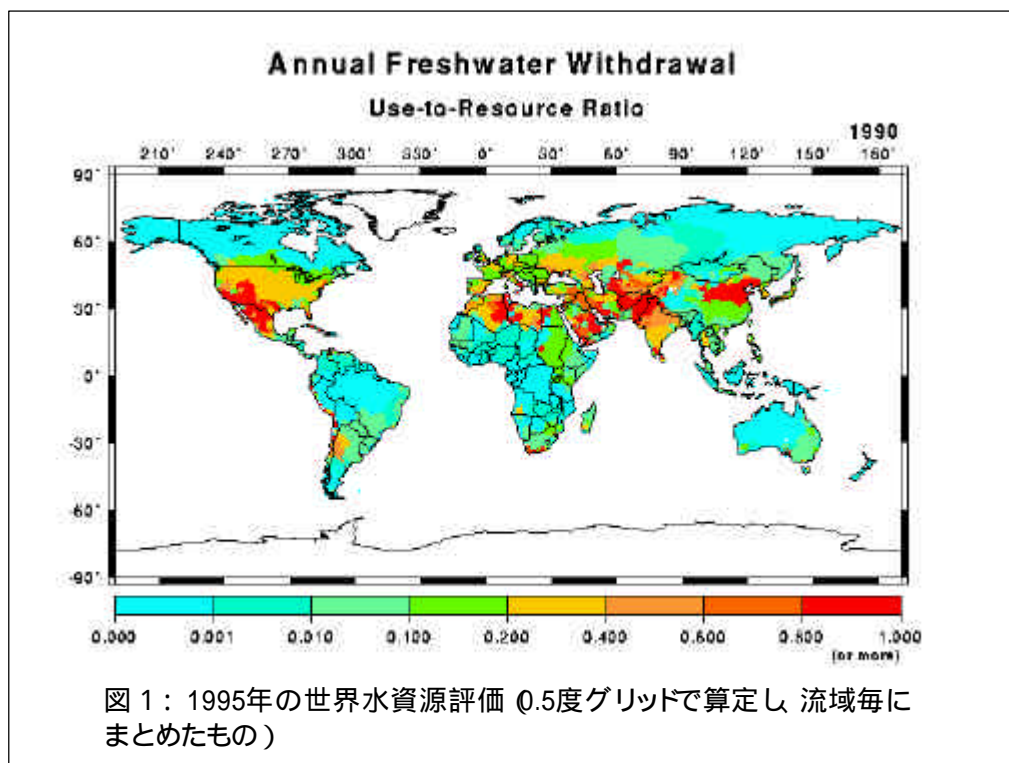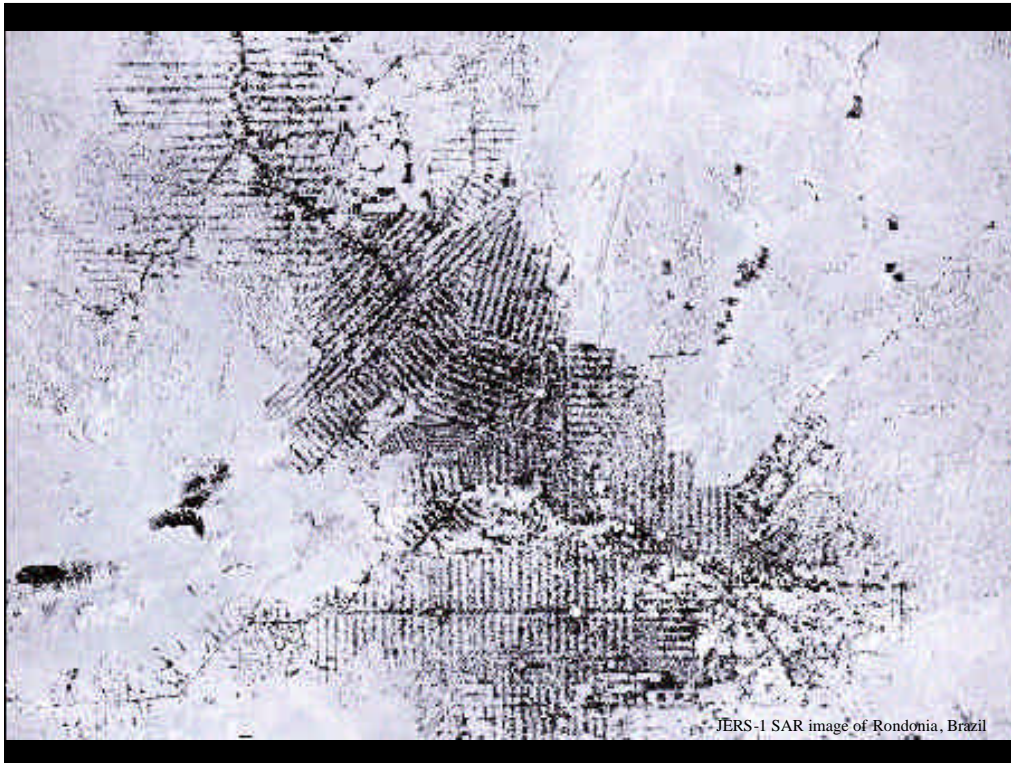
Simultaneous observation of SAR and optical sensors

LAI (NDVI) + Biomass
        + Time-series observation
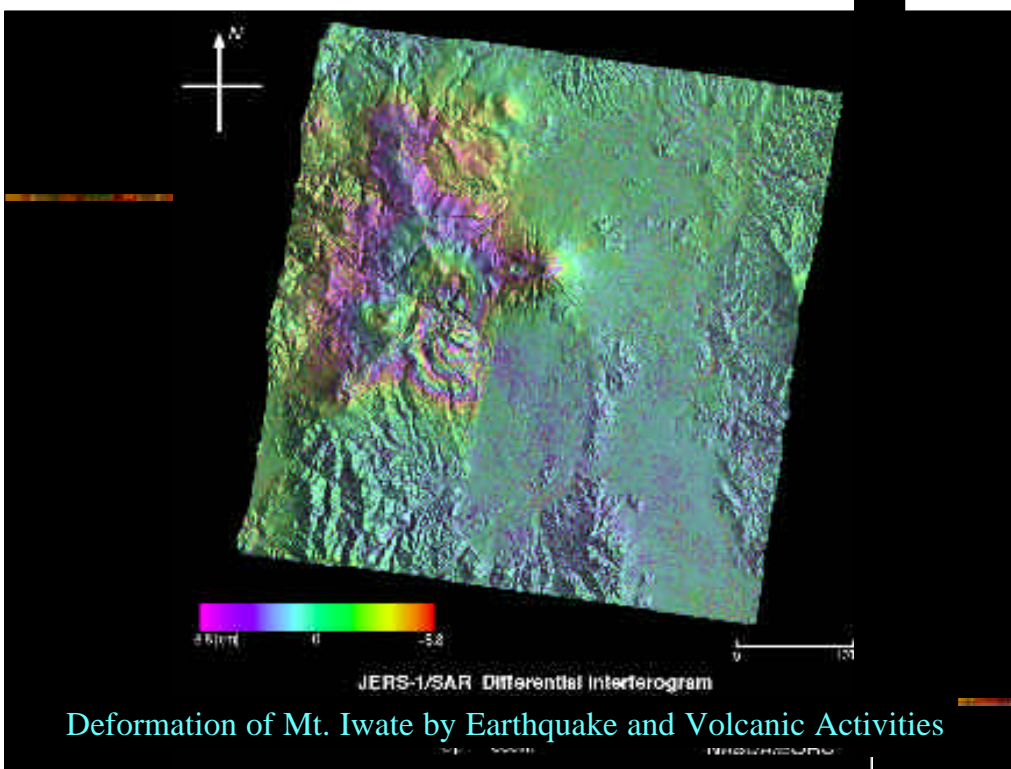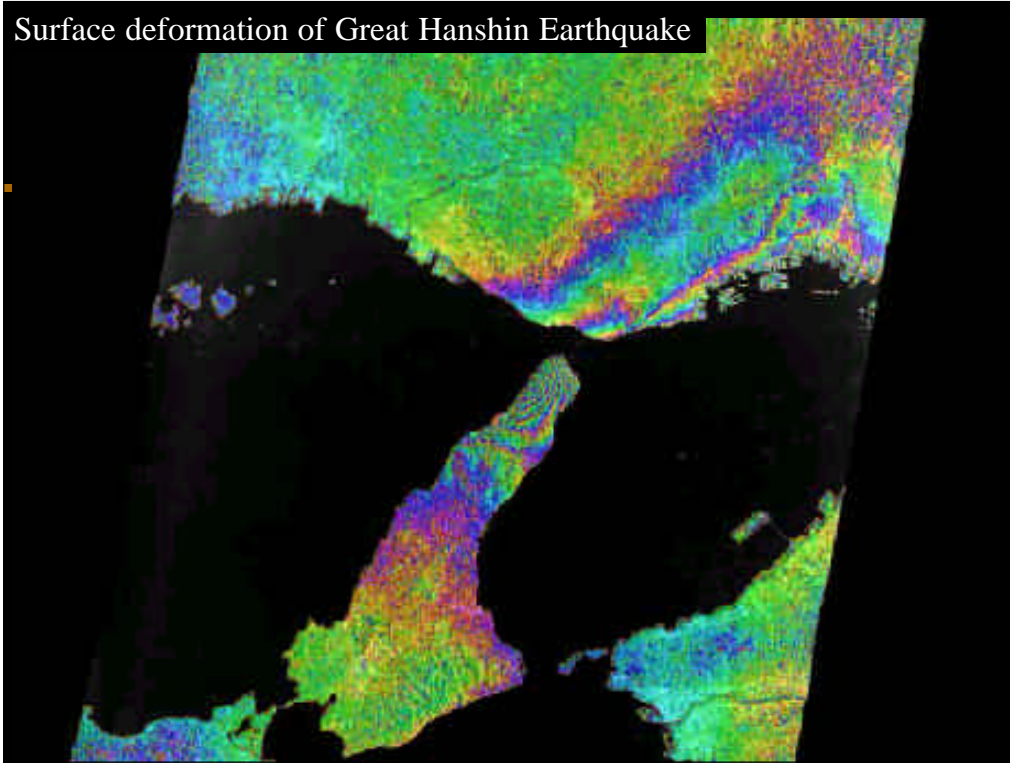
Hazard Monitoring

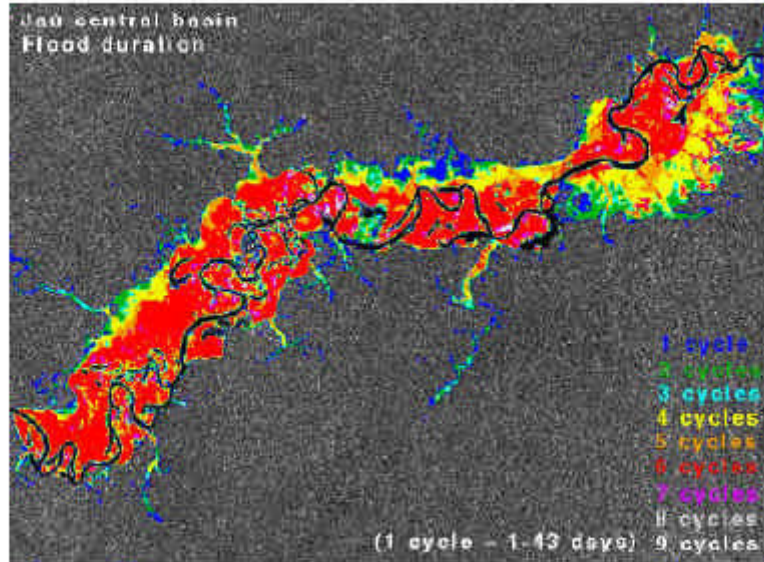**Eruption of Mt. Pinatubo (1991, MESSR resolution = 70m)**

Surface deformation of Great Hanshin Earthquake

JERS-1/SAR Differential Interferogram

Deformation of Mt. Iwate by Earthquake and Volcanic Activities

Annual variation of forest innundation in the Jaú River, Amazon, Brazil

"Core" data products

- Global high-resolution DEM and ortho-image (PRISM, AVNIR-2, and PALSAR):
  - Exploring possibility of establishing "Global DEM consortium" on voluntary basis
- Global biomass density dataset (PALSAR and AVNIR-2):
- Land surface deformation dataset (Earthquake-prone areas only):

- Algorithm development and data production by EORC with collaboration with other research organizations.

Strategies for research promotion

- Distributing data for research
  - Simulated image data, Raw image data + basic software
  - Derived "core" datasets
- Research announcement
  - Recruiting core scientists
- Promoting to form user forum or community
  - Hazard monitoring, DEM, Vegetation monitoring etc.
- Joint research programs with NASDA
  - For larger-scale experiments for operational uses
- Basic research by EORC
  - For the core data products
  - For calibration/validation
- Collaboration with the "Data Node" organizations

1st.Research Announcement

- Submission due: Feb.2000
- More than 200 applications.
- Diversified research fields
  - But, mainly from public research organizations/universities
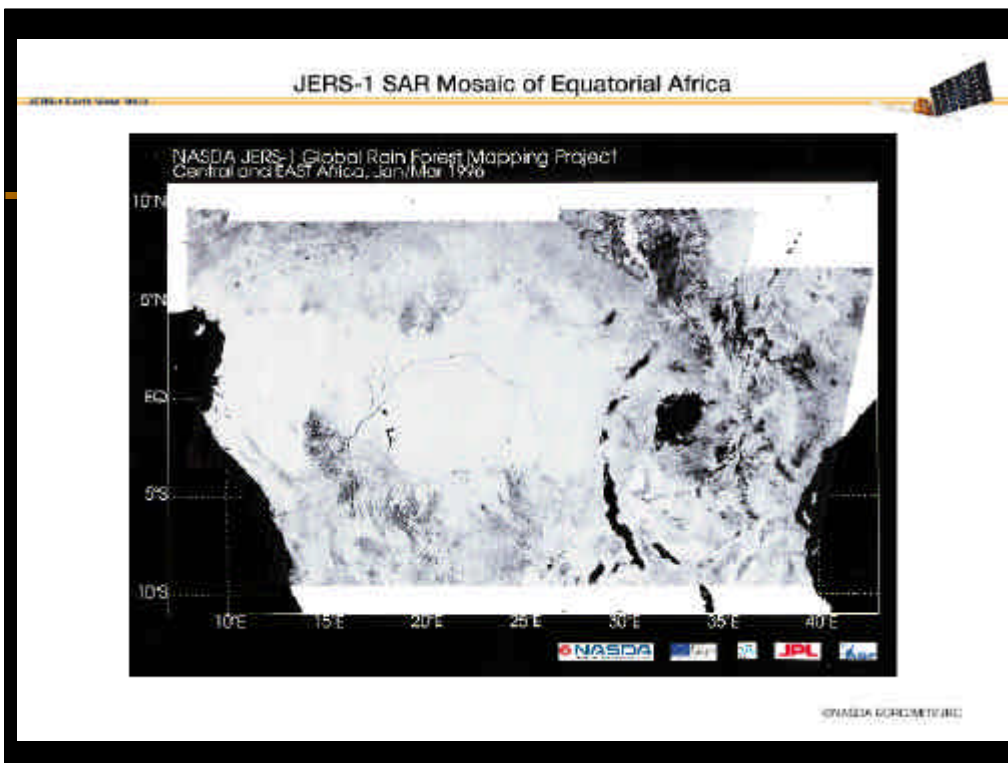- Approximately 150 proposals are accepted.
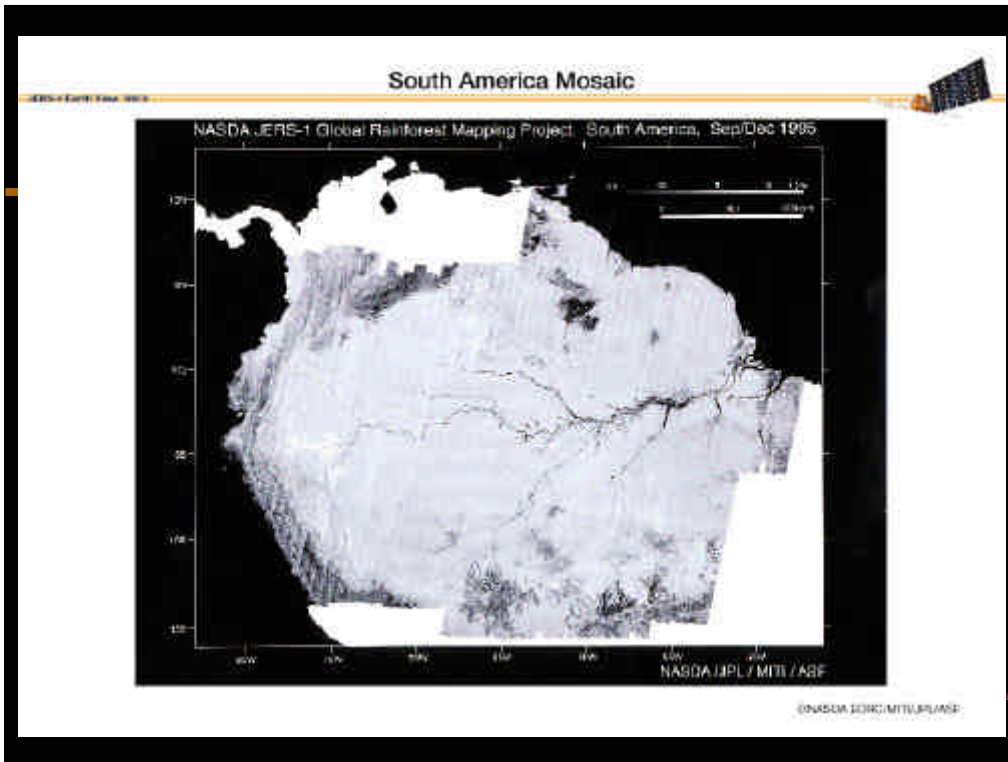
1st.Research Announcement

PI numbers by the field
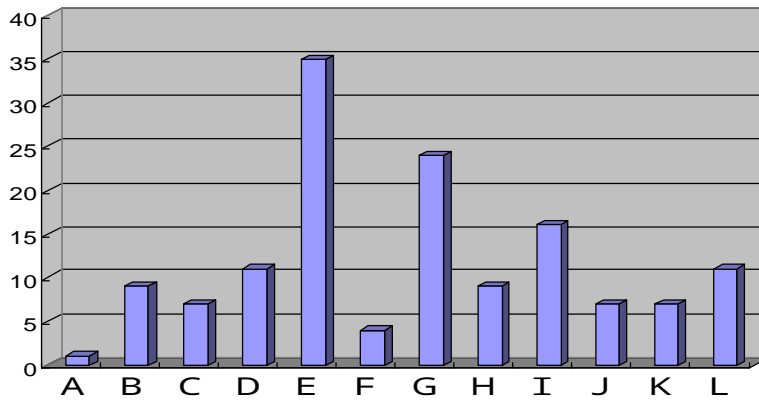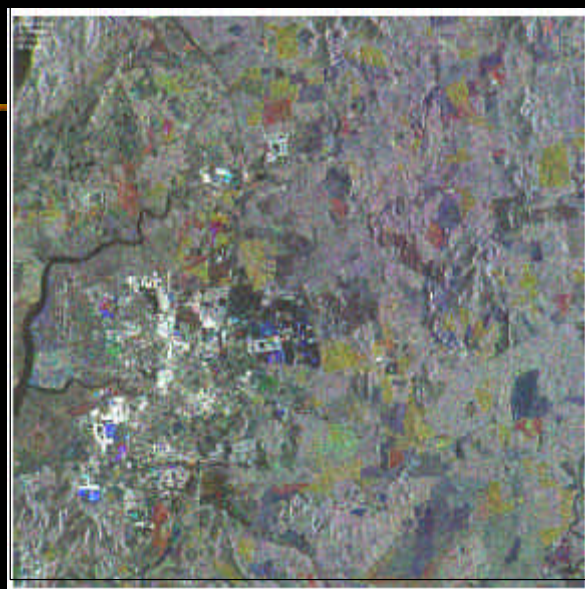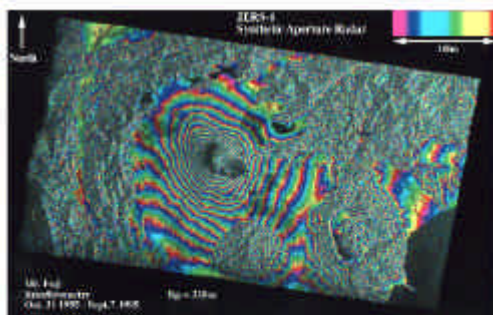

A: Calibration of optical Sensors   F: Geology & Non renewable Resources   J : Agricultural Applications

B: Calibration of SAR   G: Terrestrial   K : Hydrology & Water Resources

C: DEM & Mapping   H: Oceanography & Coastal Zone   L: Geography & GIS Applications

D: Land use & Land Cover   Applications

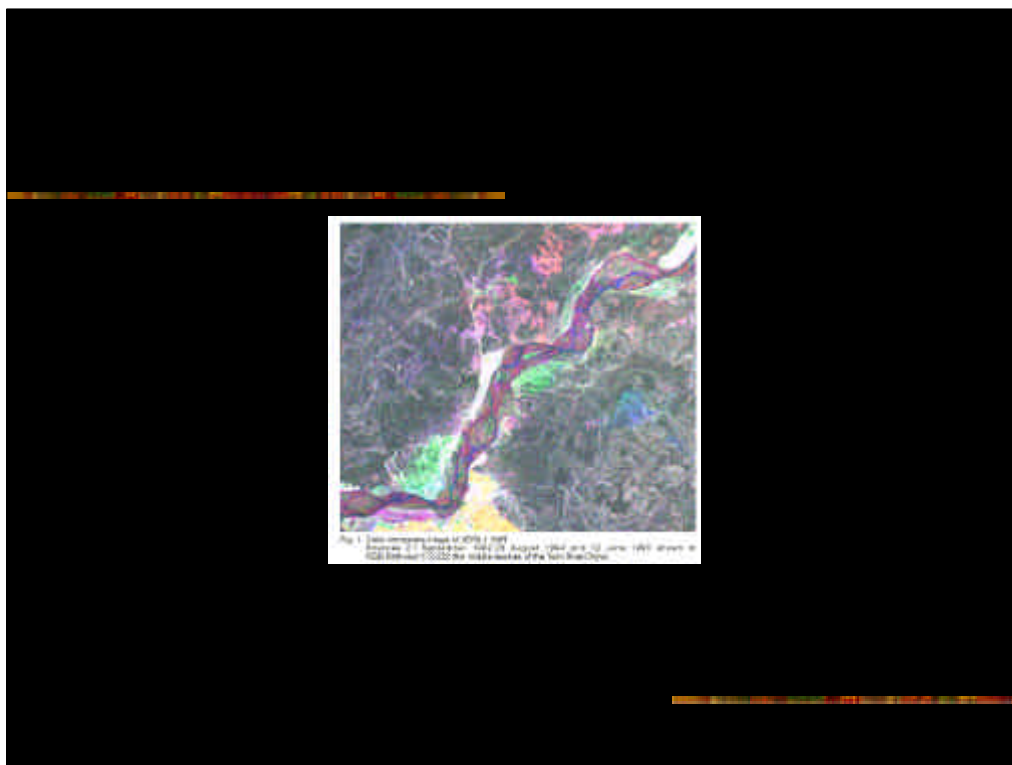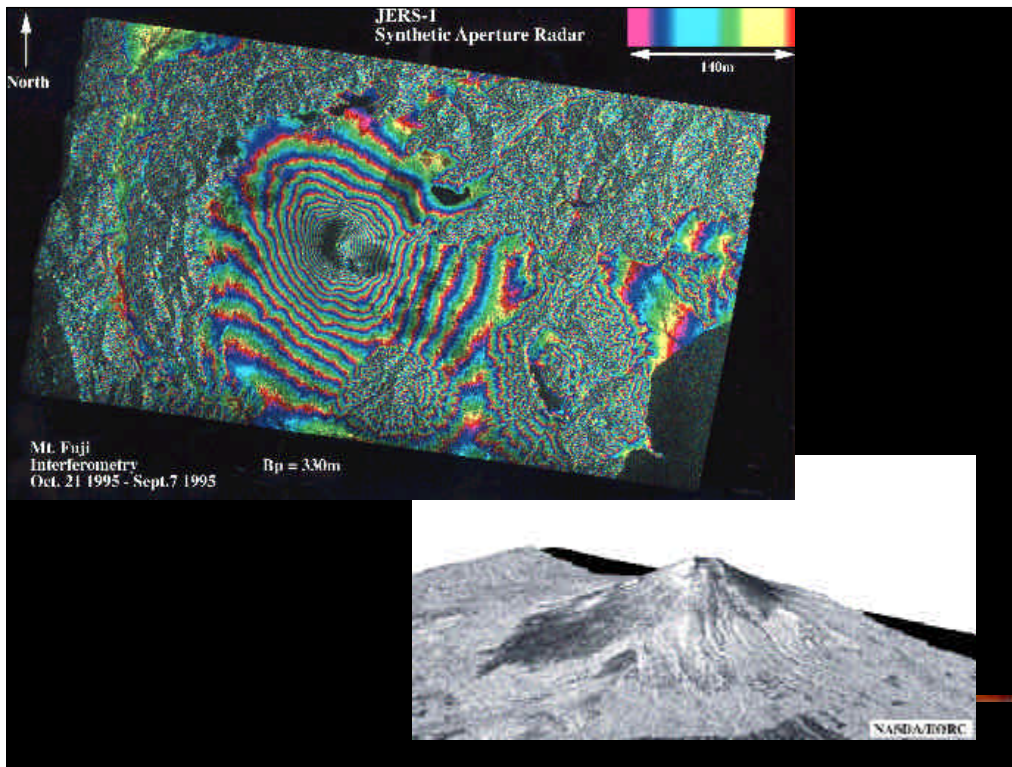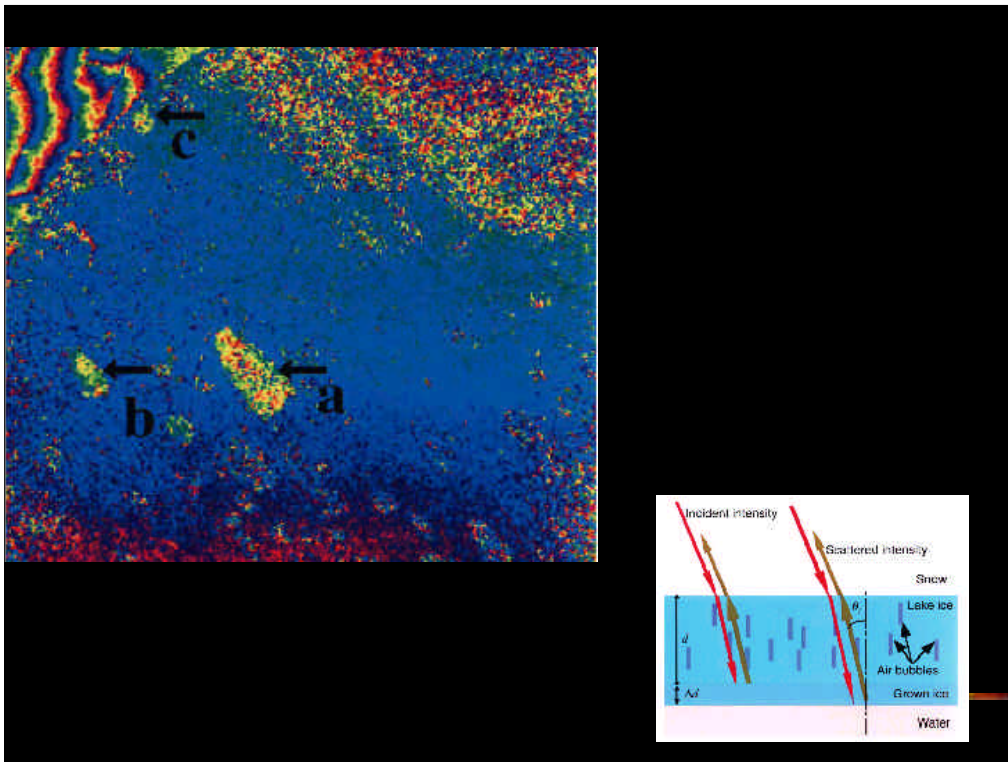E: Disaster Management   I: Cryoshere,Snow and Ice Distribution

END

South America Mosaic

JERS-1 SAR Mosaic of Equatorial Africa

合成開口レーダの干渉処理による富士山 DEM

JERS-1
Synthetic Aperture Radar

140m

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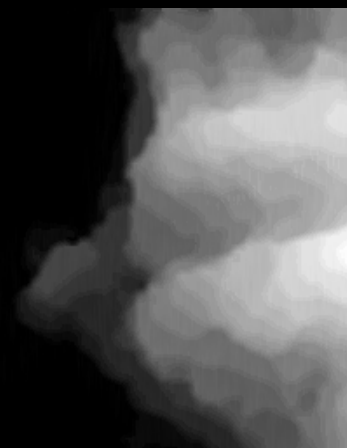
Bp = 330m

NASDA/EORC

Simulated PRSM image and derived DEM

**Simulation image of PRISM
(nadir, 2.5m resolution)**

**DEM generated from
simulation images**

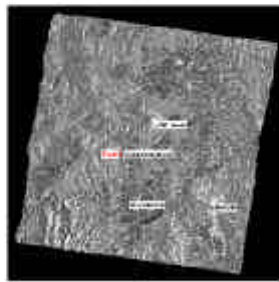Change Detection of the Mt. Iwate and Shizukuishi
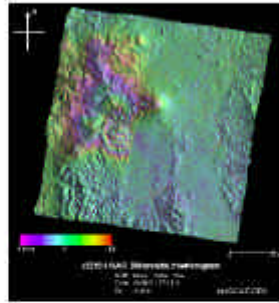
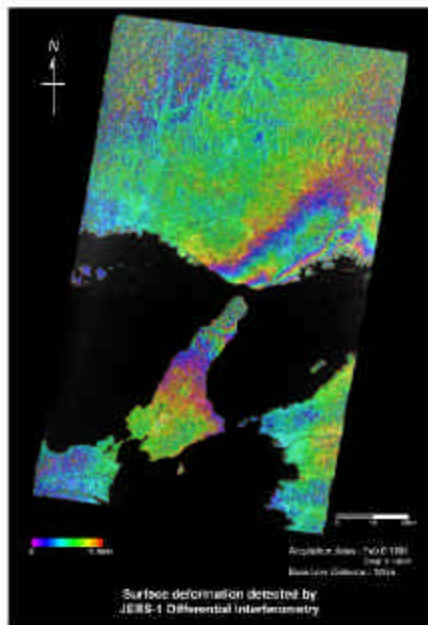

Hyogo-Ken-Nanbu Earthquake(Differential Interferogram)